[PDF] 110 IELTS Academic Reading Practice Tests with Answers

Test 1

PASSAGE 1

You should spend about 20 minutes on Questions 1–13, which are based on Reading Passage 1 below.

Odonata

Odonata is the order of insects that includes dragonflies and damselflies. To the human eye, their shining colors and delicate-looking wings make them beautiful creatures to behold. In the natural world, however, they are fearsome predators. Dragonflies and damselflies get their name from the powerful serrated jaws they use to tear apart their prey. The word *odonata* means "toothed jaw."

Dragonflies and damselflies are often confused with each other because they are very similar. Close observation reveals the differences between them. The most obvious difference is the way they hold their wings while at rest. Dragonflies hold their wings out to the side while damselflies fold their wings back. Dragonflies have very large eyes that seem to cover the entire face because they are so close together that they touch each other. Damselflies' eyes are smaller, and there is a space between them. Dragonflies are larger and stronger animals than damselflies and fly longer distances. Thus, they can be found in woods and fields away from the water. Damselflies are not such strong fliers and are most often seen around the edges of ponds and streams since they do not normally fly far from the water.

The largest odonata living today are the Hawaiian endemic dragonfly and the Central American damselfly, each of these species having a wingspan of 19 centimeters. The smallest is the libellulid dragonfly, native to east Asia, with a wingspan of just 20 millimeters. Fossils have been discovered that prove that dragonflies have been in existence for over 300 million years. The largest dragonfly fossil ever found belongs to the now-extinct *meganeura monyi*, which lived 300 million years ago and had a wingspan of 75 centimeters. This giant was a fearsome predator indeed, which feasted on small amphibians as well as on other insects.

Dragonflies and damselflies both lay their eggs on or just below the surface of the water in a pond or stream. Some species lay their eggs on the stem of an aquatic plant. The babies emerge from the eggs in the form of nymphs. They live underwater, breathing through gills and preying upon water insects, tadpoles, small fish, and even other nymphs. They hunt by hiding in the shadows at the bottom of a pond or stream, waiting for prey animals to swim by. They have a special lip that they can extend far forward in order to grab their prey when it comes close. Depending on the species, they live this way for several months or even several years. As the nymph grows, it sheds its skin several times. Finally, it leaves the water and sheds its skin one last time. The adult emerges, ready to live the next few weeks or months on land and in the air. The adults do not live for more than four months, and many species live as adults for only a few weeks.

The exceptional visual abilities and flying skills of dragonflies and damselflies make them very adept hunters. Their special eyes give them a nearly 360-degree field of vision, and they can detect even the smallest movement or flash of light caused by other flying insects. They have two sets of wings that can move independently of each other. This gives them great maneuverability in the air, which is important to these creatures because they catch their prey while flying. They can hover, make sharp turns, and fly backward. Some species of dragonflies can fly 60 kilometers an hour or more. Their prey consists of flying insects such as mosquitoes, deerflies, smaller dragonflies, and butterflies and moths. One species of dragonfly takes spiders out of their webs.

Bloodthirsty predators that they are, dragonflies and damselflies are prey for other animals in their turn. The nymphs are eaten by fish, frogs, toads, and other aquatic creatures. In the adult stage, they are hunted by birds, frogs, and larger dragonflies and damselflies. They might also be caught in a spider’s web. What goes around comes around.

PART 1 — QUESTIONS

Questions 1-6

Which of the facts below are true of dragonflies, and which are true of damselflies, according to the information in the passage?

A. if it is a fact about dragonflies only

B. if it is a fact about damselflies only

C. if it is a fact about both dragonflies and damselflies

	A	B	C
1 They have sawlike jaws.	○	○	○
2 They hold their wings on their backs while resting.	○	○	○
3 Their eyes have a gap between them.	○	○	○
4 They can be seen in fields at a distance from ponds and streams.	○	○	○
5 The largest species has a wingspan of 19 centimeters.	○	○	○
6 The largest fossil has a wingspan of 75 centimeters.	○	○	○

Questions 7-13

Complete the notes about the life cycle of odonata below. Choose your answers from the box below.

The eggs are laid **7** _____. The young dragonflies and damselflies, called **8** _____, live underwater for a few **9** _____. They eat small water animals, catching their food **10** _____. When they are almost fully grown, they leave the water. The adults live for only a few **11** _____. They are skillful **12** _____ and catch their prey **13** _____.

A. **in the air** B. **with their lips** C. **tadpoles** D. **fliers**

E. near the water's surface F. nymphs G. at the bottom of a pond

H. months or years I. weeks or months J. swimmers

K. with their wings

PASSAGE 2

You should spend about 20 minutes on Questions 14–26, which are based on Reading Passage 2 below.

History of Fire Fighting and Prevention

More than two thousand years ago, Roman emperor Augustus organized a group of watchmen whose job was mainly to look out for fires and sound an alarm in the event of one. For many centuries that followed, fire equipment was limited to buckets of water that got passed from person to person. The ax was later found to be a useful tool both for removing fuel in large fires and for opening holes to allow smoke and flames to escape from burning buildings. Watchmen also learned to create firebreaks with long hooked poles and ropes in order to pull down structures that provided fuel for a fire. In 1066, in order to reduce the risk of fire in thatched-roof houses, King William the Conqueror made a ruling: Citizens had to extinguish their cooking fires at night. His term *couvre-feu*, meaning "cover fire," is the origin of the modern day term *curfew*, which no longer carries a literal translation.

The event that had the largest influence in the history of fire fighting was the Great Fire of London in 1666. The devastating blaze originated at the King's Bakery near the London Bridge. At the onset, Lord Mayor Bludworth showed little concern for the fire, assuming it would extinguish itself before he could organize a group of men to attend to it. However, the summer of 1666 had been uncharacteristically hot and dry, and the wooden houses nearby caught fire quickly. Within a short time, the wind had carried the fire across the city, burning down over 300 houses in its path. Although the procedure of pulling down buildings to prevent a fire from spreading was standard in Britain, the mayor grew concerned over the cost it would involve to rebuild the city and ordered that the surrounding structures be left intact. By the time the king ordered the destruction of buildings in the fire's path, the fire was too large to control. It was not until the Duke of York ordered the Paper House to be destroyed in order to create a crucial firebreak that the London fire finally began to lose its fuel.

When it became clear that four-fifths of the city had been destroyed by the fire, drastic measures were taken in London to create a system of organized fire prevention. At the hands of architects such as Christopher Wren, most of London was rebuilt using stone and brick, materials that were far less flammable than wood and straw. Because of the long history of fires in London, those who could afford to build new homes and businesses began to seek insurance for their properties. As insurance became a profitable business, companies soon realized the monetary benefits of hiring men to extinguish fires. In the early years of insurance companies, all insured properties were marked with an insurance company's name or logo. If a fire broke out and a building did not contain the insurance mark, the fire brigades were called away and the building was left to burn.

The British insurance companies were largely responsible for employing people to develop new technology for extinguishing fires. The first fire engines were simple tubs on wheels that were pulled to the location of the fire, with water being supplied by a bucket brigade. Eventually, a hand pump was designed to push the water out of the tub into a hose with a nozzle. The pump

allowed for a steady stream of water to shoot through a hose directly at the fire source. Before long, companies began to utilize water pipes made from hollowed tree trunks that were built under the roadway. By digging down into the road, firemen could insert a hole into the tree-trunk pipe and access the water to feed into the pump.

Fire fighting became a competitive business, as companies fought to be the first to arrive at a scene to access the water pipes. After a series of fires destroyed parts of London, fire-fighting companies were forced to reconsider their intentions. By the eighteenth century, fire brigades began to join forces, and in 1833 the Sun Insurance Company along with ten other London companies created the London Fire Engine Establishment. In 1865, the government became involved, bringing standards to both fire prevention and fire fighting and establishing London's Metropolitan Fire Brigade. Though the firemen were well paid, they were constantly on duty and thus obliged to call their fire station home for both themselves and their families.

New technology for fighting fires continued to develop in both Europe and the New World. Leather hoses with couplings that joined the lengths together were hand-sewn in the Netherlands and used until the late 1800s, when rubber hoses became available. The technology for steam engine fire trucks was available in Britain and America in 1829, but most brigades were hesitant to use them until the 1850s. It was the public that eventually forced the brigades into putting the more efficient equipment to use. In the early 1900s, when the internal-combustion engine was developed, the trucks became motorized. This was a timely advancement in fire-fighting history, as World War I put added pressure on brigades throughout the world.

PART 2 — QUESTIONS

Questions 14-20

Complete the chart below.

Use NO MORE THAN THREE WORDS from the text for each answer.

Cause	Effect
Men used poles and ropes to pull down buildings near a fire.	The fire did not have **14** _____.
Thatched-roof houses burn down easily.	The King ordered people to **15** _____ their fires nightly.
At the time of the Great Fire of London, the weather was **16** _____.	The fire spread quickly.
The Mayor of London thought it would be too expensive to **17** _____.	He told people not to pull down buildings in the fire's path.
The Great Fire destroyed most of London.	People built new buildings out of **18** _____.
There had been many **19** _____ in London over time.	People started to buy insurance to protect their homes.
Insurance companies did not want to pay for rebuilding clients' houses destroyed by fire.	Insurance companies hired men to **20** _____.

Questions 21-23

Choose the correct letters, A–C.

21 The first fire engines

- **A** ○ carried water to the site of the fire.
- **B** ○ used hand pumps.
- **C** ○ had very long hoses.

22 In 1865,

A ○ London was destroyed by a series of fires.

B ○ fire brigades began to join forces.

C ○ the Metropolitan Fire Brigade was established.

23 Firemen who worked for the Metropolitan Fire Brigade

A ○ earned low salaries.

B ○ lived at the fire station.

C ○ were not allowed to marry.

Questions 24-26

Do the following statements agree with the information in the reading passage?

24 Leather hoses for fire fighting were made by machine.

A ○ YES

B ○ NO

C ○ NOT GIVEN

25 Steam engine fire trucks were used until the early 1900s.

A ○ YES

B ○ NO

C ○ NOT GIVEN

26 Fires caused a great deal of damage in London during World War I.

A ○ YES

B ○ NO

C ○ NOT GIVEN

PASSAGE 3

You should spend about 20 minutes on Questions 27–40, which are based on Reading Passage 3 below.

The Luddites

The term *Luddite* is used to refer to a person who is opposed to new technology. The word derives from the name Ned Ludd, a man who may or may not have actually existed. The original Luddites were textile workers in early nineteenth-century England who protested changes brought on by the industrial revolution. These weavers made lace and stockings by hand, carrying out their craft independently in their homes according to traditional methods. In the 1800s, automated power looms and stocking frames were introduced, radically changing the traditional work system. Weavers' work was moved from individual homes to factories; individuals could not afford to buy the new machines for themselves. The new machines were not difficult to run. They could be operated by unskilled workers and turned out an inferior product, but they produced large quantities cheaply, which was the aim of the new factory owners. The makers of finely crafted, handmade textiles could not compete with the new machines. Instead of continuing their tradition as skilled, independent workers, they would have to go to work in factories for low wages.

The industrial revolution was happening everywhere. In the textile-producing towns of England, workers focused on the new weaving machines as the source of their troubles. The height of Luddite activity occurred in the years 1811–1812. Groups of men, often in disguise, would arrive at a factory and make demands for higher wages and better working conditions. If these demands were not met, the group retaliated by smashing the factory machines. These groups often claimed that they were working under the command of General Ned Ludd, and thus came to be called Luddites.

Who was Ned Ludd? Rumors about this mysterious person abounded. He came to be associated with that traditional champion of the poor, Robin Hood. The original Luddite activity was centered around Nottingham, and many said that Ned Ludd hid out in nearby Sherwood Forest, just as the legendary Robin Hood had. According to another tradition, Ned Ludd was a weaver who had accidentally broken two stocking frames, and from that, came to be the one blamed any time an expensive piece of weaving equipment was damaged. Whoever Ned Ludd may or may not have been, riots protesting the new factories were carried out in his name throughout England's textile-producing region.

Workers' families suffered as wages fell and food prices rose. There were food riots in several towns, and Luddite activity spread. In the winter of 1812, the Frame-Breaking Act was passed, making the destruction of factory equipment a crime punishable by death. The government sent thousands of troops into areas affected by the riots. In the spring of that year, several factory owners were killed during Luddite riots, and a number of textile workers died as well. Following one of the largest incidents, when rioters set fire to a mill in Westhoughton, four rioters, including a young boy, were executed. In another incident that spring, a group of over a thousand workers attacked a mill in Lancashire with sticks and rocks. When they were beaten

back by armed guards protecting the mill, they moved to the mill owner's house and burned it down. The wave of violence resulted in a crack down by the government. Suspected Luddites were arrested and imprisoned, and many of them were hanged.

By the summer of 1812, Luddite activity had begun to die down, although there continued to be sporadic incidents over the next several years. In 1816, a bad harvest and economic downturn led to a small revival of rioting. In June of that year, workers attacked two mills, smashing equipment and causing thousands of dollars worth of damage. Government troops were brought in to stop the violence. In the end, six of the rioters were executed for their participation. However, rioting never again reached the levels it had in 1811 and 1812.

The Luddites were short-lived, but they left an impressive mark. They were responsible for destroying close to one thousand weaving machines during the height of their activity in 1811–1812, as well as burning down several factories. Beyond the physical damage, however, they left their mark in people's minds. The famed English novelist Charlotte Brontë set her novel *Shirley* in Yorkshire at the time of the riots. This novel is still widely read today. In our present time of rapid technological change, people who are concerned about the pace of technological advance often call themselves Neo-Luddites. Although the responses to it may differ, concern about the changes brought on by technology continues.

PART 3 — QUESTIONS

Questions 27-32

Match each cause in List A with its effect in List B. There are more effects in List B than you will need, so you will not use them all.

A. Troops were sent into the area.

B. Weavers stopped working at home and went to work in factories.

C. Rioters often wore disguises.

D. Workers destroyed factory equipment.

E. Many rioters were hanged.

F. Charlotte Brontë wrote a novel about the Luddites.

G. Prices went up, and salaries went down.

H. Factory owners did not need to hire skilled weavers.

I. Luddite rioting resumed for a short while.

J. People compared Ned Ludd to Robin Hood.

	A	B	C	D	E	F	G	H	I	J
27 The new weaving machines were expensive to buy.	○	○	○	○	○	○	○	○	○	○
28 The new weaving machines were easy to operate.	○	○	○	○	○	○	○	○	○	○
29 Workers' demands for better pay and conditions were not met.	○	○	○	○	○	○	○	○	○	○
30 Rioting spread to many towns.	○	○	○	○	○	○	○	○	○	○
31 A law was passed against destroying factory equipment.	○	○	○	○	○	○	○	○	○	○
32 Economic conditions worsened in 1816.	○	○	○	○	○	○	○	○	○	○

Questions 33-40

Do the following statements agree with the information given in the passage?

33 A Luddite is a person who resists new technology.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

34 Before the nineteenth century, weavers made lace by hand.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

35 Factory owners as well as workers died as a result of Luddite rioting.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

36 The Luddite movement did not spread beyond England.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

37 Nobody knows for certain who Ned Ludd was.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

38 Worker protests during the economic downturn of 1816 were nonviolent.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

39 Luddite activity lasted for many years.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

40 Neo-Luddites do not use computers.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

Answer Key

#	Answer	Explanation
1	C	Dragonflies and damselflies get their name from the powerful serrated jaws they use to tear apart their prey
2	B	Dragonflies hold their wings out to the side while damselflies fold their wings back
3	B	Damselflies' eyes are smaller, and there is a space between them
4	A	Dragonflies are larger and stronger animals than damselflies and fly longer distances. Thus, they can be found in woods and fields away from the water. Damselflies are not such strong fliers and are most often seen around the edges of ponds and streams since they do not normally fly far from the water
5	C	The largest odonata living today are the Hawaiian endemic dragonfly and the Central American damselfly, each of these species having a wingspan of 19 centimeters
6	A	The largest dragonfly fossil ever found belongs to the now-extinct meganeura monyi, which lived 300 million years ago and had a wingspan of 75 centimeters
7	E	Dragonflies and damselflies both lay their eggs on or just below the surface of the water in a pond or stream
8	F	The babies emerge from the eggs in the form of nymphs
9	H	Depending on the species, they live this way for several months or even several years
10	B	They have a special lip that they can extend far forward in order to grab their prey when it comes close
11	I	The adult emerges, ready to live the next few weeks or months on land and in the air
12	D	The exceptional visual abilities and flying skills of dragonflies and damselflies make them very adept hunters
13	A	This gives them great maneuverability in the air, which is important to these creatures because they catch their prey while flying
14	fuel	Watchmen also learned to create firebreaks with long hooked poles and ropes in order to pull down structures that provided fuel for a fire

#	Answer	Explanation
15	**extinguish**	In 1066, in order to reduce the risk of fire in thatched-roof houses, King William the Conqueror made a ruling: Citizens had to extinguish their cooking fires at night
16	**hot and dry**	However, the summer of 1666 had been uncharacteristically hot and dry, and the wooden houses nearby caught fire quickly
17	**rebuild the city**	the mayor grew concerned over the cost it would involve to rebuild the city and ordered that the surrounding structures be left intact
18	**stone and brick**	At the hands of architects such as Christopher Wren, most of London was rebuilt using stone and brick, materials that were far less flammable than wood and straw
19	**fires**	Because of the long history of fires in London, those who could afford to build new homes and businesses began to seek insurance for their properties
20	**extinguish fires**	As insurance became a profitable business, companies soon realized the monetary benefits of hiring men to extinguish fires
21	**A**	The first fire engines were simple tubs on wheels that were pulled to the location of the fire, with water being supplied by a bucket brigade
22	**C**	In 1865, the government became involved, bringing standards to both fire prevention and fire fighting and establishing London's Metropolitan Fire Brigade
23	**B**	Though the firemen were well paid, they were constantly on duty and thus obliged to call their fire station home for both themselves and their families
24	**NO**	Leather hoses with couplings that joined the lengths together were hand-sewn in the Netherlands and used until the late 1800s, when rubber hoses became available
25	**YES**	The technology for steam engine fire trucks was available in Britain and America in 1829, but most brigades were hesitant to use them until the 1850s. It was the public that eventually forced the brigades into putting the more efficient equipment to use. In the early 1900s, when the internal-combustion engine was developed, the trucks became motorized
26	**NOT GIVEN**	This was a timely advancement in fire-fighting history, as World War I put added pressure on brigades throughout the world
27	**B**	Weavers' work was moved from individual homes to factories; individuals could not afford to buy the new machines for themselves

#	Answer	Explanation
28	**H**	The new machines were not difficult to run. They could be operated by unskilled workers
29	**D**	Groups of men, often in disguise, would arrive at a factory and make demands for higher wages and better working conditions. If these demands were not met, the group retaliated by smashing the factory machines
30	**A**	There were food riots in several towns, and Luddite activity spread. In the winter of 1812, the Frame-Breaking Act was passed, making the destruction of factory equipment a crime punishable by death. The government sent thousands of troops into areas affected by the riots
31	**E**	In the winter of 1812, the Frame-Breaking Act was passed, making the destruction of factory equipment a crime punishable by death Suspected Luddites were arrested and imprisoned, and many of them were hanged
32	**I**	In 1816, a bad harvest and economic downturn led to a small revival of rioting
33	**TRUE**	The term Luddite is used to refer to a person who is opposed to new technology
34	**TRUE**	The original Luddites were textile workers in early nineteenth-century England who protested changes brought on by the industrial revolution. These weavers made lace and stockings by hand, carrying out their craft independently in their homes according to traditional methods
35	**TRUE**	In the spring of that year, several factory owners were killed during Luddite riots, and a number of textile workers died as well
36	**NOT GIVEN**	The original Luddites were textile workers in early nineteenth-century England who protested changes brought on by the industrial revolution
37	**TRUE**	The word derives from the name Ned Ludd, a man who may or may not have actually existed
38	**FALSE**	In June of that year, workers attacked two mills, smashing equipment and causing thousands of dollars worth of damage
39	**FALSE**	The Luddites were short-lived, but they left an impressive mark
40	**NOT GIVEN**	In our present time of rapid technological change, people who are concerned about the pace of technological advance often call themselves Neo-Luddites

Test 2

PASSAGE 1

You should spend about 20 minutes on Questions 1–13, which are based on Reading Passage 1 below.

The Vikings' Wayfaring Ways

Perhaps best known as fierce warriors, the Vikings were also the most far-ranging of peoples. In fact, the term *Viking*, in Old Norse, means "to go on an expedition." From the late 700s until the eleventh century, Viking explorers journeyed from their native Norway, Denmark, and Sweden to many distant lands. They traveled as far west as Newfoundland in present-day Canada, and as far east as Baghdad.

Those from Norway sailed west to the British Isles, and eventually across the Atlantic Ocean. During their first expedition, in 793, a force of Viking warriors sacked the famed abbey at Lindisfarne, on England's northeast coast. In the 800s, groups of raiders went on to occupy the Shetland Islands, north of the British Isles and west of Norway, and the Orkney Islands off northern Scotland.

By 870, the Vikings were settling Iceland. In 980, an Icelandic assembly found a man named Eric "the Red" Ericson guilty of murder and sent him into exile. Eric the Red responded by sailing to a large island to the west, which he called "Greenland." An Icelandic saga mentions that people would be attracted to go to Greenland if it had a favorable name. Around 998, Eric the Red's son, Leif "the Lucky" Ericson, and a small Viking fleet sailed west to North America. There they established the first European settlement in the New World, called "Vinland."

Vikings from Denmark, meanwhile, ravaged large swaths of England and France. In 866, a Viking "Great Army" landed in England, occupying much of the country's north and east. They forced the English king to acknowledge their control of much of England under the so-called Danelaw. To the west, they conquered coastal portions of Ireland, and in 841 founded Dublin, today a major Irish city, but originally a Viking fort. The Vikings remained a major power in Ireland until the early eleventh century.

To the south, the Vikings conquered France, moving swiftly up rivers in long boats, powered by oar and sail. From 845 to 886, they surged up the Seine to attack Paris three times. To stop the raids, French King Charles III the Simple in 911 offered the Viking chief Rollo territories in northwest France, called Normandy, after the Normans or "Northmen." There they set up a powerful kingdom and, in 1066, under William, Duke of Normandy, defeated King Harold at the battle of Hastings in England.

Farther south, in 844, the Vikings had raided Portugal and Spain, then largely controlled by Arab Moors. A fleet of 100 Viking ships seized Lisbon and boldly sailed up the Guadalquivir River to occupy Seville. However, the Moors dealt them a rare defeat. The Moors catapulted flaming projectiles onto the Viking vessels, forcing a retreat.

Still other Vikings sailed much farther, to raid Morocco, then to the eastern Mediterranean and beyond. Many of these Vikings enlisted with the military forces of the Byzantine Empire, the Greek-speaking successors to the Roman Empire. Vikings made up the Byzantine Emperor's elite Varangian Guard. In 902, hundreds of Varangians served as marines during a Byzantine naval assault on the island of Crete. Varangians battled Arab forces in Syria in 955, and even fought in Jerusalem. So many men left Scandinavia for the Byzantine Empire that, to stem the outflow, Sweden passed a law denying inherited property to anyone serving under the Byzantines.

The Vikings of Sweden, meanwhile, were moving out of Scandinavia to the east and south. They journeyed through the Baltic Sea, then built inland trading posts in Germany and Poland. In time, they struck out across Central and Eastern Europe, down the Vistula River in Poland, and the Dnieper, Volga, and Don Rivers in Russia. Their vessel of choice was the "knar," a cargo ship with a deep draft and wide hull. Viking merchants on horseback penetrated far into the Asian heartland, trading with towns on the Caspian and Black seas.

The most significant settlements were in Russia and Ukraine. In 862, Vikings settled in the town of Novgorod, in northwestern Russia. It became the capital of a country called Rus, after the Finnish name for the Swedes. Rus came from the word *Rutosi*, meaning "rowers." Rus formed the foundation of Russia, as the Russian and Viking leaders of Rus intermarried, converted to Christianity, and steadily expanded their territory. And after lucrative trade relations were established with the Byzantines and with Muslim lands, the Rus moved their capital southward to Kiev, later the capital of Ukraine.

Another important Viking market town was Bulgar, on the Volga River. There, merchants peddled honey, wax, amber, and steel swords. The Viking's most common commodity may have been skins: they dealt in horse, beaver, rabbit, mink, ermine, and sable skins. They also traded hazelnuts, fish, cattle, and falcons. Another commodity was slaves, many of them Slavs from Eastern Europe. The merchants eagerly exchanged their goods for Arab silver coins. In Sweden, archeologists have excavated about 100,000 such coins, minted in such distant cities as Cairo and Tashkent.

Like their Danish and Norwegian relatives, the Swedish Vikings traveled to the most exotic realms. They took part in the Silk Road trade with India and China. Archeological evidence shows that Viking traders even traveled by camel caravan to Baghdad.

Given the wide-ranging travel of the Vikings, it is fitting the Anglo-Saxons gave them the nickname "Færgenga"— "Far Going."

PART 1 — QUESTIONS

Questions 1-5

Answer the questions below.

Choose ONE NUMBER ONLY from the text for each answer.

1 When did Viking warriors raid an abbey on the coast of England? _____

2 When was Eric the Red convicted of a crime? _____

3 When did Vikings establish a fort in Ireland? _____

4 When was a Viking chief granted lands by a king of France? _____

5 When did Viking warriors defeat an English king? _____

Questions 6-13

Complete the summary using the list of words, A–O, below.

The people known as Vikings were given this name because they were **6** _____. Groups of Vikings from Norway traveled west to Britain, Iceland, and beyond. They were the first Europeans who **7** _____ North America. Groups from Denmark **8** _____ large areas of England and France. Other groups of Vikings raided areas of Portugal and Spain. The people of Seville, Spain, drove the Vikings away by throwing **9** _____ at them. Large numbers of Vikings left Scandinavia for the Byzantine Empire, and many of these joined the Byzantine military. At one point, they took part in **10** _____ on the Greek island of Crete. Groups of Swedish Vikings crossed the Baltic Sea to explore the lands beyond. They traveled down Russian rivers, then journeyed deep into Asia by **11** _____. After settling in northwest Russia, they expanded their territories toward the south. Kiev, Ukraine, eventually became the Vikings' territorial **12** _____. The Vikings also had an important **13** _____ in the town of Bulgar on the Volga River.

A. **warriors** B. **an attack** C. **capital** D. **explorers** E. **trade with**

F. **conquered** G. **burning objects** H. **settled in** I. **ship** J. **oars**

K. **market** L. **a parade** M. **archeologists** N. **silver coins** O. **horse**

PASSAGE 2

You should spend about 20 minutes on Questions 14–26, which are based on Reading Passage 2 below.

Dyslexia

Dyslexia, also referred to as "specific reading disability," predominantly affects a person's ability to read and write. Dyslexics have difficulty connecting visual symbols (i.e., letters) with their corresponding sounds. Many people who suffer from dyslexia also have trouble with enunciation, organization, and short-term memory. Dyslexia is the most common learning disability in children. It is not related to intellectual ability, vision, or access to education. Approximately 5-10 percent of school-age children in North America suffer from the condition, with each case varying in severity. Children are generally diagnosed with dyslexia during the elementary school years when they are learning how to read and spell.

Determining the definite cause of dyslexia is a difficult task since studies of the morphology of the brain are generally conducted in an autopsy. One hypothesis suggests that dyslexic children suffer from "strabismus," the tendency of the eyes to focus on two different points. When reading, for example, one eye focuses on the beginning of the word and the other focuses on the end. This theory could explain why dyslexics have difficulty reading. Many dyslexic children read letters and words backwards, often mistaking a *b* for a *d* or reading *was* instead of *saw*. These reversals are normal for children under the age of six, but indicate a problem if they persist beyond the early elementary grades. Neurological research points to tiny flaws in the dyslexic brain called ectopias and microgyria. These flaws alter the structure of the cortex, the area of the brain that is responsible for connecting visual and audio processing. Genetic research, often in the form of twins studies, shows that dyslexia may be passed on in families.

Though most children are not diagnosed with dyslexia until they enter the school system, there are some early signs of the disability. Toddlers who talk much later than average, have difficulty learning new words, or do not understand the concept of rhyming may develop other dyslexic symptoms. As children begin school, teachers are trained to look for warning signs, such as an inability to recognize letters or spaces between words on a page or difficulty following instructions given with more than one command at a time. Properly screening children for dyslexia is important since other factors can limit reading abilities, including vision or hearing impairment, anxiety, or other neurological problems.

Dyslexia is a type of learning disorder that can often be compensated for with therapy and motivational techniques. Phonological training, which involves identifying and separating sound patterns, is the most common form of therapy used in the school system. Depending on the severity of the disorder, dyslexic children are pulled from regular classroom activities in order to work one-on-one with a language specialist. Studies have shown that activity in the right temporoparietal cortex tends to increase after sufficient phonological training. Improvements in visual focus can sometimes be achieved when students are given an eye patch to wear while they learn to read. Encouraging children to use many senses while reading also has proven

benefits. Some teachers find that having students listen to a book on tape before reading the text can help with information processing as well.

Though it is properly classified as a learning disability, dyslexia is commonly mistaken for a behavioral disorder. Dyslexic children often exhibit behavior that seems abnormal but is caused by frustration at their own inability to perform at the same level as their peers. Some studies show that attention deficit disorder co-occurs with dyslexia in up to 50 percent of cases. In general, behavioral problems decline as dyslexic students are diagnosed and begin to receive treatment.

Other learning disabilities are neurologically linked to dyslexia, including dyscalculia, dysgraphia, and dyspraxia. People who suffer from dyscalculia can usually perform difficult mathematical tasks, but have trouble with formulas or basic addition and subtraction. Dysgraphia prevents people from writing in an organized manner. Dyspraxia impedes the performance of routine tasks that involve balance and fine motor skills.

The earlier children are diagnosed with dyslexia, the more likely they are to overcome their disabilities and progress to adult reading levels. Many studies show that children who are diagnosed after grade three have a much lower chance of eliminating the symptoms of dyslexia. Some dyslexics, especially those who are not diagnosed as children, naturally develop their own coping mechanisms such as an increased visual memory. In some instances, dyslexics develop keen spatial and visual abilities that prepare them for very specialized careers.

PART 2 — QUESTIONS

Questions 14-20

Do the following statements agree with the information in the reading passage?

YES if the statement agrees with the information

NO if the statement contradicts the information

NOT GIVEN if there is no information on this in the passage

14 Dyslexia is a disorder related to intelligence.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

15 Dyslexia is usually diagnosed during a child's first years of school.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

16 People with dyslexia often read in reverse.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

17 There is a tendency for dyslexia between twins.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

18 Scientists are looking for a drug treatment for dyslexia.

A ○ YES

B ○ NO

C ○ NOT GIVEN

19 Dyslexia in children is often accompanied by behavioral problems.

A ○ YES

B ○ NO

C ○ NOT GIVEN

20 People with dysgraphia have difficulty with math.

A ○ YES

B ○ NO

C ○ NOT GIVEN

Questions 21-23

Which of the following are signs of dyslexia mentioned in the passage?

Choose THREE answers from the list below.

21 22 23 Which of the following are signs of dyslexia mentioned in the passage?

A ☐ learning to talk at a later than normal age

B ☐ trouble with new vocabulary

C ☐ leaving big spaces between words

D ☐ problems following directions

E ☐ difficulty turning the pages of a book

F ☐ inability to give commands

Questions 24-26

Which of the following are treatments for dyslexia mentioned in the passage?

Choose THREE answers from the list below.

24 **25** **26** Which of the following are treatments for dyslexia mentioned in the passage?

- **A** ☐ using special computers
- **B** ☐ learning to identify sounds
- **C** ☐ wearing eyeglasses
- **D** ☐ attending a special school
- **E** ☐ covering one eye while reading
- **F** ☐ listening to tapes

PASSAGE 3

You should spend about 20 minutes on Questions 27–40, which are based on Reading Passage 3 below.

Catastrophe Theory

A

In the late eighteenth and early nineteenth centuries, the popular theory among Earth scientists was that a number of major catastrophes had taken place over a relatively short period of time to give Earth its shape. French geologist Baron Georges Cuvier introduced this idea, which was later coined the "catastrophe theory." Proponents of the catastrophe theory used fossilized creatures and the faunal changes in rock strata to support their beliefs that major events such as volcanoes had occurred on a worldwide scale. The catastrophe theory was used to support the notion that Earth's history was not a relatively long one.

B

In response to the catastrophe theory, a handful of Earth scientists searched for explanations that would provide a better scientific basis for Earth's geology. James Hutton, the father of geology, is best known for his gradualist theory, a paradigm that became known as "uniformitarianism." Hutton published *Theory of the Earth* in 1795, after which many other geologists including Charles Lyell, adopted the idea that small changes on Earth occurred over a large expanse of time. Uniformitarians rejected the idea that cataclysmic events could shape the Earth so quickly, and instead proposed the theory that the key to the present is the past. The term *deep time* was used to describe the span in which gradual geological processes occurred, especially the formation of sedimentary rock. Charles Darwin later based his work on the idea, by developing his theory of evolution.

C

The majority of paleontologists and geologists adopted the gradualist theory of Earth's history for more than 100 years. In 1980, a discovery in Italy gave scientists a reason to reconsider the discarded theories of catastrophism. Geologist Walter Alvarez discovered a clay layer in the K-T boundary that intrigued him. The K-T boundary refers to the layer of Earth between the Cretaceous and Tertiary periods. The geologist with the help of his father Luis Alvarez, a prominent physicist, analyzed the clay for heavy metals. After careful examination, the clay was found to contain high levels of iridium. Samples taken from the K-T boundary in other parts of the world were examined, with the same findings.

D

The Alvarez group wrote a historic paper that applied the catastrophe theory to their discovery. According to their hypothesis, the iridium in the K-T boundary was caused by an asteroid or a comet that hit Earth near the end of the Cretaceous period, over 65 million years ago. They also proposed that the impact would have raised enough dust to block the sun and cool Earth, which

in turn would have prevented photosynthesis. This chain reaction would have led to the extinction of plants and animals. The main reason that the Alvarez theory took hold so quickly in both the world of science and the public realm, was that it could account for the extinction of the dinosaurs at the end of the Cretaceous period. The acceptance of this theory was widespread, even before the discovery in 1990 of a 180-kilometer crater in Mexico's Yucatan Peninsula, a potential piece of evidence of the asteroid impact.

E

Events that have occurred on Earth in the last 100 years or more have proved to geologists that not all processes are gradual. Major rivers have flooded areas in a matter of days, and volcanoes have erupted, causing mass devastation. The eruption of Mount St. Helens was proof of how a catastrophe could easily change the Earth's landscape. Modern research on fossils even supports the theory of a marine catastrophe, not unlike the legends and stories among many peoples of great floods. Some scientists believe that animal remains found within the layers of sedimentary rock may have been casualties of such a flood. Sedimentary rock is made up of layers such as sandstone and limestone and is created by water movement. In addition, some scientists propose that the glacial ice sheet that once spread out across North America melted catastrophically rather than having a slow glacial retreat. Deep erosion up to 100 meters wide was discovered along the bottom of some of the Great Lakes. Within the gullies, layers of periodic sediment point to catastrophic melting.

F

Though there is little debate that catastrophic events caused the mass extinction of several of Earth's species, namely the dinosaurs, geologists still question whether asteroids, volcanoes, or other natural disasters were the cause. The idea that the moon was formed as a result of catastrophic events is a related field of study and one that has been debated for decades.

PART 3 — QUESTIONS

Questions 27-32

Complete the notes using the list of words, A–K, below.

Catastrophe Theory

First introduced by **27** _____

Proposes that major **28** _____ have given Earth its shape.

Supports the idea that the Earth has a **29** _____ history.

Gradualist Theory

First introduced by **30** _____

Proposes that many **31** _____ changes in the shape of the Earth happened over a **32** _____ period of time.

A. **short** B. **small** C. **Charles Darwin** D. **long** E. **definite**
F. **disasters** G. **James Hutton** H. **mysterious** I. **Walter Alvarez**
J. **evolution** K. **Georges Cuvier**

Questions 33-39

The passage has six paragraphs, A–F. Which paragraph mentions the following information?

You may use any paragraph more than once.

	A	B	C	D	E	F
33 proof that not all changes on Earth have occurred gradually	○	○	○	○	○	○
34 a theory explaining the presence of iridium beneath Earth's surface	○	○	○	○	○	○

	A	B	C	D	E	F
35 publication of a book about the gradualist theory	○	○	○	○	○	○
36 discovery of a large crater that could have been caused by an asteroid	○	○	○	○	○	○
37 evidence of the occurrence of a large flood in Earth's past	○	○	○	○	○	○
38 recurrence of interest in the catastrophe theory	○	○	○	○	○	○
39 ideas about how quickly ice age glaciers disappeared	○	○	○	○	○	○

Questions 40-40

Choose the correct letter, A–C.

40 Most scientists now agree that

A ○ the gradualist theory is correct.

B ○ catastrophic events occur regularly on the moon.

C ○ a major catastrophe caused the dinosaurs to disappear.

Answer Key

#	Answer	Explanation
1	**793**	During their first expedition, in 793, a force of Viking warriors sacked the famed abbey at Lindisfarne, on England's northeast coast
2	**980**	In 980, an Icelandic assembly found a man named Eric "the Red" Ericson guilty of murder and sent him into exile
3	**841**	To the west, they conquered coastal portions of Ireland, and in 841 founded Dublin, today a major Irish city, but originally a Viking fort
4	**911**	To stop the raids, French King Charles III the Simple in 911 offered the Viking chief Rollo territories in northwest France, called Normandy, after the Normans or "Northmen."
5	**1066**	There they set up a powerful kingdom and, in 1066, under William, Duke of Normandy, defeated King Harold at the battle of Hastings in England
6	**D**	In fact, the term Viking, in Old Norse, means "to go on an expedition." From the late 700s until the eleventh century, Viking explorers journeyed from their native Norway, Denmark, and Sweden to many distant lands
7	**H**	There they established the first European settlement in the New World, called "Vinland."
8	**F**	Vikings from Denmark, meanwhile, ravaged large swaths of England and France
9	**G**	The Moors catapulted flaming projectiles onto the Viking vessels, forcing a retreat
10	**B**	In 902, hundreds of Varangians served as marines during a Byzantine naval assault on the island of Crete
11	**O**	Viking merchants on horseback penetrated far into the Asian heartland, trading with towns on the Caspian and Black seas
12	**C**	And after lucrative trade relations were established with the Byzantines and with Muslim lands, the Rus moved their capital southward to Kiev, later the capital of Ukraine
13	**K**	Another important Viking market town was Bulgar, on the Volga River

#	Answer	Explanation
14	**NO**	It is not related to intellectual ability, vision, or access to education
15	**YES**	Children are generally diagnosed with dyslexia during the elementary school years when they are learning how to read and spell
16	**YES**	Many dyslexic children read letters and words backwards, often mistaking a b for a d or reading was instead of saw
17	**NOT GIVEN**	Genetic research, often in the form of twins studies, shows that dyslexia may be passed on in families
18	**NOT GIVEN**	Dyslexia is a type of learning disorder that can often be compensated for with therapy and motivational techniques
19	**YES**	Dyslexic children often exhibit behavior that seems abnormal but is caused by frustration at their own inability to perform at the same level as their peers
20	**NO**	People who suffer from dyscalculia can usually perform difficult mathematical tasks, but have trouble with formulas or basic addition and subtraction. Dysgraphia prevents people from writing in an organized manner
21	**A / B / D**	Toddlers who talk much later than average, have difficulty learning new words, or do not understand the concept of rhyming may develop other dyslexic symptoms. As children begin school, teachers are trained to look for warning signs, such as an inability to recognize letters or spaces between words on a page or difficulty following instructions given with more than one command at a time
22	**A / B / D**	Toddlers who talk much later than average, have difficulty learning new words, or do not understand the concept of rhyming may develop other dyslexic symptoms. As children begin school, teachers are trained to look for warning signs, such as an inability to recognize letters or spaces between words on a page or difficulty following instructions given with more than one command at a time
23	**A / B / D**	Toddlers who talk much later than average, have difficulty learning new words, or do not understand the concept of rhyming may develop other dyslexic symptoms. As children begin school, teachers are trained to look for warning signs, such as an inability to recognize letters or spaces between words on a page or difficulty following instructions given with more than one command at a time
24	**B / E / F**	Phonological training, which involves identifying and separating sound patterns, is the most common form of therapy used in the

#	Answer	Explanation
		school system. Depending on the severity of the disorder, dyslexic children are pulled from regular classroom activities in order to work one-on-one with a language specialist. Studies have shown that activity in the right temporoparietal cortex tends to increase after sufficient phonological training. Improvements in visual focus can sometimes be achieved when students are given an eye patch to wear while they learn to read. Encouraging children to use many senses while reading also has proven benefits. Some teachers find that having students listen to a book on tape before reading the text can help with information processing as well
25	**B / E / F**	Phonological training, which involves identifying and separating sound patterns, is the most common form of therapy used in the school system. Depending on the severity of the disorder, dyslexic children are pulled from regular classroom activities in order to work one-on-one with a language specialist. Studies have shown that activity in the right temporoparietal cortex tends to increase after sufficient phonological training. Improvements in visual focus can sometimes be achieved when students are given an eye patch to wear while they learn to read. Encouraging children to use many senses while reading also has proven benefits. Some teachers find that having students listen to a book on tape before reading the text can help with information processing as well
26	**B / E / F**	Phonological training, which involves identifying and separating sound patterns, is the most common form of therapy used in the school system. Depending on the severity of the disorder, dyslexic children are pulled from regular classroom activities in order to work one-on-one with a language specialist. Studies have shown that activity in the right temporoparietal cortex tends to increase after sufficient phonological training. Improvements in visual focus can sometimes be achieved when students are given an eye patch to wear while they learn to read. Encouraging children to use many senses while reading also has proven benefits. Some teachers find that having students listen to a book on tape before reading the text can help with information processing as well
27	**K**	French geologist Baron Georges Cuvier introduced this idea, which was later coined the “catastrophe theory.”
28	**F**	In the late eighteenth and early nineteenth centuries, the popular theory among Earth scientists was that a number of major catastrophes had taken place over a relatively short period of time to give Earth its shape

#	Answer	Explanation
29	**A**	The catastrophe theory was used to support the notion that Earth’s history was not a relatively long one
30	**G**	James Hutton, the father of geology, is best known for his gradualist theory, a paradigm that became known as “uniformitarianism.”
31	**B**	adopted the idea that small changes on Earth occurred over a large expanse of time
32	**D**	adopted the idea that small changes on Earth occurred over a large expanse of time
33	**E**	Events that have occurred on Earth in the last 100 years or more have proved to geologists that not all processes are gradual
34	**D**	According to their hypothesis, the iridium in the K-T boundary was caused by an asteroid or a comet that hit Earth near the end of the Cretaceous period, over 65 million years ago
35	**B**	James Hutton, the father of geology, is best known for his gradualist theory, a paradigm that became known as “uniformitarianism.” Hutton published Theory of the Earth in 1795, after which many other geologists including Charles Lyell, adopted the idea that small changes on Earth occurred over a large expanse of time
36	**D**	The acceptance of this theory was widespread, even before the discovery in 1990 of a 180-kilometer crater in Mexico’s Yucatan Peninsula, a potential piece of evidence of the asteroid impact
37	**E**	Modern research on fossils even supports the theory of a marine catastrophe, not unlike the legends and stories among many peoples of great floods. Some scientists believe that animal remains found within the layers of sedimentary rock may have been casualties of such a flood
38	**C**	In 1980, a discovery in Italy gave scientists a reason to reconsider the discarded theories of catastrophism
39	**E**	In addition, some scientists propose that the glacial ice sheet that once spread out across North America melted catastrophically rather than having a slow glacial retreat
40	**C**	Though there is little debate that catastrophic events caused the mass extinction of several of Earth’s species, namely the dinosaurs, geologists still question whether asteroids, volcanoes, or other natural disasters were the cause

Test 3

PASSAGE 1

You should spend about 20 minutes on Questions 1–13, which are based on Reading Passage 1 below.

The CT Scanner

1

A

The computed tomography scanner, better known as the CT scanner, was originally designed to provide cross-sectional images of the brain. The word *tomography* comes from the Greek word *tomos*, meaning "section," and *graphia*, meaning "picture." Godfrey Hounsfield developed the technique in 1972 and was later knighted and awarded the Nobel Peace Prize for his contribution to the medical field. Within four years of this development, CT scans, also called CAT scans (computed axial tomography), were restructured, allowing technicians to scan the entire body for evidence of tumors, injuries, and other abnormalities. Rather than taking a single picture as in an X ray, a CT scanner sends several beams into an area and takes photographs from many different angles.

2

B

While the original CT scans took Hounsfield several hours to reconstruct into a useful image, today's machines can produce an in-depth image in a fraction of a second. Creating a scanner that could produce images at a faster rate was crucial in the development of tomography, as it reduced the degree of distortion in an image caused when patients breathed and moved. As well as providing images with better resolution, today's scanners also provide more comfort for the patient.

3

C

During a CT scan, a patient must lie still on a special table while the radiology technician locates the specific area that needs to be photographed. The table slides into a round tunnel (gantry), where it can be rotated or moved forward and backward in order to obtain the necessary view. Inside the donut-shaped machine, a number of X rays are taken, each producing a small slice of the image that doctors require. When passing through dense tissue such as a bone, the X-ray beams are weak and appear white in the CT images. Tissues such as those found in the brain

are less dense and appear gray. Images that appear black denote organs such as lungs or others that can fill with air.

4

D

The CT scanner is made up of several computer systems, including the host computer, which organizes the entire process. One of the computers converts the raw data into an image, while another allows the technician to control the rotation of the gantry. After the information is processed, it is displayed on a monitor for radiologists and physicians to analyze. The information is also saved and printed to keep in a doctor's records and to share and discuss with patients and their family members.

5

E

Physicians order CT scans for a number of different reasons, including searching for and assessing tumors, cysts, kidney stones, and bone injuries. Without this technology, surgeons would have to perform many needless and costly operations. Brain, chest, and abdominal CT scans are the most common, though physicians also rely on the CT scanner to guide their needles while draining an abscess or performing a biopsy. Most emergency or shock-treatment centers contain a CT scanner in order to assess trauma victims. CT scans can pinpoint internal bleeding both in the brain and throughout the body.

6

F

In many cases, a patient must be given a contrast material before undergoing a CT scan. During "dynamic CT scanning," iodine dye is either injected into the blood or added to a drink that the patient must ingest approximately forty-five minutes before entering the scanner. The liquid X-ray dye makes it easier to see the organs and blood vessels when the pictures are developed. The intravenous contrast material is typically used for chest or pelvic scans, while oral-contrast material is used for abdominal scans. In some cases, physicians request that pictures be taken both before and after the contrast material enters the patient's body. Patients who receive contrast material in the arm often report feeling a warm sensation, and in rare cases an allergic reaction occurs. Contrast material causes water loss and is avoided when scanning patients who suffer from kidney failure.

7

G

The danger of radiation exposure caused by X-ray beams is generally considered minimal compared to the benefits that a CT scan can provide. In many cases, especially in the detection of tumors and internal bleeding, CT scans provide information that can save a person's life. Full-body scanning, which is saved for serious conditions such as coronary artery disease, remains a controversial procedure as prolonged exposure to radiation is linked to cancer. Pregnant women are excluded from receiving CT scans, as the X rays can be harmful to the fetus. When pregnant woman require an evaluation, most physicians favor using other procedures such as an ultrasound or an MRI.

PART 1 — QUESTIONS

Questions 1-7

The following reading passage has seven sections, A–G. Choose the correct heading for each section from the list of headings below. Write the correct number, i–x. There are more headings than sections, so you will not use them all.

i. **Scanning the Brain and Chest**

ii. **The Role of Computers**

iii. **The CT Scan Is Invented**

iv. **The High Cost of CT Scans**

v. **Risks Associated with CT Scans**

vi. **Emergency Room Care**

vii. **Faster and More Comfortable**

viii. **How Doctors Use CT Scans**

ix. **The Patient Is Photographed**

x. **Enhancing Scan Images with Dyes**

Questions 8-10

Which of the following are facts about the original CT scanner mentioned in the passage? Choose THREE answers from the list below and write the correct letters, A–F.

8 **9** **10** Which of the following are facts about the original CT scanner mentioned in the passage?

- **A** ☐ It made it difficult for patients to breathe.
- **B** ☐ It was created to take pictures of the brain.
- **C** ☐ It was much bigger than current CT scanners.
- **D** ☐ It was developed in 1972.
- **E** ☐ It took several hours to produce a completed image.
- **F** ☐ It produced images in color.

Questions 11-13

Which of the following are facts about contrast materials used for CT scans mentioned in the passage? Choose THREE answers from the list below and write the correct letters, A–F.

11 **12** **13** Which of the following are facts about contrast materials used for CT scans mentioned in the passage?

- **A** ☐ They are bright in color.
- **B** ☐ They can be given by injection.
- **C** ☐ They have a bitter taste.
- **D** ☐ They might cause a feeling of warmth in the arm.
- **E** ☐ They are administered only by a specially trained technician.
- **F** ☐ They may cause allergies in a few patients.

PASSAGE 2

You should spend about 20 minutes on Questions 14–27, which are based on Reading Passage 2 below.

Nineteenth-Century Paperback Literature

A publishing craze that hit both America and England from the mid- to late nineteenth century attracted the readership of the semiliterate working class. In America, dime novels typically centered on tales of the American Revolution and the Wild West, while British penny bloods (later called penny dreadfuls) told serial tales of horror or fictionalized versions of true crimes. These paperback novels were sold at newsstands and dry goods stores and succeeded in opening up the publishing market for both writers and readers. The industrial revolution facilitated the growth of literacy, making it easier to print and transport publications in large quantities, thus providing inexpensive entertainment for the masses.

Though Johann Gutenberg's printing press was designed in the fifteenth century, it was not until after the first newspapers began circulating in the eighteenth century that it became a profitable invention. Throughout the nineteenth century, commoners in England were becoming educated through normal schools, church schools, and mutual instruction classes, and by the 1830s, approximately 75 percent of the working class had learned to read. In 1870, the Forster Education Act made elementary education mandatory for all children. Though few children's books were available, penny dreadfuls were highly accessible, especially to male youths who created clubs in order to pool their money and start their own libraries. Similar to reading a newspaper, dime novels and penny dreadfuls were meant to be read quickly and discarded, unlike the hardbound high literature that was written in volumes and published for the elite. Struggling authors, many of whom had limited writing and storytelling skills, suddenly found an audience desperate to read their work. When the first typewriter became available in the 1870s, authors were able to maximize their output. Successful authors, some of whom wrote over 50,000 words a month, were able to earn a decent living at a penny per word.

From the 1830s to 1850s, penny bloods featured tales of gore that often depicted the upper class as corrupt. One of the most beloved characters from the penny blood serials was Sweeney Todd. In the original story, *String of Pearls: A Romance*, published in 1846, Sweeney Todd was a demon barber who used his razor to torture his victims before turning them into meat pies. In 1847, hack playwright George Dibdin Pitt adapted Thomas Prest's story for the stage, renaming it *The String of Pearls: The Fiend of Fleet Street*. With no copyright laws, authors were always at risk of having their ideas pilfered. Pitt's play was released again one year later at one of London's "bloodbath" theaters under the name *Founded on Fact*. The Sweeney Todd story also made its way into musicals and comedies. Controversy still exists over whether Thomas Prest's character was based on a real person. No records of a barber shop on Fleet Street, or a barber named Sweeney Todd have been found, though Thomas Prest was known for getting his inspiration from "The Old Bailey" of the *London Times*, a section devoted to real-life horror stories.

Despite the warning from Lord Shaftsbury that the paperback literature was seducing middle-class society into an unproductive life of evil, the penny bloods grew in popularity. They provided a literary voice for commoners at an affordable price. Eventually, penny bloods became known as penny dreadfuls and began to focus more on adventure than horror.

In 1860, Beadle and Adams was the first firm in the United States to publish a title that would be categorized as a dime novel. *Malaeska: The Indian Wife of the White Hunter*, by Anne Stephens, had originally been published twenty years earlier as a series in a magazine. In novel form, approximately 300,000 copies of the story were sold in the first year, paving the way for the new fad in America. Many dime novels were written as serials with recurring characters, such as Deadwood Dick, Commander Cody, and Wild Bill. Originally, the paperbacks were intended for railroad travelers; however, during the Civil War, soldiers quickly became the most avid dime novel readers. Beadle dime novels became so popular that the company had to build a factory of hack writers to mass produce them. As urbanization spread, stories of the Wild West were in less demand, and tales of urban outlaws became popular. At that time, dime novels were chosen for their illustrated covers rather than their sensational stories and characters. Despite their popularity, by the late 1880s dry goods stores were so full of unsold books that prices dropped to less than five cents per copy. Many titles that could still not sell were given away or destroyed. The International Copyright Law, passed by Congress in 1890, required publishers to pay royalties to foreign authors. Selling at less than five cents a copy, the paperback industry was doomed until the arrival of pulp paper.

PART 2 — QUESTIONS

Questions 14-19

Which of the characteristics below belongs to which type of literature? Write:

A if it is characteristic of penny bloods

B if it is characteristic of dime novels

C if it is characteristic of both penny bloods and dime novels

	A	B	C
14 They were popular in America.	○	○	○
15 They were popular in Britain.	○	○	○
16 They showed members of the upper class as corrupt.	○	○	○
17 They were inexpensive.	○	○	○
18 They featured tales of the Wild West.	○	○	○
19 They were popular among members of the working class.	○	○	○

Questions 20-23

Match each year with the event that occurred during that year. Choose the correct event, A–F, from the box below and write the correct letter. There are more events than years, so you will not use them all.

A. The first dime novel was published in the United States.

B. Lord Shaftsbury warned people about the dangers of penny bloods.

C. if it is characteristic of both penny bloods and dime novels

D. A law was passed requiring children to attend school.

E. A law about copyrights was passed.

F. The first Sweeney Todd story was published.

	A	B	C	D	E	F
20 1870	○	○	○	○	○	○
21 1846	○	○	○	○	○	○
22 1860	○	○	○	○	○	○
23 1890	○	○	○	○	○	○

Questions 24-27

Do the following statements agree with the information in the reading passage? Write:

YES if the statement agrees with the information

NO if the statement contradicts the information

NOT GIVEN if there is no information on this in the passage

24 The literacy rate in England rose in the nineteenth century.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

25 Children's books were popular in the nineteenth century.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

26 Most people agree that Sweeney Todd was based on a real person.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

27 Dime novels were popular among Civil War soldiers.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

PASSAGE 3

You should spend about 20 minutes on Questions 28–40, which are based on Reading Passage 3 below.

Cosmic Black Holes

In 1687, the English scientist Isaac Newton published his monumental work, *Philosophiae Naturalis Principia Mathematica* (*Mathematical Principles of Natural Philosophy*), containing his theory of gravitation and the mathematics to support it. In essence, Newton's law of gravitation stated that the gravitational force between two objects, for example, two astronomical bodies, is directly proportional to their masses. Astronomers found that it accurately predicted all the observable data that science at that time was able to collect, with one exception—a very slight variation in the orbit of the planet Mercury around the sun.

It was 228 years before anyone was able to offer a refinement of Newton's law that accounted for the shape of Mercury's orbit. In 1915, Albert Einstein's general theory of relativity was published. Using the equations of general relativity, he calculated the shape of Mercury's orbit. The results predicted astronomical observations exactly and provided the first proof of his theory. Expressing it very simplistically, the general theory of relativity presumes that both matter and energy can distort space—time and cause it to curve. What we commonly call gravity is in fact the effect of that curvature.

Among other phenomena, Einstein's theory predicted the existence of black holes, although initially he had doubts about their existence. Black holes are areas in space where the gravitational field is so strong that nothing can escape them. Because of the immense gravitational pull, they consume all the light that comes near them, and thus they are "black." In fact, neither emitting nor reflecting light, they are invisible. Due to this, they can be studied only by inference based on observations of their effect on the matter—both stars and gases—around them and by computer simulation. In particular, when gases are being pulled into a black hole, they can reach temperatures up to 1,000 times the heat of the sun and become an intensely glowing source of X rays.

Surrounding each black hole is an "event horizon," which defines the area over which the gravitational force of the black hole operates. Anything passing over the lip of the event horizon is pulled into the black hole. Because observations of event horizons are difficult due to their relatively small size, even less is known about them than about black holes themselves.

Black holes exist in three sizes. Compact ones, called star-mass black holes and which have been known to exist for some time, are believed to be the result of the death of a single star. When a star has consumed itself to the point that it no longer has the energy to support its mass, the core collapses and forms a black hole. Shock waves then bounce out, causing the shell of the star to explode. In a way that is not yet understood, the black hole may then reenergize and create multiple explosions within the first few minutes of its existence. So-called super-massive black holes, also well documented, contain the mass of millions or even billions of stars. And just recently one intermediate black hole, with about 500 times the mass of the

sun, has been discovered. Scientists have postulated that the intermediate black hole may provide a “missing link” in understanding the evolution of black holes.

Current scientific data suggest that black holes are fairly common and lie at the center of most galaxies. Based on indirect evidence gained using X-ray telescopes, thousands of black holes have been located in our galaxy and beyond. The black hole at the center of the Milky Way, known as Sagittarius A* (pronounced “A-star”), is a supermassive one, containing roughly four million times the mass of our sun. Astronomers suggest that orbiting around Sagittarius A*, 26,000 light years from Earth, may be as many as tens of thousands of smaller black holes. One possible theory to explain this is that a process called “dynamical friction” is causing stellar black holes to sink toward the center of the galaxy.

It is thought that the first black holes came into existence not long after the big bang. Newly created clouds of gases slowly coalesced into the first stars. As these early stars collapsed, they gave rise to the first black holes. A number of theories proposed that the first black holes were essentially “seeds,” which then gravitationally attracted and consumed enormous quantities of matter found in adjacent gas clouds and dust. This allowed them to grow into the super-massive black holes that now sit in the centers of galaxies. However, a new computer simulation proposes that such growth was minimal. When the simulated star collapsed and formed a black hole, there was very little matter anywhere near the black hole’s event horizon. Being in essence “starved,” it grew by less than 1 percent over the course of its first hundred million years. The new simulations do not definitively invalidate the seed theory, but they make it far less likely. On the other hand, it is known that black holes a billion times more massive than our sun did exist in the early universe. Researchers have yet to discover how these super-massive black holes were formed in such a short time, and the origin of these giants poses one of the most fundamental questions in astrophysics.

It has become practically a hallmark of the research on black holes that with each new study, more is known, more theories are generated, and yet more questions are raised than answered.

PART 3 — QUESTIONS

Questions 28-34

Complete each sentence with the correct ending, A–N, below. Write the correct letter, A–N.

- Newton's law of gravitation **28** _____
- Einstein's theory of relativity **29** _____
- We define black holes as areas that have **30** _____
- Scientists study black holes **31** _____
- Gases that are pulled into a black hole **32** _____
- Event horizons are **33** _____
- Compact black holes occur **34** _____

A. **by observing the matter around them.**

B. **suggested the presence of black holes in outer space.**

C. **when a single star collapses.**

D. **difficult to study.**

E. **barely visible light.**

F. **an inescapable gravitational pull.**

G. **did not apply to most astronomical bodies.**

H. **by direct observation.**

I. **could not explain Mercury's path around the sun.**

J. **caused doubt about the existence of black holes.**

K. **lose visibility.**

L. **become very hot.**

M. **with large event horizons.**

N. **at the center of each black hole.**

Questions 35-36

Choose the correct letter, A, B, or C.

35 Black holes can be found

- **A** ○ only in the Milky Way.
- **B** ○ in most galaxies.
- **C** ○ close to the sun.

36 Sagittarius A* is

- **A** ○ a black hole located 26,000 light years from Earth.
- **B** ○ one of thousands of black holes orbiting Earth.
- **C** ○ a well-known compact black hole.

Questions 37-40

Do the following statements agree with the information given in the passage? Write:

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

37 It is not certain when the big bang occurred.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

38 According to the “seed” theory, the first black holes eventually became super-massive black holes.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

39 The “seed” theory has been proven true by computer simulation.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

40 The black holes that existed in the early universe were all compact black holes.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

Answer Key

#	Answer	Explanation
1	iii	Godfrey Hounsfield developed the technique in 1972 and was later knighted and awarded the Nobel Peace Prize for his contribution to the medical field
2	vii	Creating a scanner that could produce images at a faster rate was crucial in the development of tomography, as it reduced the degree of distortion in an image caused when patients breathed and moved. As well as providing images with better resolution, today's scanners also provide more comfort for the patient
3	ix	During a CT scan, a patient must lie still on a special table while the radiology technician locates the specific area that needs to be photographed
4	ii	The CT scanner is made up of several computer systems, including the host computer, which organizes the entire process
5	viii	Physicians order CT scans for a number of different reasons, including searching for and assessing tumors, cysts, kidney stones, and bone injuries
6	x	In many cases, a patient must be given a contrast material before undergoing a CT scan. During "dynamic CT scanning," iodine dye is either injected into the blood or added to a drink that the patient must ingest approximately forty-five minutes before entering the scanner. The liquid X-ray dye makes it easier to see the organs and blood vessels when the pictures are developed
7	v	The danger of radiation exposure caused by X-ray beams is generally considered minimal compared to the benefits that a CT scan can provide
8	B / D / E	The computed tomography scanner, better known as the CT scanner, was originally designed to provide cross-sectional images of the brain. The word tomography comes from the Greek word tomos, meaning "section," and graphia, meaning "picture." Godfrey Hounsfield developed the technique in 1972 While the original CT scans took Hounsfield several hours to reconstruct into a useful image, today's machines can produce an in-depth image in a fraction of a second
9	B / D / E	The computed tomography scanner, better known as the CT scanner, was originally designed to provide cross-sectional images of the brain. The word tomography comes from the Greek word tomos, meaning "section," and graphia, meaning "picture."

#	Answer	Explanation
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10	**B / D / E**	The computed tomography scanner, better known as the CT scanner, was originally designed to provide cross-sectional images of the brain. The word tomography comes from the Greek word tomos, meaning "section," and graphia, meaning "picture." Godfrey Hounsfield developed the technique in 1972 While the original CT scans took Hounsfield several hours to reconstruct into a useful image, today's machines can produce an in-depth image in a fraction of a second
11	**B / D / F**	During "dynamic CT scanning," iodine dye is either injected into the blood or added to a drink that the patient must ingest approximately forty-five minutes before entering the scanner. The liquid X-ray dye makes it easier to see the organs and blood vessels when the pictures are developed. The intravenous contrast material is typically used for chest or pelvic scans, while oral-contrast material is used for abdominal scans. In some cases, physicians request that pictures be taken both before and after the contrast material enters the patient's body. Patients who receive contrast material in the arm often report feeling a warm sensation, and in rare cases an allergic reaction occurs
12	**B / D / F**	During "dynamic CT scanning," iodine dye is either injected into the blood or added to a drink that the patient must ingest approximately forty-five minutes before entering the scanner. The liquid X-ray dye makes it easier to see the organs and blood vessels when the pictures are developed. The intravenous contrast material is typically used for chest or pelvic scans, while oral-contrast material is used for abdominal scans. In some cases, physicians request that pictures be taken both before and after the contrast material enters the patient's body. Patients who receive contrast material in the arm often report feeling a warm sensation, and in rare cases an allergic reaction occurs
13	**B / D / F**	During "dynamic CT scanning," iodine dye is either injected into the blood or added to a drink that the patient must ingest approximately forty-five minutes before entering the scanner. The liquid X-ray dye makes it easier to see the organs and blood vessels when the pictures are developed. The intravenous contrast material is typically used for chest or pelvic scans, while oral-contrast material is used for abdominal scans. In some cases, physicians request that pictures be taken both before and after the contrast material enters the patient's body. Patients who receive contrast material in the arm often report feeling a warm sensation, and in rare cases an allergic reaction occurs

#	Answer	Explanation
14	**B**	In America, dime novels typically centered on tales of the American Revolution and the Wild West, while British penny bloods (later called penny dreadfuls) told serial tales of horror or fictionalized versions of true crimes
15	**A**	In America, dime novels typically centered on tales of the American Revolution and the Wild West, while British penny bloods (later called penny dreadfuls) told serial tales of horror or fictionalized versions of true crimes
16	**A**	From the 1830s to 1850s, penny bloods featured tales of gore that often depicted the upper class as corrupt
17	**C**	In America, dime novels typically centered on tales of the American Revolution and the Wild West, while British penny bloods (later called penny dreadfuls) told serial tales of horror or fictionalized versions of true crimes. These paperback novels were sold at newsstands and dry goods stores and succeeded in opening up the publishing market for both writers and readers. The industrial revolution facilitated the growth of literacy, making it easier to print and transport publications in large quantities, thus providing inexpensive entertainment for the masses
18	**B**	In America, dime novels typically centered on tales of the American Revolution and the Wild West, while British penny bloods (later called penny dreadfuls) told serial tales of horror or fictionalized versions of true crimes
19	**C**	A publishing craze that hit both America and England from the mid- to late nineteenth century attracted the readership of the semiliterate working class. In America, dime novels typically centered on tales of the American Revolution and the Wild West, while British penny bloods (later called penny dreadfuls) told serial tales of horror or fictionalized versions of true crimes
20	**C**	In 1870, the Forster Education Act made elementary education mandatory for all children
21	**F**	In the original story, String of Pearls: A Romance, published in 1846, Sweeney Todd was a demon barber who used his razor to torture his victims before turning them into meat pies
22	**A**	In 1860, Beadle and Adams was the first firm in the United States to publish a title that would be categorized as a dime novel
23	**E**	The International Copyright Law, passed by Congress in 1890, required publishers to pay royalties to foreign authors
24	**YES**	Throughout the nineteenth century, commoners in England were becoming educated through normal schools, church schools, and

#	Answer	Explanation
		mutual instruction classes, and by the 1830s, approximately 75 percent of the working class had learned to read
25	**NO**	Though few children's books were available, penny dreadfuls were highly accessible, especially to male youths who created clubs in order to pool their money and start their own libraries
26	**NO**	Controversy still exists over whether Thomas Prest's character was based on a real person
27	**YES**	however, during the Civil War, soldiers quickly became the most avid dime novel readers
28	**I**	Astronomers found that it accurately predicted all the observable data that science at that time was able to collect, with one exception—a very slight variation in the orbit of the planet Mercury around the sun
29	**B**	Among other phenomena, Einstein's theory predicted the existence of black holes, although initially he had doubts about their existence
30	**F**	Black holes are areas in space where the gravitational field is so strong that nothing can escape them
31	**A**	Due to this, they can be studied only by inference based on observations of their effect on the matter—both stars and gases—around them and by computer simulation
32	**L**	In particular, when gases are being pulled into a black hole, they can reach temperatures up to 1,000 times the heat of the sun and become an intensely glowing source of X rays
33	**D**	Because observations of event horizons are difficult due to their relatively small size, even less is known about them than about black holes themselves
34	**C**	Compact ones, called star-mass black holes and which have been known to exist for some time, are believed to be the result of the death of a single star
35	**B**	Current scientific data suggest that black holes are fairly common and lie at the center of most galaxies
36	**A**	The black hole at the center of the Milky Way, known as Sagittarius A* (pronounced "A-star"), is a supermassive one, containing roughly four million times the mass of our sun. Astronomers suggest that orbiting around Sagittarius A*, 26,000 light years from Earth, may be as many as tens of thousands of smaller black holes

#	Answer	Explanation
37	**NOT GIVEN**	It is thought that the first black holes came into existence not long after the big bang
38	**TRUE**	A number of theories proposed that the first black holes were essentially “seeds,” which then gravitationally attracted and consumed enormous quantities of matter found in adjacent gas clouds and dust. This allowed them to grow into the super-massive black holes that now sit in the centers of galaxies
39	**FALSE**	The new simulations do not definitively invalidate the seed theory, but they make it far less likely
40	**FALSE**	On the other hand, it is known that black holes a billion times more massive than our sun did exist in the early universe

Test 4

PASSAGE 1

You should spend about 20 minutes on Questions 1–13, which are based on Reading Passage 1 below.

The Gulf Stream and Global Warming

Labrador and London lie at about the same latitude, but Labrador is frigid and has only 30 miles of paved roads while London is one of the major centers of civilization. Why do two places, equidistant from the Arctic Circle, have such disparate climates? The Gulf Stream that flows by the British Isles makes all the difference: Its warm waters make northwestern Europe so abundant with life that palm trees can actually grow on the southern shores of England.

This life-giving Gulf Stream is warm, salty water, which travels along the surface of the Atlantic Ocean from the Caribbean, along the east coast of the United States, and then veers toward Europe. In the tropics, this water is warmed by the sun and becomes saltier because of the higher rate of evaporation in the heat. The Gulf Stream divides as it travels, but the majority of the stream moves north and east. As it travels past Europe, the Gulf Stream warms the atmosphere, and the prevailing westerly winds bring the warmed air to all of northwestern Europe, making the area suitable for intense agriculture. The Gulf Stream makes it possible for Europe to feed an increasingly large population.

After the Gulf Stream reaches southeast Greenland and western Iceland, much of the heat of the stream is gone, and the colder, denser water then sinks. The bulk of the Gulf Stream is carried down toward the ocean floor into as many as seven large vortices, called chimneys. They suck the Gulf Stream waters down over a mile deep, where the water is then drawn into another dynamic ocean current. Almost 2 miles below the surface, this cold water current flows in reverse, from the north southward. When this cold water nears the equator, it is again pulled up from the bottom of the ocean as the surface water is heated and starts its journey north. This upwelling brings with it minerals and food from the detritus at the bottom of the ocean to refresh food supplies for fish and other marine creatures.

This stream of water—the warm water traveling north along the surface and the cold water traveling south along the floor—has become known as the Great Ocean Conveyor Belt. This flow of ocean currents has been extremely important in regulating the temperature of the globe and in making life possible. These currents in the North Atlantic are part of the Great Conveyor Belt that flows through all the oceans of the world. The least stable section of this global current is in the North Atlantic. The Gulf Stream is the most unstable of all.

Predictions of the effects of global warming on the Gulf Stream are based on computer models, which differ to some extent. But several important facts are known. South of Greenland, there used to be as many as seven chimneys that pulled water from the Gulf Stream down toward the ocean floor. In the last several years, only one remained, and then, in 2007, that one

disappeared. The causes for the demise of the chimneys may include the increase in fresh water from glacial melt. In recent winters, glacial melt has released record amounts of fresh water into the oceans. As the North Atlantic waters, including fresh water from rivers as well as the increased amount of glacial melt, mix with the Gulf Stream, the salt water is diluted. Because fresh water is not as dense as salt water, it does not sink, which impairs the natural mechanism for forming the chimneys. As the chimneys have disappeared, the Gulf Stream has slowed. About 30 per cent of the water from the Gulf Stream that used to reach Europe travels elsewhere or is lost in the disintegration of the current, a loss of over six million tons of water flow every second. Without a strong Gulf Stream, the slow, cold water of the lower part of the conveyor belt fails to rise, which reduces the circulation of nutrients for marine life. The problem of warming then worsens: As less surface water, which is full of carbon dioxide from the atmosphere, siphons into the depths of the ocean, less carbon dioxide is removed from the atmosphere, thus increasing global warming.

Ocean sediments and glacial cores show that there have been global swings in temperature in the past. The last Ice Age, when much of North America and northern Europe were covered in glaciers 2 miles thick, occurred when the average temperature dropped about 5 degrees Celsius. That ice age ended about 20,000 years ago. The last “Little Ice Age,” when the average temperature dropped only 1 to 2 degrees Celsius, occurred in the sixteenth and seventeenth centuries, hitting Europe hardest. At that time, the Gulf Stream had slowed to about half its usual rate.

Core samples also show that the changes in temperature have been abrupt, not gradual. There would be little time to prepare for the devastating changes resulting from the weakening of the Gulf Stream. The good news is that in the winters of 2008 and 2009, one of the chimneys off southeastern Greenland suddenly burst into action again, bringing the Gulf Stream waters down deep enough to be caught in the conveyor and to keep the ocean currents in the North Atlantic flowing.

PART 1 — QUESTIONS

Questions 1-7

Write the correct letter, A, B, or C.

1 Labrador and London are similar in

- **A** ○ climate.
- **B** ○ distance from the North Pole.
- **C** ○ abundance of wildlife.

2 Europe can support a large population because

- **A** ○ it has a lot of fresh water.
- **B** ○ it is at the proper latitude.
- **C** ○ it has a good climate for farming.

3 When the Gulf Stream reaches the North Atlantic, it sinks because

- **A** ○ it has become colder.
- **B** ○ it has become less salty.
- **C** ○ it is blown by the winds.

4 Ocean currents help make life on Earth possible because they

- **A** ○ enable marine life to travel.
- **B** ○ maintain suitable temperatures.
- **C** ○ regulate glacial melt.

5 In 2007, the number of vortices, or chimneys, that pulled the waters of the Gulf Stream down toward the ocean floor was

- **A** ○ zero.
- **B** ○ one.

C ○ seven.

6 During the most recent Little Ice Age,

A ○ the Gulf Stream slowed down significantly.

B ○ Europe was affected only slightly.

C ○ glaciers covered much of North America.

7 In the past, climate change has happened

A ○ at regular intervals.

B ○ gradually over time.

C ○ very quickly.

Questions 8-13

The flow chart below shows a possible effect of global warming on the Gulf Stream.
Complete the flow chart using the list of words, A–L, below.

Write the correct letter, A–L.

Glaciers

8 _____

↓

The ocean becomes

9 _____

↓

The water doesn't

10 _____

↓

The Gulf Stream current is

11 _____

↓

The colder water at the southern end doesn't

12 _____

↓

There is less

13 _____ available for sea life

A. **less salty** B. **colder** C. **warmer** D. **sink** E. **rise** F. **weakened**

G. **strengthened** H. **heated** I. **food** J. **thaw** K. **air** L. **form**

PASSAGE 2

You should spend about 20 minutes on Questions 14–27, which are based on Reading Passage 2 below.

Chocolate—Food of the Gods

The cacao plant is believed to have evolved at least 4,000 years ago. It is a small evergreen tree, 15–25 feet high, which grows in the tropical forest understory, where it is protected by the shade of larger trees. The scientific name for the cacao plant is *Theobroma*, which means "food of the gods." Native to the Amazon and Orinoco River basins, it requires a humid climate and regular rainfall. Small pink flowers grow directly on the trunk and older branches. The fruit, a cacao pod, is melon shaped and weighs roughly 1 pound when fully ripened. A mature tree may have as many as 6,000 flowers but will only produce about twenty pods. Each pod contains between twenty and sixty seeds, called beans. The beans have a 40–50 percent fat content, referred to as cocoa butter. (Cacao is the plant; cocoa is the edible derivative and the primary ingredient in chocolate.)

Chemical analysis of pottery vessels unearthed in Puerto Escondido, Honduras, and dating from around 3,100 years ago show traces of a compound that is found exclusively in the cacao plant. At that time, the plant was already being used as a beverage ingredient. However, it was not the cacao beans that were first used. Instead, the first cacao-based drink was probably produced by fermenting the pulp in the cacao pods to yield a beerlike beverage. Researchers speculate that the chocolate drink made from the cacao beans and known later throughout Mesoamerica may have arisen as an accidental by-product of the brewing process. In all, ten small, beautifully crafted drinking vessels were found at the Puerto Escondido site, suggesting that even then the cacao brew was not consumed on a frequent basis but was reserved for important feasts or ceremonial events.

The villagers of Puerto Escondido had likely been influenced by the great Olmec civilization, which flourished for about 800 years beginning 3,200–2,400 years ago in the southern Gulf of Mexico region. Although centered in the modern Mexican states of Tabasco and Veracruz, Olmec influence reached as far south as El Salvador and Honduras. A majority of scholars concur that the Olmec people created the first civilization in the western hemisphere. They built large cities with significant architecture and established commerce extending over hundreds of miles. Relatively little is known about Olmec society because very little archeological evidence has survived the damp climate of the Gulf of Mexico. What is known, however, is that the later Mayan peoples, who did leave behind a great deal of cultural evidence, based much of their high culture on earlier Olmec traditions.

Mayan civilization flourished in southern Mexico and Central America from around 500 B.C.E. to around 1500, and the word *cacao* comes from the Mayan word *Ka'kau*. However, this is not a native Mayan word but is derived from the Olmec language. To the Mayans, the cacao pod symbolized life and fertility. Many of the bas-reliefs carved on their palaces and temples show cacao pods. It is believed that the Mayans took the cacao tree from its native rain forest and began to cultivate it in plantations. After harvesting the seed pods, they scooped out the

contents—the cacao beans embedded in a sticky, white flesh—and allowed it all to ferment until the seeds turned dark brown. The seeds were then roasted and ground into a thick chocolate paste.

From the paste, the Mayans made a hot chocolate drink. However, it was very different from contemporary hot chocolate. The basic drink was made by mixing the paste with water, chili powder, cornmeal, and other ingredients and heating it. Then the liquid was poured back and forth from one vessel held at arm's height to another resting on the ground. This created a chocolate drink with a thick head of dark foam—considered the best part of the drink. Among the Mayans, as the chocolate drink grew more popular and the ingredients more readily available, people from all levels of society enjoyed it at least on occasion.

The Maya preserved their knowledge of cacao use through stone carvings, some in jade and obsidian, pottery decorations, and written documents that detailed the use of cacao, described in Mayan as "food of the gods." Cacao was used in ceremonies, medical treatments, and daily life centuries before the discovery of the New World by Europeans. Certain recipes for cacao drinks included vanilla, nuts, honey from native bees, and various flowers.

Ek Chuah (meaning "black star" in Yucatec Maya) was the patron god of merchants and commerce. Because cacao seeds were light in weight, easily transported, and of great value, they were used as currency throughout Mesoamerica. Thus Ek Chuah also became the patron god of cacao. Each April, the Maya held a festival to honor this deity. The celebration included offerings of cacao, feathers, and incense, the sacrifice of a dog with cacao-colored markings, other animal sacrifices, and an exchange of gifts. Given that the chocolate drink could be made only through the direct destruction of currency, one can understand why it was called the "food of gods." The immortals could easily afford it, while for humans it was a precious commodity indeed.

PART 2 — QUESTIONS

Questions 14-18

Do the following statements agree with the information in the passage?

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

14 The cacao plant originated in the Gulf of Mexico region.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

15 The cacao plant prefers wet weather.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

16 Each flower on the cacao plant produces twenty pods.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

17 Cacao drinks were originally made using the pulp from the pod.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

18 In ancient Puerto Escondido, cacao drinks were served hot.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

Questions 19-25

According to the information in Reading Passage 2, which ancient civilizations do the following phrases describe?

A. the ancient Olmec civilization only

B. the ancient Mayan civilization only

C. both the Olmec and the Mayan civilizations

	A	B	C
19 collapsed around 2,400 years ago	○	○	○
20 was located in Mexico	○	○	○
21 grew cacao on large farms	○	○	○
22 left behind little concrete evidence of their culture	○	○	○
23 influenced the ancient inhabitants of Puerto Escondido	○	○	○
24 carved images of cacao pods	○	○	○
25 made a drink by mixing cacao with chili powder and cornmeal	○	○	○

Questions 26-27

Write the correct letter, A, B, or C.

26 The ancient Maya used cacao seeds as

A ○ decorations.

B ○ a dye.

C ○ money.

27 In April, the ancient Maya celebrated

A ○ dogs.

B ○ a god.

C ○ stars.

PASSAGE 3

You should spend about 20 minutes on Questions 28–40, which are based on Reading Passage 3 below.

The Intelligence of Corvids

For hundreds of years humans thought that tool making was a uniquely human trait. In 1960, Jane Goodall observed chimpanzees using tools in the wild, a discovery to which Goodall's mentor Louis Leakey famously responded, "We must redefine tool, redefine man, or accept chimpanzees as human." It is now commonly accepted that various primates engage in tool making, and there is a growing body of evidence that many corvids, a group of bird species that includes crows, jays, rooks, ravens, and magpies, are also tool makers, and that they show many other signs of possessing high intelligence.

Scientists have observed wild New Caledonian crows making hooks out of twigs to pull grubs from tree holes that are too deep for their beaks. New Caledonian crows also sometimes use their beaks to create small spears from leaves for collecting insects. Because New Caledonian crows are highly social and because tool design varies from area to area, most researchers assume the birds' tool use is cultural; that is, the tool use is learned from other crows.

In 2002, however, three researchers at Oxford University reported in *Science* a startling new twist to tool making in corvids: A New Caledonian crow that had been captured in 2000 as a juvenile had invented a new tool from materials not found in her natural habitat without observing the behavior in other crows. The crow, named Betty, shared space with a male crow named Abel. The researchers had set up an experiment in which both crows were presented with a straight wire and a hooked wire and food that could most easily be retrieved with a hooked wire. When Abel flew away with the hooked wire, Betty bent the straight wire and successfully lifted the bucket of food with her hook. The researchers then set out to see whether they could get Betty to replicate the behavior. Ten times, they set out a single straight wire and food to be retrieved. Betty retrieved the food nine times by bending the wire; once she managed to retrieve the food with the straight wire. Alex Kacelnik, one of the researchers who worked with the crows, noted that she had solved a new problem by doing something she had never done before.

Professor John Marzluff, at the University of Washington in Seattle, demonstrated another interesting ability in American crows: recognizing faces of individual humans. In 2005, he and other researchers each wore a caveman mask when they captured, tagged, and then released crows on campus. Then Marzluff and other researchers took turns wearing the mask and walking around campus. Over time, increasing numbers of crows flocked together and cawed at anyone wearing the caveman mask, regardless of the size, gender, and skin color of the mask wearer or whether the wearer was one of the researchers who had originally captured crows. When the same people did not wear the mask, they got no reaction from the crows. This showed that it was clearly the face that was identified as a threat to the flock. Crows that had not originally been captured were joining the harassment of the perceived threat. When

Marzluff suggested that researchers try wearing the caveman mask upside down, some crows actually turned their heads upside down to better identify the face of the “enemy.”

In their studies of western scrub jays published in *Science* in May 2006, Johann Dally, Nathan Emery, and Nicola Clayton showed that jays have the ability to remember whether a specific other jay saw them hide food for later use. When it became clear that a jay that observed the hiding might have access to the cache, the hiders retrieved their food and re-hid it when given the opportunity to do so without observation. They did not re-hide food when other jays were introduced to the situation. Similarly, ravens in the wild have been observed misleading other ravens by pretending to hide food in one location then flying off to hide it elsewhere when the other raven goes to investigate the false cache.

Corvids are also capable of fooling humans. Marzluff tells the story of a pair of crows that built a fake nest that they always flew to when researchers were in their area. The crows’ actual nest with their young was nearby, but the humans never saw the crows actually fly to it.

In an experiment to test social cooperation in rooks, University of Cambridge researchers found that pairs of rooks quickly figured out how to pull on ropes at the same time to bring food that could not be gained through the individual effort of one rook.

Otto Koehler tested the ability of captive jackdaws to count, a skill apparently related to their communication often being based on the number of calls. First, Koehler trained jackdaws to expect five food rewards. Then the jackdaws were given a number of boxes, some of which contained food. They proceeded to open the boxes until they had found five pieces of food, at which point they stopped opening boxes because they knew they had reached five. In another experiment Koehler also trained jackdaws to choose a box with the same number of dots on the lid as the number of dots on a cue card.

Tool makers, tricksters, cooperators, mathematicians—the corvids are far from “bird brains.” In fact, their intelligence, in many cases, appears to equal or even surpass that of many of our primate “cousins.”

PART 3 — QUESTIONS

Questions 28-33

Complete the summary using the list of words and phrases, A–N, below. Not all letters are used.

Write the correct letter, A–N.

Jane Goodall's work in 1960 showed that **28** _____ were not the only ones to make tools. Since then, scientists have observed different kinds of animals making tools. New Caledonian crows, for example, make tools in order to retrieve the **29** _____ that they eat in the wild. Scientists believe that generally these birds **30** _____ how to make tools. In 2002, a captive New Caledonian crow named Betty invented a new tool. Scientists observed Betty use pieces of wire to make **31** _____, which she used to retrieve food. The interesting thing is that other crows did not **32** _____ the tools. Once the scientists saw Betty make a tool, they tried to get her to **33** _____ the behavior, which she did successfully.

A. **learn from other birds** B. **twigs** C. **humans** D. **repeat** E. **spears**

F. **are born knowing** G. **leaves** H. **hooks** I. **try to take away**

J. **modify** K. **chimpanzees** L. **grubs** M. **teach her how to make**

N. **corvids**

Questions 34-36

Write the correct letter, A, B, or C.

34 Researchers wore a mask when working with crows in order to

A ○ conceal their true identity from the crows.

B ○ find out whether crows would recognize the mask in another situation.

C ○ protect their faces from aggressive crows.

35 Crows harassed researchers wearing the mask because the researchers

A ○ had worn the mask when handling crows.

B ○ were of a size and skin color that crows feared.

C ○ took turns wearing the mask while walking around campus.

36 When researchers removed the mask,

A ○ the crows did not harass them.

B ○ they were attacked by the entire flock of crows.

C ○ they could more easily tag the crows.

Questions 37-40

Match each corvid action described by researchers below with the information it shows us about corvid intelligence.

Write the correct letter, A–F. There are more types of information listed than actions, so you will not use them all.

A. Corvids can count.

B. Corvids recognize individual birds.

C. Corvids are good at discovering food sources.

D. Corvids can work together to achieve a goal.

E. Corvids protect themselves by tricking their enemies.

F. Corvids are skilled at remembering where they hid things.

	A	B	C	D	E	F
37 Birds opened boxes to obtain food.	○	○	○	○	○	○
38 Birds pulled ropes to get food.	○	○	○	○	○	○
39 Birds hid food from other birds.	○	○	○	○	○	○
40 Birds built a nest that was not real.	○	○	○	○	○	○

Answer Key

#	Answer	Explanation
1	B	Why do two places, equidistant from the Arctic Circle, have such disparate climates
2	C	As it travels past Europe, the Gulf Stream warms the atmosphere, and the prevailing westerly winds bring the warmed air to all of northwestern Europe, making the area suitable for intense agriculture. The Gulf Stream makes it possible for Europe to feed an increasingly large population
3	A	After the Gulf Stream reaches southeast Greenland and western Iceland, much of the heat of the stream is gone, and the colder, denser water then sinks
4	B	This flow of ocean currents has been extremely important in regulating the temperature of the globe and in making life possible
5	A	In the last several years, only one remained, and then, in 2007, that one disappeared
6	A	The last “Little Ice Age,” when the average temperature dropped only 1 to 2 degrees Celsius, occurred in the sixteenth and seventeenth centuries, hitting Europe hardest. At that time, the Gulf Stream had slowed to about half its usual rate
7	C	Core samples also show that the changes in temperature have been abrupt, not gradual
8	J	In recent winters, glacial melt has released record amounts of fresh water into the oceans
9	A	As the North Atlantic waters, including fresh water from rivers as well as the increased amount of glacial melt, mix with the Gulf Stream, the salt water is diluted
10	D	Because fresh water is not as dense as salt water, it does not sink, which impairs the natural mechanism for forming the chimneys
11	F	As the chimneys have disappeared, the Gulf Stream has slowed
12	E	Without a strong Gulf Stream, the slow, cold water of the lower part of the conveyor belt fails to rise, which reduces the circulation of nutrients for marine life

#	Answer	Explanation
13	**I**	Without a strong Gulf Stream, the slow, cold water of the lower part of the conveyor belt fails to rise, which reduces the circulation of nutrients for marine life
14	**FALSE**	Native to the Amazon and Orinoco River basins, it requires a humid climate and regular rainfall
15	**TRUE**	Native to the Amazon and Orinoco River basins, it requires a humid climate and regular rainfall
16	**FALSE**	A mature tree may have as many as 6,000 flowers but will only produce about twenty pods
17	**TRUE**	Instead, the first cacao-based drink was probably produced by fermenting the pulp in the cacao pods to yield a beerlike beverage
18	**NOT GIVEN**	In all, ten small, beautifully crafted drinking vessels were found at the Puerto Escondido site, suggesting that even then the cacao brew was not consumed on a frequent basis but was reserved for important feasts or ceremonial events
19	**A**	The villagers of Puerto Escondido had likely been influenced by the great Olmec civilization, which flourished for about 800 years beginning 3,200–2,400 years ago in the southern Gulf of Mexico region
20	**C**	The villagers of Puerto Escondido had likely been influenced by the great Olmec civilization, which flourished for about 800 years beginning 3,200–2,400 years ago in the southern Gulf of Mexico region Mayan civilization flourished in southern Mexico and Central America from around 500 B.C.E. to around 1500, and the word cacao comes from the Mayan word Ka'kau
21	**B**	It is believed that the Mayans took the cacao tree from its native rain forest and began to cultivate it in plantations
22	**A**	Relatively little is known about Olmec society because very little archeological evidence has survived the damp climate of the Gulf of Mexico. What is known, however, is that the later Mayan peoples, who did leave behind a great deal of cultural evidence, based much of their high culture on earlier Olmec traditions
23	**A**	The villagers of Puerto Escondido had likely been influenced by the great Olmec civilization, which flourished for about 800 years beginning 3,200–2,400 years ago in the southern Gulf of Mexico region
24	**B**	To the Mayans, the cacao pod symbolized life and fertility. Many of the bas-reliefs carved on their palaces and temples show cacao pods

#	Answer	Explanation
25	**B**	From the paste, the Mayans made a hot chocolate drink. However, it was very different from contemporary hot chocolate. The basic drink was made by mixing the paste with water, chili powder, cornmeal, and other ingredients and heating it
26	**C**	Because cacao seeds were light in weight, easily transported, and of great value, they were used as currency throughout Mesoamerica
27	**B**	Each April, the Maya held a festival to honor this deity
28	**C**	For hundreds of years humans thought that tool making was a uniquely human trait. In 1960, Jane Goodall observed chimpanzees using tools in the wild, a discovery to which Goodall's mentor Louis Leakey famously responded, "We must redefine tool, redefine man, or accept chimpanzees as human."
29	**L**	Scientists have observed wild New Caledonian crows making hooks out of twigs to pull grubs from tree holes that are too deep for their beaks
30	**A**	Because New Caledonian crows are highly social and because tool design varies from area to area, most researchers assume the birds' tool use is cultural; that is, the tool use is learned from other crows
31	**H**	When Abel flew away with the hooked wire, Betty bent the straight wire and successfully lifted the bucket of food with her hook
32	**M**	A New Caledonian crow that had been captured in 2000 as a juvenile had invented a new tool from materials not found in her natural habitat without observing the behavior in other crows
33	**D**	The researchers then set out to see whether they could get Betty to replicate the behavior
34	**B**	In 2005, he and other researchers each wore a caveman mask when they captured, tagged, and then released crows on campus. Then Marzluff and other researchers took turns wearing the mask and walking around campus
35	**A**	In 2005, he and other researchers each wore a caveman mask when they captured, tagged, and then released crows on campus
36	**A**	When the same people did not wear the mask, they got no reaction from the crows
37	**A**	Otto Koehler tested the ability of captive jackdaws to count, a skill apparently related to their communication often being based on the number of calls. First, Koehler trained jackdaws to expect five

#	Answer	Explanation
		food rewards. Then the jackdaws were given a number of boxes, some of which contained food. They proceeded to open the boxes until they had found five pieces of food, at which point they stopped opening boxes because they knew they had reached five
38	**D**	In an experiment to test social cooperation in rooks, University of Cambridge researchers found that pairs of rooks quickly figured out how to pull on ropes at the same time to bring food that could not be gained through the individual effort of one rook
39	**B**	In their studies of western scrub jays published in Science in May 2006, Johann Dally, Nathan Emery, and Nicola Clayton showed that jays have the ability to remember whether a specific other jay saw them hide food for later use
40	**E**	Corvids are also capable of fooling humans. Marzluff tells the story of a pair of crows that built a fake nest that they always flew to when researchers were in their area

Test 5

PASSAGE 1

You should spend about 20 minutes on Questions 1-14, which are based on Reading Passage 1 below.

Candle Making in Colonial America

The primary material used in making candles today is paraffin[1] wax, which is derived from petroleum. In the process of refining crude oil, refiners "crack" the oil, thereby separating it into different products such as gasoline, heating oil, and kerosene. Paraffin wax, originally produced by plants that lived 100 to 700 million years ago to protect their leaves, is inert and remains suspended in the decayed vegetable matter that eventually becomes crude oil. In the refining process, paraffin wax is separated out and sold as a by-product.

Paraffin was not discovered until the early 1800s. At that time, paraffin was derived by a process of distilling bituminous schist, now known as shale oil. In 1850, Dr. James Young, a Scottish industrial chemist, applied for a patent for obtaining paraffin oil and paraffin from bituminous coals. Shortly after that, under a license from Young, paraffin was being produced from coal on a large scale in the United States. Because petroleum is now readily available, Young's original process for obtaining parrafin is no longer profitable, and paraffin is currently produced from crude oil.

Before the discovery of paraffin, candle making had for centuries relied on different materials. Chemically, those materials were also hydrocarbons; however, they were derived directly from insects, animals, or plants.

In colonial times in America, beeswax was highly valued for making candles. Even today beeswax, though more expensive, is highly regarded because pure beeswax candles emit no smoke when burning, whereas paraffin candles produce a black, slightly oily soot. Beeswax is secreted only by female worker bees. As a worker bee eats honey, her wax glands exude the wax as oval flakes that form on the underside of her last four abdominal segments. The bee then removes the wax flakes and chews them, mixing the wax flakes with her saliva to soften them. When the wax is sufficiently pliable, she attaches it to the honeycomb. As the wax comb is built up, each pocket is filled with honey and then sealed with more wax.

Given the numerous uses and considerable value not only of honey but also of the bees themselves and their beeswax, beekeeping was an important part of American life in the seventeenth and eighteenth centuries. Many of the early settlers brought honeybee hives with them from Europe. Not indigenous to North America, the European honeybees nonetheless thrived and often escaped into the wild. In 1785, writing in *Notes on the State of Virginia*, Thomas Jefferson observed, "The bees have generally extended themselves into the country, a little in advance of the white settlers. The Indians therefore call them the white man's fly, and consider their approach as indicating the approach of the settlements of the whites." Eventually,

the Native Americans as well as the colonists used beeswax and honey in the frontier bartering system that grew up in the absence of readily available coinage.

Another source of colonial candle material was animal fat or tallow. Cattle and sheep were the most common sources of tallow. Pork fat was not used because candles made from it dripped too much and were dangerous. Additionally, the odor[1] of burning pork tallow was particularly offensive. Chicken and duck fat were too soft to make candles. The tallow was rendered—heated in a cauldron until the fat melted—and then strained numerous times to remove any gristle, meat fibers,[2] and as many impurities as possible. Straining reduced, but did not entirely eliminate, the extent to which the candles smoked and emitted a noxious odor. Tallow candles needed to be stored in tightly closed containers, usually made of tin or wood, to keep out rodents and other animals that might eat them.

In the New World, the colonists discovered a native plant high in a natural waxy substance that could be extracted and used for candle making. The plant is the bayberry shrub, also known as candleberry. Bayberry shrubs are dense and semievergreen. The plants are extremely hardy, grow to as much as nine feet high, and do well even in salt-laden, coastal soil unsuitable for other horticulture. In winter, the female plants bear clusters of blue-gray berries, which lend their color to the wax. The colonists boiled the berries to separate the waxy matter from the pulp and then skimmed the wax off the top. Although making bayberry candles was more labor[3] intensive than making tallow candles, bayberry candles were considerably superior, burning longer and producing less smoke. Further recommending them, they had a pleasing scent. Compared to beeswax, bayberries were available in greater quantities, and the colonists found that bayberry wax was harder than beeswax and thus also burned longer.

Because the bayberry clusters were harvested in winter and because making the candles was very time-consuming, the candles were often saved for special occasions, particularly Christmas and New Year’s Eve. Eventually, they became a holiday tradition and gave rise to the saying, “Bayberry candles burned to the socket, puts luck in the home, food in the larder, and gold in the pocket.” Fortunate indeed was the colonial household with brightly burning candles and a holiday feast.

PART 1 — QUESTIONS

Questions 1-3

Write the correct letter, A, B, or C.

1 Paraffin is

- **A** ○ a petroleum by-product.
- **B** ○ found in rocks.
- **C** ○ from a type of vegetable.

2 Paraffin was first obtained from

- **A** ○ crude oil.
- **B** ○ rotten vegetables.
- **C** ○ bituminous coal.

3 James Young was

- **A** ○ a candle maker.
- **B** ○ an oil producer.
- **C** ○ a scientist.

Questions 4-14

Classify the following as descriptive of

Write the correct letter, A, B, C, or D.

A. paraffin

B. beeswax

C. tallow

D. bayberry wax

	A	B	C	D
4 was often made from the fat of cows	○	○	○	○
5 is made from a bush that grows near the sea	○	○	○	○
6 needs to be filtered before being made into candles	○	○	○	○
7 was not used before the nineteenth century	○	○	○	○
8 produces smokeless candles	○	○	○	○
9 produced candles that were attractive to hungry mice and rats	○	○	○	○
10 is bluish in color	○	○	○	○
11 was brought to colonial America by European settlers	○	○	○	○
12 was often reserved for holiday use	○	○	○	○
13 has a pleasing aroma	○	○	○	○
14 was often used for trading in place of money	○	○	○	○

PASSAGE 2

You should spend about 20 minutes on Questions 15-27, which are based on Reading Passage 2 below.

Caffeine

Almost 200 years ago, a young German chemist named Friedrich Ferdinand Runge isolated a molecule from coffee beans; he named the substance *kaffein*. Today, scientists are still studying the properties of this bitter, white powder. More than sixty plants are known to produce caffeine, whose pungent taste helps protect them from insect predators.

Caffeine is probably the most widely used drug in the world. Humans have been consuming caffeine for hundreds of years, primarily in the form of coffee, tea, and cocoa. Today, it is also added to soft drinks and energy drinks and is a component of some over-the-counter medications. Many of the world's people, including children, ingest it in some form daily.

The body absorbs caffeine in less than an hour, and it remains in the system for only a few hours, passing from the gastrointestinal tract into the bloodstream within about ten minutes and circulating to other organs, including the brain. Caffeine molecules are small and soluble in fat, properties that allow them to pass through a protective shield known as the blood–brain barrier and directly target the central nervous system.

Caffeine acts on the body in many ways, some of them probably still unknown. However, caffeine accomplishes its principal action as a stimulant by inhibiting adenosine, a chemical that binds to receptors on nerve cells and slows down their activity. Caffeine binds to the same receptors, robbing adenosine of the ability to do its job and leaving caffeine free to stimulate nerve cells, which in turn release epinephrine (also known as adrenaline), a hormone that increases heart rate and blood pressure, supplies an energy boost, and in general makes people feel good.

For all its popularity, caffeine retains a somewhat negative image. It is, after all, a mildly habit-forming stimulant that has been linked to nervousness and anxiety and that causes insomnia. It affects most of the body's major organs. Recent research casts doubt on the magnitude of many of these seemingly undesirable effects and even suggests that a daily dose of caffeine may reduce the risk of some chronic diseases, while providing short-term benefits as well.

Daily caffeine consumption has been associated with lowered incidence of type II diabetes, Parkinson's disease, and Alzheimer's disease. How caffeine works to thwart diabetes, a condition characterized[1] by high levels of glucose in the blood, remains unknown, but glucose tolerance or more efficient glucose metabolism may be involved. Parkinson's disease, a central nervous system disorder that causes tremor and joint stiffness, is linked to insufficient amounts of a substance called dopamine in the brain. Caffeine may interact with brain cells that produce dopamine and help maintain a steady supply. The role of caffeine in Alzheimer's disease, which damages the brain and causes memory loss and confusion, may be related to a problem in the

blood–brain barrier, possibly a contributor in Alzheimer's, if not the major cause. Caffeine has been found to protect the barrier against disruption resulting from high levels of cholesterol.

Habitual coffee and tea drinkers had long been observed to have a lower incidence of non-melanoma skin cancers, although no one knew why. A recent study found that caffeine affects skin cells damaged by ultraviolet radiation, a main cause of skin cancer. Caffeine interferes with a protein that cancerous cells need to survive, leaving the damaged cells to die before they become cancerous. Drinking caffeinated coffee has also been associated with a decreased incidence of endometrial cancer—that is, cancer of the cells lining the uterus. The strongest effect appears to be in overweight women, who are at greatest risk for the disease. Researchers believe blood sugar, fat cells, and estrogen may play a role. Although the mechanism remains unknown, people who drink more than two cups of coffee or tea a day reportedly have about half the risk of developing chronic liver disease as those who drink less than one cup of coffee daily; caffeinated coffee has also been associated with lowered risk of cirrhosis and liver cancer.

While many of caffeine's undesirable effects, such as elevated heart rate and blood pressure, are brief, some short-term benefits, including pain relief, increased alertness, and increased physical endurance, have also been attributed to caffeine. As a component of numerous over-the-counter diet pills and pain relievers, caffeine increases their effectiveness and helps the body absorb them more quickly. By constricting blood vessels in the brain, it can alleviate headaches—even migraines—and can help counter the drowsiness caused by antihistamines.

Caffeine does not alter the need for sleep, but it does offer a temporary solution to fatigue for people who need to stay alert. Research has shown that sleep-deprived individuals who consumed caffeine had improved memory and reasoning abilities, at least in the short term. Studies of runners and cyclists have shown that caffeine can improve their stamina—hence its addition to energy-boosting sports drinks.

People who consume a lot of caffeine regularly may develop temporary withdrawal symptoms, headache being the most common, if they quit or cut back on it abruptly. Fortunately, these symptoms last only a day or two in most cases. Individuals who are more sensitive to the stimulatory side effects of caffeine may want to avoid it, but most doctors agree that the equivalent of three cups of coffee a day does not harm healthy people. There is no medical basis to give up daily caffeine and many reasons to include a moderate amount in one's diet.

PART 2 — QUESTIONS

Questions 15-23

Do the following statements agree with the information given in the passage?

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

15 Before 200 years ago, people did not drink coffee regularly.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

16 Children generally do not consume caffeine.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

17 The nervous system is affected by caffeine.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

18 Caffeine causes the heart to beat faster.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

19 Caffeine can be addictive.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

20 Alzheimer's disease may be caused in part by caffeine consumption.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

21 Drinking coffee can help protect against some skin cancers.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

22 Caffeine may increase the incidence of endometrial cancer.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

23 Caffeine can help some medications work faster.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

Questions 24-27

Write the correct letter, A, B, or C.

24 Caffeine is used to treat

A ○ high blood pressure.

B ○ liver cancer.

C ○ headaches.

25 Some athletes use caffeine to

A ○ increase their endurance.

B ○ improve their speed.

C ○ maintain their alertness.

26 Symptoms of caffeine withdrawal

A ○ can become an ongoing problem.

B ○ may last as long as a week.

C ○ are usually short-lived.

27 Drinking three cups of coffee a day

A ○ may be recommended by a doctor.

B ○ will probably not cause problems.

C ○ is harmful to the health.

PASSAGE 3

You should spend about 20 minutes on Questions 28-40, which are based on Reading Passage 3 below.

Animal Camouflage

The theory of natural selection, proposed by Charles Darwin almost 150 years ago, hypothesizes[1] that organisms with traits that give them a survival advantage tend to live longer and produce more offspring. Over many thousands of years of evolution, those beneficial characteristics dominate the gene pool. Animals that use camouflage to conceal themselves from their enemies, predator and prey alike, provide a classic example of natural selection at work. Creatures with some type of protective coloring pass along the genes responsible, with each generation fine-tuning them along the way, eventually providing the most effective coloring for their environment and lifestyle. Scientists have described four types of camouflage that animals use: background matching, disruptive coloration, countershading, and mimicry.

From dirt-colored chipmunks and gophers to leaf-green praying mantises and tree frogs to ocean-gray mackerel and sharks, all sorts of wildlife use background matching, also known as *crypsis*, to blend in with their surroundings. Some animals have the ability to alter their coloring as their environment changes seasonally or as they change locations. The arctic fox and the snowshoe hare both have white winter fur that matches the snow and ice around them, but a brown pelt in warmer weather blends in with their woodland environs. Some reptiles and fish can alter their surface appearance instantly as they move from place to place. The green anole lizard changes from green to brown as it travels among leaves and branches, whereas the flounder and other types of flatfish are able to match not just the color but also the silty or mottled sandy texture of the ocean floor beneath them.

Most animals, though, cannot change their appearance so easily. Because background matching works only for a specific setting and often requires animals to remain motionless for long periods, a somewhat more effective strategy involves having a camouflage that works on many backgrounds, blending in with all, but not perfectly matching any of them.

Disruptive coloration uses a pattern such as stripes or spots to disrupt the body's outline. The pattern breaks up the contour of the animal's body, confusing observers and making it difficult to distinguish an individual shape. Colors with more contrast, like a tiger's stripes, tend to increase the disruptive effect. This type of camouflage works well for animals that travel in herds. It helps zebras blend in not so much with their background as with each other. Their major predator, the lion, sees a mass of moving stripes and has trouble targeting a specific animal. A single zebra, on the other hand, may use background matching when hiding in tall grass, where its black and white stripes merge with the green and yellow stalks. The different colors of the grasses and zebra are no help to a lion, which is color-blind.[1]

Animals with countershading typically have a dark backside and a light belly, which affect an onlooker's perception of their three-dimensional appearance and help decrease their visibility in sunlight. Countershading also can create a more uniformly dark appearance, presenting an

apparent lack of depth. Caterpillars make good use of this effect, which gives them a flat look that blends in with tree bark.

Countershading is useful to birds and marine animals that are typically seen against a light environment from below and against dark surroundings from above. Predatory birds like hawks take advantage of it to conceal themselves from the small birds and rodents they hunt. While in flight, a dark back absorbs the sunlight above them and a light underside reflects the light below, diminishing telltale shadows that might give them away. On the ground or in a tree, their mottled brown feathers blend in with branches and leaves. Penguins also use countershading. Their white chests and black backs stand out on land but disappear in water where penguins spend most of their time. They are almost invisible to an observer looking down into dark water, while a creature in deeper water looking up sees a splash of white that looks like a beam of sunlight.

Mimicry, or masquerading, works not by hiding a creature but by making it appear to be something else. Walking stick insects are virtually indistinguishable from twigs, and katydids look so much like green leaves that leaf-eating insects have been observed trying to chew on them.

A type of mimicry known as *aposematism* involves masquerading as an animal that is undesirable or even dangerous. Predators bypass the foul-tasting monarch butterfly, but they also avoid the tasty look-alike viceroy butterfly. Coral snake impersonators, like the harmless scarlet snake, have the same red, black, and yellow bands but in a different order: black, yellow, red, yellow on the coral snake and red, black, yellow, black on the scarlet snake. Different types of moths use aposematism to scare off predators; some species have a big spot on each wing to mimic the eyes of a large animal, while the hawk moth caterpillar has a pattern on its rear that looks like a snake head.

Some predators use what is known as aggressive mimicry to disguise themselves as something harmless so they can catch prey off guard. Small animals are not afraid of turkey vultures, which are scavengers, not predators. So when the similar zone-tailed hawk flies with a group of turkey vultures, it has an easy time locating and zeroing in on its living prey.

No single type of camouflage works best in all situations, and many animals use more than one technique to enhance their ability to avoid detection by predator and prey alike.

PART 3 — QUESTIONS

Questions 28-36

Complete the summary below. Choose NO MORE THAN THREE WORDS from the passage for each answer.

Camouflage helps animals hide from both **28** _____.

Animals pass on their **29** _____ through their genes.

There are four different types of camouflage. In background matching, an animal's appearance helps it **30** _____ with its environment.

The arctic fox and snowshoe hare are examples of animals that **31** _____ with the seasons. However, not all animals can easily change their appearance. Many use a different strategy, having camouflage that helps them disguise themselves **32** _____. Animals with disruptive coloration have marking such as **33** _____ that make it difficult for a predator to discern the shape of the body. Therefore, the predator has a hard time targeting one animal out of a group. Although zebras are black and white, they can hide in tall grass because their major predator is **34** _____. **35** _____ is a type of camouflage that helps hide animals that are seen from above or below. Penguins, for example, have **36** _____, which help them blend in with the dark water from the point of view of an observer standing above.

Questions 37-40

Do the following statements agree with the information in the passage?

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

37 The walking stick insect looks like a small stick.

- **A** ○ TRUE
- **B** ○ FALSE

C ○ NOT GIVEN

38 The viceroy butterfly is similar in appearance to the monarch butterfly.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

39 The scarlet snake is extremely poisonous.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

40 The hawk moth caterpillar is brightly colored.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

Answer Key

#	Answer	Explanation
1	A	The primary material used in making candles today is paraffin wax, which is derived from petroleum In the refining process, paraffin wax is separated out and sold as a by-product
2	C	In 1850, Dr. James Young, a Scottish industrial chemist, applied for a patent for obtaining paraffin oil and paraffin from bituminous coals
3	C	In 1850, Dr. James Young, a Scottish industrial chemist, applied for a patent for obtaining paraffin oil and paraffin from bituminous coals
4	C	Another source of colonial candle material was animal fat or tallow. Cattle and sheep were the most common sources of tallow
5	D	The plant is the bayberry shrub, also known as candleberry. Bayberry shrubs are dense and semievergreen. The plants are extremely hardy, grow to as much as nine feet high, and do well even in salt-laden, coastal soil unsuitable for other horticulture
6	C	The tallow was rendered—heated in a cauldron until the fat melted—and then strained numerous times to remove any gristle, meat fibers,2 and as many impurities as possible
7	A	Paraffin was not discovered until the early 1800s
8	B	pure beeswax candles emit no smoke when burning
9	C	Tallow candles needed to be stored in tightly closed containers, usually made of tin or wood, to keep out rodents and other animals that might eat them
10	D	In winter, the female plants bear clusters of blue-gray berries, which lend their color to the wax
11	B	Many of the early settlers brought honeybee hives with them from Europe
12	D	Because the bayberry clusters were harvested in winter and because making the candles was very time-consuming, the candles were often saved for special occasions, particularly Christmas and New Year’s Eve
13	D	Although making bayberry candles was more labor3 intensive than making tallow candles, bayberry candles were considerably

#	Answer	Explanation
		superior, burning longer and producing less smoke. Further recommending them, they had a pleasing scent
14	B	Eventually, the Native Americans as well as the colonists used beeswax and honey in the frontier bartering system that grew up in the absence of readily available coinage
15	NOT GIVEN	Humans have been consuming caffeine for hundreds of years, primarily in the form of coffee, tea, and cocoa
16	FALSE	Many of the world's people, including children, ingest it in some form daily
17	TRUE	Caffeine molecules are small and soluble in fat, properties that allow them to pass through a protective shield known as the blood–brain barrier and directly target the central nervous system
18	TRUE	Caffeine binds to the same receptors, robbing adenosine of the ability to do its job and leaving caffeine free to stimulate nerve cells, which in turn release epinephrine (also known as adrenaline), a hormone that increases heart rate and blood pressure, supplies an energy boost, and in general makes people feel good
19	TRUE	It is, after all, a mildly habit-forming stimulant that has been linked to nervousness and anxiety and that causes insomnia
20	FALSE	Daily caffeine consumption has been associated with lowered incidence of type II diabetes, Parkinson's disease, and Alzheimer's disease
21	TRUE	Habitual coffee and tea drinkers had long been observed to have a lower incidence of non-melanoma skin cancers, although no one knew why
22	FALSE	Drinking caffeinated coffee has also been associated with a decreased incidence of endometrial cancer—that is, cancer of the cells lining the uterus
23	TRUE	As a component of numerous over-the-counter diet pills and pain relievers, caffeine increases their effectiveness and helps the body absorb them more quickly
24	C	By constricting blood vessels in the brain, it can alleviate headaches—even migraines—and can help counter the drowsiness caused by antihistamines
25	A	Studies of runners and cyclists have shown that caffeine can improve their stamina—hence its addition to energy-boosting sports drinks
26	C	Fortunately, these symptoms last only a day or two in most cases

#	Answer	Explanation
27	**B**	most doctors agree that the equivalent of three cups of coffee a day does not harm healthy people
28	**predators and prey**	Animals that use camouflage to conceal themselves from their enemies, predator and prey alike, provide a classic example of natural selection at work
29	**protective coloring**	Creatures with some type of protective coloring pass along the genes responsible, with each generation fine-tuning them along the way, eventually providing the most effective coloring for their environment and lifestyle
30	**blend in**	all sorts of wildlife use background matching, also known as crypsis, to blend in with their surroundings
31	**alter their coloring/alter coloring**	Some animals have the ability to alter their coloring as their environment changes seasonally or as they change locations
32	**on many backgrounds/on backgrounds**	Because background matching works only for a specific setting and often requires animals to remain motionless for long periods, a somewhat more effective strategy involves having a camouflage that works on many backgrounds, blending in with all, but not perfectly matching any of them
33	**stripes or spots**	Disruptive coloration uses a pattern such as stripes or spots to disrupt the body’s outline
34	**color-blind/colorblind**	The different colors of the grasses and zebra are no help to a lion, which is color-blind.1
35	**countershading**	Countershading is useful to birds and marine animals that are typically seen against a light environment from below and against dark surroundings from above
36	**black backs**	Their white chests and black backs stand out on land but disappear in water where penguins spend most of their time. They are almost invisible to an observer looking down into dark water, while a creature in deeper water looking up sees a splash of white that looks like a beam of sunlight
37	**TRUE**	Walking stick insects are virtually indistinguishable from twigs, and katydids look so much like green leaves that leaf-eating insects have been observed trying to chew on them
38	**TRUE**	Predators bypass the foul-tasting monarch butterfly, but they also avoid the tasty look-alike viceroy butterfly
39	**FALSE**	Coral snake impersonators, like the harmless scarlet snake, have the same red, black, and yellow bands but in a different order:

#	Answer	Explanation
		black, yellow, red, yellow on the coral snake and red, black, yellow, black on the scarlet snake
40	**NOT GIVEN**	Different types of moths use aposematism to scare off predators; some species have a big spot on each wing to mimic the eyes of a large animal, while the hawk moth caterpillar has a pattern on its rear that looks like a snake head

Test 6

PASSAGE 1

You should spend about 20 minutes on Questions 1-14, which are based on Reading Passage 1 below.

Pollination

Plants have evolved a wide variety of methods to reproduce themselves. Some plants reproduce asexually by splitting off new roots or bulbs (e.g., garlic, lilies) or even branches, stems, or leaves (e.g., mangroves, spider plants). Plants that reproduce asexually are essentially reproducing clones of themselves. This is a simple and direct method of reproduction, producing new plants more quickly and with less energy than plants using sexual reproduction. The majority of plants, however, reproduce sexually. The advantages from an evolutionary perspective include more genetic variety and better dispersal than the colonies of clones formed by asexual reproduction. In flowering plants, pollen (male) grains are moved from the anther to the stigma, where the pollen fertilizes the ovaries (female), resulting in seeds.

A few flowering plants such as peas, beans, and tomatoes pollinate themselves, but more commonly, pollination occurs between separate plants, either through pollen being borne by the wind (most conifers and many grasses) or by pollinators, animal species that plants rely on to help move the pollen from one plant to the ovaries of another. Most pollinators are insects, but some species of bird and bats also play an important role.

Plants have evolved a variety of methods to entice pollinators to do their work. Many produce nectar, a sugary substance that pollinators use as food. A well-known example is the honeybee, which collects nectar as well as pollen for food. When a bee enters one flower, it brushes against the anther, and pollen grains are picked up by the surface of its body. When the bee enters a second flower and brushes against the stigma, some of that pollen comes in contact with the ovaries of the second plant, thus fertilizing it, resulting in seeds that contain genetic material from the male gametes of the first plant combined with the female reproductive organs of the second plant. Most bees, butterflies, and moths, as well as certain species of bats and birds, are attracted to nectar-producing flowers.

Flowering plants have evolved a variety of methods for signaling their usefulness to pollinators or for otherwise making their work easier. Butterflies are attracted to flowers that are open during the day, are bright—typically red, yellow, or orange—and have a “landing platform.” In contrast, many moths are active at night and thus are attracted to flowers that are pale or white, have a strong fragrance, but also have broad areas to land on. Both butterflies and moths have long tongues and have co-evolved with plants that have developed deep sources of nectar that are available only to certain species. Hummingbirds are also attracted by color especially by bright reds, and flowers that attract these tiny birds also have strong stems and are designed for pollen to be brushed on the hummingbirds’ heads as they sip nectar.

Bees do not see red; thus, flowers that attract bees tend to be blue, yellow, purple, or other colors. Many bee attractors also have nectar guides, which are spots near the center of each flower that reflect ultraviolet light, making it easier for the bees to find the nectar. Bees are also attracted to flowers with a mintlike or sweet smell. Snapdragons not only attract bees visually, they are adapted to appeal to certain bee species: snapdragons have a landing platform that, if the bee is the correct weight, opens—allowing access to the nectar and pollen.

Pollinators play a major role in agriculture. While many staple crops such as rice, corn, canola, and wheat are self-pollinating or pollinated by the wind, farmers are dependent on pollinator species for many fruit, vegetable, nut, and seed crops. Over 30 percent of the world's crops require the work of pollinator species. Bees are the most common agricultural pollinators, with crops including fruit trees such as apples and cherries; vegetables such as squash, beans, tomatoes, and eggplant; flowering shrubs and annual and perennial flowers; forage crops such as clover and alfalfa; and fiber crops such as cotton. Other pollinators include midges (cocoa), wasps (figs), moths (yucca, papaya), butterflies (asters, daisies, marigolds), and even a few species of bats (agave, palms, durians) and hummingbirds (fuchsia).

Recent declines in honeybees and in other pollinator species around the world have raised concerns about future food production, and many scientists have called for increased study of the role of pollinators, the agricultural and environmental changes involved in the declines, as well as the economic and environmental effects and ways to prevent further declines.

PART 1 — QUESTIONS

Questions 1-5

Complete the summary using the list of words and phrases below.

Write the correct letter, A-I.

The reproduction of plants occurs in different ways. Some plants send out new parts such as **1** _____ or bulbs. These grow into new plants, which are actually **2** _____ of the original plant. The advantage of this form of reproduction is that it does not require a lot of **3** _____ or energy. Many **4** _____ reproduce themselves by forming seeds through the process of pollination. Some plants pollinate themselves. Others rely on the **5** _____ or animals to carry the pollen from plant to plant.

A. **pollen** B. **flowering plants** C. **roots** D. **grains** E. **spider plants**

F. **air** G. **copies** H. **fertilization** I. **time**

Questions 6-14

Do the following statements agree with the information given in the passage?

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

6 Honeybees eat both nectar and pollen.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

7 If an attractive flower is very small, a butterfly will land on its leaves.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

8 Moths are attracted by both color and scent.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

9 Certain flowers have evolved to be pollinated by hummingbirds.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

10 Special markings on a flower help bees to locate the nectar.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

11 Bees rarely respond to scent.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

12 Most grain crops are pollinated by insects.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

13 Close to one third of the world's harvest depends on animals for pollination.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

14 Farmers in certain parts of the world have suffered economically because of the decline in the honeybee population.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

PASSAGE 2

You should spend about 20 minutes on Questions 15-27, which are based on Reading Passage 2 below.

Paleolithic Cave Art

Students of art history tend to be familiar with the images of horses and bison discovered in the famous cave art site in Lascaux, France, in 1940. Less well known but vitally important to understanding Ice Age art and culture is the art discovered by three cave explorers in the Chauvet Cave near Vallon-Pont-d'Arc in southern France in 1994.

The Chauvet Cave hosts one of the largest group of Paleolithic drawings yet discovered on one site, as well as the fossilized remains of a number of now-extinct animals. The art found in the Chauvet Cave differs from that found in most other European cave art sites, which primarily feature prey animals such as horses, bison, wild cattle, and reindeer. The Chauvet paintings include many animals that humans would have feared—panthers, bears, lions, hyenas, and rhinoceroses. While the Chauvet paintings also include many species that would have been hunted by the artists—horses, aurochs, bison, and extinct species of moose and deer—the presence of non-prey animals calls into question a common theory that the primary purpose of cave art was to magically ensure plentiful game. Perhaps the discovery of the Chauvet art points to a shift in emphasis from the hunters' predators to the hunters' prey over time, but more evidence is needed.

Carbon-14 dating has established three of the paintings (one bison and two rhinoceroses) as being 31,000 years old. This discovery pushes the common understanding of the date range for European cave art much further back than what had been assumed. It has also clearly disproved theories that earlier cave art was cruder and more primitive because these older images are equally sophisticated in execution.

In addition to the hundreds of animal paintings, the Chauvet Cave also has an image of a being, referred to as the Sorcerer, with the body of a human and the head of a bison. There is also part of an image of a woman. In addition, explorers found the skull of a cave bear placed on a squared-off altarlike rock. The cave had been untouched for thousands of years due to a rock slide that had sealed off the cave; the floor of the cave contains the footprints of humans and cave bears, and fire pits, stone tools, remnants of torches, and bones from meals. After scientists collected data and recorded images, the site was placed off-limits to prevent the damage that has occurred at many other caves known for their rock art.

Ice Age paintings in certain European caves have been extremely well preserved and have reached iconic status because of their beauty and the artists' skill in execution. As a result, many people assume that the art of early hunters and gathers was limited to cave paintings. While the artwork in the deep caves has been the best preserved, artwork was also done on the walls of rock shelters and on rock faces out in open light. Paleolithic artists not only painted with pigments but also created engravings by scratching designs into rock with pointed tools, as well as creating low-relief sculptures. Often the artists seemed to have seen a suggestion of

an animal’s shape in a rock, and then added detail through incising lines, incorporating clay, or applying pigment. In addition to animal images, most sites also have geometrical designs, including dots and quadrangles. Archeologists have also discovered small sculpted figures from the same time period.

Images of hands, created either by wetting the palm of the hand with paint and pressing the hand onto rock or by applying paint around the hand, perhaps by spitting pigment from the mouth, are common. However, full images of humans are rare in the European caves. Images combining human and animal elements such as the Chauvet Cave Sorcerer have been found in various sites as have partial images of women, but portrayals of a full human are few and far between, and they tend to be simple abstract depictions. Most of the animal images, on the other hand, are detailed, realistic portrayals of an individual animal species, not simply an abstract symbol meant to depict an animal such as a horse or bison.

PART 2 — QUESTIONS

Questions 15-21

Choose the correct letter, A, B, or C.

15 As compared with the Chauvet Cave, the cave art site in Lascaux is

- **A** ○ more well known.
- **B** ○ less important.
- **C** ○ more difficult to explore.

16 The art discovered in the Chauvet Cave differs from other European cave art because

- **A** ○ it does not include images of horses and bison.
- **B** ○ it shows images of now-extinct animals.
- **C** ○ it includes images of predatory animals.

17 According to the passage, a common belief about the function of cave art is that

- **A** ○ it was meant to bring animals to be hunted.
- **B** ○ it was intended to drive away predatory animals.
- **C** ○ it was used to warn others about the presence of fearsome animals.

18 As compared with other European cave art sites, the art in the Chauvet Cave is

- **A** ○ cruder and more primitive.
- **B** ○ significantly older.
- **C** ○ more sophisticated in subject matter.

19 Images found in the Chauvet Cave include

- **A** ○ a crude map.
- **B** ○ a part-human, part-animal being.
- **C** ○ a complete drawing of a woman.

20 In addition to art, other discoveries in the Chauvet Cave include

- **A** ○ implements made of stone.
- **B** ○ human bones.
- **C** ○ bison pelts.

21 No humans had visited the Chauvet Cave for thousands of years because

- **A** ○ cave bears lived inside it.
- **B** ○ it was declared off limits.
- **C** ○ the entrance was blocked by rocks.

Questions 22-27

Complete the sentences below.

Choose NO MORE THAN TWO WORDS from the passage for each answer.

- People often believe that Paleolithic art consisted only of **22** _____.
- Ice Age artists used pointed tools to make **23** _____ and sculptures on rocks.
- As well as pictures of animals, **24** _____ are common in most sites.
- Pictures of **25** _____ were sometimes made by wetting the palm with paint.
- It is unusual to see an image of a **26** _____ in European cave art.
- Rather than being symbolic, paintings of animals are **27** _____ images.

PASSAGE 3

You should spend about 20 minutes on Questions 28-40, which are based on Reading Passage 3 below.

The Braille System

A

About 200 years ago, a curious three-year-old boy playing in his father's shop had an accident that ended up changing the lives of hundreds of thousands of people. The little boy was Louis Braille, and his father was a harness maker in Coupvray, France, a small town near Paris. Louis poked his eye with one of the sharp tools on his father's workbench. The injury and the ensuing infection, which spread through both eyes, caused him to lose his vision. Only a dozen years later, at the age of fifteen, Braille developed a system of raised dots on paper that made it possible for blind people to read and write. While he was not the first person to toy with the idea of tactile reading—that is, reading by feeling shapes on a flat surface—his system surpassed others thanks to its simplicity, ease of use, and adaptability.

B

During the first few years after his accident, Braille attended a local school with sighted children, where he learned by the only means available to him—listening and memorizing. He was a gifted student and at the age of ten earned a scholarship to attend the Royal Institution for Blind Youth in Paris. He later became a teacher at the Institution and remained there until his death in 1852 at the age of forty-three. The Institution relied largely on oral instruction, but pupils had access to a few books specially designed for blind students by Valentin Haüy, the school's founder. Haüy had developed a method for pressing shapes of letters onto wet paper and then letting them dry, providing pages with raised characters that students could "read" by running their fingertips across the thick paper. The books were big and cumbersome and took a long time to produce—and to read. In addition, they addressed only part of the blind students' communication dilemma—the ability to read. For full literacy, students also needed to be able to write.

C

A man named Charles Barbier, who had invented a system known as night writing for soldiers to send messages in the dark, provided the inspiration Braille needed for his reading method. Barbier visited the Royal Institution for Blind Youth in 1821 to demonstrate his technique, which used rectangular cells with raised dots. The cells, thirty-six in all, represented sounds rather than individual letters of the alphabet and consisted of a template of twelve dots in six rows of two. Braille saw the system's benefits right away and then zeroed in on its drawbacks. He thought it should be based on the alphabet—the way sighted people read—and not on phonetics. It also needed a way to designate punctuation marks, accents, numbers, and other symbols; and, for the user to be able to read with ease, a cell had to be small enough to fit beneath one's fingertip.

D

For the next three years, Braille fine-tuned his system and in 1824 came up with a version that worked to his satisfaction: a six-dot cell (three rows of two) that allowed for sixty-three possible combinations of dots, enough for all twenty-six letters of the Roman alphabet plus accents, capital letters, punctuation marks, and numbers. For example, a cell with one dot at the top left (position one) represents the letter a, whereas a cell with one dot at the bottom right (position six) means the next symbol is a capital letter. The numbers zero to nine are coded the same as the letters a to j, except they are preceded by a cell with dots in positions three through six (bottom left dot and all three dots in the right column). Users could read an individual cell with a single touch of the fingertip, and they scanned dots from left to right as in normal reading. What's more, the Braille system made it possible to write by punching dots into paper (from right to left because the reverse side is read).

E

Originally, Braille symbols were written with a slate and stylus—the equivalent of paper-and-pencil writing, using the slate to hold the paper and the stylus to prick holes in it. In 1892, a Braille writing machine was invented; used like a typewriter, it has six keys and a space bar. Today, writing Braille is no more difficult or time-consuming than producing a printed document. You need only to hook up a standard computer to a machine that will emboss the text in Braille. Braille's fellow students quickly learned his system; for the first time, they could take notes in class and write papers, not to mention pass notes back and forth to one another. Yet the system was not widely used in Braille's lifetime. It did not become the official communication system for blind people in France until 1854, two years after he died.

F

The system remains in use today, only slightly altered from the original version. It has incorporated symbols for math, science, and music and has been adapted to dozens of languages, including many with non-Roman alphabets, such as Chinese and Japanese. Braille symbols often show up in public places, such as on elevator buttons, and their helpfulness in labeling household items like canned goods is undisputed. Nevertheless, knowledge of Braille has declined in recent years as technology has provided innovations, such as recorded books and computers with synthetic speech, that make it less necessary to read the old-fashioned way. Many now deem Braille an obsolete system, but its devotees still consider it a form of literacy as basic as the three R's.

PART 3 — QUESTIONS

Questions 28-36

Reading Passage 3 has six paragraphs, A-F. Which paragraph contains the following information?

You may use any letter more than once.

	A	B	C	D	E	F
28 a description of the Braille system of representing letters and numbers	○	○	○	○	○	○
29 Louis Braille's early education	○	○	○	○	○	○
30 how people write in Braille	○	○	○	○	○	○
31 when Louis Braille first developed his system	○	○	○	○	○	○
32 when the Braille system was officially accepted in France	○	○	○	○	○	○
33 a reading system for the blind used when Louis Braille was a child	○	○	○	○	○	○
34 how Braille is read	○	○	○	○	○	○
35 the reason why Louis Braille was blind	○	○	○	○	○	○
36 a description of the method on which Louis Braille based his system	○	○	○	○	○	○

Questions 37-40

Do the following statements agree with the information given in the passage?

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

37 Braille symbols represent letters and numbers only.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

38 Braille is used in a variety of languages.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

39 Braille readers can read faster than sighted readers.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

40 Modern technology has made Braille less important.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

Answer Key

#	Answer	Explanation
1	**C**	Some plants reproduce asexually by splitting off new roots or bulbs (e.g., garlic, lilies) or even branches, stems, or leaves (e.g., mangroves, spider plants)
2	**G**	Plants that reproduce asexually are essentially reproducing clones of themselves
3	**I**	This is a simple and direct method of reproduction, producing new plants more quickly and with less energy than plants using sexual reproduction
4	**B**	In flowering plants, pollen (male) grains are moved from the anther to the stigma, where the pollen fertilizes the ovaries (female), resulting in seeds
5	**F**	pollination occurs between separate plants, either through pollen being borne by the wind (most conifers and many grasses) or by pollinators, animal species that plants rely on to help move the pollen from one plant to the ovaries of another
6	**TRUE**	A well-known example is the honeybee, which collects nectar as well as pollen for food
7	**NOT GIVEN**	Butterflies are attracted to flowers that are open during the day, are bright—typically red, yellow, or orange—and have a “landing platform.”
8	**TRUE**	In contrast, many moths are active at night and thus are attracted to flowers that are pale or white, have a strong fragrance, but also have broad areas to land on
9	**TRUE**	Hummingbirds are also attracted by color especially by bright reds, and flowers that attract these tiny birds also have strong stems and are designed for pollen to be brushed on the hummingbirds’ heads as they sip nectar
10	**TRUE**	Many bee attractors also have nectar guides, which are spots near the center of each flower that reflect ultraviolet light, making it easier for the bees to find the nectar
11	**FALSE**	Bees are also attracted to flowers with a mintlike or sweet smell
12	**FALSE**	While many staple crops such as rice, corn, canola, and wheat are self-pollinating or pollinated by the wind, farmers are dependent on pollinator species for many fruit, vegetable, nut, and seed crops

#	Answer	Explanation
13	**TRUE**	Over 30 percent of the world's crops require the work of pollinator species
14	**NOT GIVEN**	Recent declines in honeybees and in other pollinator species around the world have raised concerns about future food production, and many scientists have called for increased study of the role of pollinators, the agricultural and environmental changes involved in the declines, as well as the economic and environmental effects and ways to prevent further declines
15	**A**	Students of art history tend to be familiar with the images of horses and bison discovered in the famous cave art site in Lascaux, France, in 1940. Less well known but vitally important to understanding Ice Age art and culture is the art discovered by three cave explorers in the Chauvet Cave near Vallon-Pont-d'Arc in southern France in 1994
16	**C**	The art found in the Chauvet Cave differs from that found in most other European cave art sites, which primarily feature prey animals such as horses, bison, wild cattle, and reindeer. The Chauvet paintings include many animals that humans would have feared—panthers, bears, lions, hyenas, and rhinoceroses
17	**A**	While the Chauvet paintings also include many species that would have been hunted by the artists—horses, aurochs, bison, and extinct species of moose and deer—the presence of non-prey animals calls into question a common theory that the primary purpose of cave art was to magically ensure plentiful game
18	**B**	Carbon-14 dating has established three of the paintings (one bison and two rhinoceroses) as being 31,000 years old. This discovery pushes the common understanding of the date range for European cave art much further back than what had been assumed
19	**B**	In addition to the hundreds of animal paintings, the Chauvet Cave also has an image of a being, referred to as the Sorcerer, with the body of a human and the head of a bison
20	**A**	the floor of the cave contains the footprints of humans and cave bears, and fire pits, stone tools, remnants of torches, and bones from meals
21	**C**	The cave had been untouched for thousands of years due to a rock slide that had sealed off the cave
22	**cave paintings**	As a result, many people assume that the art of early hunters and gathers was limited to cave paintings
23	**engravings**	Paleolithic artists not only painted with pigments but also created engravings by scratching designs into rock with pointed tools, as

#	Answer	Explanation
		well as creating low-relief sculptures
24	**geometrical designs**	In addition to animal images, most sites also have geometrical designs, including dots and quadrangles
25	**hands**	Images of hands, created either by wetting the palm of the hand with paint and pressing the hand onto rock or by applying paint around the hand, perhaps by spitting pigment from the mouth, are common
26	**(full) human**	However, full images of humans are rare in the European caves
27	**detailed, realistic / detailed,realistic / detailed realistic**	Most of the animal images, on the other hand, are detailed, realistic portrayals of an individual animal species, not simply an abstract symbol meant to depict an animal such as a horse or bison
28	**D**	For the next three years, Braille fine-tuned his system and in 1824 came up with a version that worked to his satisfaction: a six-dot cell (three rows of two) that allowed for sixty-three possible combinations of dots, enough for all twenty-six letters of the Roman alphabet plus accents, capital letters, punctuation marks, and numbers. For example, a cell with one dot at the top left (position one) represents the letter a, whereas a cell with one dot at the bottom right (position six) means the next symbol is a capital letter. The numbers zero to nine are coded the same as the letters a to j, except they are preceded by a cell with dots in positions three through six (bottom left dot and all three dots in the right column)
29	**B**	During the first few years after his accident, Braille attended a local school with sighted children, where he learned by the only means available to him—listening and memorizing. He was a gifted student and at the age of ten earned a scholarship to attend the Royal Institution for Blind Youth in Paris
30	**E**	Originally, Braille symbols were written with a slate and stylus—the equivalent of paper-and-pencil writing, using the slate to hold the paper and the stylus to prick holes in it. In 1892, a Braille writing machine was invented; used like a typewriter, it has six keys and a space bar
31	**A**	Only a dozen years later, at the age of fifteen, Braille developed a system of raised dots on paper that made it possible for blind people to read and write
32	**E**	It did not become the official communication system for blind people in France until 1854, two years after he died
33	**B**	The Institution relied largely on oral instruction, but pupils had access to a few books specially designed for blind students by

#	Answer	Explanation
		Valentin Haüy, the school’s founder. Haüy had developed a method for pressing shapes of letters onto wet paper and then letting them dry, providing pages with raised characters that students could “read” by running their fingertips across the thick paper
34	**D**	Users could read an individual cell with a single touch of the fingertip, and they scanned dots from left to right as in normal reading
35	**A**	Louis poked his eye with one of the sharp tools on his father’s workbench. The injury and the ensuing infection, which spread through both eyes, caused him to lose his vision
36	**C**	A man named Charles Barbier, who had invented a system known as night writing for soldiers to send messages in the dark, provided the inspiration Braille needed for his reading method. Barbier visited the Royal Institution for Blind Youth in 1821 to demonstrate his technique, which used rectangular cells with raised dots. The cells, thirty-six in all, represented sounds rather than individual letters of the alphabet and consisted of a template of twelve dots in six rows of two
37	**FALSE**	a six-dot cell (three rows of two) that allowed for sixty-three possible combinations of dots, enough for all twenty-six letters of the Roman alphabet plus accents, capital letters, punctuation marks, and numbers
38	**TRUE**	It has incorporated symbols for math, science, and music and has been adapted to dozens of languages, including many with non-Roman alphabets, such as Chinese and Japanese
39	**NOT GIVEN**	Users could read an individual cell with a single touch of the fingertip, and they scanned dots from left to right as in normal reading
40	**TRUE**	Nevertheless, knowledge of Braille has declined in recent years as technology has provided innovations, such as recorded books and computers with synthetic speech, that make it less necessary to read the old-fashioned way

Test 7

PASSAGE 1

Nutmeg – a valuable spice

The nutmeg tree, *Myristica fragrans*, is a large evergreen tree native to Southeast Asia. Until the late 18th century, it only grew in one place in the world: a small group of islands in the Banda Sea, part of the Moluccas – or Spice Islands – in northeastern Indonesia. The tree is thickly branched with dense foliage of tough, dark green oval leaves, and produces small, yellow, bell-shaped flowers and pale yellow pear-shaped fruits. The fruit is encased in a flesh husk. When the fruit is ripe, this husk splits into two halves along a ridge running the length of the fruit. Inside is a purple-brown shiny seed, 2-3 cm long by about 2 cm across, surrounded by a lacy red or crimson covering called an 'aril'. These are the sources of the two spices nutmeg and mace, the former being produced from the dried seed and the latter from the aril.

Nutmeg was a highly prized and costly ingredient in European cuisine in the Middle Ages, and was used as a flavouring, medicinal, and preservative agent. Throughout this period, the Arabs were the exclusive importers of the spice to Europe. They sold nutmeg for high prices to merchants based in Venice, but they never revealed the exact location of the source of this extremely valuable commodity. The Arab-Venetian dominance of the trade finally ended in 1512, when the Portuguese reached the Banda Islands and began exploiting its precious resources.

Always in danger of competition from neighbouring Spain, the Portuguese began subcontracting their spice distribution to Dutch traders. Profits began to flow into the Netherlands, and the Dutch commercial fleet swiftly grew into one of the largest in the world. The Dutch quietly gained control of most of the shipping and trading of spices in Northern Europe. Then, in 1580, Portugal fell under Spanish rule, and by the end of the 16th century the Dutch found themselves locked out of the market. As prices for pepper, nutmeg, and other spices soared across Europe, they decided to fight back.

In 1602, Dutch merchants founded the VOC, a trading corporation better known as the Dutch East India Company. By 1617, the VOC was the richest commercial operation in the world. The company had 50,000 employees worldwide, with a private army of 30,000 men and a fleet of 200 ships. At the same time, thousands of people across Europe were dying of the plague, a highly contagious and deadly disease. Doctors were desperate for a way to stop the spread of this disease, and they decided nutmeg held the cure. Everybody wanted nutmeg, and many were willing to spare no expense to have it. Nutmeg bought for a few pennies in Indonesia could be sold for 68,000 times its original cost on the streets of London. The only problem was the short supply. And that's where the Dutch found their opportunity.

The Banda Islands were ruled by local sultans who insisted on maintaining a neutral trading policy towards foreign powers. This allowed them to avoid the presence of Portuguese or Spanish troops on their soil, but it also left them unprotected from other invaders. In 1621, the Dutch arrived and took over. Once securely in control of the Bandas, the Dutch went to work

protecting their new investment. They concentrated all nutmeg production into a few easily guarded areas, uprooting and destroying any trees outside the plantation zones. Anyone caught growing a nutmeg seedling or carrying seeds without the proper authority was severely punished. In addition, all exported nutmeg was covered with lime to make sure there was no chance a fertile seed which could be grown elsewhere would leave the islands. There was only one obstacle to Dutch domination. One of the Banda Islands, a sliver of land called Run, only 3 km long by less than 1 km wide, was under the control of the British. After decades of fighting for control of this tiny island, the Dutch and British arrived at a compromise settlement, the Treaty of Breda, in 1667. Intent on securing their hold over every nutmeg-producing island, the Dutch offered a trade: if the British would give them the island of Run, they would in turn give Britain a distant and much less valuable island in North America. The British agreed. That other island was Manhattan, which is how New Amsterdam became New York. The Dutch now had a monopoly over the nutmeg trade which would last for another century.

Then, in 1770, a Frenchman named Pierre Poivre successfully smuggled nutmeg plants to safety in Mauritius, an island off the coast of Africa. Some of these were later exported to the Caribbean where they thrived, especially on the island of Grenada. Next, in 1778, a volcanic eruption in the Banda region caused a tsunami that wiped out half the nutmeg groves. Finally, in 1809, the British returned to Indonesia and seized the Banda Islands by force. They returned the islands to the Dutch in 1817, but not before transplanting hundreds of nutmeg seedlings to plantations in several locations across southern Asia. The Dutch nutmeg monopoly was over.

Today, nutmeg is grown in Indonesia, the Caribbean, India, Malaysia, Papua New Guinea and Sri Lanka, and world nutmeg production is estimated to average between 10,000 and 12,000 tonnes per year.

PART 1 — QUESTIONS

Questions 1-4

Complete the notes below.

Choose **ONE WORD ONLY** from the passage for each answer.

Write your answers in boxes on your answer sheet.

The nutmeg tree and fruit

- the leaves of the tree are **1** _____ in shape
- the **2** _____ surrounds the fruit and breaks open when the fruit is ripe
- the **3** _____ is used to produce the spice nutmeg
- the covering known as the aril is used to produce **4** _____
- the tree has yellow flowers and fruit

Questions 5-7

Do the following statements agree with the information given in the Reading Passage?

In boxes on your answer sheet, write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

5 In the Middle Ages, most Europeans knew where nutmeg was grown.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

6 The VOC was the world's first major trading company.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

7 Following the Treaty of Breda, the Dutch had control of all the islands where nutmeg grew.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

Questions 8-13

Complete the table below.

Choose **ONE WORD ONLY** from the passage for each answer.

Write your answers in boxes on your answer sheet.

Middle Ages	Nutmeg was brought to Europe by the **8** _____
16th century	European nations took control of the nutmeg trade
17th century	Demand for nutmeg grew, as it was believed to be effective against the disease known as the **9** _____ The Dutch – took control of the Banda Islands – restricted nutmeg production to a few areas – put **10** _____ on nutmeg to avoid it being cultivated outside the islands – finally obtained the island of **11** _____ from the British
Late 18th century	1770 – nutmeg plants were secretly taken to **12** _____ 1778 – half the Banda Islands' nutmeg plantations were destroyed by a **13** _____

PASSAGE 2

Driverless cars

A

The automotive sector is well used to adapting to automation in manufacturing. The implementation of robotic car manufacture from the 1970s onwards led to significant cost savings and improvements in the reliability and flexibility of vehicle mass production. A new challenge to vehicle production is now on the horizon and, again, it comes from automation. However, this time it is not to do with the manufacturing process, but with the vehicles themselves.

Research projects on vehicle automation are not new. Vehicles with limited self-driving capabilities have been around for more than 50 years, resulting in significant contributions towards driver assistance systems. But since Google announced in 2010 that it had been trialling self-driving cars on the streets of California, progress in this field has quickly gathered pace.

B

There are many reasons why technology is advancing so fast. One frequently cited motive is safety; indeed, research at the UK's Transport Research Laboratory has demonstrated that more than 90 percent of road collisions involve human error as a contributory factor, and it is the primary cause in the vast majority. Automation may help to reduce the incidence of this.

Another aim is to free the time people spend driving for other purposes. If the vehicle can do some or all of the driving, it may be possible to be productive, to socialise or simply to relax while automation systems have responsibility for safe control of the vehicle. If the vehicle can do the driving, those who are challenged by existing mobility models – such as older or disabled travellers – may be able to enjoy significantly greater travel autonomy.

C

Beyond these direct benefits, we can consider the wider implications for transport and society, and how manufacturing processes might need to respond as a result. At present, the average car spends more than 90 percent of its life parked. Automation means that initiatives for car-sharing become much more viable, particularly in urban areas with significant travel demand. If a significant proportion of the population choose to use shared automated vehicles, mobility demand can be met by far fewer vehicles.

D

The Massachusetts Institute of Technology investigated automated mobility in Singapore, finding that fewer than 30 percent of the vehicles currently used would be required if fully automated car sharing could be implemented. If this is the case, it might mean that we need to manufacture far fewer vehicles to meet demand. However, the number of trips being taken

would probably increase, partly because empty vehicles would have to be moved from one customer to the next.

Modelling work by the University of Michigan Transportation Research Institute suggests automated vehicles might reduce vehicle ownership by 43 percent, but that vehicles' average annual mileage double as a result. As a consequence, each vehicle would be used more intensively, and might need replacing sooner. This faster rate of turnover may mean that vehicle production will not necessarily decrease.

E

Automation may prompt other changes in vehicle manufacture. If we move to a model where consumers are tending not to own a single vehicle but to purchase access to a range of vehicle through a mobility provider, drivers will have the freedom to select one that best suits their needs for a particular journey, rather than making a compromise across all their requirements.

Since, for most of the time, most of the seats in most cars are unoccupied, this may boost production of a smaller, more efficient range of vehicles that suit the needs of individuals. Specialised vehicles may then be available for exceptional journeys, such as going on a family camping trip or helping a son or daughter move to university.

F

There are a number of hurdles to overcome in delivering automated vehicles to our roads. These include the technical difficulties in ensuring that the vehicle works reliably in the infinite range of traffic, weather and road situations it might encounter; the regulatory challenges in understanding how liability and enforcement might change when drivers are no longer essential for vehicle operation; and the societal changes that may be required for communities to trust and accept automated vehicles as being a valuable part of the mobility landscape.

G

It's clear that there are many challenges that need to be addressed but, through robust and targeted research, these can most probably be conquered within the next 10 years. Mobility will change in such potentially significant ways and in association with so many other technological developments, such as telepresence and virtual reality, that it is hard to make concrete predictions about the future. However, one thing is certain: change is coming, and the need to be flexible in response to this will be vital for those involved in manufacturing the vehicles that will deliver future mobility.

PART 2 — QUESTIONS

Questions 14-18

The Reading Passage has seven paragraphs, **A-G**.

Which section contains the following information?

*Write the correct letter, **A-G**, in boxes on your answer sheet.*

	A	B	C	D	E	F	G
14 reference to the amount of time when a car is not in use	○	○	○	○	○	○	○
15 mention of several advantages of driverless vehicles for individual road-users	○	○	○	○	○	○	○
16 reference to the opportunity of choosing the most appropriate vehicle for each trip	○	○	○	○	○	○	○
17 an estimate of how long it will take to overcome a number of problems	○	○	○	○	○	○	○
18 a suggestion that the use of driverless cars may have no effect on the number of vehicles manufactured	○	○	○	○	○	○	○

Questions 19-22

Complete the summary below.

Choose **NO MORE THAN TWO WORDS** from the passage for each answer.

Write your answers in boxes on your answer sheet.

The impact of driverless cars

Figures from the Transport Research Laboratory indicate that most motor accidents are partly due to **19** _____, so the introduction of driverless vehicles will result in greater safety. In addition to the direct benefits of automation, it may bring other advantages. For example, schemes for **20** _____ will be more workable, especially in towns and cities, resulting in fewer cars on the road.

According to the University of Michigan Transportation Research Institute, there could be a 43 percent drop in **21** _____ of cars. However, this would mean that the yearly **22** _____ of each car would, on average, be twice as high as it currently is. this would lead to a higher turnover of vehicles, and therefore no reduction in automotive manufacturing.

Questions 23-24

Choose **TWO** letters, **A-E**.

Write the correct letters in boxes on your answer sheet.

23 **24** Which **TWO** benefits of automated vehicles does the writer mention?

- **A** ☐ Car travellers could enjoy considerable cost savings.
- **B** ☐ It would be easier to find parking spaces in urban areas.
- **C** ☐ Travellers could spend journeys doing something other than driving.
- **D** ☐ People who find driving physically difficult could travel independently.
- **E** ☐ A reduction in the number of cars would mean a reduction in pollution.

Questions 25-26

Choose **TWO** letters, **A-E**.

Write the correct letters in boxes on your answer sheet.

25 **26** Which **TWO** challenges to automated vehicle development does the writer mention?

- **A** ☐ making sure the general public has confidence in automated vehicles
- **B** ☐ managing the pace of transition from conventional to automated vehicles
- **C** ☐ deciding how to compensate professional drivers who become redundant
- **D** ☐ setting up the infrastructure to make roads suitable for automated vehicles
- **E** ☐ getting automated vehicles to adapt to various different driving conditions

PASSAGE 3

What is exploration?

We are all explores. Our desire to discover, and then share that new-found knowledge, is part of what makes us human – indeed, this has played an important part in our success as a species. Long before the first caveman slumped down beside the fire and grunted news that there were plenty of wildebeest over yonder, our ancestors had learnt the value of sending out scouts to investigate the unknown. This questing nature of ours undoubtedly helped our species spread around the globe, just as it nowadays no doubt helps the last nomadic Penan maintain their existence in the depleted forests of Borneo, and a visitor negotiate the subways of New York.

Over the years, we've come to think of explorers as a peculiar breed – different from the rest of us, different from those of us who are merely 'well travelled', even; and perhaps there *is* a type of person more suited to seeking out the new, a type of caveman more inclined to risk venturing out. That, however, doesn't take away from the fact that we all have this enquiring instinct, even today; and that in all sorts of professions – whether artist, marine biologist or astronomer – borders of the unknown are being tested each day.

Thomas Hardy set some of his novels in Egdon Heath, a fictional area of uncultivated land, and used the landscape to suggest the desires and fears of his characters. He is delving into matters we all recognise because they are common to humanity. This is surely an act of exploration, and into a world as remote as the author chooses. Explorer and travel writer Peter Fleming talks of the moment when the explorer returns to the existence he has left behind with his loved ones. The traveller 'who has for weeks or months seen himself only as a puny and irrelevant alien crawling laboriously over a country in which he has no roots and no background, suddenly encounters his other self, a relatively solid figure, with a place in the minds of certain people'.

In this book about the exploration of the earth's surface, I have confined myself to those whose travels were real and who also aimed at more than personal discovery. But that still left me with another problem: the word 'explorer' has become associated with a past era. We think back to a golden age, as if exploration peaked somehow in the 19th century – as if the process of discovery is now on the decline, though the truth is that we have named only one and a half million of this planet's species, and there may be more than 10 million – and that's not including bacteria. We have studied only 5 per cent of the species we know. We have scarcely mapped the ocean floors, and know even less about ourselves; we fully understand the workings of only 10 per cent of our brains.

Here is how some of today's 'explorers' define the word. Ran Fiennes, dubbed the 'greatest living explorer', said, 'An explorer is someone who has done something that no human has done before – and also done something scientifically useful.' Chris Bonington, a leading mountaineer, felt exploration was to be found in the act of physically touching the unknown: 'You have to have gone somewhere new.' Then Robin Hanbury-Tenison, a campaigner on behalf of remote so-called 'tribal' peoples, said, 'A traveller simply records information about some far-off world, and reports back; but an explorer *changes* the world.' Wilfred Thesiger, who crossed Arabia's

Empty Quarter in 1946, and belongs to an era of unmechanised travel now lost to the rest of us, told me, ‘If I’d gone across by camel when I could have gone by car, it would have been a stunt.’ To him, exploration meant bringing back information from a remote place regardless of any great self-discovery.

Each definition is slightly different – and tends to reflect the field of endeavour of each pioneer. It was the same whoever I asked: the prominent historian would say exploration was a thing of the past, the cutting-edge scientist would say it was of the present. And so on. They each set their own particular criteria; the common factor in their approach being that they all had, unlike many of us who simply enjoy travel or discovering new things, both a very definite objective from the outset and also a desire to record their findings.

I’d best declare my own bias. As a writer, I’m interested in the exploration of ideas. I’ve done a great many expeditions and each one was unique. I’ve lived for months alone with isolated groups of people all around the world, even two ‘uncontacted tribes’. But none of these things is of the slightest interest to anyone unless, through my books, I’ve found a new slant, explored a new idea. Why? Because the world has moved on. The time has long passed for the great continental voyages – another walk to the poles, another crossing of the Empty Quarter. We know how the land surface of our planet lies; exploration of it is now down to the details – the habits of microbes, say, or the grazing behaviour of buffalo. Aside from the deep sea and deep underground, it’s the era of specialists. However, this is to disregard the role the human mind has in conveying remote places; and this is what interests me: how a fresh interpretation, even of a well-travelled route, can give its readers new insights.

PART 3 — QUESTIONS

Questions 27-32

Choose the correct letter, **A**, **B**, **C** or **D**.

Write the correct letter in boxes on your answer sheet.

27 The writer refers to visitors to New York to illustrate the point that

- **A** ○ exploration is an intrinsic element of being human.
- **B** ○ most people are enthusiastic about exploring.
- **C** ○ exploration can lead to surprising results.
- **D** ○ most people find exploration daunting.

28 According to the second paragraph, what is the writer's view of explorers?

- **A** ○ Their discoveries have brought both benefits and disadvantages.
- **B** ○ Their main value is in teaching others.
- **C** ○ They act on an urge that is common to everyone.
- **D** ○ They tend to be more attracted to certain professions than to others.

29 The writer refers to a description of Egdon Heath to suggest that

- **A** ○ Hardy was writing about his own experience of exploration.
- **B** ○ Hardy was mistaken about the nature of exploration.
- **C** ○ Hardy's aim was to investigate people's emotional states.
- **D** ○ Hardy's aim was to show the attraction of isolation.

30 In the fourth paragraph, the writer refers to 'a golden age' to suggest that

- **A** ○ the amount of useful information produced by exploration has decreased.
- **B** ○ fewer people are interested in exploring than in the 19th century.
- **C** ○ recent developments have made exploration less exciting.

D ○ we are wrong to think that exploration is no longer necessary.

31 In the sixth paragraph, when discussing the definition of exploration, the writer argues that

A ○ people tend to relate exploration to their own professional interests.

B ○ certain people are likely to misunderstand the nature of exploration.

C ○ the generally accepted definition has changed over time.

D ○ historians and scientists have more valid definitions than the general public.

32 In the last paragraph, the writer explains that he is interested in

A ○ how someone's personality is reflected in their choice of places to visit.

B ○ the human ability to cast new light on places that may be familiar.

C ○ how travel writing has evolved to meet changing demands.

D ○ the feelings that writers develop about the places that they explore.

Questions 33-37

Look at the following statements and the list of explorers below.

Match each statement with the correct explorer, **A-E**.

*Write the correct letter, **A-E**, in boxes on your answer sheet.*

NB *You may use any letter more than once.*

List of Explorers

A Peter Fleming

B Ran Fiennes

C Chris Bonington

D Robin Hanbury-Tenison

E Wilfred Thesiger

	A	B	C	D	E
33 He referred to the relevance of the form of transport used.	○	○	○	○	○
34 He described feelings on coming back home after a long journey.	○	○	○	○	○
35 He worked for the benefit of specific groups of people.	○	○	○	○	○
36 He did not consider learning about oneself an essential part of exploration.	○	○	○	○	○
37 He defined exploration as being both unique and of value to others.	○	○	○	○	○

Questions 38-40

Complete the summary below.

Choose **NO MORE THAN TWO WORDS** from the passage for each answer.

Write your answers in boxes on your answer sheet.

The writer's own bias

The writer has experience of a large number of **38** _____, and was the first stranger that certain previously **39** _____ people had encountered. He believes there is no need for further exploration of Earth's **40** _____, except to answer specific questions such as how buffalo eat.

Answer Key

#	Answer	Explanation
1	**oval**	The tree is thickly branched with dense foliage of tough, dark green oval leaves
2	**husk**	When the fruit is ripe, this husk splits into two halves along a ridge running the length of the fruit
3	**seed**	the former being produced from the dried seed and the latter from the aril
4	**mace**	These are the sources of the two spices nutmeg and mace
5	**FALSE**	They sold nutmeg for high prices to merchants based in Venice, but they never revealed the exact location of the source of this extremely valuable commodity
6	**NOT GIVEN**	By 1617, the VOC was the richest commercial operation in the world
7	**TRUE**	The Dutch now had a monopoly over the nutmeg trade which would last for another century
8	**Arabs**	Throughout this period, the Arabs were the exclusive importers of the spice to Europe
9	**plague**	At the same time, thousands of people across Europe were dying of the plague, a highly contagious and deadly disease. Doctors were desperate for a way to stop the spread of this disease, and they decided nutmeg held the cure
10	**lime**	In addition, all exported nutmeg was covered with lime to make sure there was no chance a fertile seed which could be grown elsewhere would leave the islands
11	**Run**	the Dutch offered a trade: if the British would give them the island of Run, they would in turn give Britain a distant and much less valuable island in North America. The British agreed.
12	**Mauritius**	Then, in 1770, a Frenchman named Pierre Poivre successfully smuggled nutmeg plants to safety in Mauritius, an island off the coast of Africa
13	**tsunami**	Next, in 1778, a volcanic eruption in the Banda region caused a tsunami that wiped out half the nutmeg groves
14	**C**	At present, the average car spends more than 90 percent of its life parked

#	Answer	Explanation
15	**B**	Another aim is to free the time people spend driving for other purposes
16	**E**	drivers will have the freedom to select one that best suits their needs for a particular journey
17	**G**	It's clear that there are many challenges that need to be addressed but, through robust and targeted research, these can most probably be conquered within the next 10 years
18	**D**	This faster rate of turnover may mean that vehicle production will not necessarily decrease
19	**human error**	research at the UK's Transport Research Laboratory has demonstrated that more than 90 percent of road collisions involve human error as a contributory factor
20	**car sharing / car-sharing**	Automation means that initiatives for car-sharing become much more viable, particularly in urban areas with significant travel demand
21	**ownership**	Modelling work by the University of Michigan Transportation Research Institute suggests automated vehicles might reduce vehicle ownership by 43 percent
22	**mileage**	but that vehicles' average annual mileage double as a result
23	**C / D**	If the vehicle can do some or all of the driving, it may be possible to be productive, to socialise or simply to relax while automation systems have responsibility for safe control of the vehicle those who are challenged by existing mobility models – such as older or disabled travellers – may be able to enjoy significantly greater travel autonomy.
24	**C / D**	If the vehicle can do some or all of the driving, it may be possible to be productive, to socialise or simply to relax while automation systems have responsibility for safe control of the vehicle those who are challenged by existing mobility models – such as older or disabled travellers – may be able to enjoy significantly greater travel autonomy.
25	**A / E**	the societal changes that may be required for communities to trust and accept automated vehicles as being a valuable part of the mobility landscape These include the technical difficulties in ensuring that the vehicle works reliably in the infinite range of traffic, weather and road situations it might encounter
26	**A / E**	the societal changes that may be required for communities to trust and accept automated vehicles as being a valuable part of the mobility landscape These include the technical difficulties in

#	Answer	Explanation
		ensuring that the vehicle works reliably in the infinite range of traffic, weather and road situations it might encounter
27	**A**	We are all explores. Our desire to discover, and then share that new-found knowledge, is part of what makes us human – indeed, this has played an important part in our success as a species.
28	**C**	That, however, doesn't take away from the fact that we all have this enquiring instinct, even today; and that in all sorts of professions
29	**C**	used the landscape to suggest the desires and fears of his characters
30	**D**	as if the process of discovery is now on the decline, though the truth is that we have named only one and a half million of this planet's species, and there may be more than 10 million – and that's not including bacteria
31	**A**	Each definition is slightly different – and tends to reflect the field of endeavour of each pionee
32	**B**	this is what interests me: how a fresh interpretation, even of a well-travelled route, can give its readers new insights
33	**E**	If I'd gone across by camel when I could have gone by car, it would have been a stunt
34	**A**	Peter Fleming talks of the moment when the explorer returns to the existence he has left behind with his loved ones
35	**D**	a campaigner on behalf of remote so-called 'tribal' peoples
36	**E**	To him, exploration meant bringing back information from a remote place regardless of any great self-discovery
37	**B**	An explorer is someone who has done something that no human has done before – and also done something scientifically useful
38	**expeditions / unique expeditions**	I've done a great many expeditions and each one was unique
39	**uncontacted / isolated**	I've lived for months alone with isolated groups of people all around the world, even two 'uncontacted tribes'
40	**surface / land surface**	We know how the land surface of our planet lies; exploration of it is now down to the details – the habits of microbes, say, or the grazing behaviour of buffalo

Test 8

PASSAGE 1

Could urban engineers learn from dance?

A

The way we travel around cities has a major impact on whether they are sustainable. Transportation is estimated to account for 30% of energy consumption in most of the world's most developed nations, so lowering the need for energy-using vehicles is essential for decreasing the environmental impact of mobility. But as more and more people move to cities, it is important to think about other kinds of sustainable travel too. The ways we travel affect our physical and mental health, our social lives, our access to work and culture, and the air we breathe. Engineers are tasked with changing how we travel round cities through urban design, but the engineering industry still works on the assumptions that led to the creation of the energy-consuming transport systems we have now: the emphasis placed solely on efficiency, speed, and quantitative data. We need radical changes, to make it healthier, more enjoyable, and less environmentally damaging to travel around cities.

B

Dance might hold some of the answers. That is not to suggest everyone should dance their way to work, however healthy and happy it might make us, but rather that the techniques used by choreographers to experiment with and design movement in dance could provide engineers with tools to stimulate new ideas in city-making. Richard Sennett, an influential urbanist and sociologist who has transformed ideas about the way cities are made, argues that urban design has suffered from a separation between mind and body since the introduction of the architectural blueprint.

C

Whereas medieval builders improvised and adapted construction through their intimate knowledge of materials and personal experience of the conditions on a site, building designs are now conceived and stored in media technologies that detach the designer from the physical and social realities they are creating. While the design practices created by these new technologies are essential for managing the technical complexity of the modern city, they have the drawback of simplifying reality in the process.

D

To illustrate, Sennett discusses the Peachtree Center in Atlanta, USA, a development typical of the modernist approach to urban planning prevalent in the 1970s. Peachtree created a grid of streets and towers intended as a new pedestrian-friendly downtown for Atlanta. According to Sennett, this failed because its designers had invested too much faith in computer-aided design to tell them how it would operate. They failed to take into account that purpose-built street

cafés could not operate in the hot sun without the protective awnings common in older buildings, and would need energy-consuming air conditioning instead, or that its giant car park would feel so unwelcoming that it would put people off getting out of their cars. What seems entirely predictable and controllable on screen has unexpected results when translated into reality.

E

The same is true in transport engineering, which uses models to predict and shape the way people move through the city. Again, these models are necessary, but they are built on specific world views in which certain forms of efficiency and safety are considered and other experience of the city ignored. Designs that seem logical in models appear counter-intuitive in the actual experience of their users. The guard rails that will be familiar to anyone who has attempted to cross a British road, for example, were an engineering solution to pedestrian safety based on models that prioritise the smooth flow of traffic. On wide major roads, they often guide pedestrians to specific crossing points and slow down their progress across the road by using staggered access points divide the crossing into two – one for each carriageway. In doing so they make crossings feel longer, introducing psychological barriers greatly impacting those that are the least mobile, and encouraging others to make dangerous crossings to get around the guard rails. These barriers don't just make it harder to cross the road: they divide communities and decrease opportunities for healthy transport. As a result, many are now being removed, causing disruption, cost, and waste.

F

If their designers had had the tools to think with their bodies – like dancers – and imagine how these barriers would feel, there might have been a better solution. In order to bring about fundamental changes to the ways we use our cities, engineering will need to develop a richer understanding of why people move in certain ways, and how this movement affects them. Choreography may not seem an obvious choice for tackling this problem. Yet it shares with engineering the aim of designing patterns of movement within limitations of space. It is an art form developed almost entirely by trying out ideas with the body, and gaining instant feedback on how the results feel. Choreographers have deep understanding of the psychological, aesthetic, and physical implications of different ways of moving.

G

Observing the choreographer Wayne McGregor, cognitive scientist David Kirsh described how he 'thinks with the body', Kirsh argues that by using the body to simulate outcomes, McGregor is able to imagine solutions that would not be possible using purely abstract thought. This kind of physical knowledge is valued in many areas of expertise, but currently has no place in formal engineering design processes. A suggested method for transport engineers is to improvise design solutions and instant feedback about how they would work from their own experience of them, or model designs at full scale in the way choreographers experiment with groups of dancers. Above all, perhaps, they might learn to design for emotional as well as functional effects.

PART 1 — QUESTIONS

Questions 1-6

The Reading Passage has seven paragraphs, **A-G**.

Which paragraph contains the following information?

*Write the correct letter, **A-G**, in boxes on your answer sheet.*

	A	B	C	D	E	F	G
1 reference to an appealing way of using dance that the writer is not proposing	○	○	○	○	○	○	○
2 an example of a contrast between past and present approaches to building	○	○	○	○	○	○	○
3 mention of an objective of both dance and engineering	○	○	○	○	○	○	○
4 reference to an unforeseen problem arising from ignoring the climate	○	○	○	○	○	○	○
5 why some measures intended to help people are being reversed	○	○	○	○	○	○	○
6 reference to how transport has an impact on human lives	○	○	○	○	○	○	○

Questions 7-13

Complete the summary below.

Choose **ONE WORD ONLY** from the passage for each answer.

Write your answers in boxes on your answer sheet.

Guard rails

Guard rails were introduced on British roads to improve the **7** _____ of pedestrians, while ensuring that the movement of **8** _____ is not disrupted.

Pedestrians are led to access points, and encouraged to cross one **9** _____ at a time.

An unintended effect is to create psychological difficulties in crossing the road, particularly for less **10** _____ people. Another result is that some people cross the road in a **11** _____ way. The guard rails separate **12** _____, and make it more difficult to introduce forms of transport that are **13** _____

PASSAGE 2

Should we try to bring extinct species back to life?

A

The passenger pigeon was a legendary species. Flying in vast numbers across North America, with potentially many millions within a single flock, their migration was once one of nature's great spectacles. Sadly, the passenger pigeon's existence came to an end on 1 September 1914, when the last living specimen died at Cincinnati Zoo. Geneticist Ben Novak is lead researcher on an ambitious project which now aims to bring the bird back to life through a process known as 'de-extinction'. The basic premise involves using cloning technology to turn the DNA of extinct animals into a fertilised embryo, which is carried by the nearest relative still in existence – in this case, the abundant band-tailed pigeon – before being born as a living, breathing animal. Passenger pigeons are one of the pioneering species in this field, but they are far from the only ones on which this cutting-edge technology is being trialled.

B

In Australia, the thylacine, more commonly known as the Tasmanian tiger, is another extinct creature which genetic scientists are striving to bring back to life. 'There is no carnivore now in Tasmania that fills the niche which thylacines once occupied,' explains Michael Archer of the University of New South Wales. He points out that in the decades since the thylacine went extinct, there has been a spread in a 'dangerously debilitating' facial tumour syndrome which threatens the existence of the Tasmanian devils, the island's other notorious resident. Thylacines would have prevented this spread because they would have killed significant numbers of Tasmanian devils. 'If that contagious cancer had popped up previously, it would have burned out in whatever region it started. The return of thylacines to Tasmania could help to ensure that devils are never again subjected to risks of this kind.'

C

If extinct species can be brought back to life, can humanity begin to correct the damage it has caused to the natural world over the past few millennia? 'The idea of de-extinction is that we can reverse this process, bringing species that no longer exist back to life,' says Beth Shapiro of University of California Santa Cruz's Genomics Institute. 'I don't think that we can do this. There is no way to bring back something that is 100 per cent identical to a species that went extinct a long time ago.' A more practical approach for long-extinct species is to take the DNA of existing species as a template, ready for the insertion of strands of extinct animal DNA to create something new; a hybrid, based on the living species, but which looks and/or acts like the animal which died out.

D

This complicated process and questionable outcome begs the question: what is the actual point of this technology? 'For us, the goal has always been replacing the extinct species with a suitable replacement,' explains Novak. 'When it comes to breeding, band-tailed pigeons scatter

and make maybe one or two nests per hectare, whereas passenger pigeons were very social and would make 10,000 or more nests in one hectare.' Since the disappearance of this key species, ecosystems in the eastern US have suffered, as the lack of disturbance caused by thousands of passenger pigeons wrecking trees and branches means there has been minimal need for regrowth. This has left forests stagnant and therefore unwelcoming to the plants and animals which evolved to help regenerate the forest after a disturbance. According to Novak, a hybridized band-tailed pigeon, with the added nesting habits of a passenger pigeon, could, in theory, re-establish that forest disturbance, thereby creating a habitat necessary for a great many other native species to thrive.

E

Another popular candidate for this technology is the woolly mammoth. George Church, professor at Harvard Medical School and leader of the Woolly Mammoth Revival Project, has been focusing on cold resistance, the main way in which the extinct woolly mammoth and its nearest living relative, the Asian elephant, differ. By pinpointing which genetic traits made it possible for mammoths to survive the icy climate of the tundra, the project's goal is to return mammoths, or a mammoth-like species, to the area. 'My highest priority would be preserving the endangered Asian elephant,' says Church, 'expanding their range to the huge ecosystem of the tundra. Necessary adaptations would include smaller ears, thicker hair, and extra insulating fat, all for the purpose of reducing heat loss in the tundra, and all traits found in the now extinct woolly mammoth.' This repopulation of the tundra and boreal forests of Eurasia and North America with large mammals could also be a useful factor in reducing carbon emissions – elephants punch holes through snow and knock down trees, which encourages grass growth. This grass growth would reduce temperature, and mitigate emissions from melting permafrost.

F

While the prospect of bringing extinct animals back to life might capture imaginations, it is, of course, far easier to try to save an existing species which is merely threatened with extinction. 'Many of the technologies that people have in mind when they think about de-extinction can be used as a form of "genetic rescue",' explains Shapiro. She prefers to focus the debate on how this emerging technology could be used to fully understand why various species went extinct in the first place, and therefore how we could use it to make genetic modifications which could prevent mass extinctions in the future. 'I would also say there's an incredible moral hazard to not do anything at all,' she continues. 'We know that what we are doing today is not enough, and we have to be willing to take some calculated and measured risks.'

PART 2 — QUESTIONS

Questions 14-17

The Reading Passage has six paragraphs, **A-F**.

Which paragraph contains the following information?

*Write the correct letter, **A-F**, in boxes on your answer sheet.*

NB *You may use any letter more than once.*

	A	B	C	D	E	F
14 a reference to how further disappearance of multiple species could be avoided.	○	○	○	○	○	○
15 explanation of a way of reproducing an extinct animal using the DNA of only that species	○	○	○	○	○	○
16 reference to a habitat which has suffered following the extinction of a species	○	○	○	○	○	○
17 mention of the exact point at which a particular species became extinct	○	○	○	○	○	○

Questions 18-22

Complete the summary below.

Choose **NO MORE THAN TWO WORDS** from the passage for each answer.

Write your answers in boxes on your answer sheet.

The woolly mammoth revival project

Professor George Church and his team are trying to identify the **18** _____ which enabled mammoths to live in the tundra. The findings could help preserve the mammoth's close relative, the endangered Asian elephant.

According to Church, introducing Asian elephants to the tundra would involve certain physical adaptations to minimise **19** _____. To survive in the tundra, the

species would need to have the mammoth-like features of thicker hair, **20** _____ of a reduced size and more **21** _____

Repopulating the tundra with mammoths or Asian elephant/mammoth hybrids would also have an impact on the environment, which could help to reduce temperatures and decrease **22** _____

Questions 23-26

Look at the following statements and the list of people below.

Match each statement with the correct person, **A**, **B** or **C**.

*Write the correct letter, **A**, **B** or **C**, in boxes on your answer sheet.*

NB *You may use any letter more than once.*

List of People

A Ben Novak

B Michael Archer

C Beth Shapiro

	A	B	C
23 Reintroducing an extinct species to its original habitat could improve the health of a particular species living there.	○	○	○
24 It is important to concentrate on the causes of an animal's extinction.	○	○	○
25 A species brought back from extinction could have an important beneficial impact on the vegetation of its habitat.	○	○	○
26 Our current efforts at preserving biodiversity are insufficient.	○	○	○

PASSAGE 3

Having a laugh

The findings of psychological scientists reveal the importance of humour

Humans start developing a sense of humour as early as six weeks old, when babies begin to laugh and smile in response to stimuli. Laughter is universal across all human cultures and even exists in some form in rats, chimps, and bonobos. Like other human emotions and expressions, laughter and humour provide psychological scientists with rich resources for studying human psychology, ranging from the development of language to the neuroscience of social perception.

Theories focusing on the evolution of laughter point to it as an important adaptation for social communication. Take, for example, the recorded laughter in TV comedy shows. Back in 1950, US sound engineer Charley Douglass hated dealing with the unpredictable laughter of live audiences, so started recording his own 'laugh tracks'. These were intended to help people at home feel like they were in a social situation, such as a crowded theatre. Douglass even recorded various types of laughter, as well as mixtures of laugher from men, women, and children. In doing so, he picked up on a quality of laughter that is now interesting researchers: a simple 'haha' communicates a remarkable amount of socially relevant information.

In one study conducted in 2016, samples of laughter from pairs of English-speaking students were recorded at the University of California, Santa Cruz. A team made up of more than 30 psychological scientists, anthropologists, and biologists then played these recording to listeners from 24 diverse societies, from indigenous tribes in New Guinea to city-dwellers in India and Europe. Participants were asked whether they thought the people laughing were friends or strangers. On average, the results were remarkably consistent: worldwide, people's guesses were correct approximately 60% of the time.

Researchers have also found that different types of laughter serve as codes to complex human social hierarchies. A team led by Christopher Oveis from the University of California, San Diego, found that high-status individuals had different laughs from low-status individuals, and that strangers' judgements of an individual's social status were influenced by the dominant or submissive quality of their laughter. In their study, 48 male college students were randomly assigned to groups of four, with each group composed of two low-status members, who had just joined their college fraternity group, and two high-status members, older student took a turn at being teased by the others, involving the use of mildly insulting nicknames. Analysis revealed that, as expected, high-status individuals produced more dominant laughs and fewer submissive laughs relative to the low-status individuals. Meanwhile, low-status individuals were more likely to change their laughter based on their position of power; that is, the newcomers produced more dominant laughs when they were in the 'powerful' role of teasers. Dominant laughter was higher in pitch, louder, and more variable in tone than submissive laughter.

A random group of volunteers then listened to an equal number of dominant and submissive laughs from both the high- and low-status individuals, and were asked to estimate the social

status of the laughter. In line with predictions, laughers producing dominant laughs were perceived to be significantly higher in status than laughers producing submissive laughs. ‘This was particularly true for low-status individuals, who were rated as significantly higher in status when displaying a dominant versus submissive laugh,’ Oveis and colleagues note. ‘Thus, by strategically displaying more dominant laughter when the context allows, low-status individuals may achieve higher status in the eyes of others.’ However, high-status individuals were rated as high-status whether they produced their natural dominant laugh or tried to do a submissive one.

Another study, conducted by David Cheng and Lu Wang of Australian National University, was based on the hypothesis that humour might provide a respite from tedious situations in the workplace. This ‘mental break’ might facilitate the replenishment of mental resources. To test this theory, the researchers recruited 74 business students, ostensibly for an experiment on perception. First, the students performed a tedious task in which they had to cross out every instance of the letter ‘e’ over two pages of text. The students then were randomly assigned to watch a video clip eliciting either humour, contentment, or neutral feelings. Some watched a clip of the BBC comedy *Mr. Bean*, others a relaxing scene with dolphins swimming in the ocean, and others a factual video about the management profession.

The students then completed a task requiring persistence in which they were asked to guess the potential performance of employees based on provided profiles, and were told that making 10 correct assessments in a row would lead to a win. However, the software was programmed such that is was nearly impossible to achieve 10 consecutive correct answers. Participants were allowed to quit the task at any point. Students who had watched the *Mr. Bean* video ended up spending significantly more time working on the task, making twice as many predictions as the other two groups.

Cheng and Wang then replicated these results in a second study, during which they had participants complete long multiplication questions by hand. Again, participants who watched the humorous video spent significantly more time working on this tedious task and completed more questions correctly than did the students in either of the other groups.

‘Although humour has been found to help relieve stress and facilitate social relationships, traditional view of task performance implies that individuals should avoid things such as humour that may distract them from the accomplishment of task goals,’ Cheng and Wang conclude. ‘We suggest that humour is not only enjoyable but more importantly, energising.’

PART 3 — QUESTIONS

Questions 27-31

Choose the correct letter, **A**, **B**, **C** or **D**.

Write the correct letter in boxes on your answer sheet.

27 When referring to laughter in the first paragraphs, the writer emphasises

- **A** ○ its impact on language.
- **B** ○ its function in human culture.
- **C** ○ its value to scientific research.
- **D** ○ its universality in animal societies.

28 What does the writer suggest about Charley Douglass?

- **A** ○ He understood the importance of enjoying humour in a group setting.
- **B** ○ He believed that TV viewers at home needed to be told when to laugh.
- **C** ○ He wanted his shows to appeal to audiences across the social spectrum.
- **D** ○ He preferred shows where audiences were present in the recording studio.

29 What makes the Santa Cruz study particularly significant?

- **A** ○ the various different types of laughter that were studied
- **B** ○ the similar results produced by a wide range of cultures
- **C** ○ the number of different academic disciplines involved
- **D** ○ the many kinds of people whose laughter was recorded

30 Which of the following happened in the San Diego study?

- **A** ○ Some participants became very upset.
- **B** ○ Participants exchanged roles.
- **C** ○ Participants who had not met before became friends.

D ○ Some participants were unable to laugh.

31 In the fifth paragraph, what did the results of the San Diego study suggest?

A ○ It is clear whether a dominant laugh is produced by a high- or low-status person.

B ○ Low-status individuals in a position of power will still produce submissive laughs.

C ○ The submissive laughs of low- and high-status individuals are surprisingly similar.

D ○ High-status individuals can always be identified by their way of laughing.

Questions 32-36

Complete the summary using the list of words, **A-H**, below.

*Write the correct letter, **A-H**, in boxes on your answer sheet.*

The benefits of humour

In one study at Australian National University, randomly chosen groups of participants were shown one of three videos, each designed to generate a different kind of **32** _____. When all participants were then given a deliberately frustrating task to do, it was found that those who had watched the **33** _____ video persisted with the task for longer and tried harder to accomplish the task than either of the other two groups.

A second study in which participants were asked to perform a particularly **34** _____ task produced similar results. According to researchers David Cheng and Lu Wang, these findings suggest that humour not only reduces **35** _____ and helps build social connections but it may also have a **36** _____ Effect on the body and mind.

A. **laughter** B. **relaxing** C. **boring** D. **anxiety** E. **stimulating**

F. **emotion** G. **enjoyment** H. **amusing**

Questions 37-40

Do the following statements agree with the information given in the Reading Passage?

In boxes on your answer sheet, write

TRUE if the statement agrees with the claims of the writer

FALSE if the statement contradicts the claims of the writer

NOT GIVEN if it is impossible to say what the writer thinks about this

37 Participants in the Santa Cruz study were more accurate at identifying the laughs of friends than those of strangers.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

38 The researchers in the San Diego study were correct in their predictions regarding the behaviour of the high-status individuals.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

39 The participants in the Australian National University study were given a fixed amount of time to complete the task focusing on employee profiles.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

40 Cheng and Wang's conclusions were in line with established notions regarding task performance.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

Answer Key

#	Answer	Explanation
1	**B**	That is not to suggest everyone should dance their way to work, however healthy and happy it might make us, but rather that the techniques used by choreographers to experiment with and design movement in dance could provide engineers with tools to stimulate new ideas in city-making
2	**C**	Whereas medieval builders improvised and adapted construction through their intimate knowledge of materials and personal experience of the conditions on a site, building designs are now conceived and stored in media technologies that detach the designer from the physical and social realities they are creating
3	**F**	Choreography may not seem an obvious choice for tackling this problem. Yet it shares with engineering the aim of designing patterns of movement within limitations of space
4	**D**	They failed to take into account that purpose-built street cafés could not operate in the hot sun without the protective awnings common in older buildings
5	**E**	Designs that seem logical in models appear counter-intuitive in the actual experience of their users
6	**A**	The way we travel around cities has a major impact on whether they are sustainable
7	**safety**	The guard rails that will be familiar to anyone who has attempted to cross a British road, for example, were an engineering solution to pedestrian safety
8	**traffic**	based on models that prioritise the smooth flow of traffic
9	**carriageway**	On wide major roads, they often guide pedestrians to specific crossing points and slow down their progress across the road by using staggered access points divide the crossing into two – one for each carriageway
10	**mobile**	In doing so they make crossings feel longer, introducing psychological barriers greatly impacting those that are the least mobile
11	**dangerous**	and encouraging others to make dangerous crossings to get around the guard rails
12	**communities**	These barriers don't just make it harder to cross the road: they divide communities

#	Answer	Explanation
13	**healthy**	and decrease opportunities for healthy transport
14	**F**	how we could use it to make genetic modifications which could prevent mass extinctions in the future
15	**A**	The basic premise involves using cloning technology to turn the DNA of extinct animals into a fertilised embryo, which is carried by the nearest relative still in existence – in this case, the abundant band-tailed pigeon – before being born as a living, breathing animal.
16	**D**	Since the disappearance of this key species, ecosystems in the eastern US have suffered, as the lack of disturbance caused by thousands of passenger pigeons wrecking trees and branches means there has been minimal need for regrowth.
17	**A**	Sadly, the passenger pigeon's existence came to an end on 1 September 1914, when the last living specimen died at Cincinnati Zoo.
18	**genetic traits**	By pinpointing which genetic traits made it possible for mammoths to survive the icy climate of the tundra, the project's goal is to return mammoths, or a mammoth-like species, to the area
19	**heat loss**	all for the purpose of reducing heat loss in the tundra
20	**ears**	Necessary adaptations would include smaller ears
21	**fat / insulating fat**	extra insulating fat
22	**emissions / carbon emissions**	This grass growth would reduce temperature, and mitigate emissions from melting permafrost
23	**B**	The return of thylacines to Tasmania could help to ensure that devils are never again subjected to risks of this kind
24	**C**	She prefers to focus the debate on how this emerging technology could be used to fully understand why various species went extinct in the first place
25	**A**	According to Novak, a hybridized band-tailed pigeon, with the added nesting habits of a passenger pigeon, could, in theory, re-establish that forest disturbance, thereby creating a habitat necessary for a great many other native species to thrive
26	**C**	We know that what we are doing today is not enough
27	**C**	Like other human emotions and expressions, laughter and humour provide psychological scientists with rich resources for studying human psychology, ranging from the development of language to the neuroscience of social perception

#	Answer	Explanation
28	**A**	Back in 1950, US sound engineer Charley Douglass hated dealing with the unpredictable laughter of live audiences, so started recording his own ‘laugh tracks’. These were intended to help people at home feel like they were in a social situation, such as a crowded theatre.
29	**B**	the results were remarkably consistent
30	**B**	older student took a turn at being teased by the others, involving the use of mildly insulting nicknames
31	**D**	high-status individuals were rated as high-status whether they produced their natural dominant laugh or tried to do a submissive one
32	**F**	The students then were randomly assigned to watch a video clip eliciting either humour, contentment, or neutral feelings
33	**H**	Students who had watched the Mr. Bean video ended up spending significantly more time working on the task
34	**C**	participants who watched the humorous video spent significantly more time working on this tedious task
35	**D**	humour has been found to help relieve stress and facilitate social relationships
36	**E**	We suggest that humour is not only enjoyable but more importantly, energising.
37	**NOT GIVEN**	worldwide, people’s guesses were correct approximately 60% of the time
38	**TRUE**	Analysis revealed that, as expected, high-status individuals produced more dominant laughs and fewer submissive laughs relative to the low-status individuals.
39	**FALSE**	Participants were allowed to quit the task at any point
40	**FALSE**	traditional view of task performance implies that individuals should avoid things such as humour that may distract them from the accomplishment of task goals,’ Cheng and Wang conclude. ‘We suggest that humour is not only enjoyable but more importantly, energising.

Test 9

PASSAGE 1

Henry Moore (1898-1986)

The British sculptor Henry Moore was a leading figure in the 20th-century art world

Henry Moore was born in Castleford, a small town near Leeds in the north of England. He was the seventh child of Raymond Moore and his wife Mary Baker. He studied at Castleford Grammar School from 1909 to 1915, where his early interest in art was encouraged by his teacher Alice Gostick. After leaving school, Moore hoped to become a sculptor, but instead he complied with his father's wish that he train as a schoolteacher. He had to abandon his training in 1917 when he was sent to France to fight in the First World War.

After the war, Moore enrolled at the Leeds School of Art, where he studied for two years. In his first year, he spent most of his time drawing. Although he wanted to study sculpture, no teacher was appointed until his second year. At the end of that year, he passed the sculpture examination and was awarded a scholarship to the Royal College of Art in London. In September 1921, he moved to London and began three years of advanced study in sculpture.

Alongside the instruction he received at the Royal College, Moore visited many of the London museums, particularly the British Museum, which had a wide-ranging collection of ancient sculpture. During these visits, he discovered the power and beauty of ancient Egyptian and African sculpture. As he became increasingly interested in these 'primitive' forms of art, he turned away from European sculptural traditions.

After graduating, Moore spent the first six months of 1925 travelling in France. When he visited the Trocadero Museum in Paris, he was impressed by a cast of a Mayan* sculpture of the rain spirit. It was a male reclining figure with its knees drawn up together, and its head at a right angle to its body. Moore became fascinated with this stone sculpture, which he thought had a power and originality that no other stone sculpture possessed. He himself started carving a variety of subjects in stone, including depiction of reclining women, mother-and-child groups, and masks.

Moore's exceptional talent soon gained recognition, and in 1926 he started work as a sculpture instructor at the Royal College. In 1933, he became a member of a group of young artists called Unit One. The aim of the group was to convince the English public of the merits of the emerging international movement in modern art and architecture.

Around this time, Moore moved away from the human figure to experiment with abstract shapes. In 1931, he held an exhibition at the Leicester Galleries in London. His work was enthusiastically welcomed by fellow sculptors, but the reviews in the press were extremely negative and turned Moore into a notorious figure. There were calls for his resignation from the Royal College, and the following year, when his contract expired, he left to start a sculpture department at the Chelsea School of Art in London.

Throughout the 1930s, Moore did not show any inclination to please the British public. He became interested in the paintings of the Spanish artist Pablo Picasso, whose work inspired him to distort the human body in a radical way. At times, he seemed to abandon the human figure altogether. The pages of his sketchbooks from this period show his ideas for abstract sculptures that bore little resemblance to the human form.

In 1940, during the Second World War, Moore stopped teaching at the Chelsea School and moved to a farmhouse about 20 miles north of London. A shortage of materials forced him to focus on drawing. He did numerous small sketches of Londoners, later turning these ideas into large coloured drawings in his studio. In 1942, he returned to Castleford to make a series of sketches of the miners who worked there.

In 1944, Harlow, a town near London, offered Moore a commission for a sculpture depicting a family. The resulting work signifies a dramatic change in Moore's style, away from the experimentation of the 1930s towards a more natural and humanistic subject matter. He did dozens of studies in clay for the sculpture, and these were cast in bronze and issued in editions of seven to nine copies each. In this way, Moore's work became available to collectors all over the world. The boost to his income enabled him to take on ambitious projects and start working on the scale he felt his sculpture demanded.

Critics who had begun to think that Moore had become less revolutionary were proven wrong by the appearance, in 1950, of the first of Moore's series of standing figures in bronze, with their harsh and angular pierced forms and distinct impression of menace. Moore also varied his subject matter in the 1950s with such works as *Warrior with Shield* and *Falling Warrior*. These were rare examples of Moore's use of the male figure and owe something to his visit to Greece in 1951, when he had the opportunity to study ancient works of art.

In his final years, Moore created the Henry Moore Foundation to promote art appreciation and to display his work. Moore was the first modern English sculptor to achieve international critical acclaim and he is still regarded as one of the most important sculptors of the 20th century.

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*Mayan: belonging to an ancient civilisation that inhabited parts of current-day Mexico, Guatemala, Belize, El Salvador and Honduras.

PART 1 — QUESTIONS

Questions 1-7

Do the following statements agree with the claims of the writer in the Reading Passage?

In boxes on your answer sheet, write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

1 On leaving school, Moore did what his father wanted him to do.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

2 Moore began studying sculpture in his first term at the Leeds School of Art.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

3 When Moore started at the Royal College of Art, its reputation for teaching sculpture was excellent.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

4 Moore became aware of ancient sculpture as a result of visiting London Museums.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

5 The Trocadero Museum's Mayan sculpture attracted a lot of public interest.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

6 Moore thought the Mayan sculpture was similar in certain respects to other stone sculptures.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

7 The artists who belonged to Unit One wanted to make modern art and architecture more popular.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

Questions 8-13

Complete the notes below.

Choose **ONE WORD ONLY** from the passage for each answer.

Write your answers in boxes on your answer sheet.

Moore's career as an artist

1930s

- Moore's exhibition at the Leicester Galleries is criticised by the press
- Moore is urged to offer his **8** _____ and leave the Royal College.

1940s

- Moore turns to drawing because **9** _____ for sculpting are not readily available

- While visiting his hometown, Moore does some drawings of **10** _____
- Moore is employed to produce a sculpture of a **11** _____
- **12** _____ start to buy Moore's work
- Moore's increased **13** _____ makes it possible for him to do more ambitious sculptures

1950s

- Moore's series of bronze figures marks a further change in his style

PASSAGE 2

The Desolenator: producing clean water

14

A

Travelling around Thailand in the 1990s, William Janssen was impressed with the basic rooftop solar heating systems that were on many homes, where energy from the sun was absorbed by a plate and then used to heat water for domestic use. Two decades later Janssen developed that basic idea he saw in Southeast Asia into a portable device that uses the power from the sun to purify water.

15

B

The Desolenator operates as a mobile desalination unit that can take water from different places, such as the sea, rivers, boreholes and rain, and purify it for human consumption. It is particularly valuable in regions where natural groundwater reserves have been polluted, or where seawater is the only water source available.

Janssen saw that there was a need for a sustainable way to clean water is both the developing and the developed countries when he moved to the United Arab Emirates and saw large-scale water processing. 'I was confronted with the enormous carbon footprint that the Gulf nations have because of all of the desalination that they do,' he says.

16

C

The Desolenator can produce 15 litres of drinking water per day, enough to sustain a family for cooking and drinking. Its main selling point is that unlike standard desalination techniques, it doesn't require a generated power supply: just sunlight. It measures 120 cm by 90 cm, and it easy to transport, thanks to its two wheels. Water enters through a pipe, and flows as a thin film between a sheet of double glazing and the surface of a solar panel, where it is heated by the sun. The warm water flows into a small boiler (heated by a solar-powered battery) where it is converted to steam. When the steam cools, it becomes distilled water. The device has a very simple filter to trap particles, and this can easily be shaken to remove them. There are two tubes for liquid coming out: one for the waste – salt from seawater, fluoride, etc. – and another for the distilled water. The performance of the unit is shown on an LCD screen and transmitted to the company which provides servicing when necessary.

17

D

A recent analysis found that at least two-thirds of the world's population lives with severe water scarcity for at least a month every year. Janssen says that by 2030 half of the world's population will be living with water stress – where the demand exceeds the supply over a certain period of time. 'It is really important that a sustainable solution is brought to the market that is able to help these people,' he says. Many countries 'don't have the money for desalination plants, which are very expensive to build. They don't have the money to operate them, they are very maintenance intensive, and they don't have the money to buy the diesel to run the desalination plants, so it is a really bad situation.'

18

E

The device is aimed at a wide variety of users – from homeowners in the developing world who do not have a constant supply of water to people living off the grid in rural parts of the US. The first commercial versions of the Desolenator are expected to be in operation in India early next year, after field tests are carried out. The market for the self-sufficient devices in developing countries is twofold – those who cannot afford the money for the device outright and pay through microfinance, and middle-income homes that can lease their own equipment. 'People in India don't pay for a fridge outright; they pay for it over six months. They would put the Desolenator on their roof and hook it up to their municipal supply and they would get very reliable drinking water on a daily basis,' Janssen says. In the developed world, it is aimed at niche markets where tap water is unavailable – for camping, on boats, or for the military, for instance.

19

F

Prices will vary according to where it is bought. In the developing world, the price will depend on what deal aid organisations can negotiate. In developed countries, it is likely to come in at $1,000 (£685) a unit, said Janssen. 'We are a venture with a social mission. We are aware that the product we have envisioned is mainly finding application in the developing world and humanitarian sector and that this is the way we will proceed. We do realise, though, that to be a viable company there is a bottom line to keep in mind,' he says.

20

G

The company itself is based at Imperial College London, although Janssen, its chief executive, still lives in the UAE. It has raised £340,000 in funding so far. Within two years, he says, the company aims to be selling 1,000 units a month, mainly in the humanitarian field. They are expected to be sold in areas such as Australia, northern Chile, Peru, Texas and California.

PART 2 — QUESTIONS

Questions 14-20

The Reading Passage has nine paragraphs, **A-H**

Choose the correct heading for each section from the list of headings below

*Write the correct number, **i-x**, in boxes on your answer sheet.*

List of Headings

i. **Getting the finance for production**

ii. **An unexpected benefit**

iii. **From initial inspiration to new product**

iv. **The range of potential customers for the device**

v. **What makes the device different from alternatives**

vi. **Cleaning water from a range of sources**

vii. **Overcoming production difficulties**

viii. **Profit not the primary goal**

ix. **A warm welcome for the device**

x. **The number of people affected by water shortages**

Questions 21-26

Complete the summary below.

Choose **ONE WORD ONLY** from the passage for each answer.

Write your answers in boxes on your answer sheet.

How the Desolenator works

The energy required to operate the Desolenator comes from sunlight. The device can be used in different locations, as it has **21** _____. Water is fed into a pipe, and a **22** _____ of water flows over a solar panel. The water then enters a boiler, where it turns into steam. Any particles in the water are caught in a **23** _____. The purified water comes out through one tube, and all types of **24** _____ come out through another. A screen displays the **25** _____ of the device, and

transmits the information to the company so that they know when the Desolenator requires **26** _____.

PASSAGE 3

Why fairy tales are really scary tales

Some people think that fairy tales are just stories to amuse children, but their universal and enduring appeal may be due to more serious reasons

People of every culture tell each other fairy tales but the same story often takes a variety of forms in different parts of the world. In the story of *Little Red Riding Hood* that European children are familiar with, a young girl on the way to see her grandmother meets a wolf and tells him where she is going. The wolf runs on ahead and disposes of the grandmother, then gets into bed dressed in the grandmother's clothes to wait for Little Red Riding Hood. You may think you know the story – but which version? In some versions, the wolf swallows up the grandmother, while in others it locks her in a cupboard. In some stories Red Riding Hood gets the better of the wolf on her own, while in others a hunter or a woodcutter hears her cries and comes to her rescue.

The universal appeal of these tales is frequently attributed to the idea that they contain cautionary messages: in the case of *Little Red Riding Hood*, to listen to your mother, and avoid talking to strangers. 'It might be what we find interesting about this story is that it's got this survival-relevant information in it,' says anthropologist Jamie Tehrani at Durham University in the UK. But his research suggests otherwise. 'We have this huge gap in our knowledge about the history and prehistory of storytelling, despite the fact that we know this genre is an incredibly ancient one,' he says. That hasn't stopped anthropologists, folklorists* and other academics devising theories to explain the importance of fairy tales in human society. Now Tehrani has found a way to test these ideas, borrowing a technique from evolutionary biologists.

To work out the evolutionary history, development and relationships among groups of organisms, biologists compare the characteristics of living species in a process called 'phylogenetic analysis'. Tehrani has used the same approach to compare related versions of fairy tales to discover how they have evolved and which elements have survived longest.

Tehrani's analysis focused on *Little Red Riding Hood* in its many forms, which include another Western fairy tale known as *The Wolf and the Kids*. Checking for variants of these two tales and similar stories from Africa, East Asia and other regions, he ended up with 58 stories recorded from oral traditions. Once his phylogenetic analysis had established that they were indeed related, he used the same methods to explore how they have developed and altered over time.

First he tested some assumptions about which aspects of the story alter least as it evolves, indicating their importance. Folklorists believe that what happens in a story is more central to the story than the characters in it – that visiting a relative, only to be met by a scary animal in disguise, is more fundamental than whether the visitor is a little girl or three siblings, or the animal is a tiger instead of a wolf.

However, Tehrani found no significant difference in the rate of evolution of incidents compared with that of characters. 'Certain episodes are very stable because they are crucial to the story,

but there are lots of other details that can evolve quite freely,' he says. Neither did his analysis support the theory that the central section of a story is the most conserved part. He found no significant difference in the flexibility of events there compared with the beginning or the end.

But the really big surprise came when he looked at the cautionary elements of the story. 'Studies on hunter-gatherer folk tales suggest that these narratives include really important information about the environment and the possible dangers that may be faced there – stuff that's relevant to survival,' he says. Yet in his analysis such elements were just as flexible as seemingly trivial details. What, then, is important enough to be reproduced from generation to generation?

The answer, it would appear, is fear – blood-thirsty and gruesome aspects of the story, such as the eating of the grandmother by the wolf, turned out to be the best preserved of all. Why are these details retained by generations of storytellers, when other features are not? Tehrani has an idea: 'In an oral context, a story won't survive because of one great teller. It also needs to be interesting when it's told by someone who's not necessarily a great storyteller.' Maybe being swallowed whole by a wolf, then cut out of its stomach alive is so gripping that it helps the story remain popular, no matter how badly it's told.

Jack Zipes at the University of Minnesota, Minneapolis, is unconvinced by Tehrani's views on fairy tales. 'Even if they're gruesome, they won't stick unless they matter,' he says. He believes the perennial theme of women as victims in stories like *Little Red Riding Hood* explains why they continue to feel relevant. But Tehrani points out that although this is often the case in Western versions, it is not always true elsewhere. In Chinese and Japanese versions, often known as *The Tiger Grandmother*, the villain is a woman, and in both Iran and Nigeria, the victim is a boy.

Mathias Clasen at Aarhus University in Denmark isn't surprised by Tehrani's findings. 'Habits and morals change, but the things that scare us, and the fact that we seek out entertainment that's designed to scare us – those are constant,' he says. Clasen believes that scary stories teach us what it feels like to be afraid without having to experience real danger, and so build up resistance to negative emotions.

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*Folklorists: those who study traditional stories

PART 3 — QUESTIONS

Questions 27-31

Complete each sentence with the correct ending, **A-F**, below.

*Write the correct letter, **A-F**, in boxes on your answer sheet.*

• In fairy tales, details of the plot **27** _____

• Tehrani rejects the idea that the useful lessons for life in fairy tales **28** _____

• Various theories about the social significance of fairy tales **29** _____

• Insights into the development of fairy tales **30** _____

• All the fairy tales analysed by Tehrani **31** _____

A. **may be provided through methods used in biological research.**

B. **are the reason for their survival.**

C. **show considerable global variation.**

D. **contain animals which transform to become humans.**

E. **were originally spoken rather than written.**

F. **have been developed without factual basis.**

Questions 32-36

Complete the summary using the list of words, **A-I**, below.

*Write the correct letter, **A-I**, in boxes on your answer sheet.*

Phylogenetic analysis of *Little Red Riding Hood*

Tehrani used techniques from evolutionary biology to find out if **32** _____ existed among 58 stories from around the world. He also wanted to know which aspects of the stories had fewest **33** _____, as he believed these aspects would be the most important ones. Contrary to other beliefs, he found that some **34** _____ that were included in a story tended to change over time, and that the middle of a story

seemed no more important than the other parts. He was also surprised that parts of a story which seemed to provide some sort of **35** _____ were unimportant. The aspect that he found most important in a story's survival was **36** _____

A. **ending** B. **events** C. **warning** D. **links** E. **records** F. **variations**
G. **horror** H. **people** I. **plot**

Questions 37-40

Choose the correct letter, **A**, **B**, **C** or **D**.

Write the correct letter in boxes on your answer sheet.

37 What method did Jamie Tehrani use to test his ideas about fairy tales?

A ○ He compared oral and written forms of the same stories.

B ○ He looked at many different forms of the same basic story.

C ○ He looked at unrelated stories from many different countries.

D ○ He contrasted the development of fairy tales with that of living creatures.

38 When discussing Tehrani's views, Jack Zipes suggests that

A ○ Tehrani ignores key changes in the role of women.

B ○ stories which are too horrific are not always taken seriously.

C ○ Tehrani overemphasises the importance of violence in stories.

D ○ features of stories only survive if they have a deeper significance.

39 Why does Tehrani refer to Chinese and Japanese fairy tales?

A ○ to indicate that Jack Zipes' theory is incorrect

B ○ to suggest that crime is a global problem

C ○ to imply that all fairy tales have a similar meaning

D ○ to add more evidence for Jack Zipes' ideas

40 What does Mathias Clasen believe about fairy tales?

A ○ They are a safe way of learning to deal with fear.

B ○ They are a type of entertainment that some people avoid.

C ○ They reflect the changing values of our society.

D ○ They reduce our ability to deal with real-world problems.

Answer Key

#	Answer	Explanation
1	**TRUE**	After leaving school, Moore hoped to become a sculptor, but instead he complied with his father's wish that he train as a schoolteacher
2	**FALSE**	After the war, Moore enrolled at the Leeds School of Art, where he studied for two years. In his first year, he spent most of his time drawing
3	**NOT GIVEN**	At the end of that year, he passed the sculpture examination and was awarded a scholarship to the Royal College of Art in London.
4	**TRUE**	Moore visited many of the London museums, particularly the British Museum, which had a wide-ranging collection of ancient sculpture. During these visits, he discovered the power and beauty of ancient Egyptian and African sculpture
5	**NOT GIVEN**	When he visited the Trocadero Museum in Paris, he was impressed by a cast of a Mayan* sculpture of the rain spirit
6	**FALSE**	Moore became fascinated with this stone sculpture, which he thought had a power and originality that no other stone sculpture possessed
7	**TRUE**	The aim of the group was to convince the English public of the merits of the emerging international movement in modern art and architecture
8	**resignation**	There were calls for his resignation from the Royal College
9	**materials**	A shortage of materials forced him to focus on drawing
10	**miners**	In 1942, he returned to Castleford to make a series of sketches of the miners who worked there
11	**family**	In 1944, Harlow, a town near London, offered Moore a commission for a sculpture depicting a family
12	**collectors**	In this way, Moore's work became available to collectors all over the world
13	**income**	The boost to his income enabled him to take on ambitious projects and start working on the scale he felt his sculpture demanded

#	Answer	Explanation
14	**iii**	Two decades later Janssen developed that basic idea he saw in Southeast Asia into a portable device that uses the power from the sun to purify water
15	**vi**	The Desolenator operates as a mobile desalination unit that can take water from different places, such as the sea, rivers, boreholes and rain, and purify it for human consumption.
16	**v**	Its main selling point is that unlike standard desalination techniques, it doesn't require a generated power supply
17	**x**	A recent analysis found that at least two-thirds of the world's population lives with severe water scarcity for at least a month every year
18	**iv**	The device is aimed at a wide variety of users – from homeowners in the developing world who do not have a constant supply of water to people living off the grid in rural parts of the US.
19	**viii**	We are a venture with a social mission. We are aware that the product we have envisioned is mainly finding application in the developing world and humanitarian sector and that this is the way we will proceed
20	**i**	It has raised £340,000 in funding so far
21	**wheels**	It measures 120 cm by 90 cm, and it easy to transport, thanks to its two wheels
22	**film**	Water enters through a pipe, and flows as a thin film between a sheet of double glazing and the surface of a solar panel
23	**filter**	The device has a very simple filter to trap particles
24	**waste**	There are two tubes for liquid coming out: one for the waste – salt from seawater, fluoride, etc. – and another for the distilled water
25	**performance**	The performance of the unit is shown on an LCD screen
26	**servicing**	transmitted to the company which provides servicing when necessary
27	**C**	In some versions, the wolf swallows up the grandmother, while in others it locks her in a cupboard. In some stories Red Riding Hood gets the better of the wolf on her own, while in others a hunter or a woodcutter hears her cries and comes to her rescue
28	**B**	'It might be what we find interesting about this story is that it's got this survival-relevant information in it,' says anthropologist Jamie Tehrani at Durham University in the UK. But his research suggests otherwise.

#	Answer	Explanation
29	**F**	That hasn’t stopped anthropologists, folklorists* and other academics devising theories to explain the importance of fairy tales in human society
30	**A**	Tehrani has used the same approach to compare related versions of fairy tales to discover how they have evolved and which elements have survived longest
31	**E**	Checking for variants of these two tales and similar stories from Africa, East Asia and other regions, he ended up with 58 stories recorded from oral traditions
32	**D**	Once his phylogenetic analysis had established that they were indeed related
33	**F**	he used the same methods to explore how they have developed and altered over time
34	**B**	Certain episodes are very stable because they are crucial to the story, but there are lots of other details that can evolve quite freely
35	**C**	Yet in his analysis such elements were just as flexible as seemingly trivial details
36	**G**	The answer, it would appear, is fear – blood-thirsty and gruesome aspects of the story, such as the eating of the grandmother by the wolf, turned out to be the best preserved of all
37	**B**	Tehrani’s analysis focused on Little Red Riding Hood in its many forms
38	**D**	they won’t stick unless they matter
39	**A**	But Tehrani points out that although this is often the case in Western versions, it is not always true elsewhere. In Chinese and Japanese versions, often known as The Tiger Grandmother, the villain is a woman, and in both Iran and Nigeria, the victim is a boy.
40	**A**	Clasen believes that scary stories teach us what it feels like to be afraid without having to experience real danger, and so build up resistance to negative emotions

Test 10

PASSAGE 1

The return of the huarango

The arid valleys of southern Peru are welcoming the return of a native plant

The south coast of Peru is a narrow, 2,000-kilometre-long strip of desert squeezed between the Andes and the Pacific Ocean. It is also one of the most fragile ecosystems on Earth. It hardly ever rains there, and the only year-round source of water is located tens of metres below the surface. This is why the huarango tree is so suited to life there: it has the longest roots of any tree in the world. They stretch down 50-80 metres and, as well as sucking up water for the tree, they bring it into the higher subsoil, creating a water source for other plant life.

Dr David Beresford-Jones, archaeobotanist at Cambridge University, has been studying the role of the huarango tree in landscape change in the Lower Ica Valley in southern Peru. He believes the huarango was key to the ancient people's diet and, because it could reach deep water sources, it allowed local people to withstand years of drought when their other crops failed. But over the centuries huarango trees were gradually replaced with crops. Cutting down native woodland leads to erosion, as there is nothing to keep the soil in place. So when the huarangos go, the land turns into a desert. Nothing grows at all in the Lower Ica Valley now.

For centuries the huarango tree was vital to the people of the neighbouring Middle Ica Valley too. They grew vegetables under it and ate products made from its seed pods. Its leaves and bark were used for herbal remedies, while its branches were used for charcoal for cooking and heating, and its trunk was used to build houses. But now it is disappearing rapidly. The majority of the huarango forests in the valley have already been cleared for fuel and agriculture – initially, these were smallholdings, but now they're huge farms producing crops for the international market.

'Of the forests that were here 1,000 years ago, 99 per cent have already gone,' says botanist Oliver Whaley from Kew Gardens in London, who, together with ethnobotanist Dr William Milliken, is running a pioneering project to protect and restore the rapidly disappearing habitat. In order to succeed, Whaley needs to get the local people on board, and that has meant overcoming local prejudices. 'Increasingly aspirational communities think that if you plant food trees in your home or street, it shows you are poor, and still need to grow your own food,' he says. In order to stop the Middle Ica Valley going the same way as the Lower Ica Valley, Whaley is encouraging locals to love the huarangos again. 'It's a process of cultural resuscitation,' he says. He has already set up a huarango festival to reinstate a sense of pride in their eco-heritage, and has helped local schoolchildren plant thousands of trees.

'In order to get people interested in habitat restoration, you need to plant a tree that is useful to them,' says Whaley. So, he has been working with local families to attempt to create a sustainable income from the huarangos by turning their products into foodstuffs. 'Boil up the

beans and you get this thick brown syrup like molasses. You can also use it in drinks, soups or stews.' The pods can be ground into flour to make cakes, and the seeds roasted into a sweet, chocolatey 'coffee'. 'It's packed full of vitamins and minerals,' Whaley says.

And some farmers are already planting huarangos. Alberto Benevides, owner of Ica Valley's only certified organic farm, which Whaley helped set up, has been planting the tree for 13 years. He produces syrup and flour, and sells these products at an organic farmers' market in Lima. His farm is relatively small and doesn't yet provide him with enough to live on, but he hopes this will change. 'The organic market is growing rapidly in Peru,' Benevides says. 'I am investing in the future.'

But even if Whaley can convince the local people to fall in love with the huarango again, there is still the threat of the larger farms. Some of these cut across the forests and break up the corridors that allow the essential movement of mammals, birds and pollen up and down the narrow forest strip. In the hope of counteracting this, he's persuading farmers to let him plant forest corridors on their land. He believes the extra woodland will also benefit the farms by reducing their water usage through a lowering of evaporation and providing a refuge for bio-control insects.

'If we can record biodiversity and see how it all works, then we're in a good position to move on from there. Desert habitats can reduce down to very little,' Whaley explains. 'It's not like a rainforest that needs to have this huge expanse. Life has always been confined to corridors and islands here. If you just have a few trees left, the population can grow up quickly because it's used to exploiting water when it arrives.' He sees his project as a model that has the potential to be rolled out across other arid areas around the world. 'If we can do it here, in the most fragile system on Earth, then that's a real message of hope for lots of places, including Africa, where there is drought and they just can't afford to wait for rain.'

PART 1 — QUESTIONS

Questions 1-5

Complete the notes below.

Choose **ONE WORD ONLY** from the passage for each answer.

Write your answer in boxes on your answer sheet.

The importance of the huarango tree

- its roots can extend as far as 80 metres into the soil
- can access **1** _____ deep below the surface
- was a crucial part of local inhabitants' **2** _____ a long time ago
- helped people to survive periods of **3** _____
- prevents **4** _____ of the soil
- prevents land from becoming a **5** _____

Questions 6-8

Complete the table below.

Choose **NO MORE THAN TWO WORDS** from the passage for each answer.

Write your answers in boxes on your answer sheet.

Traditional uses of the huarango tree

Part of tree	Traditional use
6 _____	Fuel
Leaves and **7** _____	Medicine
8 _____	construction

Questions 9-13

Do the following statements agree with the information given in the Reading Passage?

In boxes on your answer sheet, write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

9 Local families have told Whaley about some traditional uses of huarango products.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

10 Farmer Alberto Benevides is now making a good profit from growing huarangos.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

11 Whaley needs the co-operation of farmers to help preserve the area's wildlife.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

12 For Whaley's project to succeed, it needs to be extended over a very large area.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

13 Whaley has plans to go to Africa to set up a similar project.

- **A** ○ TRUE
- **B** ○ FALSE

C ○ NOT GIVEN

PASSAGE 2

Silbo Gomero – the whistle 'language' of the Canary Islands

La Gomera is one of the Canary Islands situated in the Atlantic Ocean off the northwest coast of Africa. This small volcanic island is mountainous, with steep rocky slopes and deep, wooded ravines, rising to 1,487 metres at its highest peak. It is also home to the best known of the world's whistle 'languages', a means of transmitting information over long distances which is perfectly adapted to the extreme terrain of the island.

This 'language', known as 'Silbo' or 'Silbo Gomero' – from the Spanish word for 'whistle' – is now shedding light on the language-processing abilities of the human brain, according to scientists. Researchers say that Silbo activates parts of the brain normally associated with spoken language, suggesting that the brain is remarkably flexible in its ability to interpret sounds as language.

'Science has developed the idea of brain areas that are dedicated to language, and we are starting to understand the scope of signals that can be recognised as language,' says David Corina, co-author of a recent study and associate professor of psychology at the University of Washington in Seattle.

Silbo is a substitute for Spanish, with individual words recoded into whistles which have high- and low-frequency tones. A whistler – or *silbador* – puts a finger in his or her mouth to increase the whistle's pitch, while the other hand can be cupped to adjust the direction of the sound. 'There is much more ambiguity in the whistled signal than in the spoken signal,' explains lead researcher Manuel Carreiras, psychology professor at the University of La Laguna on the Canary island of Tenerife. Because whistled 'words' can be hard to distinguish, silbadores rely on repetition, as well as awareness of context, to make themselves understood.

The silbadores of Gomera are traditionally shepherds and other isolated mountain folk, and their novel means of staying in touch allows them to communicate over distances of up to 10 kilometres. Carreiras explains that silbadores are able to pass a surprising amount of information via their whistles. 'In daily life they use whistles to communicate short commands, but any Spanish sentence could be whistled.' Silbo has proved particularly useful when fires have occurred on the island and rapid communication across large areas has been vital.

The study team used neuroimaging equipment to contrast the brain activity of silbadores while listening to whistled and spoken Spanish. Results showed the left temporal lobe of the brain, which is usually associated with spoken language, was engaged during the processing of Silbo. The researchers found that other key regions in the brain's frontal lobe also responded to the whistles, including those activated in response to sign language among deaf people. When the experiments were repeated with non-whistlers, however, activation was observed in all areas of the brain.

'Our results provide more evidence about the flexibility of human capacity for language in a variety of forms,' Corina says. 'These data suggest that left-hemisphere language regions are

uniquely adapted for communicative purposes, independent of the modality of signal. The non-Silbo speakers were not recognising Silbo as a language. They had nothing to grab onto, so multiple areas of their brains were activated.'

Carreiras says the origins of Silbo Gomero remain obscure, but that indigenous Canary Islanders, who were of North African origin, already had a whistled language when Spain conquered the volcanic islands in the 15th century. Whistled languages survive today in Papua New Guinea, Mexico, Vietnam, Guyana, China, Nepal, Senegal, and a few mountainous pockets in southern Europe. There are thought to be as many as 70 whistled languages still in use, though only 12 have been described and studied scientifically. This form of communication is an adaptation found among cultures where people are often isolated from each other, according to Julien Meyer, a researcher at the Institute of Human Sciences in Lyon, France. 'They are mostly used in mountains or dense forests,' he says. 'Whistled languages are quite clearly defined and represent an original adaptation of the spoken language for the needs of isolated human groups.'

But with modern communication technology now widely available, researchers say whistled languages like Silbo are threatened with extinction. With dwindling numbers of Gomera islanders still fluent in the language, Canaries' authorities are taking steps to try to ensure its survival. Since 1999, Silbo Gomero has been taught in all of the island's elementary schools. In addition, locals are seeking assistance from the United Nations Educational, Scientific and Cultural Organization (UNESCO). 'The local authorities are trying to get an award from the organisation to declare [Silbo Gomero] as something that should be preserved for humanity,' Carreiras adds.

PART 2 — QUESTIONS

Questions 14-19

Do the following statements agree with the information given in the Reading Passage?

In boxes on your answer sheet, write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

14 La Gomera is the most mountainous of all the Canary Islands.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

15 Silbo is only appropriate for short and simple messages.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

16 In the brain-activity study, silbadores and non-whistlers produced different results.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

17 The Spanish introduced Silbo to the islands in the 15th century.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

18 There is precise data available regarding all of the whistle languages in existence today.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

19 The children of Gomera now learn Silbo.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

Questions 20-26

Complete the notes below.

Choose **ONE WORD ONLY** from the passage for each answer.

Write your answers in boxes on your answer sheet.

Silbo Gomero

How Silbo is produced

- high- and low-frequency tones represent different sounds in Spanish **20** _____
- pitch of whistle is controlled using silbador's **21** _____
- **22** _____ is changed with a cupped hand

How Silbo is used

- has long been used by shepherds and people living in secluded locations
- in everyday use for the transmission of brief **23** _____
- can relay essential information quickly, e.g. to inform people about **24** _____

The future of Silbo

- future under threat because of new **25** _____

- Canaries' authorities hoping to receive a UNESCO **26** _____ to help preserve it

PASSAGE 3

Environmental practices of big businesses

The environmental practices of big businesses are shaped by a fundamental fact that for many of us offend our sense of justice. Depending on the circumstances, a business may maximize the amount of money it makes, at least in the short term, by damaging the environment and hurting people. That is still the case today for fishermen in an unmanaged fishery without quotas, and for international logging companies with short-term leases on tropical rainforest land in places with corrupt officials and unsophisticated landowners. When government regulation is effective, and when the public is environmentally aware, environmentally clean big businesses may out-compete dirty ones, but the reverse is likely to be true if government regulation is ineffective and if the public doesn't care.

It is easy for the rest of us to blame a business for helping itself by hurting other people. But blaming alone is unlikely to produce change. It ignores the fact that businesses are not charities but profit-making companies, and that publicly owned companies with shareholders are under obligation to those shareholders to maximize profits, provided that they do so by legal means. US laws make a company's directors legally liable for something termed 'breach of fiduciary responsibility' if they knowingly manage a company in a way that reduces profits. The car manufacturer Henry Ford was in fact successfully sued by shareholders in 1919 for raising the minimum wage of his workers to $5 per day: the courts declared that, while Ford's humanitarian sentiments about his employees were nice, his business existed to make profits for its stockholders.

Our blaming of businesses also ignores the ultimate responsibility of the public for creating the condition that let a business profit through destructive environmental policies. In the long run, it is the public, either directly or through its politicians, that has the power to make such destructive policies unprofitable and illegal, and to make sustainable environmental policies profitable.

The public can do that by suing businesses for harming them, as happened after the Exxon Valdez disaster, in which over 40,000m^3 of oil were spilled off the coast of Alaska. The public may also make their opinion felt by preferring to buy sustainably harvested products; by making employees of companies with poor track records feel ashamed of their company and complain to their own management; by preferring their governments to award valuable contracts to businesses with a good environmental track record; and by pressing their governments to pass and enforce laws and regulations requiring good environmental practices.

In turn, big businesses can exert powerful pressure on any suppliers that might ignore public or government pressure. For instance, after the US public became concerned about the spread of a disease known as BSE, which was transmitted to humans through infected meat, the US government's Food and Drug Administration introduced rules demanding that the meat industry abandon practices associated with the risk of the disease spreading. But for five years the meat packers refused to follow these, claiming that they would be too expensive to obey. However, when a major fast-food company then made the same demands after customer purchases of its

hamburgers plummeted, the meat industry complied within weeks. The public's task is therefore to identify which links in the supply chain are sensitive to public pressure: for instance, fast-food chains or jewelry stores, but not meat packers or gold miners.

Some readers may be disappointed or outraged that I place the ultimate responsibility for business practices harming the public on the public itself. I also believe that the public must accept the necessity for higher prices for products to cover the added costs, if any, of sound environmental practices. My views may seem to ignore the belief that businesses should act in accordance with moral principles even if this leads to a reduction in their profits. But I think we have to recognize that, throughout human history, in all politically complex human societies, government regulation has arisen precisely because it was found that not only did moral principles need to be made explicit, they also needed to be enforced.

To me, the conclusion that the public has the ultimate responsibility for the behavior of even the biggest businesses is empowering and hopeful, rather than disappointing. My conclusion is not a moralistic one about who is right or wrong, admirable or selfish, a good guy or a bad guy. In the past, businesses have changed when the public came to expect and require different behavior, to reward businesses for behavior that the public wanted, and to make things difficult for businesses practicing behaviors that the public didn't want. I predict that in the future, just as in the past, changes in public attitudes will be essential for changes in businesses' environmental practices.

PART 3 — QUESTIONS

Questions 27-31

Complete the summary using the list of words, **A-J**, below.

*Write the correct letter, **A-J**, in boxes on your answer sheet.*

Big businesses

Many big businesses today are prepared to harm people and the environment in order to make money, and they appear to have no **27** _____ . Lack of **28** _____ by governments and lack of public **29** _____ can lead to environmental problems such as **30** _____ or the destruction of **31** _____

A. **funding** B. **trees** C. **rare species** D. **moral standards** E. **control**

F. **involvement** G. **flooding** H. **overfishing** I. **worker support**

Questions 32-34

Choose the correct letter, **A**, **B**, **C** or **D**.

Write the correct letter in boxes on your answer sheet.

32 The main idea of the third paragraph is that environmental damage

- **A** ○ requires political action if it is to be stopped.
- **B** ○ is the result of ignorance on the part of the public.
- **C** ○ could be prevented by the action of ordinary people.
- **D** ○ can only be stopped by educating business leaders.

33 In the fourth paragraph, the writer describes ways in which the public can

- **A** ○ reduce their own individual impact on the environment.
- **B** ○ learn more about the impact of business of the environment.

C ○ raise awareness of the effects of specific environmental disasters.

D ○ influence the environmental policies of businesses and governments.

34 What pressure was exerted by big business in the case of the disease BSE?

A ○ Meat packers stopped supplying hamburgers to fast-food chains.

B ○ A fast-food company forced their meat suppliers to follow the law.

C ○ Meat packers persuaded the government to reduce their expenses.

D ○ A fast-food company encouraged the government to introduce legislation.

Questions 35-39

Do the following statements agree with the claims of the writer in the Reading Passage?

In boxes on your answer sheet, write

YES if the statement agrees with the claims of the writer

NO if the statement contradicts the claims of the writer

NOT GIVEN if it is impossible to say what the writer thinks about this

35 The public should be prepared to fund good environmental practices.

A ○ YES

B ○ NO

C ○ NOT GIVEN

36 There is a contrast between the moral principles of different businesses.

A ○ YES

B ○ NO

C ○ NOT GIVEN

37 It is important to make a clear distinction between acceptable and unacceptable behaviour.

A ○ YES

B ○ NO

C ○ NOT GIVEN

38 The public have successfully influenced businesses in the past.

A ○ YES

B ○ NO

C ○ NOT GIVEN

39 In the future, businesses will show more concern for the environment.

A ○ YES

B ○ NO

C ○ NOT GIVEN

Questions 40-40

Choose the correct letter, **A**, **B**, **C** or **D**.

Write the correct letter in box on your answer sheet.

40 What would be the best subheading for this passage?

A ○ Will the world survive the threat caused by big businesses?

B ○ How can big businesses be encouraged to be less driven by profit?

C ○ What environmental dangers are caused by the greed of businesses?

D ○ Are big businesses to blame for the damage they cause the environment?

Answer Key

#	Answer	Explanation
1	**water**	They stretch down 50-80 metres and, as well as sucking up water for the tree
2	**diet**	the huarango was key to the ancient people's diet
3	**drought**	it allowed local people to withstand years of drought when their other crops failed
4	**erosion**	But over the centuries huarango trees were gradually replaced with crops. Cutting down native woodland leads to erosion, as there is nothing to keep the soil in place
5	**desert**	So when the huarangos go, the land turns into a desert.
6	**branches / its branches / huarango branches / the branches**	while its branches were used for charcoal for cooking and heating
7	**bark / its bark / huarango bark / the bark**	Its leaves and bark were used for herbal remedies
8	**trunk / its trunk / huarango trunk / the trunk**	its trunk was used to build houses
9	**NOT GIVEN**	Whaley is encouraging locals to love the huarangos again
10	**FALSE**	His farm is relatively small and doesn't yet provide him with enough to live on, but he hopes this will change
11	**TRUE**	he's persuading farmers to let him plant forest corridors on their land
12	**FALSE**	It's not like a rainforest that needs to have this huge expanse
13	**NOT GIVEN**	If we can do it here, in the most fragile system on Earth, then that's a real message of hope for lots of places, including Africa
14	**NOT GIVEN**	This small volcanic island is mountainous, with steep rocky slopes and deep, wooded ravines, rising to 1,487 metres at its highest peak
15	**FALSE**	silbadores are able to pass a surprising amount of information via their whistles

#	Answer	Explanation
16	**TRUE**	When the experiments were repeated with non-whistlers, however, activation was observed in all areas of the brain
17	**FALSE**	that indigenous Canary Islanders, who were of North African origin, already had a whistled language when Spain conquered the volcanic islands in the 15th century
18	**FALSE**	There are thought to be as many as 70 whistled languages still in use, though only 12 have been described and studied scientifically
19	**TRUE**	Since 1999, Silbo Gomero has been taught in all of the island's elementary schools
20	**words**	Silbo is a substitute for Spanish, with individual words recoded into whistles which have high- and low-frequency tones
21	**finger**	A whistler – or silbador – puts a finger in his or her mouth to increase the whistle's pitch
22	**direction**	while the other hand can be cupped to adjust the direction of the sound
23	**commands**	In daily life they use whistles to communicate short commands
24	**fires**	Silbo has proved particularly useful when fires have occurred on the island and rapid communication across large areas has been vital
25	**technology**	But with modern communication technology now widely available, researchers say whistled languages like Silbo are threatened with extinction
26	**award**	The local authorities are trying to get an award from the organisation
27	**D**	Depending on the circumstances, a business may maximize the amount of money it makes, at least in the short term, by damaging the environment and hurting people
28	**E**	but the reverse is likely to be true if government regulation is ineffective
29	**F**	and if the public doesn't care
30	**H**	That is still the case today for fishermen in an unmanaged fishery without quotas
31	**B**	and for international logging companies with short-term leases on tropical rainforest land in places

#	Answer	Explanation
32	**C**	In the long run, it is the public, either directly or through its politicians, that has the power to make such destructive policies unprofitable and illegal, and to make sustainable environmental policies profitable
33	**D**	by preferring their governments to award valuable contracts to businesses with a good environmental track record
34	**B**	But for five years the meat packers refused to follow these, claiming that they would be too expensive to obey. However, when a major fast-food company then made the same demands after customer purchases of its hamburgers plummeted, the meat industry complied within weeks.
35	**YES**	I also believe that the public must accept the necessity for higher prices for products to cover the added costs, if any, of sound environmental practices
36	**NOT GIVEN**	My views may seem to ignore the belief that businesses should act in accordance with moral principles even if this leads to a reduction in their profits.
37	**NO**	My conclusion is not a moralistic one about who is right or wrong, admirable or selfish, a good guy or a bad guy
38	**YES**	In the past, businesses have changed when the public came to expect and require different behavior
39	**NOT GIVEN**	I predict that in the future, just as in the past, changes in public attitudes will be essential for changes in businesses' environmental practices.
40	**D**	Our blaming of businesses also ignores the ultimate responsibility of the public for creating the condition that let a business profit through destructive environmental policies.

Test 11

PASSAGE 1

Why we need to protect polar bears

Polar bears are being increasingly threatened by the effects of climate change, but their disappearance could have far-reaching consequences. They are uniquely adapted to the extreme conditions of the Arctic Circle, where temperatures can reach —40°C. One reason for this is that they have up to 11 centimetres of fat underneath their skin. Humans with comparative levels of adipose tissue would be considered obese and would be likely to suffer from diabetes and heart disease. Yet the polar bear experiences no such consequences.

A 2014 study by Shi Ping Liu and colleagues sheds light on this mystery. They compared the genetic structure of polar bears with that of their closest relatives from a warmer climate, the brown bears. This allowed them to determine the genes that have allowed polar bears to survive in one of the toughest environments on Earth. Liu and his colleagues found the polar bears had a gene known as APoB, which reduces levels of low-density lipoproteins (LDLs) - a form of 'bad' cholesterol. In humans, mutations of this gene are associated with increased risk of heart disease. Polar bears may therefore be an important study model to understand heart disease in humans.

The genome of the polar bear may also provide the solution for another condition, one that particularly affects our older generation: osteoporosis. This is a disease where bones show reduced density, usually caused by insufficient exercise, reduced calcium intake or food starvation. Bone tissue is constantly being remodelled, meaning that bone is added or removed, depending on nutrient availability and the stress that the bone is under. Female polar bears, however, undergo extreme conditions during every pregnancy. Once autumn comes around, these females will dig maternity dens in the snow and will remain there throughout the winter, both before and after the birth of their cubs. This process results in about six months of fasting, where the female bears have to keep themselves and their cubs alive, depleting their own calcium and calorie reserves. Despite this, their bones remain strong and dense.

Physiologists Alanda Lennox and Allen Goodship found an explanation for this paradox in 2008. They discovered that pregnant bears were able to increase the density of their bones before they started to build their dens. In addition, six months later, when they finally emerged from the den with their cubs, there was no evidence of significant loss of bone density. Hibernating brown bears do not have this capacity and must therefore resort to major bone reformation in the following spring. If the mechanism of bone remodelling in polar bears can be understood, many bedridden humans, and even astronauts, could potentially benefit.

The medical benefits of the polar bear for humanity certainly have their importance in our conservation efforts, but these should not be the only factors taken into consideration. We tend to want to protect animals we think are intelligent and possess emotions, such as elephants and primates. Bears, on the other hand, seem to be perceived as stupid and in many cases violent.

And yet anecdotal evidence from the field challenges those assumptions, suggesting for example that polar bears have good problem-solving abilities. A male bear called GoGo in Tennoji Zoo, Osaka, has even been observed making use of a tool to manipulate his environment. The bear used a tree branch on multiple occasions to dislodge a piece of meat hung out of his reach. Problem-solving ability has also been witnessed in wild polar bears, although not as obviously as with GoGo. A calculated move by a male bear involved running and jumping onto barrels in an attempt to get to a photographer standing on a platform four metres high.

In other studies, such as one by Alison Annes in 2008, polar bears showed deliberate and focussed manipulation. For example, Annes observed bears putting objects in piles and then knocking them over in what appeared to be a game. The study demonstrates that bears are capable of agile and thought-out behaviours. These examples suggest bears have greater creativity and problem-solving abilities than previously thought.

As for emotions while the evidence is once again anecdotal, many bears have been seen to hit out at ice and snow — seemingly out of frustration — when they have just missed out on a kill. Moreover, polar bears can form unusual relationships with other species, including playing with the dogs used to pull sleds in the Arctic. Remarkably, one hand-raised polar bear called Agee has formed a close relationship with her owner Mark Dumas to the point where they even swim together. This is even more astonishing since polar bears are known to actively hunt humans in the wild.

If climate change were to lead to their extinction, this would mean not only the loss of potential breakthroughs in human medicine, but more importantly, the disappearance of an intelligent, majestic animal.

PART 1 — QUESTIONS

Questions 1-7

Do the following statements agree with the information given in the Reading Passage?

In boxes on your answer sheet, write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

1 Polar bears suffer from various health problems due to the build-up of fat under their skin.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

2 The study done by Liu and his colleagues compared different groups of polar bears.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

3 Liu and colleagues were the first researchers to compare polar bears and brown bears genetically.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

4 Polar bears are able to control their levels of bad cholesterol by genetic means.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

5 Female polar bears are able to survive for about six months without food.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

6 It was found that the bones of female polar bears were very weak when they came out of their dens in spring.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

7 The polar bear's mechanism for increasing bone density could also be used by people one day.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

Questions 8-13

Complete the table below.

Choose **ONE WORD ONLY** from the passage for each answer.

*Write your answers in boxes **8-13** on your answer sheet.*

Reasons why polar bears should be protected

People think of bears as unintelligent and **8** _____.

However, this may not be correct. For example:

- In Tennoji Zoo, a bear has been seen using a branch as a **9** _____. This allowed him to knock down some **10** _____.

- A wild polar bear worked out a method of reaching a platform where a **11** _____ was located.
- Polar bears have displayed behaviour such as conscious manipulation of objects and activity similar to a **12** _____.

Bears may also display emotions. For example:

- They may make movements suggesting **13** _____ if disappointed when hunting.
- They may form relationships with other species.

PASSAGE 2

The Step Pyramid of Djoser

14

A.

The pyramids are the most famous monuments of ancient Egypt and still hold enormous interest for people in the present day. These grand, impressive tributes to the memory of the Egyptian kings have become linked with the country even though other cultures, such as the Chinese and Mayan, also built pyramids. The evolution of the pyramid form has been written and argued about for centuries. However, there is no question that, as far as Egypt is concerned, it began with one monument to one king designed by one brilliant architect: **the Step Pyramid of Djoser at Saqqara**.

15

B.

Djoser was the first king of the Third Dynasty of Egypt and the first to build in stone. Prior to Djoser's reign, tombs were rectangular monuments made of dried clay brick, which covered underground passages where the deceased person was buried. For reasons which remain unclear, Djoser's main official, whose name was Imhotep, conceived of building a taller, more impressive tomb for his king by stacking stone slabs on top of one another, progressively making them smaller, to form the shape now known as the Step Pyramid. Djoser is thought to have reigned for 19 years, but some historians and scholars attribute a much longer time for his rule, owing to the number and size of the monuments he built.

16

C.

The Step Pyramid has been thoroughly examined and investigated over the last century, and it is now known that the building process went through many different stages. Historian Marc Van de Mieroop comments on this, writing 'Much experimentation was involved, which is especially clear in the construction of the pyramid in the center of the complex. It had several plans … before it became the first Step Pyramid in history, piling six levels on top of one another … The weight of the enormous mass was a challenge for the builders, who placed the stones at an inward incline in order to prevent the monument breaking up.'

17

D.

When finally completed, the Step Pyramid rose 62 meters high and was the tallest structure of its time. The complex in which it was built was the size of a city in ancient Egypt and included a temple, courtyards, shrines, and living quarters for the priests. It covered a region of 16 hectares and was surrounded by a wall 10.5 meters high. The wall had 13 false doors cut into it with only one true entrance cut into the south-east corner; the entire wall was then ringed by a trench 750 meters long and 40 meters wide. The false doors and the trench were incorporated into the complex to discourage unwanted visitors. If someone wished to enter, he or she would have needed to know in advance how to find the location of the true opening in the wall. Djoser was so proud of his accomplishment that he broke the tradition of having only his own name on the monument and had Imhotep's name carved on it as well.

18

E.

The burial chamber of the tomb, where the king's body was laid to rest, was dug beneath the base of the pyramid, surrounded by a vast maze of long tunnels that had rooms off them to discourage robbers. One of the most mysterious discoveries found inside the pyramid was a large number of stone vessels. Over 40,000 of these vessels, of various forms and shapes, were discovered in storerooms of the pyramid's underground passages. They are inscribed with the names of rulers from the First and Second Dynasties of Egypt and made from different kinds of stone. There is no agreement among scholars and archaeologists on why the vessels were placed in the tomb of Djoser or what they were supposed to represent. The archaeologist Jean-Philippe Lauer, who excavated most of the pyramid and complex, believes they were originally stored and then given a 'proper burial' by Djoser in his pyramid to honor his predecessors. There are other historians, however, who claim the vessels were dumped into the shafts as yet another attempt to prevent grave robbers from getting to the king's burial chamber.

19

F.

Unfortunately, all of the precautions and intricate design of the underground network did not prevent ancient robbers from finding a way in. Djoser's grave goods, and even his body, were stolen at some point in the past and all archaeologists found were a small number of his valuables overlooked by the thieves. There was enough left throughout the pyramid and its complex, however, to astonish and amaze the archaeologists who excavated it.

20

G.

Egyptologist Miroslav Verner writes, 'Few monuments hold a place in human history as significant as that of the Step Pyramid in Saqqara ... It can be said without exaggeration that

this pyramid complex constitutes a milestone in the evolution of monumental stone architecture in Egypt and in the world as a whole.' The Step Pyramid was a revolutionary advance in architecture and became the archetype which all the other great pyramid builders of Egypt would follow.

PART 2 — QUESTIONS

Questions 14-20

The Reading Passage has seven paragraphs, ***A-G.***

Choose the correct heading for paragraphs from the list of headings below.

Write the correct number, ***i-ix****, in boxes on your answer sheet.*

List of Headings

i. **The areas and artefacts within the pyramid itself**

ii. **A difficult task for those involved**

iii. **A king who saved his people**

iv. **A single certainty among other less definite facts**

v. **An overview of the external buildings and areas**

vi. **A pyramid design that others copied**

vii. **An idea for changing the design of burial structures**

viii. **An incredible experience despite the few remains**

ix. **The answers to some unexpected questions**

Questions 21-24

Complete the notes below.

Choose **ONE WORD ONLY** from the passage for each answer.

Write your answers in boxes on your answer sheet.

The Step Pyramid of Djoser

The complex that includes the Step Pyramid and its surroundings is considered to be as big as an Egyptian **21** _____ of the past. The area outside the pyramid included accommodation that was occupied by **22** _____, along with many other buildings and features.

A wall ran around the outside of the complex and a number of false entrances were built into this. In addition, a long **23** _____ encircled the wall. As a result, any visitors who

had not been invited were cleverly prevented from entering the pyramid grounds unless they knew the **24** _____ of the real entrance.

Questions 25-26

Choose **TWO** letters, **A-E**.

Write the correct letters in boxes on your answer sheet.

25 **26** Which **TWO** of the following points does the writer make about King Djoser?

- **A** ☐ Initially he had to be persuaded to build in stone rather than clay.
- **B** ☐ There is disagreement concerning the length of his reign.
- **C** ☐ He failed to appreciate Imhotep's part in the design of the Step Pyramid.
- **D** ☐ A few of his possessions were still in his tomb when archaeologists found it.
- **E** ☐ He criticised the design and construction of other pyramids in Egypt.

PASSAGE 3

The future of work

According to a leading business consultancy, 3—14% of the global workforce will need to switch to a different occupation within the next 10—15 years, and all workers will need to adapt as their occupations evolve alongside increasingly capable machines. Automation — or 'embodied artificial intelligence (AI) — is one aspect of the disruptive effects of technology on the labour market. 'Disembodied AI', like the algorithms running in our smartphones, is another.

Dr Stella Pachidi from Cambridge Judge Business School believes that some of the most fundamental changes are happening as a result of the '**algorithmication**' of jobs that are dependent on data rather than on production — the so-called knowledge economy. Algorithms are capable of learning from data to undertake tasks that previously needed human judgement, such as reading legal contracts, analysing medical scans and gathering market intelligence.

'In many cases, they can outperform humans,' says Pachidi. 'Organisations are attracted to using algorithms because they want to make choices based on what they consider is "perfect information", as well as to reduce costs and enhance productivity.'

'But these enhancements are not without consequences,' says Pachidi. 'If routine cognitive tasks are taken over by AI, how do professions develop their future experts?' she asks. 'One way of learning about a job is "legitimate peripheral participation"— a novice stands next to experts and learns by observation. If this isn't happening, then you need to find new ways to learn.'

Another issue is the extent to which the technology influences or even controls the workforce. For over two years, Pachidi monitored a telecommunications company. 'The way telecoms salespeople work is through personal and frequent contact with clients, using the benefit of experience to assess a situation and reach a decision. However, the company had started using a[n] ... algorithm that defined when account managers should contact certain customers about which kinds of campaigns and what to offer them.'

The algorithm — usually built by external designers — often becomes the keeper of knowledge, she explains. In cases like this, Pachidi believes, a short-sighted view begins to creep into working practices whereby workers learn through the 'algorithm's eyes' and become dependent on its instructions. Alternative explorations — where experimentation and human instinct lead to progress and new ideas — are effectively discouraged.

Pachidi and colleagues even observed people developing strategies to make the algorithm work to their own advantage. 'We are seeing cases where workers feed the algorithm with false data to reach their targets,' she reports.

It's scenarios like these that many researchers are working to avoid. Their objective is to make AI technologies more trustworthy and transparent, so that organisations and individuals understand how AI decisions are made. In the meantime, says Pachidi, 'We need to make sure

we fully understand the dilemmas that this new world raises regarding expertise, occupational boundaries and control.'

Economist Professor Hamish Low believes that the future of work will involve major transitions across the whole life course for everyone: 'The traditional trajectory of full-time education followed by full-time work followed by a pensioned retirement is a thing of the past,' says Low. Instead, he envisages a multistage employment life: one where retraining happens across the life course, and where multiple jobs and no job happen by choice at different stages.

On the subject of job losses, Low believes the predictions are founded on a fallacy: 'It assumes that the number of jobs is fixed. If in 30 years, half of 100 jobs are being carried out by robots, that doesn't mean we are left with just 50 jobs for humans. The number of jobs will increase: we would expect there to be 150 jobs.'

Dr Ewan McGaughey, at Cambridge's Centre for Business Research and King's College London, agrees that 'apocalyptic' views about the future of work are misguided. 'It's the laws that restrict the supply of capital to the job market, not the advent of new technologies that causes unemployment.'

His recently published research answers the question of whether automation, AI and robotics will mean a 'jobless future' by looking at the causes of unemployment. 'History is clear that change can mean redundancies. But social policies can tackle this through retraining and redeployment.'

He adds: 'If there is going to be change to jobs as a result of AI and robotics then I'd like to see governments seizing the opportunity to improve policy to enforce good job security. We can "reprogramme" the law to prepare for a fairer future of work and leisure.' McGaughey's findings are a call to arms to leaders of organisations, governments and banks to pre-empt the coming changes with bold new policies that guarantee full employment, fair incomes and a thriving economic democracy.

'The promises of these new technologies are astounding. They deliver humankind the capacity to live in a way that nobody could have once imagined,' he adds. 'Just as the industrial revolution brought people past subsistence agriculture, and the corporate revolution enabled mass production, a third revolution has been pronounced. But it will not only be one of technology. The next revolution will be social.'

PART 3 — QUESTIONS

Questions 27-30

Choose the correct letter, **A**, **B**, **C** or **D**.

Write the correct letter in boxes on your answer sheet.

27 The first paragraph tells us about

- **A** ○ the kinds of jobs that will be most affected by the growth of AI.
- **B** ○ the extent to which AI will after the nature of the work that people do.
- **C** ○ the proportion of the world's labour force who will have jobs in AI in the future.
- **D** ○ the difference between ways that embodied and disembodied AI with impact on workers.

28 According to the second paragraph, what is Stella Pachidi's view of the 'knowledge economy'?

- **A** ○ It is having an influence on the number of jobs available.
- **B** ○ It is changing people's attitudes towards their occupations.
- **C** ○ It is the main reason why the production sector is declining.
- **D** ○ It is a key factor driving current developments in the workplace.

29 What did Pachidi observe at the telecommunications company?

- **A** ○ staff disagreeing with the recommendations of AI
- **B** ○ staff feeling resentful about the intrusion of AI in their work
- **C** ○ staff making sure that AI produces the results that they want
- **D** ○ staff allowing AI to carry out tasks they ought to do themselves

30 In his recently published research, Ewan McGaughey

- **A** ○ challenges the idea that redundancy is a negative thing.
- **B** ○ shows the profound effect of mass unemployment on society.

C ○ highlights some differences between past and future job losses.

D ○ illustrates how changes in the job market can be successfully handled.

Questions 31-34

Complete the summary using the list of words, **A-G**, below.

*Write the correct letter, **A-G**, in boxes on your answer sheet.*

The 'algorithmication' of jobs

Stella Pachidi of Cambridge Judge Business School has been focusing on the 'algorithmication' of jobs which rely not on production but on **31** _____ .

While monitoring a telecommunications company, Pachidi observed a growing **32** _____ on the recommendations made by AI, as workers begin to learn through the 'algorithm's eyes'. Meanwhile, staff are deterred from experimenting and using their own **33** _____ , and are therefore prevented from achieving innovation.

To avoid the kind of situations which Pachidi observed, researchers are trying to make AI's decision-making process easier to comprehend, and to increase users' **34** _____ with regard to the technology.

A. **pressure** B. **satisfaction** C. **intuition** D. **promotion** E. **reliance**

F. **confidence** G. **information**

Questions 35-40

Look at the following statements and the list of people below.

Match each statement with the correct person, **A**, **B** or **C**.

*Write the correct letter, **A**, **B** or **C**, in boxes on your answer sheet.*

NB *You may use any letter more than once.*

List of people

A Stella Pachidi

B Hamish Low

C Ewan McGaughey

	A	B	C
35 Greater levels of automation will not result in lower employment.	○	○	○
36 There are several reasons why AI is appealing to businesses.	○	○	○
37 AI's potential to transform people's lives has parallels with major cultural shifts which occurred in previous eras.	○	○	○
38 It is important to be aware of the range of problems that AI causes.	○	○	○
39 People are going to follow a less conventional career path than in the past.	○	○	○
40 Authorities should take measures to ensure that there will be adequately paid work for everyone	○	○	○

Answer Key

#	Answer	Explanation
1	**FALSE**	Humans with comparative levels of adipose tissue would be considered obese and would be likely to suffer from diabetes and heart disease. Yet the polar bear experiences no such consequences.
2	**FALSE**	A 2014 study by Shi Ping Liu and colleagues sheds light on this mystery. They compared the genetic structure of polar bears with that of their closest relatives from a warmer climate, the brown bears.
3	**NOT GIVEN**	A 2014 study by Shi Ping Liu and colleagues sheds light on this mystery. They compared the genetic structure of polar bears with that of their closest relatives from a warmer climate, the brown bears.
4	**TRUE**	Liu and his colleagues found the polar bears had a gene known as APoB, which reduces levels of low-density lipoproteins (LDLs) – a form of 'bad' cholesterol.
5	**TRUE**	This process results in about six months of fasting, where the female bears have to keep themselves and their cubs alive, depleting their own calcium and calorie reserves.
6	**FALSE**	when they finally emerged from the den with their cubs, there was no evidence of significant loss of bone density.
7	**TRUE**	If the mechanism of bone remodelling in polar bears can be understood, many bedridden humans, and even astronauts, could potentially benefit.
8	**violent**	Bears, on the other hand, seem to be perceived as stupid and in many cases violent.
9	**tool**	A male bear called GoGo in Tennoji Zoo, Osaka, has even been observed making use of a tool to manipulate his environment.
10	**meat**	The bear used a tree branch on multiple occasions to dislodge a piece of meat hung out of his reach.
11	**photographer**	A calculated move by a male bear involved running and jumping onto barrels in an attempt to get to a photographer standing on a platform four metres high.
12	**game**	For example, Annes observed bears putting objects in piles and then knocking them over in what appeared to be a game.

#	Answer	Explanation
13	**frustration**	many bears have been seen to hit out at ice and snow — seemingly out of frustration — when they have just missed out on a kill.
14	**iv**	The evolution of the pyramid form has been written and argued about for centuries. However, there is no question that, as far as Egypt is concerned, it began with one monument to one king designed by one brilliant architect: the Step Pyramid of Djoser at Saqqara.
15	**vii**	For reasons which remain unclear, Djoser's main official, whose name was Imhotep, conceived of building a taller, more impressive tomb for his king by stacking stone slabs on top of one another, progressively making them smaller, to form the shape now known as the Step Pyramid.
16	**ii**	The weight of the enormous mass was a challenge for the builders, who placed the stones at an inward incline in order to prevent the monument breaking up.
17	**v**	It covered a region of 16 hectares and was surrounded by a wall 10.5 meters high. The wall had 13 false doors cut into it with only one true entrance cut into the south-east corner
18	**i**	One of the most mysterious discoveries found inside the pyramid was a large number of stone vessels.
19	**viii**	There was enough left throughout the pyramid and its complex, however, to astonish and amaze the archaeologists who excavated it.
20	**vi**	The Step Pyramid was a revolutionary advance in architecture and became the archetype which all the other great pyramid builders of Egypt would follow.
21	**city**	The complex in which it was built was the size of a city in ancient Egypt
22	**priests**	included a temple, courtyards, shrines, and living quarters for the priests
23	**trench**	the entire wall was then ringed by a trench 750 meters long and 40 meters wid
24	**location**	If someone wished to enter, he or she would have needed to know in advance how to find the location of the true opening in the wall.
25	**B / D**	Djoser is thought to have reigned for 19 years, but some historians and scholars attribute a much longer time for his rule, owing to the number and size of the monuments he built. Djoser's grave goods, and even his body, were stolen at some point in the

#	Answer	Explanation
		past and all archaeologists found were a small number of his valuables overlooked by the thieves.
26	**B / D**	Djoser is thought to have reigned for 19 years, but some historians and scholars attribute a much longer time for his rule, owing to the number and size of the monuments he built. Djoser's grave goods, and even his body, were stolen at some point in the past and all archaeologists found were a small number of his valuables overlooked by the thieves.
27	**B**	Automation — or 'embodied artificial intelligence (AI) — is one aspect of the disruptive effects of technology on the labour market.
28	**D**	Algorithms are capable of learning from data to undertake tasks that previously needed human judgement, such as reading legal contracts, analysing medical scans and gathering market intelligence.
29	**C**	the company had started using a[n] … algorithm that defined when account managers should contact certain customers about which kinds of campaigns and what to offer them
30	**D**	If there is going to be change to jobs as a result of AI and robotics then I'd like to see governments seizing the opportunity to improve policy to enforce good job security. We can "reprogramme" the law to prepare for a fairer future of work and leisure.
31	**G**	Dr Stella Pachidi from Cambridge Judge Business School believes that some of the most fundamental changes are happening as a result of the 'algorithmication' of jobs that are dependent on data rather than on production — the so-called knowledge economy.
32	**E**	In cases like this, Pachidi believes, a short-sighted view begins to creep into working practices whereby workers learn through the 'algorithm's eyes' and become dependent on its instructions.
33	**C**	Alternative explorations — where experimentation and human instinct lead to progress and new ideas — are effectively discouraged.
34	**F**	Their objective is to make AI technologies more trustworthy and transparent, so that organisations and individuals understand how AI decisions are made.
35	**B**	On the subject of job losses, Low believes the predictions are founded on a fallacy: 'It assumes that the number of jobs is fixed. If in 30 years, half of 100 jobs are being carried out by robots, that doesn't mean we are left with just 50 jobs for humans. The

#	Answer	Explanation
		number of jobs will increase: we would expect there to be 150 jobs.'
36	**A**	'In many cases, they can outperform humans,' says Pachidi. 'Organisations are attracted to using algorithms because they want to make choices based on what they consider is "perfect information", as well as to reduce costs and enhance productivity.'
37	**C**	'The promises of these new technologies are astounding. They deliver humankind the capacity to live in a way that nobody could have once imagined,' he adds. 'Just as the industrial revolution brought people past subsistence agriculture, and the corporate revolution enabled mass production, a third revolution has been pronounced. But it will not only be one of technology. The next revolution will be social.'
38	**A**	'But these enhancements are not without consequences,' says Pachidi. 'If routine cognitive tasks are taken over by AI, how do professions develop their future experts?' she asks.
39	**B**	Economist Professor Hamish Low believes that the future of work will involve major transitions across the whole life course for everyone: 'The traditional trajectory of full-time education followed by full-time work followed by a pensioned retirement is a thing of the past,' says Low.
40	**C**	McGaughey's findings are a call to arms to leaders of organisations, governments and banks to pre-empt the coming changes with bold new policies that guarantee full employment, fair incomes and a thriving economic democracy.

Test 12

PASSAGE 1

The White Horse of Uffington

The cutting of huge figures or ***geoglyphs*** into the earth of English hillsides has taken place for more than 3,000 years. There are 56 hill figures scattered around England, with the vast majority on the chalk downlands of the country's southern counties. The figures include giants, horses, crosses and regimental badges. Although the majority of these geoglyphs date within the last 300 years or so, there are one or two that are much older.

The most famous of these figures is perhaps also the most mysterious — **the Uffington White Horse** in Oxfordshire. The White Horse has recently been re-dated and shown to be even older than its previously assigned ancient *pre-Roman Iron Age* date. More controversial is the date of the enigmatic Long Man of Wilmington in Sussex. While many historians are convinced the figure is prehistoric, others believe that it was the work of an artistic monk from a nearby priory and was created between the 11th and 15th centuries.

The method of cutting these huge figures was simply to remove the overlying grass to reveal the gleaming white chalk below. However, the grass would soon grow over the geoglyph again unless it was regularly cleaned or scoured by a fairly large team of people. One reason that the vast majority of hill figures have disappeared is that when the traditions associated with the figures faded, people no longer bothered or remembered to clear away the grass to expose the chalk outline. Furthermore, over hundreds of years the outlines would sometimes change due to people not always cutting in exactly the same place, thus creating a different shape to the original geoglyph. The fact that any ancient hill figures survive at all in England today is testament to the strength and continuity of local customs and beliefs which, in one case at least, must stretch back over millennia.

The Uffington White Horse is a unique, stylised representation of a horse consisting of a long, sleek back, thin disjointed legs, a streaming tail, and a bird-like beaked head. The elegant creature almost melts into the landscape. The horse is situated 2.5 km from Uffington village on a steep slope close to the Late Bronze Age (c. 7th century BCE) hillfort of Uffington Castle and below the Ridgeway, a long-distance Neolithic track.

The Uffington Horse is also surrounded by Bronze Age burial mounds. It is not far from the Bronze Age cemetery of Lambourn Seven Barrows, which consists of more than 30 well-preserved burial mounds. The carving has been placed in such a way as to make it extremely difficult to see from close quarters, and like many geoglyphs is best appreciated from the air. Nevertheless, there are certain areas of the Vale of the White Horse, the valley containing and named after the enigmatic creature, from which an adequate impression may be gained. Indeed on a clear day the carving can be seen from up to 30 km away.

The earliest evidence of a horse at Uffington is from the 1070s CE when ‘White Horse Hill’ is mentioned in documents from the nearby Abbey of Abingdon, and the first reference to the horse itself is soon after, in 1190 CE. However, the carving is believed to date back much further than that. Due to the similarity of the Uffington White Horse to the stylised depictions of horses on 1st century BCE coins, it had been thought that the creature must also date to that period.

However, in 1995 Optically Stimulated Luminescence (OSL) testing was carried out by the Oxford Archaeological Unit on soil from two of the lower layers of the horse’s body, and from another cut near the base. The result was a date for the horse’s construction somewhere between 1400 and 600 BCE — in other words, it had a Late Bronze Age or Early Iron Age origin.

The latter end of this date range would tie the carving of the horse in with occupation of the nearby Uffington hillfort, indicating that it may represent a tribal emblem marking the land of the inhabitants of the hillfort. Alternatively, the carving may have been carried out during a Bronze or Iron Age ritual. Some researchers see the horse as representing the Celtic horse goddess Epona, who was worshipped as a protector of horses, and for her associations with fertility. However, the cult of Epona was not imported from Gaul (France) until around the first century CE. This date is at least six centuries after the Uffington Horse was probably carved. Nevertheless, the horse had great ritual and economic significance during the Bronze and Iron Ages, as attested by its depictions on jewellery and other metal objects. It is possible that the carving represents a goddess in native mythology, such as Rhiannon, described in later Welsh mythology as a beautiful woman dressed in gold and riding a white horse.

The fact that geoglyphs can disappear easily, along with their associated rituals and meaning, indicates that they were never intended to be anything more than temporary gestures. But this does not lessen their importance. These giant carvings are a fascinating glimpse into the minds of their creators and how they viewed the landscape in which they lived.

PART 1 — QUESTIONS

Questions 1-8

Do the following statements agree with the information given in the Reading Passage?

In boxes on your answer sheet, write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

1 Most geoglyphs in England are located in a particular area of the country.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

2 There are more geoglyphs in the shape of a horse than any other creature.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

3 A recent dating of the Uffington White Horse indicates that people were mistaken about its age.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

4 Historians have come to an agreement about the origins of the Long Man of Wilmington.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

5 Geoglyphs were created by people placing white chalk on the hillside.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

6 Many geoglyphs in England are no longer visible.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

7 The shape of some geoglyphs has been altered over time.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

8 The fame of the Uffington White Horse is due to its size.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

Questions 9-13

Complete the summary below.

Choose **ONE WORD ONLY** from the passage for each answer.

Write your answers in boxes on your answer sheet.

The Uffington White Horse

The location of the Uffington White Horse:

- a distance of 2.5 km from Uffington village

- near an ancient road known as the **9** _____
- close to an ancient cemetery that has a number of burial mounds

Dating the Uffington White Horse:

- first reference to White Horse Hill appears in **10** _____ from the 1070s
- horses shown on coins from the period 100 BCE – 1 BCE are similar in appearance
- according to analysis of the surrounding **11** _____, the Horse is Late Bronze Age / Early Iron Age

Possible reasons for creation of the Uffington White Horse:

- an emblem to indicate land ownership
- formed part of an ancient ritual
- was a representation of goddess Epona – associated with protection of horses and **12** _____
- was a representation of a Welsh goddess called **13** _____

PASSAGE 2

I contain multitudes

Wendy Moore reviews Ed Yong's book about microbes

Microbes, most of them bacteria, have populated this planet since long before animal life developed and they will outlive us. Invisible to the naked eye, they are ubiquitous. They inhabit the soil, air, rocks and water and are present within every form of life, from seaweed and coral to dogs and humans. And, as Yong explains in his utterly absorbing and hugely important book, we mess with them at our peril.

Every species has its own colony of microbes, called a *'microbiome'*, and these microbes vary not only between species but also between individuals and within different parts of each individual. What is amazing is that while the number of human cells in the average person is about 30 trillion, the number of microbial ones is higher — about 39 trillion. At best, Yong informs us, we are only 50 per cent human. Indeed, some scientists even suggest we should think of each species and its microbes as a single unit, dubbed a *'holobiont'*.

In each human there are microbes that live only in the stomach, the mouth or the armpit and by and large they do so peacefully. So 'bad' microbes are just microbes out of context. Microbes that sit contentedly in the human gut (where there are more microbes than there are stars in the galaxy) can become deadly if they find their way into the bloodstream. These communities are constantly changing too. The right hand shares just one sixth of its microbes with the left hand. And, of course, we are surrounded by microbes. Every time we eat, we swallow a million microbes in each gram of food; we are continually swapping microbes with other humans, pets and the world at large.

It's a fascinating topic and Yong, a young British science journalist, is an extraordinarily adept guide. Writing with lightness and panache, he has a knack of explaining complex science in terms that are both easy to understand and totally enthralling. Yong is on a mission. Leading us gently by the hand, he takes us into the world of microbes — a bizarre, alien planet — in a bid to persuade us to love them as much as he does. By the end, we do.

For most of human history we had no idea that microbes existed. The first man to see these extraordinarily potent creatures was a Dutch lens-maker called Antony van Leeuwenhoek in the 1670s. Using microscopes of his own design that could magnify up to 270 times, he examined a drop of water from a nearby lake and found it teeming with tiny creatures he called *'animalcules'*. It wasn't until nearly two hundred years later that the research of French biologist Louis Pasteur indicated that some microbes caused disease. It was Pasteur's 'germ theory' that gave bacteria the poor image that endures today.

Yong's book is in many ways a plea for microbial tolerance, pointing out that while fewer than one hundred species of bacteria bring disease, many thousands more play a vital role in maintaining our health. The book also acknowledges that our attitude towards bacteria is not a simple one. We tend to see the dangers posed by bacteria, yet at the same time we are sold

yoghurts and drinks that supposedly nurture ‘friendly’ bacteria. In reality, says Yong, bacteria should not be viewed as either friends or foes, villains or heroes. Instead we should realise we have a symbiotic relationship, that can be mutually beneficial or mutually destructive.

What then do these millions of organisms do? The answer is pretty much everything. New research is now unravelling the ways in which bacteria aid digestion, regulate our immune systems, eliminate toxins, produce vitamins, affect our behaviour and even combat obesity. ‘They actually help us become who we are,’ says Yong. But we are facing a growing problem. Our obsession with hygiene, our overuse of antibiotics and our unhealthy, low-fibre diets are disrupting the bacterial balance and may be responsible for soaring rates of allergies and immune problems, such as inflammatory bowel disease (IBD).

The most recent research actually turns accepted norms upside down. For example, there are studies indicating that the excessive use of household detergents and antibacterial products actually destroys the microbes that normally keep the more dangerous germs at bay. Other studies show that keeping a dog as a pet gives children early exposure to a diverse range of bacteria, which may help protect them against allergies later.

The readers of Yong’s book must be prepared for a decidedly unglamorous world. Among the less appealing case studies is one about a fungus that is wiping out entire populations of frogs and that can be halted by a rare microbial bacterium. Another is about squid that carry luminescent bacteria that protect them against predators. However, if you can overcome your distaste for some of the investigations, the reasons for Yong’s enthusiasm become clear. The microbial world is a place of wonder. Already, in an attempt to stop mosquitoes spreading dengue fever — a disease that infects 400 million people a year — mosquitoes are being loaded with a bacterium to block the disease. In the future, our ability to manipulate microbes means we could construct buildings with useful microbes built into their walls to fight off infections. Just imagine a neonatal hospital ward coated in a specially mixed cocktail of microbes so that babies get the best start in life.

PART 2 — QUESTIONS

Questions 14-16

Choose the correct letter, **A**, **B**, **C** or **D**.

Write the correct letter in boxes on your answer sheet.

14 What point does the writer make about microbes in the first paragraph?

- **A** ○ They adapt quickly to their environment.
- **B** ○ The risk they pose has been exaggerated.
- **C** ○ They are more plentiful in animal life than plant life.
- **D** ○ They will continue to exist for longer than the human race.

15 In the second paragraph, the writer is impressed by the fact that

- **A** ○ each species tends to have vastly different microbes.
- **B** ○ some parts of the body contain relatively few microbes.
- **C** ○ the average individual has more microbial cells than human ones.
- **D** ○ scientists have limited understanding of how microbial cells behave.

16 What is the writer doing in the fifth paragraph?

- **A** ○ explaining how a discovery was made
- **B** ○ comparing scientists' theories about microbes
- **C** ○ describing confusion among scientists
- **D** ○ giving details of how microbes cause disease

Questions 17-20

Complete the summary using the list of words, **A-H**, below.

Write the correct letter, A-H, in boxes on your answer sheet.

We should be more tolerant of microbes

Yong's book argues that we should be more tolerant of microbes. Many have a beneficial effect, and only a relatively small number lead to **17** _____. And although it is misleading to think of microbes as 'friendly', we should also stop thinking of them as the enemy. In fact, we should accept that our relationship with microbes is one based on **18** _____.

New research shows that microbes have numerous benefits for humans. Amongst other things, they aid digestion, remove poisons, produce vitamins and may even help reduce obesity. However, there is a growing problem. Our poor **19** _____, our overuse of antibiotics, and our excessive focus on **20** _____ are upsetting the bacterial balance and may be contributing to the huge increase in allergies and immune system problems.

A. **solution** B. **partnership** C. **destruction** D. **exaggeration**

E. **cleanliness** F. **regulations** G. **illness** H. **nutrition**

Questions 21-26

Do the following statements agree with the claims of the writer in the Reading Passage?

In boxes on your answer sheet, write

YES if the statement agrees with the claims of the writer

NO if the statement contradicts the claims of the writer

NOT GIVEN if it is impossible to say what the writer thinks about this

21 It is possible that using antibacterial products in the home fails to have the desired effect.

A ○ YES

B ○ NO

C ○ NOT GIVEN

22 It is a good idea to ensure that children come into contact with as few bacteria as possible.

A ○ YES

B ○ NO

C ○ NOT GIVEN

23 Yong's book contains more cause studies than are necessary.

A ○ YES

B ○ NO

C ○ NOT GIVEN

24 The case study about bacteria that prevent squid from being attacked may have limited appeal.

A ○ YES

B ○ NO

C ○ NOT GIVEN

25 Efforts to control dengue fever have been surprisingly successful

A ○ YES

B ○ NO

C ○ NOT GIVEN

26 Microbes that reduce the risk of infection have already been put inside the walls of some hospital wards.

A ○ YES

B ○ NO

C ○ NOT GIVEN

PASSAGE 3

How to make wise decisions

Across cultures, wisdom has been considered one of the most revered human qualities. Although the truly wise may seem few and far between, empirical research examining wisdom suggests that it isn't an exceptional trait possessed by a small handful of bearded philosophers after all — in fact, the latest studies suggest that most of us have the ability to make wise decisions, given the right context.

'It appears that experiential, situational, and cultural factors are even more powerful in shaping wisdom than previously imagined,' says Associate Professor Igor Grossmann of the University of Waterloo in Ontario, Canada. 'Recent empirical findings from cognitive, developmental, social, and personality psychology cumulatively suggest that people's ability to reason wisely varies dramatically across experiential and situational contexts. Understanding the role of such contextual factors offers unique insights into understanding wisdom in daily life, as well as how it can be enhanced and taught.'

It seems that it's not so much that some people simply possess wisdom and others lack it, but that our ability to reason wisely depends on a variety of external factors. 'It is impossible to characterize thought processes attributed to wisdom without considering the role of contextual factors,' explains Grossmann. 'In other words, wisdom is not solely an "inner quality" but rather unfolds as a function of situations people happen to be in. Some situations are more likely to promote wisdom than others.'

Coming up with a definition of wisdom is challenging, but Grossmann and his colleagues have identified *four key characteristics* as part of a framework of wise reasoning. One is intellectual humility or recognition of the limits of our own knowledge, and another is appreciation of perspectives wider than the issue at hand. Sensitivity to the possibility of change in social relations is also key, along with compromise or integration of different attitudes and beliefs.

Grossmann and his colleagues have also found that one of the most reliable ways to support wisdom in our own day-to-day decisions is to look at scenarios from a third-party perspective, as though giving advice to a friend. Research suggests that when adopting a first-person viewpoint we focus on 'the focal features of the environment' and when we adopt a third-person, 'observer' viewpoint we reason more broadly and focus more on interpersonal and moral ideals such as justice and impartiality. Looking at problems from this more expansive viewpoint appears to foster cognitive processes related to wise decisions.

What are we to do, then, when confronted with situations like a disagreement with a spouse or negotiating a contract at work, that require us to take a personal stake? Grossmann argues that even when we aren't able to change the situation, we can still evaluate these experiences from different perspectives.

For example, in one experiment that took place during the peak of a recent economic recession, graduating college seniors were asked to reflect on their job prospects. The students were

instructed to imagine their career either ‘as if you were a distant observer’ or ‘before your own eyes as if you were right there’. Participants in the group assigned to the ‘distant observer’ role displayed more wisdom-related reasoning (intellectual humility and recognition of change) than did participants in the control group.

In another study, couples in long-term romantic relationships were instructed to visualize an unresolved relationship conflict either through the eyes of an outsider or from their own perspective. Participants then discussed the incident with their partner for 10 minutes, after which they wrote down their thoughts about it. Couples in the ‘other’s eyes’ condition were significantly more likely to rely on wise reasoning — recognizing others’ perspectives and searching for a compromise — compared to the couples in the egocentric condition.

‘Ego-decentering promotes greater focus on others and enables a bigger picture, conceptual view of the experience, affording recognition of intellectual humility and change,’ says Grossmann.

We might associate wisdom with intelligence or particular personality traits, but research shows only a small positive relationship between wise thinking and crystallized intelligence and the personality traits of openness and agreeableness. ‘It is remarkable how much people can vary in their wisdom from one situation to the next, and how much stronger such contextual effects are for understanding the relationship between wise judgment and its social and affective outcomes as compared to the generalized “traits”,’ Grossmann explains. ‘That is, knowing how wisely a person behaves in a given situation is more informative for understanding their emotions or likelihood to forgive [or] retaliate as compared to knowing whether the person may be wise “in general”.

PART 3 — QUESTIONS

Questions 27-30

Choose the correct letter, **A**, **B**, **C** or **D**.

Write the correct letter in boxes on your answer sheet.

27 What point does the writer make in the first paragraph?

- **A** ○ Wisdom appears to be unique to the human race.
- **B** ○ A basic assumption about wisdom may be wrong.
- **C** ○ Concepts of wisdom may depend on the society we belong to.
- **D** ○ There is still much to be discovered about the nature of wisdom.

28 What does Igor Grossmann suggest about the ability to make wise decisions?

- **A** ○ It can vary greatly from one person to another.
- **B** ○ Earlier research into it was based on unreliable data.
- **C** ○ The importance of certain influences on it was underestimated.
- **D** ○ Various branches of psychology define it according to their own criteria.

29 According to the third paragraph, Grossmann claims that the level of wisdom an individual shows

- **A** ○ can be greater than they think it is.
- **B** ○ will be different in different circumstances.
- **C** ○ may be determined by particular aspects of their personality.
- **D** ○ should develop over time as a result of their life experiences.

30 What is described in the fifth paragraph?

- **A** ○ a difficulty encountered when attempting to reason wisely
- **B** ○ an example of the type of person who is likely to reason wisely

C ○ a controversial view about the benefits of reasoning wisely

D ○ a recommended strategy that can help people to reason wisely

Questions 31-35

Complete the summary using the list of words, **A-J**, below.

*Write the correct letter, **A-J**, in boxes on your answer sheet.*

The characteristics of wise reasoning

Igor Grossmann and colleagues have established four characteristics which enable us to make wise decisions. It is important to have a certain degree of **31** _____ regarding the extent of our knowledge, and to take into account **32** _____ which may not be the same as our own. We should also be able to take a broad **33** _____ of any situation. Another key characteristic is being aware of the likelihood of alterations in the way that people relate to each other.

Grossmann also believes that it is better to regard scenarios with **34** _____. By avoiding the first-person perspective, we focus more on **35** _____ and on other moral ideals, which in turn leads to wiser decision-making.

A. **opinions** B. **confidence** C. **view** D. **modesty** E. **problems**

F. **objectivity** G. **fairness** H. **experiences** I. **range** J. **reasons**

Questions 36-40

Do the following statements agree with the information given in the Reading Passage?

In boxes on your answer sheet, write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

36 Students participating in the job prospects experiment could choose one of two perspectives to take.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

37 Participants in the couples experiment were aware that they were taking part in a study about wise reasoning.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

38 In the couples experiments, the length of the couples' relationships had an impact on the results.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

39 In both experiments, the participants who looked at the situation from a more detached viewpoint tended to make wiser decisions.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

40 Grossmann believes that a person's wisdom is determined by their intelligence to only a very limited extent.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

Answer Key

#	Answer	Explanation
1	**TRUE**	There are 56 hill figures scattered around England, with the vast majority on the chalk downlands of the country's southern counties.
2	**NOT GIVEN**	Although the majority of these geoglyphs date within the last 300 years or so, there are one or two that are much older.
3	**TRUE**	The White Horse has recently been re-dated and shown to be even older than its previously assigned ancient pre-Roman Iron Age date.
4	**FALSE**	More controversial is the date of the enigmatic Long Man of Wilmington in Sussex. While many historians are convinced the figure is prehistoric, others believe that it was the work of an artistic monk from a nearby priory and was created between the 11th and 15th centuries.
5	**FALSE**	The method of cutting these huge figures was simply to remove the overlying grass to reveal the gleaming white chalk below.
6	**TRUE**	One reason that the vast majority of hill figures have disappeared is that when the traditions associated with the figures faded, people no longer bothered or remembered to clear away the grass to expose the chalk outline.
7	**TRUE**	over hundreds of years the outlines would sometimes change due to people not always cutting in exactly the same place, thus creating a different shape to the original geoglyph.
8	**NOT GIVEN**	The Uffington White Horse is a unique, stylised representation of a horse consisting of a long, sleek back, thin disjointed legs, a streaming tail, and a bird-like beaked head.
9	**Ridgeway**	The horse is situated 2.5 km from Uffington village on a steep slope close to the Late Bronze Age (c. 7th century BCE) hillfort of Uffington Castle and below the Ridgeway, a long-distance Neolithic track.
10	**documents**	The earliest evidence of a horse at Uffington is from the 1070s CE when 'White Horse Hill' is mentioned in documents from the nearby Abbey of Abingdon, and the first reference to the horse itself is soon after, in 1190 CE.
11	**soil**	in 1995 Optically Stimulated Luminescence (OSL) testing was carried out by the Oxford Archaeological Unit on soil from two of

#	Answer	Explanation
		the lower layers of the horse's body, and from another cut near the base.
12	**fertility**	Some researchers see the horse as representing the Celtic horse goddess Epona, who was worshipped as a protector of horses, and for her associations with fertility.
13	**Rhiannon**	It is possible that the carving represents a goddess in native mythology, such as Rhiannon, described in later Welsh mythology as a beautiful woman dressed in gold and riding a white horse.
14	**D**	they will outlive us.
15	**C**	What is amazing is that while the number of human cells in the average person is about 30 trillion, the number of microbial ones is higher — about 39 trillion
16	**A**	Using microscopes of his own design that could magnify up to 270 times, he examined a drop of water from a nearby lake and found it teeming with tiny creatures he called 'animalcules'.
17	**G**	Yong's book is in many ways a plea for microbial tolerance, pointing out that while fewer than one hundred species of bacteria bring disease, many thousands more play a vital role in maintaining our health.
18	**B**	Instead we should realise we have a symbiotic relationship, that can be mutually beneficial or mutually destructive.
19	**H**	our unhealthy, low-fibre diets are disrupting the bacterial balance and may be responsible for soaring rates of allergies and immune problems, such as inflammatory bowel disease (IBD).
20	**E**	Our obsession with hygiene
21	**YES**	the excessive use of household detergents and antibacterial products actually destroys the microbes that normally keep the more dangerous germs at bay.
22	**NO**	keeping a dog as a pet gives children early exposure to a diverse range of bacteria, which may help protect them against allergies later.
23	**NOT GIVEN**	The readers of Yong's book must be prepared for a decidedly unglamorous world.
24	**YES**	Among the less appealing case studies is one about a fungus that is wiping out entire populations of frogs and that can be halted by a rare microbial bacterium. Another is about squid that carry luminescent bacteria that protect them against predators.

#	Answer	Explanation
25	**NOT GIVEN**	Already, in an attempt to stop mosquitoes spreading dengue fever — a disease that infects 400 million people a year — mosquitoes are being loaded with a bacterium to block the disease.
26	**NO**	In the future, our ability to manipulate microbes means we could construct buildings with useful microbes built into their walls to fight off infections.
27	**B**	empirical research examining wisdom suggests that it isn't an exceptional trait possessed by a small handful of bearded philosophers after all — in fact, the latest studies suggest that most of us have the ability to make wise decisions, given the right context.
28	**C**	It appears that experiential, situational, and cultural factors are even more powerful in shaping wisdom than previously imagined
29	**B**	people's ability to reason wisely varies dramatically across experiential and situational contexts.
30	**D**	one of the most reliable ways to support wisdom in our own day-to-day decisions is to look at scenarios from a third-party perspective, as though giving advice to a friend.
31	**D**	One is intellectual humility or recognition of the limits of our own knowledge
32	**A**	Sensitivity to the possibility of change in social relations is also key, along with compromise or integration of different attitudes and beliefs.
33	**C**	another is appreciation of perspectives wider than the issue at hand.
34	**F**	one of the most reliable ways to support wisdom in our own day-to-day decisions is to look at scenarios from a third-party perspective
35	**G**	when we adopt a third-person, 'observer' viewpoint we reason more broadly and focus more on interpersonal and moral ideals such as justice and impartiality.
36	**FALSE**	Participants in the group assigned to the 'distant observer' role displayed more wisdom-related reasoning (intellectual humility and recognition of change) than did participants in the control group.
37	**NOT GIVEN**	In another study, couples in long-term romantic relationships were instructed to visualize an unresolved relationship conflict either through the eyes of an outsider or from their own perspective.

#	Answer	Explanation
38	**NOT GIVEN**	Couples in the ‘other’s eyes’ condition were significantly more likely to rely on wise reasoning — recognizing others’ perspectives and searching for a compromise — compared to the couples in the egocentric condition.
39	**TRUE**	Ego-decentering promotes greater focus on others and enables a bigger picture, conceptual view of the experience, affording recognition of intellectual humility and change
40	**TRUE**	research shows only a small positive relationship between wise thinking and crystallized intelligence and the personality traits of openness and agreeableness. ‘It is remarkable how much people can vary in their wisdom from one situation to the next, and how much stronger such contextual effects are for understanding the relationship between wise judgment and its social and affective outcomes as compared to the generalized “traits”,’ Grossmann explains.

Test 13

PASSAGE 1

Roman shipbuilding and navigation

Shipbuilding today is based on science and ships are built using computers and sophisticated tools. Shipbuilding in ancient Rome, however, was more of an art relying on estimation, inherited techniques and personal experience. The Romans were not traditionally sailors but mostly land-based people, who learned to build ships from the people that they conquered, namely the Greeks and the Egyptians.

There are a few surviving written documents that give descriptions and representations of ancient Roman ships, including the sails and rigging. Excavated vessels also provide some clues about ancient shipbuilding techniques. Studies of these have taught us that ancient Roman shipbuilders built the outer hull first, then proceeded with the frame and the rest of the ship. Planks used to build the outer hull were initially sewn together. Starting from the 6th century BCE, they were fixed using a method called mortise and tenon, whereby one plank locked into another without the need for stitching. Then in the first centuries of the current era, Mediterranean shipbuilders shifted to another shipbuilding method, still in use today, which consisted of building the frame first and then proceeding with the hull and the other components of the ship. This method was more systematic and dramatically shortened ship construction times. The ancient Romans built large merchant ships and warships whose size and technology were unequalled until the 16th century CE.

Warships were built to be lightweight and very speedy. They had to be able to sail near the coast, which is why they had no ballast or excess load and were built with a long, narrow hull. They did not sink when damaged and often would lie crippled on the sea's surface following naval battles. They had a bronze battering ram, which was used to pierce the timber hulls or break the oars of enemy vessels. Warships used both wind (sails) and human power (oarsmen) and were therefore very fast. Eventually, Rome's navy became the largest and most powerful in the Mediterranean, and the Romans had control over what they therefore called ***Mare Nostrum*** meaning 'our sea'.

There were many kinds of warship. The 'trireme' was the dominant warship from the 7th to 4th century BCE. It had rowers in the top, middle and lower levels, and approximately 50 rowers in each bank. The rowers at the bottom had the most uncomfortable position as they were under the other rowers and were exposed to the water entering through the oar-holes. It is worth noting that contrary to popular perception, rowers were not slaves but mostly Roman citizens enrolled in the military. The trireme was superseded by larger ships with even more rowers.

Merchant ships were built to transport lots of cargo over long distances and at a reasonable cost. They had a wider hull, double planting and a solid interior for added stability. Unlike warships, their V-shaped hull was deep underwater, meaning that they could not sail too close to the coast. They usually had two huge side rudders located off the stern and controlled by a

small tiller bar connected to a system of cables. They had from one to three masts with large square sails and a small triangular sail at the bow. Just like warships, merchant ships used oarsmen, but coordinating the hundreds of rowers in both types of ship was not an easy task. In order to assist them, music would be played on an instrument, and oars would then keep time with this.

The cargo on merchant ships included raw materials (e.g. iron bars, copper, marble and granite), and agricultural products (e.g. grain from Egypt's Nile valley). During the Empire, Rome was a huge city by ancient standards of about one million inhabitants. Goods from all over the world would come to the city through the port of Pozzuoli situated west of the bay of Naples in Italy and through the gigantic port of Ostia situated at the mouth of the Tiber River. Large merchant ships would approach the destination port and, just like today, be intercepted by a number of towboats that would drag them to the quay.

The time of travel along the many sailing routes could vary widely. Navigation in ancient Rome did not rely on sophisticated instruments such as compasses but on experience, local knowledge and observation of natural phenomena. In conditions of good visibility, seamen in the Mediterranean often had the mainland or islands in sight, which greatly facilitated navigation. They sailed by noting their position relative to a succession of recognisable landmarks. When weather conditions were not good or where land was no longer visible, Roman mariners estimated directions from the pole star or, with less accuracy, from the Sun at noon. They also estimated directions relative to the wind and swell. Overall, shipping in ancient Roman times resembled shipping today with large vessels regularly crossing the seas and bringing supplies from their Empire.

PART 1 — QUESTIONS

Questions 1-5

Do the following statements agree with the information given in the Reading Passage?

In boxes on your answer sheet, write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

1 The Romans' shipbuilding skills were passed on to the Greeks and the Egyptians.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

2 Skilled craftsmen were needed for the mortise and tenon method of fixing planks.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

3 The later practice used by Mediterranean shipbuilders involved building the hull before the frame.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

4 The Romans called the Mediterranean Sea *Mare Nostrum* because they dominated its use.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

5 Most rowers on ships were people from the Roman army.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

Questions 6-13

Complete the summary below.

Choose **ONE WORD ONLY** from the passage for each answer.

Write your answers in boxes on your answer sheet.

Warships and merchant ships

Warships were designed so that they were **6** _____ and moved quickly. They often remained afloat after battles and were able to sail close to land as they lacked any additional weight. A battering ram made of **7** _____ was included in the design for attacking and damaging the timber and oars of enemy ships. Warships, such as the 'trireme', had rowers on three different **8** _____ .

Unlike warships, merchant ships had a broad **9** _____ that lay far below the surface of the sea. Merchant ships were steered through the water with the help of large rudders and a tiller bar. They had both square and **10** _____ sails. On merchant ships and warships, **11** _____ was used to ensure rowers moved their oars in and out of the water at the same time.

Quantities of agricultural goods such as **12** _____ were transported by merchant ships to two main ports in Italy. The ships were pulled to the shore by **13** _____. When the weather was clear and they could see islands or land, sailors used landmarks that they knew to help them navigate their route.

PASSAGE 2

Climate change reveals ancient artefacts in Norway's glaciers

A.

Well above the treeline in Norway's highest mountains, ancient fields of ice are shrinking as Earth's climate warms. As the ice has vanished, it has been giving up the treasures it has preserved in cold storage for the last 6,000 years — items such as ancient arrows and skis from Viking Age* traders. And those artefacts have provided archaeologists with some surprising insights into how ancient Norwegians made their livings.

B.

Organic materials like textiles and hides are relatively rare finds at archaeological sites. This is because unless they're protected from the microorganisms that cause decay, they tend not to last long. Extreme cold is one reliable way to keep artefacts relatively fresh for a few thousand years, but once thawed out, these materials experience degradation relatively swiftly.

With climate change shrinking ice cover around the world, glacial archaeologists need to race the clock to find newly revealed artefacts, preserve them, and study them. If something fragile dries and is windblown it might very soon be lost to science, or an arrow might be exposed and then covered again by the next snow and remain well-preserved. The unpredictability means that glacial archaeologists have to be systematic in their approach to fieldwork.

C.

Over a nine-year period, a team of archaeologists, which included Lars Pilo of Oppland County Council, Norway, and James Barrett of the McDonald Institute for Archaeological Research, surveyed patches of ice in Oppland, an area of south-central Norway that is home to some of the country's highest mountains. Reindeer once congregated on these icy patches in the later summer months to escape biting insects, and from the late Stone Age**, hunters followed. In addition, trade routes threaded through the mountain passes of Oppland, linking settlements in Norway to the rest of Europe.

The slow but steady movement of glaciers tends to destroy anything at their bases, so the team focused on stationary patches of ice, mostly above 1,400 metres. That ice is found amid fields of frost-weathered boulders, fallen rocks, and exposed bedrock that for nine months of the year is buried beneath snow.

'Fieldwork is hard work — hiking with all our equipment, often camping on permafrost — but very rewarding. You're rescuing the archaeology, bringing the melting ice to wider attention, discovering a unique environmental history and really connecting with the natural environment,' says Barrett.

D.

At the edges of the contracting ice patches, archaeologists found more than 2,000 artefacts, which formed a material record that ran from 4,000 BCE to the beginnings of the Renaissance in the 14th century. Many of the artefacts are associated with hunting. Hunters would have easily misplaced arrows and they often discarded broken bows rather than take them all the way home. Other items could have been used by hunters traversing the high mountain passes of Oppland: all-purpose items like tools, skis, and horse tack.

E.

Barrett's team radiocarbon-dated 153 of the artefacts and compared those dates to the timing of major environmental changes in the region — such as periods of cooling or warming — and major social and economic shifts — such as the growth of farming settlements and the spread of international trade networks leading up to the Viking Age. They found that some periods had produced lots of artefacts, which indicates that people had been pretty active in the mountains during those times. But there were few or no signs of activity during other periods.

F.

What was surprising, according to Barrett, was the timing of these periods. Oppland's mountains present daunting terrain and in periods of extreme cold, glaciers could block the higher mountain passes and make travel in the upper reaches of the mountains extremely difficult. Archaeologists assumed people would stick to lower elevations during a time like the Late Antique Little Ice Age, a short period of deeper-than-usual cold from about 536-600 CE. But it turned out that hunters kept regularly venturing into the mountains even when the climate turned cold, based on the amount of stuff they had apparently dropped there.

'Remarkably, though, the finds from the ice may have continued through this period, perhaps suggesting that the importance of mountain hunting increased to supplement failing agricultural harvests in times of low temperatures,' says Barrett. A colder turn in the Scandinavian climate would likely have meant widespread crop failures, so more people would have depended on hunting to make up for those losses.

G.

Many of the artefacts Barrett's team recovered date from the beginning of the Viking Age, the 700s through to the 900s CE. Trade networks connecting Scandinavia with Europe and the Middle East were expanding around this time. Although we usually think of ships when we think of Scandinavian expansion, these recent discoveries show that plenty of goods travelled on overland routes, like the mountain passes of Oppland. And growing Norwegian towns, along with export markets, would have created a booming demand for hides to fight off the cold, as well as antlers to make useful things like combs. Business must have been good for hunters.

H.

Norway's mountains are probably still hiding a lot of history — and prehistory — in remote ice patches. When Barrett's team looked at the dates for their sample of 153 artefacts, they noticed a gap with almost no artefacts from about 3,800 to 2,200 BCE. In fact, archaeological finds from that period are rare all over Norway. The researchers say that could be because many of

those artefacts have already disintegrated or are still frozen in the ice. That means archaeologists could be extracting some of those artefacts from retreating ice in years to come.

PART 2 — QUESTIONS

Questions 14-19

The Reading Passage has eight sections, **A-H.**

Which section contains the following information?

*Write the correct number, **A-H**, in boxes on your answer sheet.*

	A	B	C	D	E	F	G	H
14 an explanation for weapons being left behind in the mountains	○	○	○	○	○	○	○	○
15 a reference to the physical difficulties involved in an archaeological expedition	○	○	○	○	○	○	○	○
16 an explanation of why less food may have been available	○	○	○	○	○	○	○	○
17 a reference to the possibility of future archaeological discoveries	○	○	○	○	○	○	○	○
18 examples of items that would have been traded	○	○	○	○	○	○	○	○
19 a reference to the pressure archaeologists are under to work quickly	○	○	○	○	○	○	○	○

Questions 20-22

Complete the summary below.

Choose **ONE WORD ONLY** from the passage for each answer.

Write your answers in boxes on your answer sheet.

Interesting finds at an archaeological site

Organic materials such as animal skins and textiles are not discovered very often at archaeological sites. They have little protection against **20** _____, which means

that they decay relatively quickly. But this is not always the case. If temperatures are low enough, fragile artefacts can be preserved for thousands of years.

A team of archaeologists have been working in the mountains in Oppland in Norway to recover artefacts revealed by shrinking ice cover. In the past, there were trade routes through these mountains and **21** _____ gathered there in the summer months to avoid being attacked by **22** _____ on lower ground. The people who used these mountains left things behind and it is those objects that are of interest to archaeologists.

Questions 23-24

Choose **TWO** letters, **A-E**.

Write the correct letters in boxes on your answer sheet.

23 **24** Which **TWO** of the following statements does the writer make about the discoveries of Barrett's team?

- **A** ☐ Artefacts found in the higher mountain passes were limited to skiing equipment.
- **B** ☐ Hunters went into the mountains even during periods of extreme cold.
- **C** ☐ The number of artefacts from certain time periods was relatively low.
- **D** ☐ Radiocarbon dating of artefacts produced some unreliable results.
- **E** ☐ More artefacts were found in Oppland than at any other mountain site.

Questions 25-26

Choose **TWO** letters, **A-E**.

Write the correct letters in boxes on your answer sheet.

25 **26** Which **TWO** of the following statements does the writer make about the Viking Age?

- **A** ☐ Hunters at this time benefited from an increased demand for goods.
- **B** ☐ The beginning of the period saw the greatest growth in the wealth of Vikings.
- **C** ☐ Vikings did not rely on ships alone to transport goods.
- **D** ☐ Norwegian towns at this time attracted traders from around the world.

E ☐ Vikings were primarily interested in their trading links with the Middle East.

PASSAGE 3

Plant ‘thermometer’ triggers springtime growth by measuring night-time heat

***A photoreceptor molecule in plant cells has been found to have a second job as a thermometer after dark – allowing plants* to *read seasonal temperature changes. Scientists say the discovery could help breed crops that are more resilient to the temperatures expected* to *result from climate change*.**

A.

An international team of scientists led by the University of Cambridge has discovered that the ‘thermometer’ molecule in plants enables them to develop according to seasonal temperature changes. Researchers have revealed that molecules called **phytochromes** — used by plants to detect light during the day actually change their function in darkness to become cellular temperature gauges that measure the heat of the night.

The new findings, published in the journal *Science,* show that phytochromes control genetic switches in response to temperature as well as light to dictate plant development.

B.

At night, these molecules change states, and the pace at which they change is ‘directly proportional to temperature’, say scientists, who compare phytochromes to mercury in a thermometer. The warmer it is, the faster the molecular change — stimulating plant growth.

C.

Farmers and gardeners have known for hundreds of years how responsive plants are to temperature: warm winters cause many trees and flowers to bud early, something humans have long used to predict weather and harvest times for the coming year. The latest research pinpoints for the first time a molecular mechanism in plants that reacts to temperature — often triggering the buds of spring we long to see at the end of winter.

D.

With weather and temperatures set to become ever more unpredictable due to climate change, researchers say the discovery that this light-sensing molecule also functions as the internal thermometer in plant cells could help us breed tougher crops. ‘It is estimated that agricultural yields will need to double by 2050, but climate change is a major threat to achieving this. Key crops such as wheat and rice are sensitive to high temperatures. Thermal stress reduces crop yields by around 10% for every one degree increase in temperature,’ says lead researcher Dr Philip Wigge from Cambridge’s Sainsbury Laboratory. ‘Discovering the molecules that allow plants to sense temperature has the potential to accelerate the breeding of crops resilient to thermal stress and climate change.’

E.

In their active state, phytochrome molecules bind themselves to DNA to restrict plant growth. During the day, sunlight activates the molecules, slowing down growth. If a plant finds itself in shade, phytochromes are quickly inactivated — enabling it to grow faster to find sunlight again. This is how plants compete to escape each other's shade. 'Light-driven changes to phytochrome activity occur very fast, in less than a second,' says Wigge.

At night, however, it's a different story. Instead of a rapid deactivation following sundown, the molecules gradually change from their active to inactive state. This is called 'dark reversion'. 'Just as mercury rises in a thermometer, the rate at which phytochromes revert to their inactive state during the night is a direct measure of temperature,' says Wigge.

F.

'The lower the temperature, the slower the rate at which phytochromes revert to inactivity, so the molecules spend more time in their active, growth-suppressing state. This is why plants are slower to grow in winter. Warm temperatures accelerate dark reversion, so that phytochromes rapidly reach an inactive state and detach themselves from the plant's DNA — allowing genes to be expressed and plant growth to resume.' Wigge believes phytochrome thermo-sensing evolved at a later stage, and co-opted the biological network already used for light-based growth during the downtime of night.

G.

Some plants mainly use day length as an indicator of the season. Other species, such as daffodils, have considerable temperature sensitivity, and can flower months in advance during a warm winter. In fact, the discovery of the dual role of phytochromes provides the science behind a well-known rhyme long used to predict the coming season: oak before ash we'll have a splash, ash before oak we're in for a soak.

Wigge explains: 'Oak trees rely much more on temperature, likely using phytochromes as thermometers to dictate development, whereas ash trees rely on measuring day length to determine their seasonal timing. A warmer spring, and consequently a higher likeliness of a hot summer, will result in oak leafing before ash. A cold spring will see the opposite. As the British know only too well, a colder summer is likely to be a rain-soaked one.'

H.

The new findings are the culmination of twelve years of research involving scientists from Germany, Argentina and the US, as well as the Cambridge team. The work was done in a model system, using a mustard plant called *Arabidopsis,* but Wigge says the phytochrome genes necessary for temperature sensing are found in crop plants as well. 'Recent advances in plant genetics now mean that scientists are able to rapidly identify the genes controlling these processes in crop plants, and even alter their activity using precise molecular "scalpels",' adds Wigge. 'Cambridge is uniquely well-positioned to do this kind of research as we have outstanding collaborators nearby who work on more applied aspects of plant biology, and can help us transfer this new knowledge into the field.'

PART 3 — QUESTIONS

Questions 27-32

Do the following statements agree with the information given in the Reading Passage?

In boxes on your answer sheet, write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

27 The Cambridge scientists' discovery of the 'thermometer molecule' caused surprise among other scientists.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

28 The target for agricultural production by 2050 could be missed.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

29 Wheat and rice suffer from a rise in temperatures.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

30 It may be possible to develop crops that require less water.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

31 Plants grow faster in sunlight than in shade.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

32 Phytochromes change their state at the same speed day and night.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

Questions 33-37

The Reading Passage has eight sections, **A-H**.

Which section contains the following information?

*Write the correct letter, **A-H**, in boxes on your answer sheet.*

33 mention of specialists who can make use of the research findings _____

34 a reference to a potential benefit of the research findings _____

35 scientific support for a traditional saying _____

36 a reference to people traditionally making plans based on plant behaviour _____

37 a reference to where the research has been reported _____

Questions 38-40

Complete the sentences below.

Choose **NO MORE THAN TWO WORDS** from the passage for each answer.

Write your answers in boxes on your answer sheet.

- Daffodils are likely to flower early in response to **38** _____ weather.

- If ash trees come into leaf before oak trees, the weather in **39** _____ will probably be wet.
- The research was carried out using a particular species of **40** _____.

Answer Key

#	Answer	Explanation
1	**FALSE**	The Romans were not traditionally sailors but mostly land- based people, who learned to build ships from the people that they conquered, namely the Greeks and the Egyptians.
2	**NOT GIVEN**	Starting from the 6th century BCE, they were fixed using a method called mortise and tenon, whereby one plank locked into another without the need for stitching.
3	**FALSE**	Then in the first centuries of the current era, Mediterranean shipbuilders shifted to another shipbuilding method, still in use today, which consisted of building the frame first and then proceeding with the hull and the other components of the ship.
4	**TRUE**	Eventually, Rome's navy became the largest and most powerful in the Mediterranean, and the Romans had control over what they therefore called Mare Nostrum meaning 'our sea'.
5	**TRUE**	It is worth noting that contrary to popular perception, rowers were not slaves but mostly Roman citizens enrolled in the military.
6	**lightweight**	Warships were built to be lightweight and very speedy.
7	**bronze**	They had a bronze battering ram, which was used to pierce the timber hulls or break the oars of enemy vessels.
8	**levels**	The 'trireme' was the dominant warship from the 7th to 4th century BCE. It had rowers in the top, middle and lower levels, and approximately 50 rowers in each bank.
9	**hull**	Unlike warships, their V-shaped hull was deep underwater, meaning that they could not sail too close to the coast.
10	**triangular**	They had from one to three masts with large square sails and a small triangular sail at the bow.
11	**music**	In order to assist them, music would be played on an instrument, and oars would then keep time with this.
12	**grain**	The cargo on merchant ships included raw materials (e.g. iron bars, copper, marble and granite), and agricultural products (e.g. grain from Egypt's Nile valley).
13	**towboats**	Large merchant ships would approach the destination port and, just like today, be intercepted by a number of towboats that would drag them to the quay.

#	Answer	Explanation
14	**D**	Hunters would have easily misplaced arrows and they often discarded broken bows rather than take them all the way home.
15	**C**	Fieldwork is hard work — hiking with all our equipment, often camping on permafrost — but very rewarding
16	**F**	A colder turn in the Scandinavian climate would likely have meant widespread crop failures, so more people would have depended on hunting to make up for those losses.
17	**H**	That means archaeologists could be extracting some of those artefacts from retreating ice in years to come.
18	**G**	And growing Norwegian towns, along with export markets, would have created a booming demand for hides to fight off the cold, as well as antlers to make useful things like combs.
19	**B**	With climate change shrinking ice cover around the world, glacial archaeologists need to race the clock to find newly revealed artefacts, preserve them, and study them.
20	**microorganisms / micro-organisms**	This is because unless they’re protected from the microorganisms that cause decay, they tend not to last long.
21	**reindeer**	Reindeer once congregated on these icy patches in the later summer months
22	**insects**	to escape biting insects
23	**B / C**	But it turned out that hunters kept regularly venturing into the mountains even when the climate turned cold, based on the amount of stuff they had apparently dropped there. But there were few or no signs of activity during other periods.
24	**B / C**	But it turned out that hunters kept regularly venturing into the mountains even when the climate turned cold, based on the amount of stuff they had apparently dropped there. But there were few or no signs of activity during other periods.
25	**A / C**	Business must have been good for hunters. these recent discoveries show that plenty of goods travelled on overland routes, like the mountain passes of Oppland
26	**A / C**	Business must have been good for hunters. these recent discoveries show that plenty of goods travelled on overland routes, like the mountain passes of Oppland
27	**NOT GIVEN**	An international team of scientists led by the University of Cambridge has discovered that the ‘thermometer’ molecule in plants enables them to develop according to seasonal temperature changes.

#	Answer	Explanation
28	**TRUE**	It is estimated that agricultural yields will need to double by 2050, but climate change is a major threat to achieving this.
29	**TRUE**	Key crops such as wheat and rice are sensitive to high temperatures. Thermal stress reduces crop yields by around 10% for every one degree increase in temperature
30	**NOT GIVEN**	researchers say the discovery that this light-sensing molecule also functions as the internal thermometer in plant cells could help us breed tougher crops.
31	**FALSE**	During the day, sunlight activates the molecules, slowing down growth. If a plant finds itself in shade, phytochromes are quickly inactivated — enabling it to grow faster to find sunlight again.
32	**FALSE**	At night, however, it's a different story. Instead of a rapid deactivation following sundown, the molecules gradually change from their active to inactive state.
33	**H**	Cambridge is uniquely well-positioned to do this kind of research as we have outstanding collaborators nearby who work on more applied aspects of plant biology, and can help us transfer this new knowledge into the field.
34	**D**	Discovering the molecules that allow plants to sense temperature has the potential to accelerate the breeding of crops resilient to thermal stress and climate change.
35	**G**	In fact, the discovery of the dual role of phytochromes provides the science behind a well-known rhyme long used to predict the coming season: oak before ash we'll have a splash, ash before oak we're in for a soak.
36	**C**	warm winters cause many trees and flowers to bud early, something humans have long used to predict weather and harvest times for the coming year.
37	**A**	The new findings, published in the journal Science, show that phytochromes control genetic switches in response to temperature as well as light to dictate plant development.
38	**warm / warm winter**	Other species, such as daffodils, have considerable temperature sensitivity, and can flower months in advance during a warm winter.
39	**summer**	A warmer spring, and consequently a higher likeliness of a hot summer, will result in oak leafing before ash. A cold spring will see the opposite. As the British know only too well, a colder summer is likely to be a rain-soaked one.

#	Answer	Explanation
40	**mustard plant / mustard plants / mustard**	The new findings are the culmination of twelve years of research involving scientists from Germany, Argentina and the US, as well as the Cambridge team. The work was done in a model system, using a mustard plant called Arabidopsis

Test 14

PASSAGE 1

Roman tunnels

The Romans, who once controlled areas of Europe, North Africa and Asia Minor, adopted the construction techniques of other civilizations to build tunnels in their territories

The Persians, who lived in present-day Iran, were one of the first civilizations to build tunnels that provided a reliable supply of water to human settlements in dry areas. In the early first millennium BCE, they introduced the *qanat* method of tunnel construction, which consisted of placing posts over a hill in a straight line, to ensure that the tunnel kept to its route, and then digging vertical shafts down into the ground at regular intervals. Underground, workers removed the earth from between the ends of the shafts, creating a tunnel. The excavated soil was taken up to the surface using the shafts, which also provided ventilation during the work. Once the tunnel was completed, it allowed water to flow from the top of a hillside down towards a canal, which supplied water for human use. Remarkably, some *qanats* built by the Persians 2,700 years ago are still in use today.

They later passed on their knowledge to the Romans, who also used the *qanat* method to construct water-supply tunnels for agriculture. Roman *qanat* tunnels were constructed with vertical shafts dug at intervals of between 30 and 60 meters. The shafts were equipped with handholds and footholds to help those climbing in and out of them and were covered with a wooden or stone lid. To ensure that the shafts were vertical, Romans hung a plumb line from a rod placed across the top of each shaft and made sure that the weight at the end of it hung in the center of the shaft. Plumb lines were also used to measure the depth of the shaft and to determine the slope of the tunnel. The 5.6 kilometer Long Claudius tunnel, built in 41 CE to drain the Fucine Lake in central Italy, had shafts that were up to 122 meters deep, took 11 years to build and involved approximately 30,000 workers.

By the 6th century BCE, a second method of tunnel construction appeared called the *counter-excavation* method, in which the tunnel was constructed from both ends. It was used to cut through high mountains when the *qanat* method was not a practical alternative. This method required greater planning and advanced knowledge of surveying, mathematics and geometry as both ends of a tunnel had to meet correctly at the center of the mountain. Adjustments to the direction of the tunnel also had to be made whenever builders encountered geological problems or when it deviated from its set path. They constantly checked the tunnel's advancing direction.

For example, by looking back at the light that penetrated through the tunnel mouth, and made corrections whenever necessary. Large deviations could happen, and they could result in one end of the tunnel not being usable. An inscription written on the side of a 428-meter tunnel, built by the Romans as part of the Saldae aqueduct system in modern-day Algeria, describes how the two teams of builders missed each other in the mountain and how the later construction of a lateral link between both corridors corrected the initial error.

The Romans dug tunnels for their roads using the counter-excavation method, whenever they encountered obstacles such as hills or mountains that were too high for roads to pass over. An example is the 37-meter-long, 6-meter-high, Furlo Pass Tunnel built in Italy in 69-79 CE. Remarkably, a modern road still uses this tunnel today. Tunnels were also built for mineral extraction. Miners would locate a mineral vein and then pursue it with shafts and tunnels underground. Traces of such tunnels used to mine gold can still be found at the Dolaucothi mines in Wales. When the sole purpose of a tunnel was mineral extraction, construction required less planning, as the tunnel route was determined by the mineral vein.

Roman tunnel projects were carefully planned and carried out. The length of time it took to construct a tunnel depended on the method being used and the type of rock being excavated. The *qanat* construction method was usually faster than the counter-excavation method as it was more straightforward. This was because the mountain could be excavated not only from the tunnel mouths but also from shafts. The type of rock could also influence construction times. When the rock was hard, the Romans employed a technique called fire quenching which consisted of heating the rock with fire, and then suddenly cooling it with cold water so that it would crack.

Progress through hard rock could be very slow, and it was not uncommon for tunnels to take years, if not decades, to be built. Construction marks left on a Roman tunnel in Bologna show that the rate of advance through solid rock was 30 centimeters per day. In contrast, the rate of advance of the Claudius tunnel can be calculated at 1.4 meters per day. Most tunnels had inscriptions showing the names of patrons who ordered construction and sometimes the name of the architect. For example, the 1.4-kilometer Cevlik tunnel in Turkey, built to divert the floodwater threatening the harbor of the ancient city of Seleuceia Pieria, had inscriptions on the entrance, still visible today, that also indicate that the tunnel was started in 69 CE and was completed in 81 CE.

PART 1 — QUESTIONS

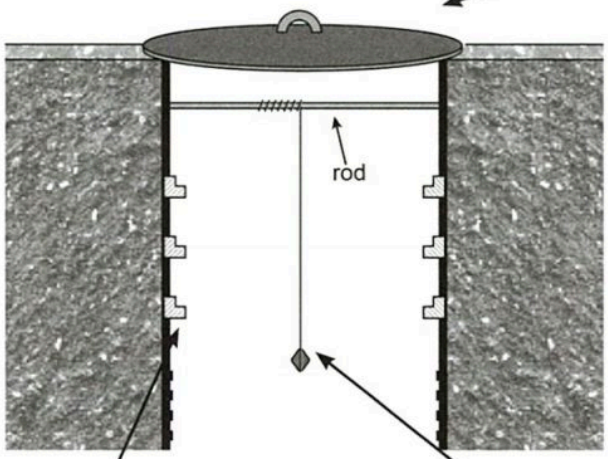
Questions 1-6

Label the diagrams below.

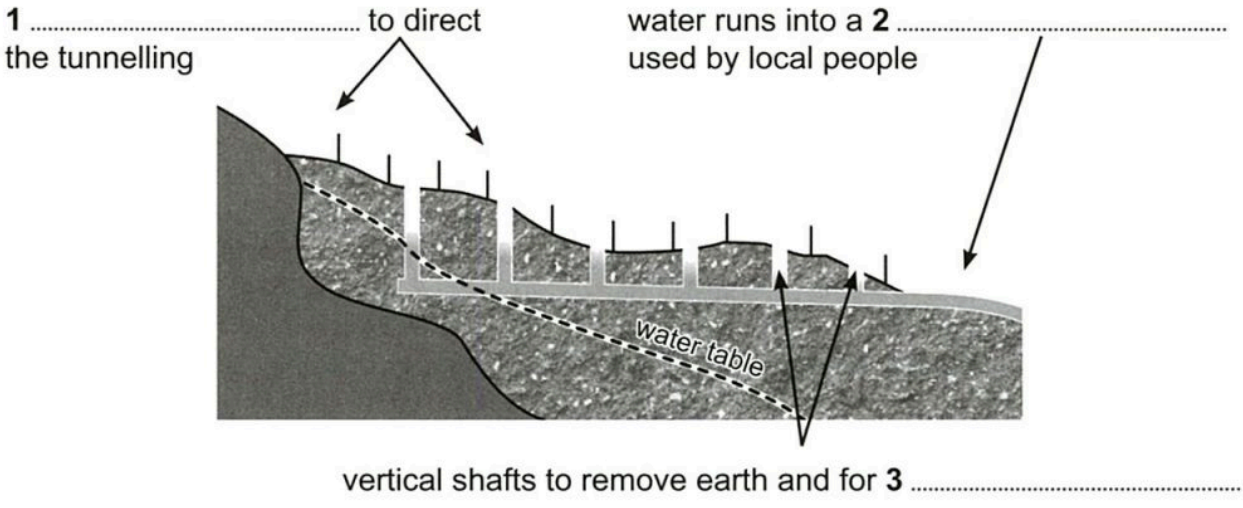
Choose **ONE WORD ONLY** from the passage for each answer.

Write your answers in boxes on your answer sheet.

Cross-section of a Roman Qanat Shaft



The Persian Qanat Method



1 _____

2 _____

3 _____

4 _____

5 _____

6 _____

Questions 7-10

Do the following statements agree with the information given in the Reading Passage?

In boxes on your answer sheet, write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

7 The counter-excavation method completely replaced the qanat method in the 6th century BCE.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

8 Only experienced builders were employed to construct a tunnel using the counter-excavation method.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

9 The information about a problem that occurred during the construction of the Saldae aqueduct system was found in an ancient book.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

10 The mistake made by the builders of the Saldae aqueduct system was that the two parts of the tunnel failed to meet.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

Questions 11-13

Answer the questions below.

Choose **NO MORE THAN TWO WORDS** from the passage for each answer.

Write your answers in boxes on your answer sheet.

11 What type of mineral were the Dolaucothi mines in Wales built to extract?

_____

12 In addition to the patron, whose name might be carved onto a tunnel? _____

13 What part of Seleuceia Pieria was the Çevlik tunnel built to protect? _____

PASSAGE 2

Changes in reading habits

What are the implications of the way we read today?

Look around on your next plane trip. The iPad is the new pacifier for babies and toddlers. Younger school-aged children read stories on smartphones; older kids don't read at all, but hunch over video games. Parents and other passengers read on tablets or skim a flotilla of email and news feeds. Unbeknown to most of us, an invisible, game-changing transformation links everyone in this picture: the neuronal circuit that underlies the brain's ability to read is subtly, rapidly changing and this has implications for everyone from the pre-reading toddler to the expert adult.

As work in neurosciences indicates, the acquisition of literacy necessitated a new circuit in our species' brain more than 6,000 years ago. That circuit evolved from a very simple mechanism for decoding basic information, like the number of goats in one's herd, to the present, highly elaborated reading brain. My research depicts how the present reading brain enables the development of some of our most important intellectual and affective processes: internalized knowledge, analogical reasoning, and inference; perspective-taking and empathy; critical analysis and the generation of insight. Research surfacing in many parts of the world now cautions that each of these essential 'deep reading' processes may be under threat as we move into digital- based modes of reading.

This is not a simple, binary issue of print versus digital reading and technological innovation. As MIT scholar Sherry Turkle has written, we do not err as a society when we innovate but when we ignore what we disrupt or diminish while innovating. In this hinge moment between print and digital cultures, society needs to confront what is diminishing in the expert reading circuit, what our children and older students are not developing, and what we can do about it.

We know from research that the reading circuit is not given to human beings through a genetic blueprint like vision or language; it needs an environment to develop. Further, it will adapt to that environment's requirements — from different writing systems to the characteristics of whatever medium is used. If the dominant medium advantages processes that are fast, multi-task oriented and well-suited for large volumes of information, like the current digital medium, so will the reading circuit. As UCLA psychologist Patricia Greenfield writes, the result is that less attention and time will be allocated to slower, time-demanding deep reading processes.

Increasing reports from educators and from researchers in psychology and the humanities bear this out. English literature scholar and teacher Mark Edmundson describes how many college students actively avoid the classic literature of the 19th and 20th centuries in favour of something simpler as they no longer have the patience to read longer, denser, more difficult texts. We should be less concerned with students' *'cognitive impatience'*, however, than by what may underlie it: the potential inability of large numbers of students to read with a level of critical analysis sufficient to comprehend the complexity of thought and argument found in more demanding texts.

Multiple studies show that digital screen use may be causing a variety of troubling downstream effects on reading comprehension in older high school and college students. In Stavanger, Norway, psychologist Anne Mangen and her colleagues studied how high school students comprehend the same material in different mediums. Mangen's group asked subjects questions about a short story whose plot had universal student appeal; half of the students read the story on a tablet, the other half in paperback. Results indicated that students who read on print were superior in their comprehension to screen-reading peers, particularly in their ability to sequence detail and reconstruct the plot in chronological order.

Ziming Liu from San Jose State University has conducted a series of studies which indicate that the 'new norm' in reading is skimming, involving word-spotting and browsing through the text. Many readers now use a pattern when reading in which they sample the first line and then word- spot through the rest of the text. When the reading brain skims like this, it reduces time allocated to deep reading processes. In other words, we don't have time to grasp complexity, to understand another's feelings, to perceive beauty, and to create thoughts of the reader's own.

The possibility that critical analysis, empathy and other deep reading processes could become the unintended 'collateral damage' of our digital culture is not a straightforward binary issue about print versus digital reading. It is about how we all have begun to read on various mediums and how that changes not only what we read, but also the purposes for which we read. Nor is it only about the young. The subtle atrophy of critical analysis and empathy affects us all equally. It affects our ability to navigate a constant bombardment of information. It incentivizes a retreat to the most familiar stores of unchecked information, which require and receive no analysis, leaving us susceptible to false information and irrational ideas.

There's an old rule in neuroscience that does not alter with age: use it or lose it. It is a very hopeful principle when applied to critical thought in the reading brain because it implies choice. The story of the changing reading brain is hardly finished. We possess both the science and the technology to identify and redress the changes in how we read before they become entrenched. If we work to understand exactly what we will lose, alongside the extraordinary new capacities that the digital world has brought us, there is as much reason for excitement as caution.

PART 2 — QUESTIONS

Questions 14-17

Choose the correct letter, **A**, **B**, **C** or **D**.

Write the correct letter in boxes on your answer sheet.

14 What is the writer's main point in the first paragraph?

- **A** ○ Our use of technology is having a hidden effect on us.
- **B** ○ Technology can be used to help youngsters to read.
- **C** ○ Travellers should be encouraged to use technology on planes.
- **D** ○ Playing games is a more popular use of technology than reading.

15 What main point does Sherry Turkle make about innovation?

- **A** ○ Technological innovation has led to a reduction in print reading.
- **B** ○ We should pay attention to what might be lost when innovation occurs.
- **C** ○ We should encourage more young people to become involved in innovation.
- **D** ○ There is a difference between developing products and developing ideas.

16 What point is the writer making in the fourth paragraph?

- **A** ○ Humans have an inborn ability to read and write.
- **B** ○ Reading can be done using many different mediums.
- **C** ○ Writing systems make unexpected demands on the brain.
- **D** ○ Some brain circuits adjust to whatever is required of them.

17 According to Mark Edmundson, the attitude of college students

- **A** ○ has changed the way he teaches.
- **B** ○ has influenced what they select to read.
- **C** ○ does not worry him as much as it does others.

D ◯ does not match the views of the general public.

Questions 18-22

Complete the summary using the list of words, **A-H**, below.

*Write the correct letter, **A-H**, in boxes on your answer sheet.*

Studies on digital screen use

There have been many studies on digital screen use, showing some **18** _____ trends. Psychologist Anne Mangen gave high-school students a short story to read, half using digital and half using print mediums. Her team then used a question-and-answer technique to find out how **19** _____ each group's understanding of the plot was. The findings showed a clear pattern in the responses, with those who read screens finding the order of information **20** _____ to recall.

Studies by Ziming Liu show that students are tending to read **21** _____ words and phrases in a text to save time. This approach, she says, gives the reader a superficial understanding of the **22** _____ content of material, leaving no time for thought.

A. **fast** B. **isolated** C. **emotional** D. **worrying** E. **many** F. **hard**

G. **combined** H. **thorough**

Questions 23-26

Do the following statements agree with the claims of the writer in The Reading Passage?

In boxes on your answer sheet, write

YES *if the statement agrees with the claims of the writer*

NO *if the statement contradicts the claims of the writer*

NOT GIVEN *if it is impossible to say what the writer thinks about this*

23 The medium we use to read can affect our choice of reading content.

A ◯ YES

B ○ NO

C ○ NOT GIVEN

24 Some age groups are more likely to lose their complex reading skills than others.

A ○ YES

B ○ NO

C ○ NOT GIVEN

25 False information has become more widespread in today's digital era.

A ○ YES

B ○ NO

C ○ NOT GIVEN

26 We still have opportunities to rectify the problems that technology is presenting.

A ○ YES

B ○ NO

C ○ NOT GIVEN

PASSAGE 3

Attitudes towards Artificial Intelligence

27

A.

Artificial intelligence (AI) can already predict the future. Police forces are using it to map when and where crime is likely to occur. Doctors can use it to predict when a patient is most likely to have a heart attack or stroke. Researchers are even trying to give AI imagination so it can plan for unexpected consequences.

Many decisions in our lives require a good forecast, and AI is almost always better at forecasting than we are. Yet for all these technological advances, we still seem to deeply lack confidence in AI predictions. Recent cases show that people don't like relying on AI and prefer to trust human experts, even if these experts are wrong.

If we want AI to really benefit people, we need to find a way to get people to trust it. To do that, we need to understand why people are so reluctant to trust AI in the first place.

28

B.

Take the case of Watson for Oncology, one of technology giant IBM's supercomputer programs. Their attempt to promote this program to cancer doctors was a PR disaster. The AI promised to deliver top-quality recommendations on the treatment of 12 cancers that accounted for 80% of the world's eases. But when doctors first interacted with Watson, they found themselves in a rather difficult situation. On the one hand, if Watson provided guidance about a treatment that coincided with their own opinions, physicians did not see much point in Watson's recommendations. The supercomputer was simply telling them what they already knew, and these recommendations did not change the actual treatment.

On the other hand, if Watson generated a recommendation that contradicted the experts' opinion, doctors would typically conclude that Watson wasn't competent. And the machine wouldn't be able to explain why its treatment was plausible because its machine-learning algorithms were simply too complex to be fully understood by humans. Consequently, this has caused even more suspicion and disbelief, leading many doctors to ignore the seemingly outlandish AI recommendations and stick to their own expertise.

29

C.

This is just one example of people's lack of confidence in AI and their reluctance to accept what AI has to offer. Trust in other people is often based on our understanding of how others think and having experience of their reliability. This helps create a psychological feeling of safety. AI, on the other hand, is still fairly new and unfamiliar to most people. Even if it can be technically explained (and that's not always the case), AI's decision-making process is usually too difficult for most people to comprehend. And interacting with something we don't understand can cause anxiety and give us a sense that we're losing control.

Many people are also simply not familiar with many instances of AI actually working, because it often happens in the background. Instead they are acutely aware of instances where AI goes wrong. Embarrassing AI failures receive a disproportionate amount of media attention, emphasising the message that we cannot rely on technology. Machine learning is not foolproof, in part because the humans who design it aren't.

30

D.

Feelings about AI run deep. In a recent experiment, people from a range of backgrounds were given various sci-fi films about AI to watch and then asked questions about automation in everyday life. It was found that, regardless of whether the film they watched depicted AI in a positive or negative light, simply watching a cinematic vision of our technological future polarised the participants' attitudes. Optimists became more extreme in their enthusiasm for AI and sceptics became even more guarded.

This suggests people use relevant evidence about AI in a biased manner to support their existing attitudes, a deep-rooted human tendency known as "confirmation bias". As AI is represented more and more in media and entertainment, it could lead to a society split between those who benefit from AI and those who reject it. More pertinently, refusing to accept the advantages offered by AI could place a large group of people at a serious disadvantage.

31

E.

Fortunately, we already have some ideas about how to improve trust in AI. Simply having previous experience with AI can significantly improve people's opinions about the technology, as was found in the study mentioned above. Evidence also suggests the more you use other technologies such as the internet, the more you trust them.

Another solution may be to reveal more about the algorithms which AI uses and the purposes they serve. Several high-profile social media companies and online marketplaces already release transparency reports about government requests and surveillance disclosures. A similar practice for AI could help people have a better understanding of the way algorithmic decisions are made.

32

F.

Research suggests that allowing people some control over AI decision-making could also improve trust and enable AI to learn from human experience. For example, one study showed that when people were allowed the freedom to slightly modify an algorithm, they felt more satisfied with its decisions, more likely to believe it was superior and more likely to use it in the future.

We don’t need to understand the intricate inner workings of AI systems, but if people are given a degree of responsibility for how they are implemented, they will be more willing to accept AI into their lives.

PART 3 — QUESTIONS

Questions 27-32

The Reading Passage has six sections, **A-F**.

Choose the correct heading for each section from the list of headings below.

*Write the correct number, **i-viii**, in boxes on your answer sheet.*

List of Headings

i. **An increasing divergence of attitudes towards AI**

ii. **Reasons why we have more faith in human judgement than in AI**

iii. **The superiority of AI projections over those made by humans**

iv. **The process by which AI can help us make good decisions**

v. **The advantages of involving users in AI processes**

vi. **Widespread distrust of an AI innovation**

vii. **Encouraging openness about how AI functions**

viii. **A surprisingly successful AI application**

Questions 33-35

Choose the correct letter, **A**, **B**, **C** or **D**.

Write the correct letter in boxes on your answer sheet.

33 What is the writer doing in Section A?

- **A** ○ providing a solution to a concern
- **B** ○ justifying an opinion about an issue
- **C** ○ highlighting the existence of a problem
- **D** ○ explaining the reasons for a phenomenon

34 According to Section C, why might some people be reluctant to accept AI?

- **A** ○ They are afraid it will replace humans in decision-making jobs.
- **B** ○ Its complexity makes them feel that they are at a disadvantage.

C ◯ They would rather wait for the technology to be tested over a period of time.

D ◯ Misunderstandings about how it works make it seem more challenging than it is.

35 What does the writer say about the media in Section C of the text?

A ◯ It leads the public to be mistrustful of AI.

B ◯ It devotes an excessive amount of attention to AI.

C ◯ Its reports of incidents involving AI are often inaccurate.

D ◯ It gives the impression that AI failures are due to designer error.

Questions 36-40

Do the following statements agree with the claims of the writer in the Reading Passage?

In boxes on your answer sheet, write

YES if the statement agrees with the claims of the writer

NO if the statement contradicts the claims of the writer

NOT GIVEN if it is impossible to say what the writer thinks about this

36 Subjective depictions of AI in sci-fi films make people change their opinions about automation.

A ◯ YES

B ◯ NO

C ◯ NOT GIVEN

37 Portrayals of AI in media and entertainment are likely to become more positive.

A ◯ YES

B ◯ NO

C ◯ NOT GIVEN

38 Rejection of the possibilities of AI may have a negative effect on many people's lives.

A ◯ YES

B ○ NO

C ○ NOT GIVEN

39 Familiarity with AI has very little impact on people's attitudes to the technology.

A ○ YES

B ○ NO

C ○ NOT GIVEN

40 AI applications which users are able to modify are more likely to gain consumer approval.

A ○ YES

B ○ NO

C ○ NOT GIVEN

Answer Key

#	Answer	Explanation
1	**posts**	they introduced the qanat method of tunnel construction, which consisted of placing posts over a hill in a straight line, to ensure that the tunnel kept to its route, and then digging vertical shafts down into the ground at regular intervals.
2	**canal**	Once the tunnel was completed, it allowed water to flow from the top of a hillside down towards a canal, which supplied water for human use.
3	**ventilation**	The excavated soil was taken up to the surface using the shafts, which also provided ventilation during the work.
4	**lid**	The shafts were equipped with handholds and footholds to help those climbing in and out of them and were covered with a wooden or stone lid.
5	**weight**	To ensure that the shafts were vertical, Romans hung a plumb line from a rod placed across the top of each shaft and made sure that the weight at the end of it hung in the center of the shaft.
6	**climbing**	The shafts were equipped with handholds and footholds to help those climbing in and out of them and were covered with a wooden or stone lid.
7	**FALSE**	It was used to cut through high mountains when the qanat method was not a practical alternative.
8	**NOT GIVEN**	This method required greater planning and advanced knowledge of surveying, mathematics and geometry as both ends of a tunnel had to meet correctly at the center of the mountain.
9	**FALSE**	An inscription written on the side of a 428-meter tunnel
10	**TRUE**	the two teams of builders missed each other in the mountain and how the later construction of a lateral link between both corridors corrected the initial error
11	**gold**	Traces of such tunnels used to mine gold can still be found at the Dolaucothi mines in Wales.
12	**architect / architect's / architect's name / architect name / the architect / the architect's / the**	Most tunnels had inscriptions showing the names of patrons who ordered construction and sometimes the name of the architect.

#	Answer	Explanation
	architect's name / the architect name	
13	**harbour / harbor / the harbour / the harbor**	the 1.4-kilometer Cevlik tunnel in Turkey, built to divert the floodwater threatening the harbor of the ancient city of Seleuceia Pieria
14	**A**	Unbeknown to most of us, an invisible, game-changing transformation links everyone in this picture: the neuronal circuit that underlies the brain's ability to read is subtly, rapidly changing and this has implications for everyone from the pre-reading toddler to the expert adult.
15	**B**	As MIT scholar Sherry Turkle has written, we do not err as a society when we innovate but when we ignore what we disrupt or diminish while innovating
16	**D**	it will adapt to that environment's requirements — from different writing systems to the characteristics of whatever medium is used.
17	**B**	Mark Edmundson describes how many college students actively avoid the classic literature of the 19th and 20th centuries in favour of something simpler as they no longer have the patience to read longer, denser, more difficult texts
18	**D**	Multiple studies show that digital screen use may be causing a variety of troubling downstream effects on reading comprehension in older high school and college students.
19	**H**	Results indicated that students who read on print were superior in their comprehension to screen-reading peers
20	**F**	particularly in their ability to sequence detail and reconstruct the plot in chronological order.
21	**B**	the 'new norm' in reading is skimming, involving word-spotting and browsing through the text
22	**C**	In other words, we don't have time to grasp complexity, to understand another's feelings, to perceive beauty, and to create thoughts of the reader's own.
23	**YES**	It is about how we all have begun to read on various mediums and how that changes not only what we read, but also the purposes for which we read.
24	**NO**	The subtle atrophy of critical analysis and empathy affects us all equally.
25	**NOT GIVEN**	It incentivizes a retreat to the most familiar stores of unchecked information, which require and receive no analysis, leaving us

#	Answer	Explanation
		susceptible to false information and irrational ideas.
26	**YES**	We possess both the science and the technology to identify and redress the changes in how we read before they become entrenched.
27	**iii**	Many decisions in our lives require a good forecast, and AI is almost always better at forecasting than we are.
28	**vi**	Consequently, this has caused even more suspicion and disbelief, leading many doctors to ignore the seemingly outlandish AI recommendations and stick to their own expertise.
29	**ii**	Trust in other people is often based on our understanding of how others think and having experience of their reliability. This helps create a psychological feeling of safety.
30	**i**	As AI is represented more and more in media and entertainment, it could lead to a society split between those who benefit from AI and those who reject it.
31	**vii**	Another solution may be to reveal more about the algorithms which AI uses and the purposes they serve.
32	**v**	Research suggests that allowing people some control over AI decision-making could also improve trust and enable AI to learn from human experience.
33	**C**	Yet for all these technological advances, we still seem to deeply lack confidence in AI predictions.
34	**B**	AI's decision-making process is usually too difficult for most people to comprehend. And interacting with something we don't understand can cause anxiety and give us a sense that we're losing control.
35	**A**	Embarrassing AI failures receive a disproportionate amount of media attention, emphasising the message that we cannot rely on technology.
36	**NO**	Optimists became more extreme in their enthusiasm for AI and sceptics became even more guarded.
37	**NOT GIVEN**	As AI is represented more and more in media and entertainment, it could lead to a society split between those who benefit from AI and those who reject it.
38	**YES**	More pertinently, refusing to accept the advantages offered by AI could place a large group of people at a serious disadvantage.
39	**NO**	Simply having previous experience with AI can significantly improve people's opinions about the technology

#	Answer	Explanation
40	**YES**	For example, one study showed that when people were allowed the freedom to slightly modify an algorithm, they felt more satisfied with its decisions, more likely to believe it was superior and more likely to use it in the future.

Test 15

PASSAGE 1

The development of the London underground railway

In the first half of the 1800s, London's population grew at an astonishing rate, and the central area became increasingly congested. In addition, the expansion of the overground railway network resulted in more and more passengers arriving in the capital. However, in 1846, a Royal Commission decided that the railways should not be allowed to enter the City, the capital's historic and business centre. The result was that the overground railway stations formed a ring around the City. The area within consisted of poorly built, overcrowded slums and the streets were full of horse-drawn traffic. Crossing the City became a nightmare. It could take an hour and a half to travel 8 km by horse-drawn carriage or bus. Numerous schemes were proposed to resolve these problems, but few succeeded.

Amongst the most vocal advocates for a solution to London's traffic problems was Charles Pearson, who worked as a solicitor for the City of London. He saw both social and economic advantages in building an underground railway that would link the overground railway stations together and clear London slums at the same time. His idea was to relocate the poor workers who lived in the inner-city slums to newly constructed suburbs, and to provide cheap rail travel for them to get to work. Pearson's ideas gained support amongst some businessmen and in 1851 he submitted a plan to Parliament. It was rejected, but coincided with a proposal from another group for an underground connecting line, which Parliament passed.

The two groups merged and established the Metropolitan Railway Company in August 1854. The company's plan was to construct an underground railway line from the Great Western Railway's (GWR) station at Paddington to the edge of the City at Farringdon Street - a distance of almost 5 km. The organisation had difficulty in raising the funding for such a radical and expensive scheme, not least because of the critical articles printed by the press. Objectors argued that the tunnels would collapse under the weight of traffic overhead, buildings would be shaken and passengers would be poisoned by the emissions from the train engines. However, Pearson and his partners persisted.

The GWR, aware that the new line would finally enable them to run trains into the heart of the City, invested almost £250,000 in the scheme. Eventually, over a five-year period, £1m was raised. The chosen route ran beneath existing main roads to minimise the expense of demolishing buildings. Originally scheduled to be completed in 21 months, the construction of the underground line took three years. It was built just below street level using a technique known as 'cut and cover'. A trench about ten metres wide and six metres deep was dug, and the sides temporarily held up with timber beams. Brick walls were then constructed, and finally a brick arch was added to create a tunnel. A two-metre-deep layer of soil was laid on top of the tunnel and the road above rebuilt.

The Metropolitan line, which opened on 10 January 1863, was the world's first underground railway. On its first day, almost 40,000 passengers were carried between Paddington and Farringdon, the journey taking about 18 minutes. By the end of the Metropolitan's first year of operation, 9.5 million journeys had been made.

Even as the Metropolitan began operation, the first extensions to the line were being authorised; these were built over the next five years, reaching Moorgate in the east of London and Hammersmith in the west. The original plan was to pull the trains with steam locomotives, using firebricks in the boilers to provide steam, but these engines were never introduced. Instead, the line used specially designed locomotives that were fitted with water tanks in which steam could be condensed. However, smoke and fumes remained a problem, even though ventilation shafts were added to the tunnels.

Despite the extension of the underground railway, by the 1880s, congestion on London's streets had become worse. The problem was partly that the existing underground lines formed a circuit around the centre of London and extended to the suburbs, but did not cross the capital's centre. The 'cut and cover' method of construction was not an option in this part of the capital. The only alternative was to tunnel deep underground.

Although the technology to create these tunnels existed, steam locomotives could not be used in such a confined space. It wasn't until the development of a reliable electric motor, and a means of transferring power from the generator to a moving train, that the world's first deep-level electric railway, the City & South London, became possible. The line opened in 1890, and ran from the City to Stockwell, south of the River Thames. The trains were made up of three carriages and driven by electric engines. The carriages were narrow and had tiny windows just below the roof because it was thought that passengers would not want to look out at the tunnel walls. The line was not without its problems, mainly caused by an unreliable power supply. Although the City & South London Railway was a great technical achievement, it did not make a profit. Then, in 1900, the Central London Railway, known as the 'Tuppenny Tube', began operation using new electric locomotives. It was very popular and soon afterwards new railways and extensions were added to the growing tube network. By 1907, the heart of today's Underground system was in place.

PART 1 — QUESTIONS

Questions 1-6

Complete the notes below.

Choose **ONE WORD ONLY** from the passage for each answer.

The London underground railway

The problem

- The [1] _____ of London increased rapidly between 1800 and 1850
- The streets were full of horse-drawn vehicles

The proposed solution

- Charles Pearson, a solicitor, suggested building an underground railway
- Building the railway would make it possible to move people to better housing in the [2] _____
- A number of [3] _____ agreed with Pearson's idea
- The company initially had problems getting the [4] _____ needed for the project
- Negative articles about the project appeared in the [5] _____

The construction

- The chosen route did not require many buildings to be pulled down
- The 'cut and cover' method was used to construct the tunnels
- With the completion of the brick arch, the tunnel was covered with [6] _____

Questions 7-13

Do the following statements agree with the information given in the passage?

TRUE *if the statement agrees with the information*

FALSE *if the statement contradicts the information*

NOT GIVEN *if there is no information on this*

[7] Other countries had built underground railways before the Metropolitan line opened.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

8 More people than predicted travelled on the Metropolitan line on the first day.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

9 The use of ventilation shafts failed to prevent pollution in the tunnels.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

10 A different approach from the 'cut and cover' technique was required in London's central area.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

11 The windows on City & South London trains were at eye level.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

12 The City & South London Railway was a financial success.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

13 Trains on the ‘Tuppenny Tube’ nearly always ran on time.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

PASSAGE 2

Stadiums: past, present and future

A

Stadiums are among the oldest forms of urban architecture: vast stadiums where the public could watch sporting events were at the centre of western city life as far back as the ancient Greek and Roman Empires, well before the construction of the great medieval cathedrals and the grand 19th- and 20th-century railway stations which dominated urban skylines in later eras.

Today, however, stadiums are regarded with growing scepticism. Construction costs can soar above £1 billion, and stadiums finished for major events such as the Olympic Games or the FIFA World Cup have notably fallen into disuse and disrepair.

But this need not be the case. History shows that stadiums can drive urban development and adapt to the culture of every age. Even today, architects and planners are finding new ways to adapt the mono-functional sports arenas which became emblematic of modernisation during the 20th century.

B

The amphitheatre* of Arles in southwest France, with a capacity of 25,000 spectators, is perhaps the best example of just how versatile stadiums can be. Built by the Romans in 90 AD, it became a fortress with four towers after the fifth century, and was then transformed into a village containing more than 200 houses. With the growing interest in conservation during the 19th century, it was converted back into an arena for the staging of bullfights, thereby returning the structure to its original use as a venue for public spectacles.

Another example is the imposing arena of Verona in northern Italy, with space for 30,000 spectators, which was built 60 years before the Arles amphitheatre and 40 years before Rome's famous Colosseum. It has endured the centuries and is currently considered one of the world's prime sites for opera, thanks to its outstanding acoustics.

C

The area in the centre of the Italian town of Lucca, known as the Piazza dell'Anfiteatro, is yet another impressive example of an amphitheatre becoming absorbed into the fabric of the city. The site evolved in a similar way to Arles and was progressively filled with buildings from the Middle Ages until the 19th century, variously used as houses, a salt depot and a prison. But rather than reverting to an arena, it became a market square, designed by Romanticist architect Lorenzo Nottolini. Today, the ruins of the amphitheatre remain embedded in the various shops and residences surrounding the public square.

D

There are many similarities between modern stadiums and the ancient amphitheatres intended for games. But some of the flexibility was lost at the beginning of the 20th century, as stadiums

were developed using new products such as steel and reinforced concrete, and made use of bright lights for night-time matches.

Many such stadiums are situated in suburban areas, designed for sporting use only and surrounded by parking lots. These factors mean that they may not be as accessible to the general public, require more energy to run and contribute to urban heat.

E

But many of today's most innovative architects see scope for the stadium to help improve the city. Among the current strategies, two seem to be having particular success: the stadium as an urban hub, and as a power plant.

There's a growing trend for stadiums to be equipped with public spaces and services that serve a function beyond sport, such as hotels, retail outlets, conference centres, restaurants and bars, children's playgrounds and green space. Creating mixed-use developments such as this reinforces compactness and multi-functionality, making more efficient use of land and helping to regenerate urban spaces.

This opens the space up to families and a wider cross-section of society, instead of catering only to sportspeople and supporters. There have been many examples of this in the UK: the mixed-use facilities at Wembley and Old Trafford have become a blueprint for many other stadiums in the world.

F

The phenomenon of stadiums as power stations has arisen from the idea that energy problems can be overcome by integrating interconnected buildings by means of a smart grid, which is an electricity supply network that uses digital communications technology to detect and react to local changes in usage, without significant energy losses. Stadiums are ideal for these purposes, because their canopies have a large surface area for fitting photovoltaic panels and rise high enough (more than 40 metres) to make use of micro wind turbines.

Freiburg Mage Solar Stadium in Germany is the first of a new wave of stadiums as power plants, which also includes the Amsterdam Arena and the Kaohsiung Stadium. The latter, inaugurated in 2009, has 8,844 photovoltaic panels producing up to 1.14 GWh of electricity annually. This reduces the annual output of carbon dioxide by 660 tons and supplies up to 80 percent of the surrounding area when the stadium is not in use. This is proof that a stadium can serve its city, and have a decidedly positive impact in terms of reduction of CO_2 emissions.

G

Sporting arenas have always been central to the life and culture of cities. In every era, the stadium has acquired new value and uses: from military fortress to residential village, public space to theatre and most recently a field for experimentation in advanced engineering. The stadium of today now brings together multiple functions, thus helping cities to create a sustainable future.

amphitheatre: (especially in Greek and Roman architecture) an open circular or oval building with a central space surrounded by tiers of seats for spectators, for the presentation of dramatic or sporting events

PART 2 — QUESTIONS

Questions 14-17

The passage has seven paragraphs, **A-G**.

Which section contains the following information?

NB *You may use any letter more than once.*

	A	B	C	D	E	F	G
14 a mention of negative attitudes towards stadium building projects	○	○	○	○	○	○	○
15 figures demonstrating the environmental benefits of a certain stadium	○	○	○	○	○	○	○
16 examples of the wide range of facilities available at some new stadiums	○	○	○	○	○	○	○
17 reference to the disadvantages of the stadiums built during a certain era	○	○	○	○	○	○	○

Questions 18-22

Complete the summary below.

Choose **ONE WORD ONLY** from the passage for each answer.

Roman amphitheatres

The Roman stadium of Europe have proved very versatile. The amphitheatre of Arles, for example, was converted first into a **18** _____, then into a residential area and finally into an arena where spectators could watch **19** _____. Meanwhile, the arena in Verona, one of the oldest Roman amphitheatres, is famous today as a venue where **20** _____ is performed. The site of Lucca's amphitheatre has also been used for many purposes over the centuries, including the storage of **21** _____. It is now a market square with **22** _____ and homes incorporated into the remains of the Roman amphitheatre.

Questions 23-26

*Choose **TWO** letters, **A-E**.*

23 **24** When comparing twentieth-century stadiums to ancient amphitheatres in Section D, which **TWO** negative features does the writer mention?

- **A** ☐ They are less imaginatively designed.
- **B** ☐ They are less spacious.
- **C** ☐ They are in less convenient locations.
- **D** ☐ They are less versatile.
- **E** ☐ They are made of less durable materials

25 **26** Which **TWO** advantages of modern stadium design does the writer mention?

- **A** ☐ offering improved amenities for the enjoyment of sports events
- **B** ☐ bringing community life back into the city environment
- **C** ☐ facilitating research into solar and wind energy solutions
- **D** ☐ enabling local residents to reduce their consumption of electricity
- **E** ☐ providing a suitable site for the installation of renewable power generators

PASSAGE 3

To catch a king

Anna Keay reviews Charles Spencers hook about the hunt for King Charles II during the English Civil War of the seventeenth century

Charles Spencer's latest book, To Catch a King, tells us the story of the hunt for King Charles II in the six weeks after his resounding defeat at the Battle of Worcester in September 1651. And what a story it is. After his father was executed by the Parliamentarians in 1649, the young Charles II sacrificed one of the very principles his father had died for and did a deal with the Scots, thereby accepting Presbyterianism* as the national religion in return for being crowned King of Scots. His arrival in Edinburgh prompted the English Parliamentary army to invade Scotland in a pre-emptive strike. This was followed by a Scottish invasion of England. The two sides finally faced one another at Worcester in the west of England in 1651. After being comprehensively defeated on the meadows outside the city by the Parliamentarian army, the 21-year-old king found himself the subject of a national manhunt, with a huge sum offered for his capture. Over the following six weeks he managed, through a series of heart-poundingly close escapes, to evade the Parliamentarians before seeking refuge in France. For the next nine years, the penniless and defeated Charles wandered around Europe with only a small group of loyal supporters.

Years later, after his restoration as king, the 50-year-old Charles II requested a meeting with the writer and diarist Samuel Pepys. His intention when asking Pepys to commit his story to paper was to ensure that this most extraordinary episode was never forgotten. Over two three-hour sittings, the king related to him in great detail his personal recollections of the six weeks he had spent as a fugitive. As the king and secretary settled down (a scene that is surely a gift for a future scriptwriter), Charles commenced his story: 'After the battle was so absolutely lost as to be beyond hope of recovery, I began to think of the best way of saving myself.'

One of the joys of Spencer's book, a result not least of its use of Charles II's own narrative as well as those of his supporters, is just how close the reader gets to the action. The day-by-day retelling of the fugitives' doings provides delicious details: the cutting of the king's long hair with agricultural shears, the use of walnut leaves to dye his pale skin, and the day Charles spent lying on a branch of the great oak tree in Boscobel Wood as the Parliamentary soldiers scoured the forest floor below. Spencer draws out both the humour - such as the preposterous refusal of Charles's friend Henry Wilmot to adopt disguise on the grounds that it was beneath his dignity - and the emotional tension when the secret of the king's presence was cautiously revealed to his supporters.

Charles's adventures after losing the Battle of Worcester hide the uncomfortable truth that whilst almost everyone in England had been appalled by the execution of his father, they had not welcomed the arrival of his son with the Scots army, but had instead firmly bolted their doors. This was partly because he rode at the head of what looked like a foreign invasion force and partly because, after almost a decade of civil war, people were desperate to avoid it beginning again. This makes it all the more interesting that Charles II himself loved the story so

much ever after. As well as retelling it to anyone who would listen, causing eye-rolling among courtiers, he set in train a series of initiatives to memorialise it. There was to be a new order of chivalry, the Knights of the Royal Oak. A series of enormous oil paintings depicting the episode were produced, including a two-metre-wide canvas of Boscobel Wood and a set of six similarly enormous paintings of the king on the run. In 1660, Charles II commissioned the artist John Michael Wright to paint a flying squadron of cherubs* carrying an oak tree to the heavens on the ceiling of his bedchamber. It is hard to imagine many other kings marking the lowest point in their life so enthusiastically, or indeed pulling off such an escape in the first place.

Charles Spencer is the perfect person to pass the story on to a new generation. His pacey, readable prose steers deftly clear of modern idioms and elegantly brings to life the details of the great tale. He has even-handed sympathy for both the fugitive king and the fierce republican regime that hunted him, and he succeeds in his desire to explore far more of the background of the story than previous books on the subject have done. Indeed, the opening third of the book is about how Charles II found himself at Worcester in the first place, which for some will be reason alone to read To Catch a King.

The tantalising question left, in the end, is that of what it all meant. Would Charles II have been a different king had these six weeks never happened? The days and nights spent in hiding must have affected him in some way. Did the need to assume disguises, to survive on wit and charm alone, to use trickery and subterfuge to escape from tight corners help form him? This is the one area where the book doesn't quite hit the mark. Instead its depiction of Charles II in his final years as an ineffective, pleasure-loving monarch doesn't do justice to the man (neither is it accurate), or to the complexity of his character. But this one niggle aside, To Catch a King is an excellent read, and those who come to it knowing little of the famous tale will find they have a treat in store.

**Presbyterianism: part of the reformed Protestant religion*

**cherub: an image of angelic children used in paintings*

PART 3 — QUESTIONS

Questions 27-31

*Complete the summary using the list of phrases, **A-J**, below.*

The story behind the hunt for Charles II

Charles II's father was executed by the Parliamentarian forces in 1649. Charles II then formed a **27** _____ with the Scots, and in order to become King of Scots, he abandoned an important **28** _____ that was held by his father and had contributed to his father's death. The opposing sides then met outside Worcester in 1651. The battle led to a **29** _____ for the Parliamentarians and Charles had to flee for his life. A **30** _____ was offered for Charles's capture, but after six weeks spent in hiding, he eventually managed to reach the **31** _____ of continental Europe.

A. **military innovation** B. **large reward** C. **widespread conspiracy**

D. **relative safety** E. **new government** F. **decisive victory**

G. **political debate** H. **strategic alliance** I. **popular solution**

J. **religious conviction**

Questions 32-35

Do the following statements agree with the claims of the writer in the passage?

YES *if the statement agrees with the claims of the writer*

NO *if the statement contradicts the claims of the writer*

NOT GIVEN *if it is impossible to say what the writer thinks about this*

32 Charles chose Pepys for the task because he considered him to be trustworthy.

A ○ YES

B ○ NO

C ○ NOT GIVEN

33 Charles's personal recollection of the escape lacked sufficient detail.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

34 Charles indicated to Pepys that he had planned his escape before the battle.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

35 The inclusion of Charles's account is a positive aspect of the book.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

Questions 36-40

*Choose the correct letter, **A**, **B**, **C**, or **D**.*

36 What is the reviewer's main purpose in the first paragraph?

- **A** ○ to describe what happened during the Battle of Worcester
- **B** ○ to give an account of the circumstances leading to Charles II's escape
- **C** ○ to provide details of the Parliamentarians' political views
- **D** ○ to compare Charles II's beliefs with those of his father

37 Why does the reviewer include examples of the fugitives' behaviour in the third paragraph?

- **A** ○ to explain how close Charles II came to losing his life
- **B** ○ to suggest that Charles II's supporters were badly prepared

C ○ to illustrate how the events of the six weeks are brought to life

D ○ to argue that certain aspects are not as well known as they should be

38 What point does the reviewer make about Charles II in the fourth paragraph?

A ○ He chose to celebrate what was essentially a defeat.

B ○ He misunderstood the motives of his opponents.

C ○ He aimed to restore people's faith in the monarchy.

D ○ He was driven by a desire to be popular.

39 What does the reviewer say about Charles Spencer in the fifth paragraph?

A ○ His decision to write the book comes as a surprise.

B ○ He takes an unbiased approach to the subject matter.

C ○ His descriptions of events would be better if they included more detail.

D ○ He chooses language that is suitable for a twenty-first-century audience.

40 When the reviewer says the book 'doesn't quite hit the mark', she is making the point that

A ○ it overlooks the impact of events on ordinary people.

B ○ it lacks an analysis of prevalent views on monarchy.

C ○ it omits any references to the deceit practised by Charles II during his time in hiding.

D ○ it fails to address whether Charles II's experiences had a lasting influence on him.

Answer Key

#	Answer	Explanation
1	**population**	In the first half of the 1800s, London's population grew at an astonishing rate, and the central area became increasingly congested.
2	**suburbs**	His idea was to relocate the poor workers who lived in the inner-city slums to newly constructed suburbs, and to provide cheap rail travel for them to get to work.
3	**businessmen**	Pearson's ideas gained support amongst some businessmen and in 1851 he submitted a plan to Parliament.
4	**funding**	The organisation had difficulty in raising the funding for such a radical and expensive scheme
5	**press**	not least because of the critical articles printed by the press.
6	**soil**	A two-metre-deep layer of soil was laid on top of the tunnel and the road above rebuilt.
7	**FALSE**	The Metropolitan line, which opened on 10 January 1863, was the world's first underground railway.
8	**NOT GIVEN**	On its first day, almost 40,000 passengers were carried between Paddington and Farringdon, the journey taking about 18 minutes.
9	**TRUE**	However, smoke and fumes remained a problem, even though ventilation shafts were added to the tunnels.
10	**TRUE**	The problem was partly that the existing underground lines formed a circuit around the centre of London and extended to the suburbs, but did not cross the capital's centre. The 'cut and cover' method of construction was not an option in this part of the capital. The only alternative was to tunnel deep underground.
11	**FALSE**	The carriages were narrow and had tiny windows just below the roof because it was thought that passengers would not want to look out at the tunnel walls.
12	**FALSE**	Although the City & South London Railway was a great technical achievement, it did not make a profit.
13	**NOT GIVEN**	Then, in 1900, the Central London Railway, known as the 'Tuppenny Tube', began operation using new electric locomotives. It was very popular and soon afterwards new railways and extensions were added to the growing tube network.

#	Answer	Explanation
14	**A**	Today, however, stadiums are regarded with growing scepticism.
15	**F**	This reduces the annual output of carbon dioxide by 660 tons and supplies up to 80 percent of the surrounding area when the stadium is not in use. This is proof that a stadium can serve its city, and have a decidedly positive impact in terms of reduction of CO2 emissions.
16	**E**	There have been many examples of this in the UK: the mixed-use facilities at Wembley and Old Trafford have become a blueprint for many other stadiums in the world.
17	**D**	But some of the flexibility was lost at the beginning of the 20th century, as stadiums were developed using new products such as steel and reinforced concrete, and made use of bright lights for night-time matches.
18	**fortress**	Built by the Romans in 90 AD, it became a fortress with four towers after the fifth century, and was then transformed into a village containing more than 200 houses.
19	**bullfights**	With the growing interest in conservation during the 19th century, it was converted back into an arena for the staging of bullfights, thereby returning the structure to its original use as a venue for public spectacles.
20	**opera**	Another example is the imposing arena of Verona in northern Italy, with space for 30,000 spectators, which was built 60 years before the Arles amphitheatre and 40 years before Rome's famous Colosseum. It has endured the centuries and is currently considered one of the world's prime sites for opera, thanks to its outstanding acoustics.
21	**salt**	The site evolved in a similar way to Arles and was progressively filled with buildings from the Middle Ages until the 19th century, variously used as houses, a salt depot and a prison
22	**shops**	Today, the ruins of the amphitheatre remain embedded in the various shops and residences surrounding the public square.
23	**C / D**	These factors mean that they may not be as accessible to the general public, require more energy to run and contribute to urban heat. But some of the flexibility was lost at the beginning of the 20th century, as stadiums were developed using new products such as steel and reinforced concrete, and made use of bright lights for night-time matches.
24	**C / D**	These factors mean that they may not be as accessible to the general public, require more energy to run and contribute to urban heat. But some of the flexibility was lost at the beginning of the 20th century, as stadiums were developed using new

#	Answer	Explanation
		products such as steel and reinforced concrete, and made use of bright lights for night-time matches.
25	**B / E**	This opens the space up to families and a wider cross-section of society, instead of catering only to sportspeople and supporters. The phenomenon of stadium as power stations has arisen from the idea that energy problems can be overcome by integrating interconnected buildings by means of a smart grid, which is an electricity supply network that uses digital communications technology to detect and react to local changes in usage, without significant energy losses.
26	**B / E**	This opens the space up to families and a wider cross-section of society, instead of catering only to sportspeople and supporters. The phenomenon of stadium as power stations has arisen from the idea that energy problems can be overcome by integrating interconnected buildings by means of a smart grid, which is an electricity supply network that uses digital communications technology to detect and react to local changes in usage, without significant energy losses.
27	**H**	did a deal with the Scots
28	**J**	the young Charles II sacrificed one of the very principles his father had died for
29	**F**	After being comprehensively defeated on the meadows outside the city by the Parliamentarian army
30	**B**	the 21-year-old king found himself the subject of a national manhunt, with a huge sum offered for his capture
31	**D**	through a series of heart-poundingly close escapes, to evade the Parliamentarians before seeking refuge in France.
32	**NOT GIVEN**	His intention when asking Pepys to commit his story to paper was to ensure that this most extraordinary episode was never forgotten.
33	**NO**	Over two three-hour sittings, the king related to him in great detail his personal recollections of the six weeks he had spent as a fugitive.
34	**NO**	Charles commenced his story: ‘After the battle was so absolutely lost as to be beyond hope of recovery, I began to think of the best way of saving myself.’
35	**YES**	One of the joys of Spencer’s book, a result not least of its use of Charles II’s own narrative as well as those of his supporters, is just how close the reader gets to the action.

#	Answer	Explanation
36	**B**	For the next nine years, the penniless and defeated Charles wandered around Europe with only a small group of loyal supporters.
37	**C**	The day-by-day retelling of the fugitives' doings provides delicious details: the cutting of the king's long hair with agricultural shears, the use of walnut leaves to dye his pale skin, and the day Charles spent lying on a branch of the great oak tree in Boscobel Wood as the Parliamentary soldiers scoured the forest floor below.
38	**A**	This makes it all the more interesting that Charles II himself loved the story so much ever after.
39	**B**	He has even-handed sympathy for both the fugitive king and the fierce republican regime that hunted him, and he succeeds in his desire to explore far more of the background of the story than previous books on the subject have done.
40	**D**	Did the need to assume disguises, to survive on wit and charm alone, to use trickery and subterfuge to escape from tight corners help form him? This is the one area where the book doesn't quite hit the mark.

Test 16

PASSAGE 1

The Dead Sea Scrolls

In late 1946 or early 1947, three Bedouin teenagers were tending their goats and sheep near the ancient settlement of Qumran, located on the northwest shore of the Dead Sea in what is now known as the West Bank. One of these young shepherds tossed a rock into an opening on the side of a cliff and was surprised to hear a shattering sound. He and his companions later entered the cave and stumbled across a collection of large clay jars, seven of which contained scrolls with writing on them. The teenagers took the seven scrolls to a nearby town where they were sold for a small sum to a local antiquities dealer. Word of the find spread, and Bedouins and archaeologists eventually unearthed tens of thousands of additional scroll fragments from 10 nearby caves; together they make up between 800 and 900 manuscripts. It soon became clear that this was one of the greatest archaeological discoveries ever made.

The origin of the Dead Sea Scrolls, which were written around 2,000 years ago between 150 BCE and 70 CE, is still the subject of scholarly debate even today. According to the prevailing theory, they are the work of a population that inhabited the area until Roman troops destroyed the settlement around 70 CE. The area was known as Judea at that time, and the people are thought to have belonged to a group called the Essenes, a devout Jewish sect.

The majority of the texts on the Dead Sea Scrolls are in Hebrew, with some fragments written in an ancient version of its alphabet thought to have fallen out of use in the fifth century BCE. But there are other languages as well. Some scrolls are in Aramaic, the language spoken by many inhabitants of the region from the sixth century BCE to the siege of Jerusalem in 70 CE. In addition, several texts feature translations of the Hebrew Bible into Greek.

The Dead Sea Scrolls include fragments from every book of the Old Testament of the Bible except for the Book of Esther. The only entire book of the Hebrew Bible preserved among the manuscripts from Qumran is Isaiah; this copy, dated to the first century BCE, is considered the earliest biblical manuscript still in existence. Along with biblical texts, the scrolls include documents about sectarian regulations and religious writings that do not appear in the Old Testament.

The writing on the Dead Sea Scrolls is mostly in black or occasionally red ink, and the scrolls themselves are nearly all made of either parchment (animal skin) or an early form of paper called ‘papyrus’. The only exception is the scroll numbered 3Q15, which was created out of a combination of copper and tin. Known as the Copper Scroll, this curious document features letters chiselled onto metal - perhaps, as some have theorized, to better withstand the passage of time. One of the most intriguing manuscripts from Qumran, this is a sort of ancient treasure map that lists dozens of gold and silver caches. Using an unconventional vocabulary and odd spelling, it describes 64 underground hiding places that supposedly contain riches buried for safekeeping. None of these hoards have been recovered, possibly because the Romans pillaged

Judea during the first century CE. According to various hypotheses, the treasure belonged to local people, or was rescued from the Second Temple before its destruction or never existed to begin with.

Some of the Dead Sea Scrolls have been on interesting journeys. In 1948, a Syrian Orthodox archbishop known as Mar Samuel acquired four of the original seven scrolls from a Jerusalem shoemaker and part-time antiquity dealer, paying less than $100 for them. He then travelled to the United States and unsuccessfully offered them to a number of universities, including Yale. Finally, in 1954, he placed an advertisement in the business newspaper The Wall Street Journal - under the category 'Miscellaneous Items for Sale' - that read: 'Biblical Manuscripts dating back to at least 200 B.C. are for sale. This would be an ideal gift to an educational or religious institution by an individual or group.' Fortunately, Israeli archaeologist and statesman Yigael Yadin negotiated their purchase and brought the scrolls back to Jerusalem, where they remain to this day.

In 2017, researchers from the University of Haifa restored and deciphered one of the last untranslated scrolls. The university's Eshbal Ratson and Jonathan Ben-Dov spent one year reassembling the 60 fragments that make up the scroll. Deciphered from a band of coded text on parchment, the find provides insight into the community of people who wrote it and the 364-day calendar they would have used. The scroll names celebrations that indicate shifts in seasons and details two yearly religious events known from another Dead Sea Scroll. Only one more known scroll remains untranslated.

PART 1 — QUESTIONS

Questions 1-5

Complete the notes below.

*Choose **ONE WORD ONLY** from the passage for each answer.*

Write your answers in boxes on your answer sheet.

The Dead Sea Scrolls

Discovery

Qumran, 1946/7

- three Bedouin shepherds in their teens were near an opening on side of cliff
- heard a noise of breaking when one teenager threw a **1** _____
- teenagers went into the **2** _____ and found a number of containers made of **3** _____

The scrolls

- date from between 150 BCE and 70 CE
- thought to have been written by group of people known as the **4** _____
- written mainly in the **5** _____ language
- most are on religious topics, written using ink on parchment or papyrus

Questions 6-13

Do the following statements agree with the information given in the Reading Passage?

In boxes on your answer sheet, write

TRUE *if the statement agrees with the information*

FALSE *if the statement contradicts the information*

NOT GIVEN *if there is no information on this*

6 The Bedouin teenagers who found the scrolls were disappointed by how little money they received for them.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

7 There is agreement among academics about the origin of the Dead Sea Scrolls.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

8 Most of the books of the Bible written on the scrolls are incomplete.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

9 The information on the Copper Scroll is written in an unusual way.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

10 Mar Samuel was given some of the scrolls as a gift.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

11 In the early 1950s, a number of educational establishments in the US were keen to buy scrolls from Mar Samuel.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

12 The scroll that was pieced together in 2017 contains information about annual occasions in the Qumran area 2,000 years ago.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

13 Academics at the University of Haifa are currently researching how to decipher the final scroll.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

PASSAGE 2

A second attempt at domesticating the tomato

A

It took at least 3,000 years for humans to learn how to domesticate the wild tomato and cultivate it for food. Now two separate teams in Brazil and China have done it all over again in less than three years. And they have done it better in some ways, as the re-domesticated tomatoes are more nutritious than the ones we eat at present.

This approach relies on the revolutionary CRISPR genome editing technique, in which changes are deliberately made to the DNA of a living cell, allowing genetic material to be added, removed or altered. The technique could not only improve existing crops, but could also be used to turn thousands of wild plants into useful and appealing foods. In fact, a third team in the US has already begun to do this with a relative of the tomato called the groundcherry.

This fast-track domestication could help make the world's food supply healthier and far more resistant to diseases, such as the rust fungus devastating wheat crops.

'This could transform what we eat,' says Jorg Kudla at the University of Munster in Germany, a member of the Brazilian team. 'There are 50,000 edible plants in the world, but 90 percent of our energy comes from just 15 crops.'

'We can now mimic the known domestication course of major crops like rice, maize, sorghum or others,' says Caixia Gao of the Chinese Academy of Sciences in Beijing. Then we might try to domesticate plants that have never been domesticated.'

B

Wild tomatoes, which are native to the Andes region in South America, produce pea-sized fruits. Over many generations, peoples such as the Aztecs and Incas transformed the plant by selecting and breeding plants with mutations* in their genetic structure, which resulted in desirable traits such as larger fruit.

But every time a single plant with a mutation is taken from a larger population for breeding, much genetic diversity is lost. And sometimes the desirable mutations come with less desirable traits. For instance, the tomato strains grown for supermarkets have lost much of their flavour.

By comparing the genomes of modern plants to those of their wild relatives, biologists have been working out what genetic changes occurred as plants were domesticated. The teams in Brazil and China have now used this knowledge to reintroduce these changes from scratch while maintaining or even enhancing the desirable traits of wild strains.

C

Kudla's team made six changes altogether. For instance, they tripled the size of fruit by editing a gene called FRUIT WEIGHT, and increased the number of tomatoes per truss by editing

another called MULTIFLORA.

While the historical domestication of tomatoes reduced levels of the red pigment lycopene - thought to have potential health benefits - the team in Brazil managed to boost it instead. The wild tomato has twice as much lycopene as cultivated ones; the newly domesticated one has five times as much.

'They are quite tasty,' says Kudla. ‘A little bit strong. And very aromatic.’

The team in China re-domesticated several strains of wild tomatoes with desirable traits lost in domesticated tomatoes. In this way they managed to create a strain resistant to a common disease called bacterial spot race, which can devastate yields. They also created another strain that is more salt tolerant - and has higher levels of vitamin C.

D

Meanwhile, Joyce Van Eck at the Boyce Thompson Institute in New York state decided to use the same approach to domesticate the groundcherry or goldenberry (Physalis pruinosa) for the first time. This fruit looks similar to the closely related Cape gooseberry (Physalis peruviana).

Groundcherries are already sold to a limited extent in the US but they are hard to produce because the plant has a sprawling growth habit and the small fruits fall off the branches when ripe. Van Eck’s team has edited the plants to increase fruit size, make their growth more compact and to stop fruits dropping. ‘There’s potential for this to be a commercial crop,’ says Van Eck. But she adds that taking the work further would be expensive because of the need to pay for a licence for the CRISPR technology and get regulatory approval.

E

This approach could boost the use of many obscure plants, says Jonathan Jones of the Sainsbury Lab in the UK. But it will be hard for new foods to grow so popular with farmers and consumers that they become new staple crops, he thinks.

The three teams already have their eye on other plants that could be ‘catapulted into the mainstream’, including foxtail, oat-grass and cowpea. By choosing wild plants that are drought or heat tolerant, says Gao, we could create crops that will thrive even as the planet warms.

But Kudla didn’t want to reveal which species were in his team’s sights, because CRISPR has made the process so easy. ‘Any one with the right skills could go to their lab and do this.’

**mutations: changes in an organism’s genetic structure that can be passed down to later generations*

PART 2 — QUESTIONS

Questions 14-18

The Reading Passage has five paragraphs, **A-E**.

Which section contains the following information?

*Write the correct letter, **A-E**, in boxes on your answer sheet.*

NB *You may use any letter more than once.*

	A	B	C	D	E
14 a reference to a type of tomato that can resist a dangerous infection.	○	○	○	○	○
15 an explanation of how problems can arise from focusing only on a certain type of tomato plant.	○	○	○	○	○
16 a number of examples of plants that are not cultivated at present but could be useful as food sources.	○	○	○	○	○
17 a comparison between the early domestication of the tomato and more recent research	○	○	○	○	○
18 a personal reaction to the flavour of a tomato that has been genetically edited	○	○	○	○	○

Questions 19-23

Look at the following statements and the list of researchers below.

*Match each statement with the correct researcher, **A-D**.*

*Write the correct letter, **A-D**, in boxes on your answer sheet.*

NB *You may use any letter more than once.*

A Jorg Kudla

B Caixia Gao

C Joyce Van Eck

D Jonathan Jones

	A	B	C	D
19 Domestication of certain plants could allow them to adapt to future environmental challenges.	○	○	○	○
20 The idea of growing and eating unusual plants may not be accepted on a large scale.	○	○	○	○
21 It is not advisable for the future direction of certain research to be made public.	○	○	○	○
22 Present efforts to domesticate one wild fruit are limited by the costs involved.	○	○	○	○
23 Humans only make use of a small proportion of the plant food available on Earth.	○	○	○	○

Questions 24-26

Complete the sentences below.

*Choose **ONE WORD ONLY** from the passage for each answer.*

Write your answers in boxes on your answer sheet.

- An undesirable trait such as loss of **24** _____ may be caused by a mutation in a tomato gene.
- By modifying one gene in a tomato plant, researchers made the tomato three times its original **25** _____
- A type of tomato which was not badly affected by **26** _____, and was rich in vitamin C, was produced by a team of researchers in China.

PASSAGE 3

Insight or evolution?

Two scientists consider the origins of discoveries and other innovative behavior

Scientific discovery is popularly believed to result from the sheer genius of such intellectual stars as naturalist Charles Darwin and theoretical physicist Albert Einstein. Our view of such unique contributions to science often disregards the person's prior experience and the efforts of their lesser-known predecessors. Conventional wisdom also places great weight on insight in promoting breakthrough scientific achievements, as if ideas spontaneously pop into someone's head - fully formed and functional.

There may be some limited truth to this view. However, we believe that it largely misrepresents the real nature of scientific discovery, as well as that of creativity and innovation in many other realms of human endeavor.

Setting aside such greats as Darwin and Einstein - whose monumental contributions are duly celebrated - we suggest that innovation is more a process of trial and error, where two steps forward may sometimes come with one step back, as well as one or more steps to the right or left. This evolutionary view of human innovation undermines the notion of creative genius and recognizes the cumulative nature of scientific progress.

Consider one unheralded scientist: John Nicholson, a mathematical physicist working in the 1910s who postulated the existence of'proto-elements' in outer space. By combining different numbers of weights of these proto-elements' atoms, Nicholson could recover the weights of all the elements in the then-known periodic table. These successes are all the more noteworthy given the fact that Nicholson was wrong about the presence of proto-elements: they do not actually exist. Yet, amid his often fanciful theories and wild speculations, Nicholson also proposed a novel theory about the structure of atoms. Niels Bohr, the Nobel prize-winning father of modern atomic theory, jumped off from this interesting idea to conceive his now-famous model of the atom.

What are we to make of this story? One might simply conclude that science is a collective and cumulative enterprise. That may be true, but there may be a deeper insight to be gleaned. We propose that science is constantly evolving, much as species of animals do. In biological systems, organisms may display new characteristics that result from random genetic mutations. In the same way, random, arbitrary or accidental mutations of ideas may help pave the way for advances in science. If mutations prove beneficial, then the animal or the scientific theory will continue to thrive and perhaps reproduce.

Support for this evolutionary view of behavioral innovation comes from many domains. Consider one example of an influential innovation in US horseracing. The so-called 'acey-deucy' stirrup placement, in which the rider's foot in his left stirrup is placed as much as 25 centimeters lower than the right, is believed to confer important speed advantages when turning on oval tracks. It was developed by a relatively unknown jockey named Jackie Westrope. Had Westrope

conducted methodical investigations or examined extensive film records in a shrewd plan to outrun his rivals? Had he foreseen the speed advantage that would be conferred by riding acey-deucy? No. He suffered a leg injury, which left him unable to fully bend his left knee. His modification just happened to coincide with enhanced left-hand turning performance. This led to the rapid and widespread adoption of riding acey-deucy by many riders, a racing style which continues in today's thoroughbred racing.

Plenty of other stories show that fresh advances can arise from error, misadventure, and also pure serendipity - a happy accident. For example, in the early 1970s, two employees of the company 3M each had a problem: Spencer Silver had a product - a glue which was only slightly sticky - and no use for it, while his colleague Art Fry was trying to figure out how to affix temporary bookmarks in his hymn book without damaging its pages. The solution to both these problems was the invention of the brilliantly simple yet phenomenally successful Post-It note. Such examples give lie to the claim that ingenious, designing minds are responsible for human creativity and invention. Far more banal and mechanical forces may be at work; forces that are fundamentally connected to the laws of science.

The notions of insight, creativity and genius are often invoked, but they remain vague and of doubtful scientific utility, especially when one considers the diverse and enduring contributions of individuals such as Plato, Leonardo da Vinci, Shakespeare, Beethoven, Galileo, Newton, Kepler, Curie, Pasteur and Edison. These notions merely label rather than explain the evolution of human innovations. We need another approach, and there is a promising candidate.

The Law of Effect was advanced by psychologist Edward Thorndike in 1898, some 40 years after Charles Darwin published his groundbreaking work on biological evolution, On the Origin of Species. This simple law holds that organisms tend to repeat successful behaviors and to refrain from performing unsuccessful ones. Just like Darwin's Law of Natural Selection, the Law of Effect involves an entirely mechanical process of variation and selection, without any end objective in sight.

Of course, the origin of human innovation demands much further study. In particular, the provenance of the raw material on which the Law of Effect operates is not as clearly known as that of the genetic mutations on which the Law of Natural Selection operates. The generation of novel ideas and behaviors may not be entirely random, but constrained by prior successes and failures - of the current individual (such as Bohr) or of predecessors (such as Nicholson).

The time seems right for abandoning the naive notions of intelligent design and genius, and for scientifically exploring the true origins of creative behavior.

PART 3 — QUESTIONS

Questions 27-31

*Choose the correct letter, **A**, **B**, **C** or **D**.*

Write the correct letter in boxes on your answer sheet.

27 The purpose of the first paragraph is to

- **A** ○ defend particular ideas.
- **B** ○ compare certain beliefs.
- **C** ○ disprove a widely held view.
- **D** ○ outline a common assumption.

28 What are the writers doing in the second paragraph?

- **A** ○ criticising an opinion
- **B** ○ justifying a standpoint
- **C** ○ explaining an approach
- **D** ○ supporting an argument

29 In the third paragraph, what do the writers suggest about Darwin and Einstein?

- **A** ○ They represent an exception to a general rule.
- **B** ○ Their way of working has been misunderstood.
- **C** ○ They are an ideal which others should aspire to.
- **D** ○ Their achievements deserve greater recognition.

30 John Nicholson is an example of a person whose idea

- **A** ○ established his reputation as an influential scientist.
- **B** ○ was only fully understood at a later point in history.
- **C** ○ laid the foundations for someone else's breakthrough.

D ○ initially met with scepticism from the scientific community.

31 What is the key point of interest about the 'acey-deucy' stirrup placement?

A ○ the simple reason why it was invented

B ○ the enthusiasm with which it was adopted

C ○ the research that went into its development

D ○ the cleverness of the person who first used it

Questions 32-36

Do the following statements agree with the claims of the writer in the Reading Passage?

In boxes on your answer sheet, write

YES *if the statement agrees with the claims of the writer*

NO *if the statement contradicts the claims of the writer*

NOT GIVEN *if it is impossible to say what the writer thinks about this*

32 Acknowledging people such as Plato or da Vinci as geniuses will help us understand the process by which great minds create new ideas.

A ○ YES

B ○ NO

C ○ NOT GIVEN

33 The Law of Effect was discovered at a time when psychologists were seeking a scientific reason why creativity occurs.

A ○ YES

B ○ NO

C ○ NOT GIVEN

34 The Law of Effect states that no planning is involved in the behaviour of organisms.

A ○ YES

B ○ NO

C ○ NOT GIVEN

35 The Law of Effect sets out clear explanations about the sources of new ideas and behaviours.

A ○ YES

B ○ NO

C ○ NOT GIVEN

36 Many scientists are now turning away from the notion of intelligent design and genius.

A ○ YES

B ○ NO

C ○ NOT GIVEN

Questions 37-40

*Complete the summary using the list of words, **A-G**, below.*

*Write the correct letter, **A-G**, in boxes on your answer sheet.*

The origins of creative behaviour

The traditional view of scientific discovery is that breakthroughs happen when a single great mind has sudden **37** _____ . Although this can occur, it is not often the case. Advances are more likely to be the result of a longer process. In some cases, this process involves **38** _____ , such as Nicholson's theory about proto-elements. In others, simple necessity may provoke innovation, as with Westrope's decision to modify the position of his riding stirrups. There is also often an element of **39** _____ , for example, the coincidence of ideas that led to the invention of the Post-It note. With both the Law of Natural Selection and the Law of Effect, there may be no clear **40** _____ involved, but merely a process of variation and selection.

A. **invention** B. **goals** C. **compromise** D. **mistakes** E. **luck**

F. **inspiration** G. **experiments**

Answer Key

#	Answer	Explanation
1	**rock**	One of these young shepherds tossed a rock into an opening on the side of a cliff and was surprised to hear a shattering sound
2	**cave**	He and his companions later entered the cave
3	**clay**	and stumbled across a collection of large clay jars, seven of which contained scrolls with writing on them
4	**Essenes**	The area was known as Judea at that time, and the people are thought to have belonged to a group called the Essenes, a devout Jewish sect
5	**Hebrew**	The majority of the texts on the Dead Sea Scrolls are in Hebrew
6	**NOT GIVEN**	The teenagers took the seven scrolls to a nearby town where they were sold for a small sum to a local antiquities dealer.
7	**FALSE**	The origin of the Dead Sea Scrolls, which were written around 2,000 years ago between 150 BCE and 70 CE, is still the subject of scholarly debate even today.
8	**TRUE**	The Dead Sea Scrolls include fragments from every book of the Old Testament of the Bible except for the Book of Esther.
9	**TRUE**	Using an unconventional vocabulary and odd spelling, it describes 64 underground hiding places that supposedly contain riches buried for safekeeping.
10	**FALSE**	In 1948, a Syrian Orthodox archbishop known as Mar Samuel acquired four of the original seven scrolls from a Jerusalem shoemaker and part-time antiquity dealer, paying less than $100 for them.
11	**FALSE**	He then travelled to the United States and unsuccessfully offered them to a number of universities, including Yale.
12	**TRUE**	In 2017, researchers from the University of Haifa restored and deciphered one of the last untranslated scrolls. The university's Eshbal Ratson and Jonathan Ben-Dov spent one year reassembling the 60 fragments that make up the scroll.
13	**NOT GIVEN**	Only one more known scroll remains untranslated.

#	Answer	Explanation
14	**C**	The team in China re-domesticated several strains of wild tomatoes with desirable traits lost in domesticated tomatoes. In this way they managed to create a strain resistant to a common disease called bacterial spot race, which can devastate yields.
15	**B**	But every time a single plant with a mutation is taken from a larger population for breeding, much genetic diversity is lost. And sometimes the desirable mutations come with less desirable traits.
16	**E**	The three teams already have their eye on other plants that could be ‘catapulted into the mainstream’, including foxtail, oat-grass and cowpea. By choosing wild plants that are drought or heat tolerant, says Gao, we could create crops that will thrive even as the planet warms.
17	**A**	It took at least 3,000 years for humans to learn how to domesticate the wild tomato and cultivate it for food. Now two separate teams in Brazil and China have done it all over again in less than three years. And they have done it better in some ways, as the re-domesticated tomatoes are more nutritious than the ones we eat at present.
18	**C**	‘They are quite tasty,’ says Kudla. ‘A little bit strong. And very aromatic.’
19	**B**	By choosing wild plants that are drought or heat tolerant, says Gao, we could create crops that will thrive even as the planet warms.
20	**D**	This approach could boost the use of many obscure plants, says Jonathan Jones of the Sainsbury Lab in the UK. But it will be hard for new foods to grow so popular with farmers and consumers that they become new staple crops, he thinks.
21	**A**	But Kudla didn’t want to reveal which species were in his team’s sights, because CRISPR has made the process so easy. ‘Any one with the right skills could go to their lab and do this.
22	**C**	‘There’s potential for this to be a commercial crop,’ says Van Eck. But she adds that taking the work further would be expensive because of the need to pay for a licence for the CRISPR technology and get regulatory approval.
23	**A**	This could transform what we eat,’ says Jorg Kudla at the University of Munster in Germany, a member of the Brazilian team. ‘There are 50,000 edible plants in the world, but 90 percent of our energy comes from just 15 crops.’
24	**flavour / flavor**	And sometimes the desirable mutations come with less desirable traits. For instance, the tomato strains grown for supermarkets

#	Answer	Explanation
		have lost much of their flavour.
25	**size**	For instance, they tripled the size of fruit by editing a gene called FRUIT WEIGHT, and increased the number of tomatoes per truss by editing another called MULTIFLORA.
26	**salt**	They also created another strain that is more salt tolerant – and has higher levels of vitamin C.
27	**D**	Scientific discovery is popularly believed to result from the sheer genius of such intellectual stars as naturalist Charles Darwin and theoretical physicist Albert Einstein.
28	**A**	However, we believe that it largely misrepresents the real nature of scientific discovery, as well as that of creativity and innovation in many other realms of human endeavor.
29	**A**	Setting aside such greats as Darwin and Einstein – whose monumental contributions are duly celebrated – we suggest that innovation is more a process of trial and error, where two steps forward may sometimes come with one step back, as well as one or more steps to the right or left.
30	**C**	Niels Bohr, the Nobel prize-winning father of modern atomic theory, jumped off from this interesting idea to conceive his now-famous model of the atom.
31	**A**	No. He suffered a leg injury, which left him unable to fully bend his left knee. His modification just happened to coincide with enhanced left-hand turning performance.
32	**NO**	These notions merely label rather than explain the evolution of human innovations. We need another approach, and there is a promising candidate.
33	**NOT GIVEN**	The Law of Effect was advanced by psychologist Edward Thorndike in 1898, some 40 years after Charles Darwin published his groundbreaking work on biological evolution, On the Origin of Species.
34	**YES**	the Law of Effect involves an entirely mechanical process of variation and selection, without any end objective in sight.
35	**NO**	In particular, the provenance of the raw material on which the Law of Effect operates is not as clearly known as that of the genetic mutations on which the Law of Natural Selection operates.
36	**NOT GIVEN**	The time seems right for abandoning the naive notions of intelligent design and genius, and for scientifically exploring the true origins of creative behavior.

#	Answer	Explanation
37	**F**	Conventional wisdom also places great weight on insight in promoting breakthrough scientific achievements, as if ideas spontaneously pop into someone's head – fully formed and functional.
38	**D**	These successes are all the more noteworthy given the fact that Nicholson was wrong about the presence of proto-elements: they do not actually exist.
39	**E**	Plenty of other stories show that fresh advances can arise from error, misadventure, and also pure serendipity – a happy accident.
40	**B**	the Law of Effect involves an entirely mechanical process of variation and selection, without any end objective in sight.

Test 17

PASSAGE 1

The thylacine

The extinct thylacine, also known as the Tasmanian tiger, was a marsupial* that bore a superficial resemblance to a dog. Its most distinguishing feature was the 13-19 dark brown stripes over its back, beginning at the rear of the body and extending onto the tail. The thylacine's average nose-to-tail length for adult males was 162.6 cm, compared to 153.7 cm for females.

The thylacine appeared to occupy most types of terrain except dense rainforest, with open eucalyptus forest thought to be its prime habitat. In terms of feeding, it was exclusively carnivorous, and its stomach was muscular with an ability to distend so that it could eat large amounts of food at one time, probably an adaptation to compensate for long periods when hunting was unsuccessful and food scarce. The thylacine was not a fast runner and probably caught its prey by exhausting it during a long pursuit. During long-distance chases, thylacines were likely to have relied more on scent than any other sense. They emerged to hunt during the evening, night and early morning and tended to retreat to the hills and forest for shelter during the day. Despite the common name 'tiger', the thylacine had a shy, nervous temperament. Although mainly nocturnal, it was sighted moving during the day and some individuals were even recorded basking in the sun.

The thylacine had an extended breeding season from winter to spring, with indications that some breeding took place throughout the year. The thylacine, like all marsupials, was tiny and hairless when born. Newborns crawled into the pouch on the belly of their mother, and attached themselves to one of the four teats, remaining there for up to three months. When old enough to leave the pouch, the young stayed in a lair such as a deep rocky cave, well-hidden nest or hollow log, whilst the mother hunted.

Approximately 4,000 years ago, the thylacine was widespread throughout New Guinea and most of mainland Australia, as well as the island of Tasmania. The most recent, well-dated occurrence of a thylacine on the mainland is a carbon-dated fossil from Murray Cave in Western Australia, which is around 3,100 years old. Its extinction coincided closely with the arrival of wild dogs called dingoes in Australia and a similar predator in New Guinea. Dingoes never reached Tasmania, and most scientists see this as the main reason for the thylacine's survival there.

The dramatic decline of the thylacine in Tasmania, which began in the 1830s and continued for a century, is generally attributed to the relentless efforts of sheep farmers and bounty hunters** with shotguns. While this determined campaign undoubtedly played a large part, it is likely that various other factors also contributed to the decline and eventual extinction of the species. These include competition with wild dogs introduced by European settlers, loss of habitat along with the disappearance of prey species, and a distemper-like disease which may also have affected the thylacine.

There was only one successful attempt to breed a thylacine in captivity, at Melbourne Zoo in 1899. This was despite the large numbers that went through some zoos, particularly London Zoo and Tasmania's Hobart Zoo. The famous naturalist John Gould foresaw the thylacine's demise when he published his Mammals of Australia between 1848 and 1863, writing, 'The numbers of this singular animal will speedily diminish, extermination will have its full sway, and it will then, like the wolf of England and Scotland, be recorded as an animal of the past.'

However, there seems to have been little public pressure to preserve the thylacine, nor was much concern expressed by scientists at the decline of this species in the decades that followed. A notable exception was T.T. Flynn, Professor of Biology at the University of Tasmania. In 1914, he was sufficiently concerned about the scarcity of the thylacine to suggest that some should be captured and placed on a small island. But it was not until 1929, with the species on the very edge of extinction, that Tasmania's Animals and Birds Protection Board passed a motion protecting thylacines only for the month of December, which was thought to be their prime breeding season. The last known wild thylacine to be killed was shot by a farmer in the north-east of Tasmania in 1930, leaving just captive specimens. Official protection of the species by the Tasmanian government was introduced in July 1936, 59 days before the last known individual died in Hobart Zoo on 7th September, 1936.

There have been numerous expeditions and searches for the thylacine over the years, none of which has produced definitive evidence that thylacines still exist. The species was declared extinct by the Tasmanian government in 1986.

**marsupial: a mammal, such as a kangaroo, whose young are born incompletely developed and are typically carried and suckled in a*

pouch on the mother's belly

***bounty hunters: people who are paid a reward for killing a wild animal*

PART 1 — QUESTIONS

Questions 1-5

Complete the notes below.

*Choose **ONE WORD ONLY** from the passage for each answer.*

Write your answers in boxes on your answer sheet.

The thylacine

Appearance and behaviour

- looked rather like a dog
- had a series of stripes along its body and tail
- ate an entirely **1** _____ diet
- probably depended mainly on **2** _____ when hunting
- young spent first months of life inside its mother's **3** _____

Decline and extinction

- last evidence in mainland Australia is a 3,100-year-old **4** _____
- probably went extinct in mainland Australia due to animals known as dingoes
- reduction in **5** _____ and available sources of food were partly responsible for decline in Tasmania

Questions 6-13

Do the following statements agree with the information given in the Reading Passage?

In boxes on your answer sheet, write

TRUE *if the statement agrees with the information*

FALSE *if the statement contradicts the information*

NOT GIVEN *if there is no information on this*

6 Significant numbers of thylacines were killed by humans from the 1830s onwards.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

7 Several thylacines were born in zoos during the late 1800s.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

8 John Gould's prediction about the thylacine surprised some biologists.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

9 In the early 1900s, many scientists became worried about the possible extinction of the thylacine.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

10 T.T. Flynn's proposal to rehome captive thylacines on an island proved to be impractical.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

11 There were still reasonable numbers of thylacines in existence when a piece of legislation protecting the species during their breeding season was passed.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

12 From 1930 to 1936, the only known living thylacines were all in captivity.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

13 Attempts to find living thylacines are now rarely made.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

PASSAGE 2

Palm oil

A

Palm oil is an edible oil derived from the fruit of the African oil palm tree, and is currently the most consumed vegetable oil in the world. It's almost certainly in the soap we wash with in the morning, the sandwich we have for lunch, and the biscuits we snack on during the day. Why is palm oil so attractive for manufacturers? Primarily because its unique properties - such as remaining solid at room temperature - make it an ideal ingredient for long-term preservation, allowing many packaged foods on supermarket shelves to have 'best before' dates of months, even years, into the future.

B

Many farmers have seized the opportunity to maximise the planting of oil palm trees. Between 1990 and 2012, the global land area devoted to growing oil palm trees grew from 6 to 17 million hectares, now accounting for around ten percent of total cropland in the entire world. From a mere two million tonnes of palm oil being produced annually globally 50 years ago, there are now around 60 million tonnes produced every single year, a figure looking likely to double or even triple by the middle of the century.

C

However, there are multiple reasons why conservationists cite the rapid spread of oil palm plantations as a major concern. There are countless news stories of deforestation, habitat destruction and dwindling species populations, all as a direct result of land clearing to establish oil palm tree monoculture on an industrial scale, particularly in Malaysia and Indonesia. Endangered species - most famously the Sumatran orangutan, but also rhinos, elephants, tigers, and numerous other fauna - have suffered from the unstoppable spread of oil palm plantations.

D

'Palm oil is surely one of the greatest threats to global biodiversity,' declares Dr Farnon Ellwood of the University of the West of England, Bristol. 'Palm oil is replacing rainforest, and rainforest is where all the species are. That's a problem.' This has led to some radical questions among environmentalists, such as whether consumers should try to boycott palm oil entirely.

Meanwhile Bhavani Shankar, Professor at London's School of Oriental and African Studies, argues, 'It's easy to say that palm oil is the enemy and we should be against it. It makes for a more dramatic story, and it's very intuitive. But given the complexity of the argument, I think a much more nuanced story is closer to the truth.'

E

One response to the boycott movement has been the argument for the vital role palm oil plays in lifting many millions of people in the developing world out of poverty. Is it desirable to have palm oil boycotted, replaced, eliminated from the global supply chain, given how many low-income people in developing countries depend on it for their livelihoods? How best to strike a utilitarian balance between these competing factors has become a serious bone of contention.

F

Even the deforestation argument isn't as straightforward as it seems. Oil palm plantations produce at least four and potentially up to ten times more oil per hectare than soybean, rapeseed, sunflower or other competing oils. That immensely high yield - which is predominantly what makes it so profitable - is potentially also an ecological benefit. If ten times more palm oil can be produced from a patch of land than any competing oil, then ten times more land would need to be cleared in order to produce the same volume of oil from that competitor.

As for the question of carbon emissions, the issue really depends on what oil palm trees are replacing. Crops vary in the degree to which they sequester carbon - in other words, the amount of carbon they capture from the atmosphere and store within the plant. The more carbon a plant sequesters, the more it reduces the effect of climate change. As Shankar explains: '[Palm oil production] actually sequesters more carbon in some ways than other alternatives. [...] Of course, if you're cutting down virgin forest it's terrible - that's what's happening in Indonesia and Malaysia, it's been allowed to get out of hand. But if it's replacing rice, for example, it might actually sequester more carbon.'

G

The industry is now regulated by a group called the Roundtable on Sustainable Palm Oil (RSPO), consisting of palm growers, retailers, product manufacturers, and other interested parties. Over the past decade or so, an agreement has gradually been reached regarding standards that producers of palm oil have to meet in order for their product to be regarded as officially 'sustainable'. The RSPO insists upon no virgin forest clearing, transparency and regular assessment of carbon stocks, among other criteria. Only once these requirements are fully satisfied is the oil allowed to be sold as certified sustainable palm oil (CSPO). Recent figures show that the RSPO now certifies around 12 million tonnes of palm oil annually, equivalent to roughly 21 percent of the world's total palm oil production.

H

There is even hope that oil palm plantations might not need to be such sterile monocultures, or 'green deserts', as Ellwood describes them. New research at Ellwood's lab hints at one plant which might make all the difference. The bird's nest fern (Asplenium nidus) grows on trees in an epiphytic fashion (meaning it's dependent on the tree only for support, not for nutrients), and is native to many tropical regions, where as a keystone species it performs a vital ecological role. Ellwood believes that reintroducing the bird's nest fern into oil palm plantations could potentially allow these areas to recover their biodiversity, providing a home for all manner of species, from fungi and bacteria, to invertebrates such as insects, amphibians, reptiles and even mammals.

PART 2 — QUESTIONS

Questions 14-20

The Reading Passage has eight paragraphs, **A-H**.

Which section contains the following information?

*Write the correct letter, **A-H**, in boxes on your answer sheet.*

	A	B	C	D	E	F	G	H
14 examples of a range of potential environmental advantages of oil palm tree cultivation	○	○	○	○	○	○	○	○
15 description of an organisation which controls the environmental impact of palm oil production	○	○	○	○	○	○	○	○
16 examples of the widespread global use of palm oil	○	○	○	○	○	○	○	○
17 reference to a particular species which could benefit the ecosystem of oil palm plantations	○	○	○	○	○	○	○	○
18 figures illustrating the rapid expansion of the palm oil industry	○	○	○	○	○	○	○	○
19 an economic justification for not opposing the palm oil industry	○	○	○	○	○	○	○	○
20 examples of creatures badly affected by the establishment of oil palm plantations	○	○	○	○	○	○	○	○

Questions 21-22

Choose **TWO** letters, **A-E**.

Write the correct letters in boxes on your answer sheet.

21 **22** Which **TWO** statements are made about the Roundtable on Sustainable Palm Oil (RSPO)?

- **A** ☐ Its membership has grown steadily over the course of the last decade.
- **B** ☐ It demands that certified producers be open and honest about their practices.
- **C** ☐ It took several years to establish its set of criteria for sustainable palm oil certification.
- **D** ☐ Its regulations regarding sustainability are stricter than those governing other industries.
- **E** ☐ It was formed at the request of environmentalists concerned about the loss of virgin forests.

Questions 23-26

Complete the sentences below.

*Choose **NO MORE THAN TWO WORDS** from the passage for each answer.*

Write your answers in boxes on your answer sheet.

- One advantage of palm oil for manufacturers is that it stays **23** _____ even when not refrigerated.
- The **24** _____ is the best known of the animals suffering habitat loss as a result of the spread of oil palm plantations.
- As one of its criteria for the certification of sustainable palm oil, the RSPO insists that growers check **25** _____ on a routine basis.
- Ellwood and his researchers are looking into whether the bird's nest fern could restore **26** _____ in areas where oil palm trees are grown.

PASSAGE 3

Building the Skyline: The Birth and Growth of Manhattan's Skyscrapers

Katharine L. Shester reviews a book by Jason Barr about the development of New York City

In Building the Skyline, Jason Barr takes the reader through a detailed history of New York City. The book combines geology, history, economics, and a lot of data to explain why business clusters developed where they did and how the early decisions of workers and firms shaped the skyline we see today. Building the Skyline is organized into two distinct parts. The first is primarily historical and addresses New York's settlement and growth from 1609 to 1900; the second deals primarily with the 20th century and is a compilation of chapters commenting on different aspects of New York's urban development. The tone and organization of the book changes somewhat between the first and second parts, as the latter chapters incorporate aspects of Barr's related research papers.

Barr begins chapter one by taking the reader on a 'helicopter time-machine' ride - giving a fascinating account of how the New York landscape in 1609 might have looked from the sky. He then moves on to a subterranean walking tour of the city, indicating the location of rock and water below the subsoil, before taking the reader back to the surface. His love of the city comes through as he describes various fun facts about the location of the New York residence of early 19th-century vice-president Aaron Burr as well as a number of legends about the city.

Chapters two and three take the reader up to the Civil War (1861-1865), with chapter two focusing on the early development of land and the implementation of a grid system in 1811. Chapter three focuses on land use before the Civil War. Both chapters are informative and well researched and set the stage for the economic analysis that comes later in the book. I would have liked Barr to expand upon his claim that existing tenements* prevented skyscrapers in certain neighborhoods because 'likely no skyscraper developer was interested in performing the necessary "slum clearance'". Later in the book, Barr makes the claim that the depth of bedrock** was not a limiting factor for developers, as foundation costs were a small fraction of the cost of development. At first glance, it is not obvious why slum clearance would be limiting, while more expensive foundations would not.

Chapter four focuses on immigration and the location of neighborhoods and tenements in the late 19th century. Barr identifies four primary immigrant enclaves and analyzes their locations in terms of the amenities available in the area. Most of these enclaves were located on the least valuable land, between the industries located on the waterfront and the wealthy neighborhoods bordering Central Park.

Part two of the book begins with a discussion of the economics of skyscraper height. In chapter five, Barr distinguishes between engineering height, economic height, and developer height — where engineering height is the tallest building that can be safely made at a given time, economic height is the height that is most efficient from society's point of view, and developer

height is the actual height chosen by the developer, who is attempting to maximize return on investment.

Chapter five also has an interesting discussion of the technological advances that led to the construction of skyscrapers. For example, the introduction of iron and steel skeletal frames made thick, load-bearing walls unnecessary, expanding the usable square footage of buildings and increasing the use of windows and availability of natural light. Chapter six then presents data on building height throughout the 20th century and uses regression analysis to 'predict' building construction. While less technical than the research paper on which the chapter is based, it is probably more technical than would be preferred by a general audience.

Chapter seven tackles the 'bedrock myth', the assumption that the absence of bedrock close to the surface between Downtown and Midtown New York is the reason for skyscrapers not being built between the two urban centers. Rather, Barr argues that while deeper bedrock does increase foundation costs, these costs were neither prohibitively high nor were they large compared to the overall cost of building a skyscraper. What I enjoyed the most about this chapter was Barr's discussion of how foundations are actually built. He describes the use of caissons, which enable workers to dig down for considerable distances, often below the water table, until they reach bedrock. Barr's thorough technological history discusses not only how caissons work, but also the dangers involved. While this chapter references empirical research papers, it is a relatively easy read.

Chapters eight and nine focus on the birth of Midtown and the building boom of the 1920s. Chapter eight contains lengthy discussions of urban economic theory that may serve as a distraction to readers primarily interested in New York. However, they would be well-suited for undergraduates learning about the economics of cities. In the next chapter, Barr considers two of the primary explanations for the building boom of the 1920s — the first being exuberance, and the second being financing. He uses data to assess the viability of these two explanations and finds that supply and demand factors explain much of the development of the 1920s; though it enabled the boom, cheap credit was not, he argues, the primary cause.

In the final chapter (chapter 10), Barr discusses another of his empirical papers that estimates Manhattan land values from the mid-19th century to the present day. The data work that went into these estimations is particularly impressive. Toward the end of the chapter, Barr assesses 'whether skyscrapers are a cause or an effect of high land values'. He finds that changes in land values predict future building height, but the reverse is not true. The book ends with an epilogue, in which Barr discusses the impact of climate change on the city and makes policy suggestions for New York going forward.

**a tenement: a multi-occupancy building of any sort, but particularly a run-down apartment building or slum building*

***bedrock: the solid, hard rock in the ground that lies under a loose layer of soil*

PART 3 — QUESTIONS

Questions 27-31

Choose the correct letter, **A**, **B**, **C** or **D**.

Write the correct letter in boxes on your answer sheet.

27 What point does Shester make about Barr's book in the first paragraph?

- **A** ○ It gives a highly original explanation for urban development.
- **B** ○ Elements of Barr's research papers are incorporated throughout the book.
- **C** ○ Other books that are available on the subject have taken a different approach.
- **D** ○ It covers a range of factors that affected the development of New York.

28 How does Shester respond to the information in the book about tenements?

- **A** ○ She describes the reasons for Barr's interest.
- **B** ○ She indicates a potential problem with Barr's analysis.
- **C** ○ She compares Barr's conclusion with that of other writers.
- **D** ○ She provides details about the sources Barr used for his research.

29 What does Shester say about chapter six of the book?

- **A** ○ It contains conflicting data.
- **B** ○ It focuses too much on possible trends.
- **C** ○ It is too specialised for most readers.
- **D** ○ It draws on research that is out of date.

30 What does Shester suggest about the chapters focusing on the 1920s building boom?

- **A** ○ The information should have been organised differently.
- **B** ○ More facts are needed about the way construction was financed.
- **C** ○ The explanation that is given for the building boom is unlikely.

D ◯ Some parts will have limited appeal to certain people.

31 What impresses Shester the most about the chapter on land values?

A ◯ the broad time period that is covered

B ◯ the interesting questions that Barr asks

C ◯ the nature of the research into the topic

D ◯ the recommendations Barr makes for the future

Questions 32-35

Do the following statements agree with the claims of the writer in the Reading Passage?

In boxes on your answer sheet, write

YES *if the statement agrees with the claims of the writer*

NO *if the statement contradicts the claims of the writer*

NOT GIVEN *if it is impossible to say what the writer thinks about this*

32 The description in the first chapter of how New York probably looked from the air in the early 1600s lacks interest.

A ◯ YES

B ◯ NO

C ◯ NOT GIVEN

33 Chapters two and three prepare the reader well for material yet to come.

A ◯ YES

B ◯ NO

C ◯ NOT GIVEN

34 The biggest problem for many nineteenth-century New York immigrant neighbourhoods was a lack of amenities.

A ◯ YES

B ○ NO

C ○ NOT GIVEN

35 In the nineteenth century, New York's immigrant neighbourhoods tended to concentrate around the harbour.

A ○ YES

B ○ NO

C ○ NOT GIVEN

Questions 36-40

*Complete the summary using the list of phrases, **A-J**, below.*

*Write the correct letter, **A-J**, in boxes on your answer sheet.*

The bedrock myth

In chapter seven, Barr indicates how the lack of bedrock close to the surface does not explain why skyscrapers are absent from **36** _____. He points out that although the cost of foundations increases when bedrock is deep below the surface, this cannot be regarded as **37** _____, especially when compared to **38** _____.

A particularly enjoyable part of the chapter was Barr's account of how foundations are built. He describes not only how **39** _____ are made possible by the use of caissons, but he also discusses their **40** _____. The chapter is well researched but relatively easy to understand.

A. **development plans** B. **deep excavations** C. **great distance**

D. **excessive expense** E. **impossible tasks** F. **associated risks**

G. **water level** H. **specific areas** I. **total expenditure**

J. **construction guidelines**

Answer Key

#	Answer	Explanation
1	**carnivorous**	In terms of feeding, it was exclusively carnivorous, and its stomach was muscular with an ability to distend so that it could eat large amounts of food at one time
2	**scent**	During long-distance chases, thylacines were likely to have relied more on scent than any other sense
3	**pouch**	Newborns crawled into the pouch on the belly of their mother, and attached themselves to one of the four teats, remaining there for up to three months
4	**fossil**	The most recent, well-dated occurrence of a thylacine on the mainland is a carbon-dated fossil from Murray Cave in Western Australia, which is around 3,100 years old
5	**habitat**	These include competition with wild dogs introduced by European settlers, loss of habitat along with the disappearance of prey species, and a distemper-like disease which may also have affected the thylacine
6	**TRUE**	The dramatic decline of the thylacine in Tasmania, which began in the 1830s and continued for a century, is generally attributed to the relentless efforts of sheep farmers and bounty hunters
7	**FALSE**	There was only one successful attempt to breed a thylacine in captivity, at Melbourne Zoo in 1899
8	**NOT GIVEN**	The famous naturalist John Gould foresaw the thylacine's demise when he published his Mammals of Australia between 1848 and 1863, writing, 'The numbers of this singular animal will speedily diminish, extermination will have its full sway, and it will then, like the wolf of England and Scotland, be recorded as an animal of the past.'
9	**FALSE**	there seems to have been little public pressure to preserve the thylacine, nor was much concern expressed by scientists at the decline of this species in the decades that followed
10	**NOT GIVEN**	In 1914, he was sufficiently concerned about the scarcity of the thylacine to suggest that some should be captured and placed on a small island

#	Answer	Explanation
11	**FALSE**	But it was not until 1929, with the species on the very edge of extinction, that Tasmania's Animals and Birds Protection Board passed a motion protecting thylacines only for the month of December, which was thought to be their prime breeding season
12	**TRUE**	The last known wild thylacine to be killed was shot by a farmer in the north-east of Tasmania in 1930, leaving just captive specimens. Official protection of the species by the Tasmanian government was introduced in July 1936, 59 days before the last known individual died in Hobart Zoo on 7th September, 1936.
13	**NOT GIVEN**	There have been numerous expeditions and searches for the thylacine over the years, none of which has produced definitive evidence that thylacines still exist. The species was declared extinct by the Tasmanian government in 1986.
14	**F**	Oil palm plantations produce at least four and potentially up to ten times more oil per hectare than soybean, rapeseed, sunflower or other competing oils. That immensely high yield – which is predominantly what makes it so profitable – is potentially also an ecological benefit.
15	**G**	The RSPO insists upon no virgin forest clearing, transparency and regular assessment of carbon stocks, among other criteria. Only once these requirements are fully satisfied is the oil allowed to be sold as certified sustainable palm oil (CSPO).
16	**A**	Palm oil is an edible oil derived from the fruit of the African oil palm tree, and is currently the most consumed vegetable oil in the world.
17	**H**	Ellwood believes that reintroducing the bird's nest fern into oil palm plantations could potentially allow these areas to recover their biodiversity, providing a home for all manner of species, from fungi and bacteria, to invertebrates such as insects, amphibians, reptiles and even mammals.
18	**B**	Between 1990 and 2012, the global land area devoted to growing oil palm trees grew from 6 to 17 million hectares, now accounting for around ten percent of total cropland in the entire world
19	**E**	One response to the boycott movement has been the argument for the vital role palm oil plays in lifting many millions of people in the developing world out of poverty
20	**C**	Endangered species – most famously the Sumatran orangutan, but also rhinos, elephants, tigers, and numerous other fauna – have suffered from the unstoppable spread of oil palm plantations.

#	Answer	Explanation
21	**B / C**	Over the past decade or so The RSPO insists upon no virgin forest clearing, transparency
22	**B / C**	Over the past decade or so The RSPO insists upon no virgin forest clearing, transparency
23	**solid**	Why is palm oil so attractive for manufacturers? Primarily because its unique properties – such as remaining solid at room temperature – make it an ideal ingredient for long-term preservation
24	**orangutan / Sumatran orangutan / orang-utan / Sumatran orang-utan**	Endangered species – most famously the Sumatran orangutan, but also rhinos, elephants, tigers, and numerous other fauna – have suffered from the unstoppable spread of oil palm plantations.
25	**carbon stocks**	The RSPO insists upon no virgin forest clearing, transparency and regular assessment of carbon stocks, among other criteria.
26	**biodiversity**	Ellwood believes that reintroducing the bird's nest fern into oil palm plantations could potentially allow these areas to recover their biodiversity
27	**D**	The first is primarily historical and addresses New York's settlement and growth from 1609 to 1900; the second deals primarily with the 20th century and is a compilation of chapters commenting on different aspects of New York's urban development.
28	**B**	At first glance, it is not obvious why slum clearance would be limiting, while more expensive foundations would not.
29	**C**	While less technical than the research paper on which the chapter is based, it is probably more technical than would be preferred by a general audience.
30	**D**	Chapter eight contains lengthy discussions of urban economic theory that may serve as a distraction to readers primarily interested in New York.
31	**C**	In the final chapter (chapter 10), Barr discusses another of his empirical papers that estimates Manhattan land values from the mid-19th century to the present day. The data work that went into these estimations is particularly impressive.
32	**NO**	Barr begins chapter one by taking the reader on a 'helicopter time-machine' ride – giving a fascinating account of how the New York landscape in 1609 might have looked from the sky.

#	Answer	Explanation
33	**YES**	Both chapters are informative and well researched and set the stage for the economic analysis that comes later in the book.
34	**NOT GIVEN**	Chapter four focuses on immigration and the location of neighborhoods and tenements in the late 19th century. Barr identifies four primary immigrant enclaves and analyzes their locations in terms of the amenities available in the area.
35	**NO**	Most of these enclaves were located on the least valuable land, between the industries located on the waterfront and the wealthy neighborhoods bordering Central Park.
36	**H**	the assumption that the absence of bedrock close to the surface between Downtown and Midtown New York is the reason for skyscrapers not being built between the two urban centers.
37	**D**	Barr argues that while deeper bedrock does increase foundation costs, these costs were neither prohibitively high nor were they large
38	**I**	compared to the overall cost of building a skyscraper
39	**B**	He describes the use of caissons, which enable workers to dig down for considerable distances, often below the water table, until they reach bedrock.
40	**F**	Barr’s thorough technological history discusses not only how caissons work, but also the dangers involved.

Test 18

PASSAGE 1

Bats to the rescue

How Madagascar's bats are helping to save the rainforest

There are few places in the world where relations between agriculture and conservation are more strained. Madagascar's forests are being converted to agricultural land at a rate of one percent every year. Much of this destruction is fuelled by the cultivation of the country's main staple crop: rice. And a key reason for this destruction is that insect pests are destroying vast quantities of what is grown by local subsistence farmers, leading them to clear forest to create new paddy fields. The result is devastating habitat and biodiversity loss on the island, but not all species are suffering. In fact, some of the island's insectivorous bats are currently thriving and this has important implications for farmers and conservationists alike.

Enter University of Cambridge zoologist Ricardo Rocha. He's passionate about conservation, and bats. More specifically, he's interested in how bats are responding to human activity and deforestation in particular. Rocha's new study shows that several species of bats are giving Madagascar's rice farmers a vital pest control service by feasting on plagues of insects. And this, he believes, can ease the financial pressure on farmers to turn forest into fields.

Bats comprise roughly one-fifth of all mammal species in Madagascar and thirty-six recorded bat species are native to the island, making it one of the most important regions for conservation of this animal group anywhere in the world.

Co-leading an international team of scientists, Rocha found that several species of indigenous bats are taking advantage of habitat modification to hunt insects swarming above the country's rice fields. They include the Malagasy mouse-eared bat, Major's long-fingered bat, the Malagasy white-bellied free-tailed bat and Peters' wrinkle-lipped bat.

'These winner species are providing a valuable free service to Madagascar as biological pest suppressors,' says Rocha. 'We found that six species of bat are preying on rice pests, including the paddy swarming caterpillar and grass webworm. The damage which these insects cause puts the island's farmers under huge financial pressure and that encourages deforestation.'

The study, now published in the journal Agriculture, Ecosystems and Environment, set out to investigate the feeding activity of insectivorous bats in the farmland bordering the Ranomafana National Park in the southeast of the country.

Rocha and his team used state-of-the-art ultrasonic recorders to record over a thousand bat 'feeding buzzes' (echolocation sequences used by bats to target their prey) at 54 sites, in order to identify the favourite feeding spots of the bats. They next used DNA barcoding techniques to analyse droppings collected from bats at the different sites.

The recordings revealed that bat activity over rice fields was much higher than it was in continuous forest - seven times higher over rice fields which were on flat ground, and sixteen times higher over fields on the sides of hills - leaving no doubt that the animals are preferentially foraging in these man-made ecosystems. The researchers suggest that the bats favour these fields because lack of water and nutrient run-off make these crops more susceptible to insect pest infestations. DNA analysis showed that all six species of bat had fed on economically important insect pests. While the findings indicated that rice farming benefits most from the bats, the scientists also found indications that the bats were consuming pests of other crops, including the black twig borer (which infests coffee plants), the sugarcane cicada, the macadamia nut-borer, and the sober tabby (a pest of citrus fruits).

'The effectiveness of bats as pest controllers has already been proven in the USA and Catalonia,' said co-author James Kemp, from the University of Lisbon. 'But our study is the first to show this happening in Madagascar, where the stakes for both farmers and conservationists are so high.'

Local people may have a further reason to be grateful to their bats. While the animal is often associated with spreading disease, Rocha and his team found evidence that Malagasy bats feed not just on crop pests but also on mosquitoes - carriers of malaria, Rift Valley fever virus and elephantiasis - as well as blackflies, which spread river blindness.

Rocha points out that the relationship is complicated. When food is scarce, bats become a crucial source of protein for local people. Even the children will hunt them. And as well as roosting in trees, the bats sometimes roost in buildings, but are not welcomed there because they make them unclean. At the same time, however, they are associated with sacred caves and the ancestors, so they can be viewed as beings between worlds, which makes them very significant in the culture of the people. And one potential problem is that while these bats are benefiting from farming, at the same time deforestation is reducing the places where they can roost, which could have long-term effects on their numbers. Rocha says, 'With the right help, we hope that farmers can promote this mutually beneficial relationship by installing bat houses.'

Rocha and his colleagues believe that maximising bat populations can help to boost crop yields and promote sustainable livelihoods. The team is now calling for further research to quantify this contribution. 'I'm very optimistic,' says Rocha. 'If we give nature a hand, we can speed up the process of regeneration.'

PART 1 — QUESTIONS

Questions 1-6

Do the following statements agree with the information given in the Reading Passage?

In boxes on your answer sheet, write

TRUE *if the statement agrees with the information*

FALSE *if the statement contradicts the information*

NOT GIVEN *if there is no information on this*

1 Many Madagascan forests are being destroyed by attacks from insects.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

2 Loss of habitat has badly affected insectivorous bats in Madagascar.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

3 Ricardo Rocha has carried out studies of bats in different parts of the world.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

4 Habitat modification has resulted in indigenous bats in Madagascar becoming useful to farmers.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

5 The Malagasy mouse-eared bat is more common than other indigenous bat species in Madagascar.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

6 Bats may feed on paddy swarming caterpillars and grass webworms.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

Questions 7-13

Complete the table below.

Choose **ONE WORD ONLY** from the passage for each answer.

Write your answers in boxes on your answer sheet.

The study carried out by Rocha's team	
Aim	• to investigate the feeding habits of bats in farmland near the Ranomafana National Park
Method	• ultrasonic recording to identify favourite feeding spots • DNA analysis of bat **7** _____
Findings	• the bats – were most active in rice fields located on hills – ate pests of rice, **8** _____, sugarcane, nuts and fruit

	– prevent the spread of disease by eating **9** _____ and blackflies • local attitudes to bats are mixed: – they provide food rich in **10** _____ – the buildings where they roost become **11** _____ – they play an important role in local **12** _____
Recommendation	• farmers should provide special **13** _____ to support the bat population

PASSAGE 2

Does education fuel economic growth?

A

Over the last decade, a huge database about the lives of southwest German villagers between 1600 and 1900 has been compiled by a team led by Professor Sheilagh Ogilvie at Cambridge University's Faculty of Economics. It includes court records, guild ledgers, parish registers, village censuses, tax lists and - the most recent addition - 9,000 handwritten inventories listing over a million personal possessions belonging to ordinary women and men across three centuries. Ogilvie, who discovered the inventories in the archives of two German communities 30 years ago, believes they may hold the answer to a conundrum that has long puzzled economists: the lack of evidence for a causal link between education and a country's economic growth.

B

As Ogilvie explains, 'Education helps us to work more productively, invent better technology, and earn more ... surely it must be critical for economic growth? But, if you look back through history, there's no evidence that having a high literacy rate made a country industrialise earlier.' Between 1600 and 1900, England had only mediocre literacy rates by European standards, yet its economy grew fast and it was the first country to industrialise. During this period, Germany and Scandinavia had excellent literacy rates, but their economies grew slowly and they industrialised late. 'Modern cross-country analyses have also struggled to find evidence that education causes economic growth, even though there is plenty of evidence that growth increases education,' she adds.

C

In the handwritten inventories that Ogilvie is analysing are the belongings of women and men at marriage, remarriage and death. From badger skins to Bibles, sewing machines to scarlet bodices - the villagers' entire worldly goods are included. Inventories of agricultural equipment and craft tools reveal economic activities; ownership of books and education-related objects like pens and slates suggests how people learned. In addition, the tax lists included in the database record the value of farms, workshops, assets and debts; signatures and people's estimates of their age indicate literacy and numeracy levels; and court records reveal obstacles (such as the activities of the guilds*) that stifled industry.

Previous studies usually had just one way of linking education with economic growth - the presence of schools and printing presses, perhaps, or school enrolment, or the ability to sign names. According to Ogilvie, the database provides multiple indicators for the same individuals, making it possible to analyse links between literacy, numeracy, wealth, and industriousness, for individual women and men over the long term.

D

Ogilvie and her team have been building the vast database of material possessions on top of their full demographic reconstruction of the people who lived in these two German communities. ‘We can follow the same people - and their descendants - across 300 years of educational and economic change,’ she says. Individual lives have unfolded before their eyes. Stories like that of the 24-year-olds Ana Regina and Magdalena Riethmullerin, who were chastised in 1707 for reading books in church instead of listening to the sermon. ‘This tells us they were continuing to develop their reading skills at least a decade after leaving school,’ explains Ogilvie. The database also reveals the case of Juliana Schweickherdt, a 50-year-old spinster living in the small Black Forest community of Wildberg, who was reprimanded in 1752 by the local weavers’ guild for ‘weaving cloth and combing wool, counter to the guild ordinance’. When Juliana continued taking jobs reserved for male guild members, she was summoned before the guild court and told to pay a fine equivalent to one third of a servant’s annual wage. It was a small act of defiance by today’s standards, but it reflects a time when laws in Germany and elsewhere regulated people’s access to labour markets. The dominance of guilds not only prevented people from using their skills, but also held back even the simplest industrial innovation.

E

The data-gathering phase of the project has been completed and now, according to Ogilvie, it is time ‘to ask the big questions’. One way to look at whether education causes economic growth is to ‘hold wealth constant’. This involves following the lives of different people with the same level of wealth over a period of time. If wealth is constant, it is possible to discover whether education was, for example, linked to the cultivation of new crops, or to the adoption of industrial innovations like sewing machines. The team will also ask what aspect of education helped people engage more with productive and innovative activities. Was it, for instance, literacy, numeracy, book ownership, years of schooling? Was there a threshold level - a tipping point - that needed to be reached to affect economic performance?

F

Ogilvie hopes to start finding answers to these questions over the next few years. One thing is already clear, she says: the relationship between education and economic growth is far from straightforward. ‘German-speaking central Europe is an excellent laboratory for testing theories of economic growth,’ she explains. Between 1600 and 1900, literacy rates and book ownership were high and yet the region remained poor. It was also the case that local guilds and merchant associations were extremely powerful and legislated against anything that undermined their monopolies. In villages throughout the region, guilds blocked labour migration and resisted changes that might reduce their influence.

‘Early findings suggest that the potential benefits of education for the economy can be held back by other barriers, and this has implications for today,’ says Ogilvie. ‘Huge amounts are spent improving education in developing countries, but this spending can fail to deliver economic growth if restrictions block people - especially women and the poor - from using their education in economically productive ways. If economic institutions are poorly set up, for instance, education can’t lead to growth.’

guild: an association of artisans or merchants which oversees the practice of their craft or trade in a particular area

PART 2 — QUESTIONS

Questions 14-18

The Reading Passage has six paragraphs, **A-F**.

Which section contains the following information?

*Write the correct letter, **A-F**, in boxes on your answer sheet.*

	A	B	C	D	E	F
14 an explanation of the need for research to focus on individuals with a fairly consistent income	○	○	○	○	○	○
15 examples of the sources the database has been compiled from	○	○	○	○	○	○
16 an account of one individual's refusal to obey an order	○	○	○	○	○	○
17 a reference to a region being particularly suited to research into the link between education and economic growth	○	○	○	○	○	○
18 examples of the items included in a list of personal possessions	○	○	○	○	○	○

Questions 19-22

Complete the summary below.

Choose **ONE WORD** from the passage for each answer.

Write your answers in boxes on your answer sheet.

Demographic reconstruction of two German communities

The database that Ogilvie and her team has compiled sheds light on the lives of a range of individuals, as well as those of their **19** _____, over a 300-year period. For example, Ana Regina and Magdalena Riethmüllerin were reprimanded for reading while they should have been paying attention to a **20** _____.

There was also Juliana Schweickherdt, who came to the notice of the weavers' guild in the year 1752 for breaking guild rules. As a punishment, she was later given a **21** _____. Cases like this illustrate how the guilds could prevent **22** _____ and stop skilled people from working

Questions 23-24

Choose **TWO** letters, **A-E**.

Write the correct letters in boxes on your answer sheet.

23 **24** Which **TWO** of the following statements does the writer make about literacy rates in Section B?

- **A** ☐ Very little research has been done into the link between high literacy rates and improved earnings.
- **B** ☐ Literacy rates in Germany between 1600 and 1900 were very good.
- **C** ☐ There is strong evidence that high literacy rates in the modern world result in economic growth.
- **D** ☐ England is a good example of how high literacy rates helped a country industrialise.
- **E** ☐ Economic growth can help to improve literacy rates.

Questions 25-26

Choose **TWO** letters, **A-E**.

Write the correct letters in boxes on your answer sheet.

25 **26** Which **TWO** of the following statements does the writer make in Section F about guilds in German-speaking Central Europe between 1600 and 1900?

- **A** ☐ They helped young people to learn a skill.
- **B** ☐ They were opposed to people moving to an area for work.
- **C** ☐ They kept better records than guilds in other parts of the world.
- **D** ☐ They opposed practices that threatened their control over a trade.
- **E** ☐ They predominantly consisted of wealthy merchants.

PASSAGE 3

Timur Gareyev - blindfold chess champion

A

Next month, a chess player named Timur Gareyev will take on nearly 50 opponents at once. But that is not the hard part. While his challengers will play the games as normal, Gareyev himself will be blindfolded. Even by world record standards, it sets a high bar for human performance. The 28-year-old already stands out in the rarefied world of blindfold chess. He has a fondness for bright clothes and unusual hairstyles, and he gets his kicks from the adventure sport of BASE jumping. He has already proved himself a strong chess player, too. In a 10-hour chess marathon in 2013, Gareyev played 33 games in his head simultaneously. He won 29 and lost none. The skill has become his brand: he calls himself the Blindfold King.

B

But Gareyev's prowess has drawn interest from beyond the chess-playing community. In the hope of understanding how he and others like him can perform such mental feats, researchers at the University of California in Los Angeles (UCLA) called him in for tests. They now have their first results. The ability to play a game of chess with your eyes closed is not a far reach for most accomplished players,' said Jesse Rissman, who runs a memory lab at UCLA. 'But the thing that's so remarkable about Timur and a few other individuals is the number of games they can keep active at once. To me it is simply astonishing.'

C

Gareyev learned to play chess in his native Uzbekistan when he was six years old. Tutored by his grandfather, he entered his first tournament aged eight and soon became obsessed with competitions. At 16, he was crowned Asia's youngest ever chess grandmaster. He moved to the US soon after, and as a student helped his university win its first national chess championship. In 2013, Gareyev was ranked the third best chess player in the US.

D

To the uninitiated, blindfold chess seems to call for superhuman skill. But displays of the feat go back centuries. The first recorded game in Europe was played in 13th-century Florence. In 1947, the Argentinian grandmaster Miguel Najdorf played 45 simultaneous games in his mind, winning 39 in the 24-hour session.

E

Accomplished players can develop the skill of playing blind even without realising it. The nature of the game is to run through possible moves in the mind to see how they play out. From this, regular players develop a memory for the patterns the pieces make, the defences and attacks. 'You recreate it in your mind,' said Gareyev. 'A lot of players are capable of doing what I'm doing.' The real mental challenge comes from playing multiple games at once in the head. Not

only must the positions of each piece on every board be memorised, they must be recalled faithfully when needed, updated with each player's moves, and then reliably stored again, so the brain can move on to the next board. First moves can be tough to remember because they are fairly uninteresting. But the ends of games are taxing too, as exhaustion sets in. When Gareyev is tired, his recall can get patchy. He sometimes makes moves based on only a fragmented memory of the pieces' positions.

F

The scientists first had Gareyev perform some standard memory tests. These assessed his ability to hold numbers, pictures and words in mind. One classic test measures how many numbers a person can repeat, both forwards and backwards, soon after hearing them. Most people manage about seven. 'He was not exceptional on any of these standard tests,' said Rissman. 'We didn't find anything other than playing chess that he seems to be supremely gifted at.' But next came the brain scans. With Gareyev lying down in the machine, Rissman looked at how well connected the various regions of the chess player's brain were. Though the results are tentative and as yet unpublished, the scans found much greater than average communication between parts of Gareyev's brain that make up what is called the frontoparietal control network. Of 63 people scanned alongside the chess player, only one or two scored more highly on the measure. 'You use this network in almost any complex task. It helps you to allocate attention, keep rules in mind, and work out whether you should be responding or not,' said Rissman.

G

It was not the only hint of something special in Gareyev's brain. The scans also suggest that Gareyev's visual network is more highly connected to other brain parts than usual. Initial results suggest that the areas of his brain that process visual images - such as chess boards - may have stronger links to other brain regions, and so be more powerful than normal. While the analyses are not finalised yet, they may hold the first clues to Gareyev's extraordinary ability.

H

For the world record attempt, Gareyev hopes to play 47 blindfold games at once in about 16 hours. He will need to win 80% to claim the title. 'I don't worry too much about the winning percentage, that's never been an issue for me,' he said. 'The most important part of blindfold chess for me is that I have found the one thing that I can fully dedicate myself to. I miss having an obsession.'

PART 3 — QUESTIONS

Questions 27-32

The Reading Passage has eight paragraphs, **A-H**.

Which paragraph contains the following information?

*Write the correct letter, **A-H**, in boxes on your answer sheet.*

NB *You may use any letter more than once.*

27 a reference to earlier examples of blindfold chess _____

28 an outline of what blindfold chess involves _____

29 a claim that Gareyev's skill is limited to chess _____

30 why Gareyev's skill is of interest to scientists _____

31 an outline of Gareyev's priorities _____

32 a reason why the last part of a game may be difficult _____

Questions 33-36

Do the following statements agree with the information given in the Reading Passage?

In boxes on your answer sheet, write

TRUE *if the statement agrees with the information*

FALSE *if the statement contradicts the information*

NOT GIVEN *if there is no information on this*

33 In the forthcoming games, all the participants will be blindfolded.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

34 Gareyev has won competitions in BASE jumping.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

35 UCLA is the first university to carry out research into blindfold chess players.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

36 Good chess players are likely to be able to play blindfold chess.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

Questions 37-40

Complete the summary below

Choose **ONE WORD ONLY** from the passage for each answer.

Write the correct letter in boxes on your answer sheet.

How the research was carried out

The researchers started by testing Gareyev's **37** _____; for example, he was required to recall a string of **38** _____ in order and also in reverse order. Although his performance was normal, scans showed an unusual amount of **39** _____ within the areas of Gareyev's brain that are concerned with directing attention. In addition, the scans raised the possibility of unusual strength in the parts of his brain that deal with **40** _____ input.

Answer Key

#	Answer	Explanation
1	**FALSE**	Madagascar's forests are being converted to agricultural land at a rate of one percent every year. Much of this destruction is fuelled by the cultivation of the country's main staple crop: rice.
2	**FALSE**	The result is devastating habitat and biodiversity loss on the island, but not all species are suffering. In fact, some of the island's insectivorous bats are currently thriving and this has important implications for farmers and conservationists alike.
3	**NOT GIVEN**	Rocha's new study shows that several species of bats are giving Madagascar's rice farmers a vital pest control service by feasting on plagues of insects.
4	**TRUE**	Rocha found that several species of indigenous bats are taking advantage of habitat modification to hunt insects swarming above the country's rice fields.
5	**NOT GIVEN**	They include the Malagasy mouse-eared bat, Major's long-fingered bat, the Malagasy white-bellied free-tailed bat and Peters' wrinkle-lipped bat.
6	**TRUE**	We found that six species of bat are preying on rice pests, including the paddy swarming caterpillar and grass webworm.
7	**droppings**	They next used DNA barcoding techniques to analyse droppings collected from bats at the different sites.
8	**coffee**	the scientists also found indications that the bats were consuming pests of other crops, including the black twig borer (which infests coffee plants), the sugarcane cicada, the macadamia nut-borer, and the sober tabby (a pest of citrus fruits).
9	**mosquitoes / mosquitos**	Rocha and his team found evidence that Malagasy bats feed not just on crop pests but also on mosquitoes – carriers of malaria, Rift Valley fever virus and elephantiasis – as well as blackflies, which spread river blindness.
10	**protein**	When food is scarce, bats become a crucial source of protein for local people.
11	**unclean**	And as well as roosting in trees, the bats sometimes roost in buildings, but are not welcomed there because they make them unclean.

#	Answer	Explanation
12	**culture**	At the same time, however, they are associated with sacred caves and the ancestors, so they can be viewed as beings between worlds, which makes them very significant in the culture of the people.
13	**houses**	Rocha says, 'With the right help, we hope that farmers can promote this mutually beneficial relationship by installing bat houses.
14	**E**	according to Ogilvie, it is time 'to ask the big questions'. One way to look at whether education causes economic growth is to 'hold wealth constant'. This involves following the lives of different people with the same level of wealth over a period of time.
15	**A**	Over the last decade, a huge database about the lives of southwest German villagers between 1600 and 1900 has been compiled by a team led by Professor Sheilagh Ogilvie at Cambridge University's Faculty of Economics.
16	**D**	The database also reveals the case of Juliana Schweickherdt, a 50-year-old spinster living in the small Black Forest community of Wildberg, who was reprimanded in 1752 by the local weavers' guild for 'weaving cloth and combing wool, counter to the guide ordinance'.
17	**F**	German-speaking central Europe is an excellent laboratory for testing theories of economic growth
18	**C**	In the handwritten inventories that Ogilvie is analysing are the belongings of women and men at marriage, remarriage and death. From badger skins to Bibles, sewing machines to scarlet bodices – the villagers' entire worldly goods are included.
19	**descendants**	We can follow the same people – and their descendants – across 300 years of educational and economic change
20	**sermon**	Stories like that of the 24-year-olds Ana Regina and Magdalena Riethmullerin, who were chastised in 1707 for reading books in church instead of listening to the sermon.
21	**fine**	When Juliana continued taking jobs reserved for male guild members, she was summoned before the guild court and told to pay a fine equivalent to one third of a servant's annual wage.
22	**innovation**	The dominance of guilds not only prevented people from using their skills, but also held back even the simplest industrial innovation.
23	**B / E**	Between 1600 and 1900, England had only mediocre literacy rates by European standards, yet its economy grew fast and it was the first country to industrialise. During this period, Germany and

#	Answer	Explanation
		Scandinavia had excellent literacy rates, but their economies grew slowly and they industrialised late. Modern cross-country analyses have also struggled to find evidence that education causes economic growth, even though there is plenty of evidence that growth increases education
24	**B / E**	Between 1600 and 1900, England had only mediocre literacy rates by European standards, yet its economy grew fast and it was the first country to industrialise. During this period, Germany and Scandinavia had excellent literacy rates, but their economies grew slowly and they industrialised late. Modern cross-country analyses have also struggled to find evidence that education causes economic growth, even though there is plenty of evidence that growth increases education
25	**B / D**	In villages throughout the region, guilds blocked labour migration resisted changes that might reduce their influence
26	**B / D**	In villages throughout the region, guilds blocked labour migration resisted changes that might reduce their influence
27	**D**	The first recorded game in Europe was played in 13th-century Florence. In 1947, the Argentinian grandmaster Miguel Najdorf played 45 simultaneous games in his mind, winning 39 in the 24-hour session.
28	**E**	The nature of the game is to run through possible moves in the mind to see how they play out.
29	**F**	‘He was not exceptional on any of these standard tests,’ said Rissman. ‘We didn’t find anything other than playing chess that he seems to be supremely gifted at.’
30	**B**	But the thing that’s so remarkable about Timur and a few other individuals is the number of games they can keep active at once. To me it is simply astonishing.
31	**H**	The most important part of blindfold chess for me is that I have found the one thing that I can fully dedicate myself to. I miss having an obsession.
32	**E**	But the ends of games are taxing too, as exhaustion sets in. When Gareyev is tired, his recall can get patchy. He sometimes makes moves based on only a fragmented memory of the pieces’ positions.
33	**FALSE**	While his challengers will play the games as normal, Gareyev himself will be blindfolded.
34	**NOT GIVEN**	He has a fondness for bright clothes and unusual hairstyles, and he gets his kicks from the adventure sport of BASE jumping.

#	Answer	Explanation
35	**NOT GIVEN**	researchers at the University of California in Los Angeles (UCLA) called him in for tests. They now have their first results.
36	**TRUE**	Accomplished players can develop the skill of playing blind even without realising it.
37	**memory**	The scientists first had Gareyev perform some standard memory tests.
38	**numbers**	One classic test measures how many numbers a person can repeat, both forwards and backwards, soon after hearing them.
39	**communication**	Though the results are tentative and as yet unpublished, the scans found much greater than average communication between parts of Gareyev's brain that make up what is called the frontoparietal control network.
40	**visual**	The scans also suggest that Gareyev's visual network is more highly connected to other brain parts than usual.

Test 19

PASSAGE 1

Urban farming

In Paris, urban farmers are trying a soil-free approach to agriculture that uses less space and fewer resources. Could it help cities face the threats to our food supplies?

On top of a striking new exhibition hall in southern Paris, the world's largest urban rooftop farm has started to bear fruit. Strawberries that are small, intensely flavoured and resplendently red sprout abundantly from large plastic tubes. Peer inside and you see the tubes are completely hollow, the roots of dozens of strawberry plants dangling down inside them. From identical vertical tubes nearby burst row upon row of lettuces; near those are aromatic herbs, such as basil, sage and peppermint. Opposite, in narrow, horizontal trays packed not with soil but with coconut fibre, grow cherry tomatoes, shiny aubergines and brightly coloured chards.

Pascal Hardy, an engineer and sustainable development consultant, began experimenting with vertical farming and aeroponic growing towers- as the soil-free plastic tubes are known – on his Paris apartment block roof five years ago. The urban rooftop space above the exhibition hall is somewhat bigger: 14,000 square metres and almost exactly the size of a couple of football pitches. Already, the team of young urban farmers who tend it have picked, in one day, 3,000 lettuces and 150 punnets of strawberries. When the remaining two thirds of the vast open area are in production, 20 staff will harvest up to 1,000 kg of perhaps 35 different varieties of fruit and vegetables, every day. 'We're not ever, obviously, going to feed the whole city this way,' cautions Hardy. 'In the urban environment you're working with very significant practical constraints, clearly, on what you can do and where. But if enough unused space can be developed like this, there's no reason why you shouldn't eventually target maybe between 5% and 10% of consumption.'

Perhaps most significantly, however, this is a real-life showcase for the work of Hardy's flourishing urban agriculture consultancy, Agripolis, which is currently fielding enquiries from around the world to design, build and equip a new breed of soil-free inner-city farm. 'The method's advantages are many,' he says. 'First, I don't much like the fact that most of the fruit and vegetables we eat have been treated with something like 17 different pesticides, or that the intensive farming techniques that produced them are such huge generators of greenhouse gases. I don't much like the fact, either, that they've travelled an average of 2,000 refrigerated kilometres to my plate, that their quality is so poor, because the varieties are selected for their capacity to withstand such substantial journeys, or that 80% of the price I pay goes to wholesalers and transport companies, not the producers.'

Produce grown using this soil-free method, on the other hand- which relies solely on a small quantity of water, enriched with organic nutrients, pumped around a closed circuit of pipes, towers and trays- is 'produced up here, and sold locally, just down there. It barely travels at all,' Hardy says. 'You can select crop varieties for their flavour, not their resistance to the transport

and storage chain, and you can pick them when they're really at their best, and not before.' No soil is exhausted, and the water that gently showers the plants' roots every 12 minutes is recycled, so the method uses 90% less water than a classic intensive farm for the same yield.

Urban farming is not, of course, a new phenomenon. Inner-city agriculture is booming from Shanghai to Detroit and Tokyo to Bangkok. Strawberries are being grown in disused shipping containers, mushrooms in underground carparks. Aeroponic farming, he says, is 'virtuous'. The equipment weighs little, can be installed on almost any flat surface and is cheap to buy: roughly €100 to €150 per square metre. It is cheap to run, too, consuming a tiny fraction of the electricity used by some techniques.

Produce grown this way typically sells at prices that, while generally higher than those of classic intensive agriculture, are lower than soil-based organic growers. There are limits to what farmers can grow this way, of course, and much of the produce is suited to the summer months. 'Root vegetables we cannot do, at least not yet,' he says. 'Radishes are OK, but carrots, potatoes, that kind of thing- the roots are simply too long. Fruit trees are obviously not an option. And beans tend to take up a lot of space for not much return.' Nevertheless, urban farming of the kind being practised in Paris is one part of a bigger and fast-changing picture that is bringing food production closer to our lives.

PART 1 — QUESTIONS

Questions 1-3

Complete the sentences below.

*Choose **NO MORE THAN TWO WORDS ANDIOR A NUMBER** from the passage for each answer.*

Write your answers in boxes on your answer sheet.

Urban farming in Paris

- Vertical tubes are used to grow strawberries, **1** _____ and herbs.
- There will eventually be a daily harvest of as much as **2** _____ in weight of fruit and vegetables.
- It may be possible that the farm's produce will account for as much as 10% of the city's **3** _____ overall.

Questions 4-7

Complete the table below.

*Choose **ONE WORD ONLY** from the passage for each answer.*

Write your answers in boxes on your answer sheet.

Intensive farming versus aeroponic urban farming

	Growth	Selection	Sale
Intensive farming	• wide range of **4** _____ used • techniques pollute air	• quality not good • varieties of fruit and vegetables chosen that can survive long **5** _____	• **6** _____ receive very little of overall income

Aeroponic urban farming	• no soil used • nutrients added to water, which is recycled	• produce chosen because of its **7** _____	

Questions 8-13

Do the following statements agree with the information given in the Reading Passage?

In boxes on your answer sheet, write

TRUE *if the statement agrees with the information*

FALSE *if the statement contradicts the information*

NOT GIVEN *if there is no information on this*

8 Urban farming can take place above or below ground.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

9 Some of the equipment used in aeroponic farming can be made by hand.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

10 Urban farming relies more on electricity than some other types of farming.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

11 Fruit and vegetables grown on an aeroponic urban farm are cheaper than traditionally grown organic produce.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

12 Most produce can be grown on an aeroponic urban farm at any time of the year.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

13 Beans take longer to grow on an urban farm than other vegetables.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

PASSAGE 2

Forest management in Pennsylvania, USA

How managing low-quality wood (also known as low-use wood) for bioenergy can encourage sustainable forest management

A

A tree's 'value' depends on several factors including its species, size, form, condition, quality, function, and accessibility, and depends on the management goals for a given forest. The same tree can be valued very differently by each person who looks at it. A large, straight black cherry tree has high value as timber to be cut into logs or made into furniture, but for a landowner more interested in wildlife habitat, the real value of that stem (or trunk) may be the food it provides to animals. Likewise, if the tree suffers from black knot disease, its value for timber decreases, but to a woodworker interested in making bowls, it brings an opportunity for a unique and beautiful piece of art.

B

In the past, Pennsylvania landowners were solely interested in the value of their trees as high-quality timber. The norm was to remove the stems of highest quality and leave behind poorly formed trees that were not as well suited to the site where they grew. This practice, called 'high-grading', has left a legacy of 'low-use wood' in the forests. Some people even call these 'junk trees', and they are abundant in Pennsylvania. These trees have lower economic value for traditional timber markets, compete for growth with higher-value trees, shade out desirable regeneration and decrease the health of a stand leaving it more vulnerable to poor weather and disease. Management that specifically targets low-use wood can help landowners manage these forest health issues, and wood energy markets help promote this.

C

Wood energy markets can accept less expensive wood material of lower quality than would be suitable for traditional timber markets. Most wood used for energy in Pennsylvania is used to produce heat or electricity through combustion. Many schools and hospitals use wood boiler systems to heat and power their facilities, many homes are primarily heated with wood, and some coal plants incorporate wood into their coal streams to produce electricity. Wood can also be gasified for electrical generation and can even be made into liquid fuels like ethanol and gasoline for lorries and cars. All these products are made primarily from low-use wood. Several tree- and plant-cutting approaches, which could greatly improve the long-term quality of a forest, focus strongly or solely on the use of wood for those markets.

D

One such approach is called a Timber Stand Improvement (TSI) Cut. In a TSI Cut, really poor-quality tree and plant material is cut down to allow more space, light, and other resources to the highest-valued stems that remain. Removing invasive plants might be another primary goal of a

TSI Cut. The stems that are left behind might then grow in size and develop more foliage and larger crowns or tops that produce more coverage for wildlife; they have a better chance to regenerate in a less crowded environment. TSI Cuts can be tailored to one farmer's specific management goals for his or her land.

E

Another approach that might yield a high amount of low-use wood is a Salvage Cut. With the many pests and pathogens visiting forests including hemlock wooly adelgid, Asian longhomed beetle, emerald ash borer, and gypsy moth, to name just a few, it is important to remember that those working in the forests can help ease these issues through cutting procedures. These types of cut reduce the number of sick trees and seek to manage the future spread of a pest problem. They leave vigorous trees that have stayed healthy enough to survive the outbreak.

F

A Shelterwood Cut, which only takes place in a mature forest that has already been thinned several times, involves removing all the mature trees when other seedlings have become established. This then allows the forester to decide which tree species are regenerated. It leaves a young forest where all trees are at a similar point in their growth. It can also be used to develop a two-tier forest so that there are two harvests and the money that comes in is spread out over a decade or more.

G

Thinnings and dense and dead wood removal for fire prevention also center on the production of low-use wood. However, it is important to remember that some retention of what many would classify as low-use wood is very important. The tops of trees that have been cut down should be left on the site so that their nutrients cycle back into the soil. In addition, trees with many cavities are extremely important habitats for insect predators like woodpeckers, bats and small mammals. They help control problem insects and increase the health and resilience of the forest. It is also important to remember that not all small trees are low-use. For example, many species like hawthorn provide food for wildlife. Finally, rare species of trees in a forest should also stay behind as they add to its structural diversity.

———

*Stand – An area covered with trees that have common features (e.g. size)

PART 2 — QUESTIONS

Questions 14-18

The Reading Passage has seven paragraphs, **A-G**.

Which paragraph contains the following information?

*Write the correct letter, **A-G**, in boxes on your answer sheet.*

NB *You may use any letter more than once.*

	A	B	C	D	E	F	G
14 bad outcomes for a forest when people focus only on its financial reward	○	○	○	○	○	○	○
15 reference to the aspects of any tree that contribute to its worth	○	○	○	○	○	○	○
16 mention of the potential use of wood to help run vehicles	○	○	○	○	○	○	○
17 examples of insects that attack trees	○	○	○	○	○	○	○
18 aan alternative name for trees that produce low-use wood	○	○	○	○	○	○	○

Questions 19-21

Look at the following purposes and the list of timber cuts below.

*Match each purpose with the correct timber cut, **A**, **B** or **C**.*

*Write the correct letter, **A**, **B** or **C**, in boxes on your answer sheet.*

NB *You may use any letter more than once.*

List of Timber Cuts

A a TSI Cut

B a Salvage Cut

C a Shelterwood Cut

	A	B	C
19 to remove trees that are diseased	○	○	○
20 to generate income across a number of years	○	○	○
21 to create a forest whose trees are close in age	○	○	○

Questions 22-26

Complete the sentences below.

*Choose **ONE WORD ONLY** from the passage for each answer.*

Write your answers in boxes on your answer sheet.

- Some dead wood is removed to avoid the possibility of **22** _____.
- The **23** _____ from the tops of cut trees can help improve soil quality.
- Some damaged trees should be left, as their **24** _____ provide habitats for a range of creatures.
- Some trees that are small, such as **25** _____, are a source of food for animals and insects.
- Any trees that are **26** _____ should be left to grow, as they add to the variety of species in the forest.

PASSAGE 3

Conquering Earth's space junk problem

Satellites, rocket shards and collision debris are creating major traffic risks in orbit around the planet. Researchers are working to reduce these threats

A

Last year, commercial companies, military and civil departments and amateurs sent more than 400 satellites into orbit, over four times the yearly average in the previous decade. Numbers could rise even more sharply if leading space companies follow through on plans to deploy hundreds to thousands of large constellations of satellites to space in the next few years.

All that traffic can lead to disaster. Ten years ago, a US commercial Iridium satellite smashed into an inactive Russian communications satellite called Cosmos-2251, creating thousands of new pieces of space shrapnel that now threaten other satellites in low Earth orbit – the zone stretching up to 2,000 kilometres in altitude. Altogether, there are roughly 20,000 human-made objects in orbit, from working satellites to small rocket pieces. And satellite operators can't steer away from every potential crash, because each move consumes time and fuel that could otherwise be used for the spacecraft's main job.

B

Concern about space junk goes back to the beginning of the satellite era, but the number of objects in orbit is rising so rapidly that researchers are investigating new ways of attacking the problem. Several teams are trying to improve methods for assessing what is in orbit, so that satellite operators can work more efficiently in ever-more-crowded space. Some researchers are now starting to compile a massive data set that includes the best possible information on where everything is in orbit. Others are developing taxonomies of space – working on measuring properties such as the shape and size of an object, so that satellite operators know how much to worry about what's coming their way.

The alternative, many say, is unthinkable. Just a few uncontrolled space crashes could generate enough debris to set off a runaway cascade of fragments, rendering near-Earth space unusable. 'If we go on like this, we will reach a point of no return,' says Carolin Frueh, an astrodynamical researcher at Purdue University in West Lafayette, Indiana.

C

Even as our ability to monitor space objects increases, so too does the total number of items in orbit. That means companies, governments and other players in space are collaborating in new ways to avoid a shared threat. International groups such as the Inter-Agency Space Debris Coordination Committee have developed guidelines on space sustainability. Those include inactivating satellites at the end of their useful life by venting pressurised materials or leftover fuel that might lead to explosions. The intergovernmental groups also advise lowering satellites deep enough into the atmosphere that they will burn up or disintegrate within 25 years. But so

far, only about half of all missions have abided by this 25-year goal, says Holger Krag, head of the European Space Agency's space-debris office in Darmstadt, Germany. Operators of the planned large constellations of satellites say they will be responsible stewards in their enterprises in space, but Krag worries that problems could increase, despite their best intentions. 'What happens to those that fail or go bankrupt?' he asks. They are probably not going to spend money to remove their satellites from space.'

D

In theory, given the vastness of space, satellite operators should have plenty of room for all these missions to fly safely without ever nearing another object. So some scientists are tackling the problem of space junk by trying to find out where all the debris is to a high degree of precision. That would alleviate the need for many of the unnecessary manoeuvres that are carried out to avoid potential collisions. 'If you knew precisely where everything was, you would almost never have a problem,' says Marlon Sorge, a space-debris specialist at the Aerospace Corporation in El Segundo, California.

E

The field is called space traffic management, because it's similar to managing traffic on the roads or in the air. Think about a busy day at an airport, says Moriba Jah, an astrodynamicist at the University of Texas at Austin: planes line up in the sky, landing and taking off close to one another in a carefully choreographed routine. Air-traffic controllers know the location of the planes down to one metre in accuracy. The same can't be said for space debris. Not all objects in orbit are known, and even those included in databases are not tracked consistently.

F

An additional problem is that there is no authoritative catalogue that accurately lists the orbits of all known space debris. Jah illustrates this with a web-based database that he has developed. It draws on several sources, such as catalogues maintained by the US and Russian governments, to visualise where objects are in space. When he types in an identifier for a particular space object, the database draws a purple line to designate its orbit. Only this doesn't quite work for a number of objects, such as a Russian rocket body designated in the database as object number 32280. When Jah enters that number, the database draws two purple lines: the US and Russian sources contain two completely different orbits for the same object. Jah says that it is almost impossible to tell which is correct, unless a third source of information made it possible to cross-correlate.

Jah describes himself as a space environmentalist: 'I want to make space a place that is safe to operate, that is free and useful for generations to come.' Until that happens, he argues, the space community will continue devolving into a tragedy in which all spaceflight operators are polluting a common resource.

PART 3 — QUESTIONS

Questions 27-31

The Reading Passage has six sections, **A-F**.

Which section contains the following information?

*Write the correct letter, **A-F**, in boxes on your answer sheet.*

	A	B	C	D	E	F
27 a reference to the cooperation that takes place to try and minimise risk	○	○	○	○	○	○
28 an explanation of a person's aims	○	○	○	○	○	○
29 a description of a major collision that occurred in space	○	○	○	○	○	○
30 a comparison between tracking objects in space and the efficiency of a transportation system	○	○	○	○	○	○
31 a reference to efforts to classify space junk	○	○	○	○	○	○

Questions 32-35

Complete the summary below.

*Choose **ONE WORD ONLY** from the passage for each answer.*

Write your answers in boxes on your answer sheet.

The Inter-Agency Space Debris Coordination Committee

The committee gives advice on how the **32** _____ of space can be achieved. The committee advises that when satellites are no longer active, any unused **33** _____ or pressurised material that could cause **34** _____ should be removed.

Although operators of large satellite constellations accept that they have obligations as stewards of space, Holger Krag points out that the operators that become **35** _____ are unlikely to prioritise removing their satellites from space.

Questions 36-40

Look at the following statements and the list of people below.

*Match each statement with the correct person, **A**, **B**, **C** or **D**.*

*Write the correct letter, **A**, **B**, **C** or **D**, in boxes on your answer sheet.*

NB *You may use any letter more than once.*

List of People

A Carolin Frueh

B Holger Krag

C Marlon Sorge

D Moriba Jah

	A	B	C	D
36 Knowing the exact location of space junk would help prevent any possible danger.	○	○	○	○
37 Space should be available to everyone and should be preserved for the future.	○	○	○	○
38 A recommendation regarding satellites is widely ignored.	○	○	○	○
39 There is conflicting information about where some satellites are in space.	○	○	○	○
40 There is a risk we will not be able to undo the damage that occurs in space.	○	○	○	○

Answer Key

#	Answer	Explanation
1	**lettuces**	From identical vertical tubes nearby burst row upon row of lettuces; near those are aromatic herbs, such as basil, sage and peppermint.
2	**1,000 kg / 1000 kg**	When the remaining two thirds of the vast open area are in production, 20 staff will harvest up to 1,000 kg of perhaps 35 different varieties of fruit and vegetables, every day.
3	**consumption / food consumption**	'We're not ever, obviously, going to feed the whole city this way,' cautions Hardy. 'In the urban environment you're working with very significant practical constraints, clearly, on what you can do and where. But if enough unused space can be developed like this, there's no reason why you shouldn't eventually target maybe between 5% and 10% of consumption.'
4	**pesticides**	First, I don't much like the fact that most of the fruit and vegetables we eat have been treated with something like 17 different pesticides
5	**journeys**	because the varieties are selected for their capacity to withstand such substantial journeys
6	**producers**	80% of the price I pay goes to wholesalers and transport companies, not the producers
7	**flavour / flavor**	You can select crop varieties for their flavour, not their resistance to the transport and storage chain
8	**TRUE**	Strawberries are being grown in disused shipping containers, mushrooms in underground carparks
9	**NOT GIVEN**	The equipment weighs little, can be installed on almost any flat surface and is cheap to buy: roughly €100 to €150 per square metre
10	**FALSE**	It is cheap to run, too, consuming a tiny fraction of the electricity used by some techniques
11	**TRUE**	Produce grown this way typically sells at prices that, while generally higher than those of classic intensive agriculture, are lower than soil-based organic growers
12	**FALSE**	There are limits to what farmers can grow this way, of course, and much of the produce is suited to the summer months
13	**NOT GIVEN**	And beans tend to take up a lot of space for not much return

#	Answer	Explanation
14	**B**	In the past, Pennsylvania landowners were solely interested in the value of their trees as high-quality timber. The norm was to remove the stems of highest quality and leave behind poorly formed trees that were not as well suited to the site where they grew. This practice, called ‘high-grading’, has left a legacy of ‘low-use wood’ in the forests.
15	**A**	A tree’s ‘value’ depends on several factors including its species, size, form, condition, quality, function, and accessibility, and depends on the management goals for a given forest.
16	**C**	Wood can also be gasified for electrical generation and can even be made into liquid fuels like ethanol and gasoline for lorries and cars.
17	**E**	With the many pests and pathogens visiting forests including hemlock wooly adelgid, Asian longhomed beetle, emerald ash borer, and gypsy moth, to name just a few,
18	**B**	Some people even call these ‘junk trees’,
19	**B**	These types of cut reduce the number of sick trees and seek to manage the future spread of a pest problem.
20	**C**	It can also be used to develop a two-tier forest so that there are two harvests and the money that comes in is spread out over a decade or more.
21	**C**	involves removing all the mature trees when other seedlings have become established. This then allows the forester to decide which tree species are regenerated. It leaves a young forest where all trees are at a similar point in their growth.
22	**fire**	Thinnings and dense and dead wood removal for fire prevention also center on the production of low-use wood.
23	**nutrients**	The tops of trees that have been cut down should be left on the site so that their nutrients cycle back into the soil.
24	**cavities**	In addition, trees with many cavities are extremely important habitats for insect predators like woodpeckers, bats and small mammals.
25	**hawthorn**	For example, many species like hawthorn provide food for wildlife.
26	**rare**	Finally, rare species of trees in a forest should also stay behind as they add to its structural diversity.
27	**C**	That means companies, governments and other players in space are collaborating in new ways to avoid a shared threat.

#	Answer	Explanation
28	**F**	Jah describes himself as a space environmentalist: ‘I want to make space a place that is safe to operate, that is free and useful for generations to come.’
29	**A**	Ten years ago, a US commercial Iridium satellite smashed into an inactive Russian communications satellite called Cosmos-2251, creating thousands of new pieces of space shrapnel that now threaten other satellites in low Earth orbit
30	**E**	Air-traffic controllers know the location of the planes down to one metre in accuracy. The same can’t be said for space debris. Not all objects in orbit are known, and even those included in databases are not tracked consistently.
31	**B**	Others are developing taxonomies of space – working on measuring properties such as the shape and size of an object, so that satellite operators know how much to worry about what’s coming their way.
32	**sustainability**	International groups such as the Inter-Agency Space Debris Coordination Committee have developed guidelines on space sustainability.
33	**fuel**	Those include inactivating satellites at the end of their useful life by venting pressurised materials or leftover fuel
34	**explosions**	that might lead to explosions
35	**bankrupt**	‘What happens to those that fail or go bankrupt?’
36	**C**	‘If you knew precisely where everything was, you would almost never have a problem,’ says Marlon Sorge
37	**D**	Jah describes himself as a space environmentalist: ‘I want to make space a place that is safe to operate, that is free and useful for generations to come.’
38	**B**	But so far, only about half of all missions have abided by this 25-year goal, says Holger Krag
39	**D**	When Jah enters that number, the database draws two purple lines: the US and Russian sources contain two completely different orbits for the same object. Jah says that it is almost impossible to tell which is correct, unless a third source of information made it possible to cross-correlate.
40	**A**	‘If we go on like this, we will reach a point of no return,’ says Carolin Frueh

Test 20

PASSAGE 1

Stonehenge

For centuries, historians and archaeologists have puzzled over the many mysteries of Stonehenge, a prehistoric monument that took an estimated 1,500 years to erect. Located on Salisbury Plain in southern England, it is comprised of roughly 100 massive upright stones placed in a circular layout.

Archaeologists believe England's most iconic prehistoric ruin was built in several stages with the earliest constructed 5,000 or more years ago. First, Neolithic* Britons used primitive tools, which may have been fashioned out of deer antlers, to dig a massive circular ditch and bank, or henge. Deep pits dating back to that era and located within the circle may have once held a ring of timber posts, according to some scholars.

Several hundred years later, it is thought, Stonehenge's builders hoisted an estimated 80 bluestones, 43 of which remain today, into standing positions and placed them in either a horseshoe or circular formation. These stones have been traced all the way to the Preseli Hills in Wales, some 300 kilometres from Stonehenge. How, then, did prehistoric builders without sophisticated tools or engineering haul these boulders, which weigh up to four tons, over such a great distance?

According to one long-standing theory among archaeologists, Stonehenge's builders fashioned sledges and rollers out of tree trunks to lug the bluestones from the Preseli Hills. They then transferred the boulders onto rafts and floated them first along the Welsh coast and then up the River Avon toward Salisbury Plain; alternatively, they may have towed each stone with a fleet of vessels. More recent archaeological hypotheses have them transporting the bluestones with supersized wicker baskets on a combination of ball bearings and long grooved planks, hauled by oxen.

As early as the 1970s, geologists have been adding their voices to the debate over how Stonehenge came into being. Challenging the classic image of industrious builders pushing, carting, rolling or hauling giant stones from faraway Wales, some scientists have suggested that it was glaciers, not humans, that carried the bluestones to Salisbury Plain. Most archaeologists have remained sceptical about this theory, however, wondering how the forces of nature could possibly have delivered the exact number of stones needed to complete the circle.

The third phase of construction took place around 2000 BCE. At this point, sandstone slabs – known as 'sarsens' – were arranged into an outer crescent or ring; some were assembled into the iconic three-pieced structures called trilithons that stand tall in the centre of Stonehenge. Some 50 of these stones are now visible on the site, which may once have contained many more. Radiocarbon dating has revealed that work continued at Stonehenge until roughly 1600 BCE, with the bluestones in particular being repositioned multiple times.

But who were the builders of Stonehenge? In the 17th century, archaeologist John Aubrey made the claim that Stonehenge was the work of druids, who had important religious, judicial and political roles in Celtic** society. This theory was widely popularized by the antiquarian William Stukeley, who had unearthed primitive graves at the site. Even today, people who identify as modern druids continue to gather at Stonehenge for the summer solstice. However, in the mid-20th century, radiocarbon dating demonstrated that Stonehenge stood more than 1,000 years before the Celts inhabited the region.

Many modern historians and archaeologists now agree that several distinct tribes of people contributed to Stonehenge, each undertaking a different phase of its construction. Bones, tools and other artefacts found on the site seem to support this hypothesis. The first stage was achieved by Neolithic agrarians who were likely to have been indigenous to the British Isles. Later, it is believed, groups with advanced tools and a more communal way of life left their mark on the site. Some believe that they were immigrants from the European continent, while others maintain that they were probably native Britons, descended from the original builders.

If the facts surrounding the architects and construction of Stonehenge remain shadowy at best, the purpose of the striking monument is even more of a mystery. While there is consensus among the majority of modern scholars that Stonehenge once served the function of burial ground, they have yet to determine what other purposes it had.

In the 1960s, the astronomer Gerald Hawkins suggested that the cluster of megalithic stones operated as a form of calendar, with different points corresponding to astrological phenomena such as solstices, equinoxes and eclipses occurring at different times of the year. While his theory has received a considerable amount of attention over the decades, critics maintain that Stonehenge's builders probably lacked the knowledge necessary to predict such events or that England's dense cloud cover would have obscured their view of the skies.

More recently, signs of illness and injury in the human remains unearthed at Stonehenge led a group of British archaeologists to speculate that it was considered a place of healing, perhaps because bluestones were thought to have curative powers.

———

* Neolithic – The era, also known as the New Stone Age, which began around 12,000 years ago and ended around 3500 BCE

** Celtic – The Celts were people who lived in Britain and northwest Europe during the Iron Age from 600 BCE to 43 CE

PART 1 — QUESTIONS

Questions 1-8

Complete the notes below.

Choose NO MORE THAN TWO WORDS from the passage for each answer.

Write your answers in boxes on your answer sheet.

Stonehenge

Construction

Stage 1:

- the ditch and henge were dug, possibly using tools made from [1] _____
- [2] _____ may have been arranged in deep pits inside the circle

Stage 2:

- bluestones from the Preseli Hills were placed in standing position
- theories about the transportation of the bluestones:
  - archaeological:
    - builders used [3] _____ to make sledges and rollers
    - [4] _____ pulled them on giant baskets
  - geological:
    - they were brought from Wales by [5] _____

Stage 3:

- sandstone slabs were arranged into an outer crescent or ring

Builders

- a theory arose in the 17th century that its builders were Celtic [6] _____

Purpose

- many experts agree it has been used as a [7] _____site
- in the 1960s, it was suggested that it worked as a kind of [8] _____

Questions 9-13

Do the following statements agree with the information given in the Reading Passage?

In boxes on your answer sheet, write

TRUE *if the statement agrees with the information*

FALSE *if the statement contradicts the information*

NOT GIVEN *if there is no information on this*

9 During the third phase of construction, sandstone slabs were placed in both the outer areas and the middle of the Stonehenge site.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

10 There is scientific proof that the bluestones stood in the same spot until approximately 1600 BCE.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

11 John Aubrey's claim about Stonehenge was supported by 20th-century findings.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

12 Objects discovered at Stonehenge seem to indicate that it was constructed by a number of different groups of people.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

13 Criticism of Gerald Hawkins' theory about Stonehenge has come mainly from other astronomers.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

PASSAGE 2

Living with artificial intelligence

Powerful artificial intelligence (AI) needs to be reliably aligned with human values, but

does this mean AI will eventually have to

police those values?

This has been the decade of AI, with one astonishing feat after another. A chess-playing AI that can defeat not only all human chess players, but also all previous human-programmed chess machines, after learning the game in just four hours? That's yesterday's news, what's next? True, these prodigious accomplishments are all in so-called narrow AI, where machines perform highly specialised tasks. But many experts believe this restriction is very temporary. By mid-century, we may have artificial general intelligence (AGI) – machines that can achieve human-level performance on the full range of tasks that we ourselves can tackle.

If so, there's little reason to think it will stop there. Machines will be free of many of the physical constraints on human intelligence. Our brains run at slow biochemical processing speeds on the power of a light bulb, and their size is restricted by the dimensions of the human birth canal. It is remarkable what they accomplish, given these handicaps. But they may be as far from the physical limits of thought as our eyes are from the incredibly powerful Webb Space Telescope.

Once machines are better than us at designing even smarter machines, progress towards these limits could accelerate. What would this mean for us? Could we ensure a safe and worthwhile coexistence with such machines? On the plus side, AI is already useful and profitable for many things, and super AI might be expected to be super useful and super profitable. But the more powerful AI becomes, the more important it will be to specify its goals with great care. Folklore is full of tales of people who ask for the wrong thing, with disastrous consequences- King Midas, for example, might have wished that everything he touched turned to gold, but didn't really intend this to apply to his breakfast.

So we need to create powerful AI machines that are 'human-friendly'- that have goals reliably aligned with our own values. One thing that makes this task difficult is that we are far from reliably human-friendly ourselves. We do many terrible things to each other and to many other creatures with whom we share the planet. If superintendent machines don't do a lot better than us, we'll be in deep trouble. We'll have powerful new intelligence amplifying the dark sides of our own fallible natures.

For safety's sake, then, we want the machines to be ethically as well as cognitively superhuman. We want them to aim for the moral high ground, not for the troughs in which many of us spend some of our time. Luckily they'll be smart enough for the job. If there are routes to the moral high ground, they'll be better than us at finding them, and steering us in the right direction.

However, there are two big problems with this utopian vision. One is how we get the machines started on the journey, the other is what it would mean to reach this destination. The 'getting

started' problem is that we need to tell the machines what they're looking for with sufficient clarity that we can be confident they will find it – whatever 'it' actually turns out to be. This won't be easy, given that we are tribal creatures and conflicted about the ideals ourselves. We often ignore the suffering of strangers, and even contribute to it, at least indirectly. How then, do we point machines in the direction of something better?

As for the 'destination' problem, we might, by putting ourselves in the hands of these moral guides and gatekeepers, be sacrificing our own autonomy – an important part of what makes us human. Machines who are better than us at sticking to the moral high ground may be expected to discourage some of the lapses we presently take for granted. We might lose our freedom to discriminate in favour of our own communities, for example.

Loss of freedom to behave badly isn't always a bad thing, of course: denying ourselves the freedom to put children to work in factories, or to smoke in restaurants are signs of progress. But are we ready for ethical silicon police limiting our options? They might be so good at doing it that we won't notice them; but few of us are likely to welcome such a future.

These issues might seem far-fetched, but they are to some extent already here. AI already has some input into how resources are used in our National Health Service (NHS) here in the UK, for example. If it was given a greater role, it might do so much more efficiently than humans can manage, and act in the interests of taxpayers and those who use the health system. However, we'd be depriving some humans (e.g. senior doctors) of the control they presently enjoy. Since we'd want to ensure that people are treated equally and that policies are fair, the goals of AI would need to be specified correctly.

We have a new powerful technology to deal with- itself, literally, a new way of thinking. For our own safety, we need to point these new thinkers in the right direction, and get them to act well for us. It is not yet clear whether this is possible, but if it is, it will require a cooperative spirit, and a willingness to set aside self-interest.

Both general intelligence and moral reasoning are often thought to be uniquely human capacities. But safety seems to require that we think of them as a package: if we are to give general intelligence to machines, we'll need to give them moral authority, too. And where exactly would that leave human beings? All the more reason to think about the destination now, and to be careful about what we wish for.

PART 2 — QUESTIONS

Questions 14-19

*Choose the correct letter, **A**, **B**, **C** or **D**.*

Write the correct letter in boxes on your answer sheet.

14 What point does the writer make about AI in the first paragraph?

- **A** ○ It is difficult to predict how quickly AI will progress.
- **B** ○ Much can be learned about the use of AI in chess machines.
- **C** ○ The future is unlikely to see limitations on the capabilities of AI.
- **D** ○ Experts disagree on which specialised tasks AI will be able to perform.

15 What is the writer doing in the second paragraph?

- **A** ○ explaining why machines will be able to outperform humans
- **B** ○ describing the characteristics that humans and machines share
- **C** ○ giving information about the development of machine intelligence
- **D** ○ indicating which aspects of humans are the most advanced

16 Why does the writer mention the story of King Midas?

- **A** ○ to compare different visions of progress
- **B** ○ to illustrate that poorly defined objectives can go wrong
- **C** ○ to emphasise the need for cooperation
- **D** ○ to point out the financial advantages of a course of action

17 What challenge does the writer refer to in the fourth paragraph?

- **A** ○ encouraging humans to behave in a more principled way
- **B** ○ deciding which values we want AI to share with us
- **C** ○ creating a better world for all creatures on the planet

D ○ ensuring AI is more human-friendly than we are ourselves

18 What does the writer suggest about the future of AI in the fifth paragraph?

A ○ The safety of machines will become a key issue.

B ○ It is hard to know what impact machines will have on the world.

C ○ Machines will be superior to humans in certain respects.

D ○ Many humans will oppose machines having a wider role.

19 Which of the following best summarises the writer's argument in the sixth paragraph?

A ○ More intelligent machines will result in greater abuses of power.

B ○ Machine learning will share very few features with human learning.

C ○ There are a limited number of people with the knowledge to program machines.

D ○ Human shortcomings will make creating the machines we need more difficult.

Questions 20-23

Do the following statements agree with the claims of the writer in The Reading Passage?

In boxes on your answer sheet, write

YES *if the statement agrees with the claims of the writer*

NO *if the statement contradicts the claims of the writer*

NOT GIVEN *if it is impossible to say what the writer thinks about this*

20 Machines with the ability to make moral decisions may prevent us from promoting the interests of our communities.

A ○ YES

B ○ NO

C ○ NOT GIVEN

21 Silicon police would need to exist in large numbers in order to be effective.

A ○ YES

B ○ NO

C ○ NOT GIVEN

22 Many people are comfortable with the prospect of their independence being restricted by machines.

A ○ YES

B ○ NO

C ○ NOT GIVEN

23 If we want to ensure that machines act in our best interests, we all need to work together.

A ○ YES

B ○ NO

C ○ NOT GIVEN

Questions 24-26

*Complete the summary using the list of phrases, **A-F**, below.*

*Write the correct letter, **A-F**, in boxes on your answer sheet.*

Using AI in the UK health system

AI currently has a limited role in the way **24** _____ are allocated in the health service. The positive aspect of AI having a bigger role is that it would be more efficient and lead to patient benefits. However, such a change would result, for example, in certain **25** _____ not having their current level of **26** _____. It is therefore important that AI goals are appropriate so that discriminatory practices could be avoided.

A. **medical practitioners** B. **specialised tasks** C. **available resources**

D. **reduced illness** E. **professional authority** F. **technology experts**

PASSAGE 3

An ideal city

Leonardo da Vinci's ideal city was centuries ahead of its time

The word 'genius' is universally associated with the name of Leonardo da Vinci. A true Renaissance man, he embodied scientific spirit, artistic talent and humanist sensibilities. Five hundred years have passed since Leonardo died in his home at Chateau du Clos Luce, outside Tours, France. Yet far from fading into insignificance, his thinking has carried down the centuries and still surprises today.

The Renaissance marked the transition from the 15th century to modernity and took place after the spread of the plague in the 14th century, which caused a global crisis resulting in some 200 million deaths across Europe and Asia. Today, the world is on the cusp of a climate crisis, which is predicted to cause widespread displacement, extinctions and death, if left unaddressed. Then, as now, radical solutions were called for to revolutionise the way people lived and safeguard humanity against catastrophe.

Around 1486 – after a pestilence that killed half the population in Milan, Italy – Leonardo turned his thoughts to urban planning problems. Following a typical Renaissance trend, he began to work on an 'ideal city' project, which – due to its excessive costs – would remain unfulfilled. Yet given that unsustainable urban models are a key cause of global climate change today, it's only natural to wonder how Leonardo might have changed the shape of modem cities.

Although the Renaissance is renowned as an era of incredible progress in art and architecture, it is rarely noted that the 15th century also marked the birth of urbanism as a true academic discipline. The rigour and method behind the conscious conception of a city had been largely missing in Western thought until the moment when prominent Renaissance men pushed forward large-scale urban projects in Italy, such as the reconfiguration of the town of Pienza and the expansion of the city of Ferrara. These works surely inspired Leonardo's decision to rethink the design of medieval cities, with their winding and overcrowded streets and with houses piled against one another.

It is not easy to identify a coordinated vision of Leonardo's ideal city because of his disordered way of working with notes and sketches. But from the largest collection of Leonardo's papers ever assembled, a series of innovative thoughts can be reconstructed regarding the foundation of a new city along the Ticino River, which runs from Switzerland into Italy and is 248 kilometres long. He designed the city for the easy transport of goods and clean urban spaces, and he wanted a comfortable and spacious city, with well-ordered streets and architecture. He recommended 'high, strong walls', with 'towers and battlements of all necessary and pleasant beauty'.

His plans for a modem and 'rational' city were consistent with Renaissance ideals. But, in keeping with his personality, Leonardo included several innovations in his urban design. Leonardo wanted the city to be built on several levels, linked with vertical outdoor staircases.

This design can be seen in some of today's high-rise buildings but was unconventional at the time. Indeed, this idea of taking full advantage of the interior spaces wasn't implemented until the 1920s and 1930s, with the birth of the Modernist movement.

While in the upper layers of the city, people could walk undisturbed between elegant palaces and streets, the lower layer was the place for services, trade, transport and industry. But the true originality of Leonardo's vision was its fusion of architecture and engineering. Leonardo designed extensive hydraulic plants to create artificial canals throughout the city. The canals, regulated by clocks and basins, were supposed to make it easier for boats to navigate inland. Leonardo also thought that the width of the streets ought to match the average height of the adjacent houses: a rule still followed in many contemporary cities across Italy, to allow access to sun and reduce the risk of damage from earthquakes.

Although some of these features existed in Roman cities, before Leonardo's drawings there had never been a multi-level, compact modem city which was thoroughly technically conceived. Indeed, it wasn't until the 19th century that some of his ideas were applied. For example, the subdivision of the city by function- with services and infrastructures located in the lower levels and wide and well-ventilated boulevards and walkways above for residents – is an idea that can be found in Georges-Eugene Haussmann's renovation of Paris under Emperor Napoleon III between 1853 and 1870.

Today, Leonardo's ideas are not simply valid, they actually suggest a way forward for urban planning. Many scholars think that the compact city, built upwards instead of outwards, integrated with nature (especially water systems), with efficient transport infrastructure, could help modem cities become more efficient and sustainable. This is yet another reason why Leonardo was aligned so closely with modem urban planning and centuries ahead of his time.

PART 3 — QUESTIONS

Questions 27-33

Do the following statements agree with the information given in The Reading Passage?

In boxes on your answer sheet, write

TRUE *if the statement agrees with the information*

FALSE *if the statement contradicts the information*

NOT GIVEN *if there is no information on this*

27 People first referred to Leonardo da Vinci as a genius 500 years ago.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

28 The current climate crisis is predicted to cause more deaths than the plague.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

29 Some of the challenges we face today can be compared to those of earlier times.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

30 Leonardo da Vinci's 'ideal city' was constructed in the 15th century.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

31 Poor town planning is a major contributor to climate change.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

32 In Renaissance times, local people fought against the changes to Pienza and Ferrara.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

33 Leonardo da Vinci kept a neat, organised record of his designs.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

Questions 34-40

Complete the summary below.

*Choose **ONE WORD ONLY** from the passage for each answer.*

Write your answers in boxes on your answer sheet.

Leonardo da Vinci's ideal city

A collection of Leonardo da Vinci's paperwork reveals his design of a new city beside the Ticino River. This was to provide better **34** _____ for trade and a less polluted environment. Although Leonardo da Vinci's city shared many of the ideals of his time, some of his innovations were considered unconventional in their design. They included features that can be seen in some tower blocks today, such as **35** _____ on the exterior of a building.

Leonardo da Vinci wasn't only an architect. His expertise in **36** _____ was evident in his plans for artificial canals within his ideal city. He also believed that the height

of houses should relate to the width of streets in case earthquakes occurred. The design of many cities in Italy today follows this **37** _____.

While some cities from **38** _____ times have aspects that can also be found in Leonardo's designs, his ideas weren't put into practice until long after his death. **39** _____ is one example of a city that was redesigned in the 19th century in the way that Leonardo had envisaged. His ideas are also relevant to today's world, where building **40** _____ no longer seems to be the best approach.

Answer Key

#	Answer	Explanation
1	**antlers / deer antlers**	which may have been fashioned out of deer antlers
2	**posts / timber posts**	Deep pits dating back to that era and located within the circle may have once held a ring of timber posts, according to some scholars.
3	**tree trunks**	According to one long-standing theory among archaeologists, Stonehenge's builders fashioned sledges and rollers out of tree trunks to lug the bluestones from the Preseli Hills.
4	**oxen**	More recent archaeological hypotheses have them transporting the bluestones with supersized wicker baskets on a combination of ball bearings and long grooved planks, hauled by oxen.
5	**glaciers**	Challenging the classic image of industrious builders pushing, carting, rolling or hauling giant stones from faraway Wales, some scientists have suggested that it was glaciers, not humans, that carried the bluestones to Salisbury Plain.
6	**druids**	In the 17th century, archaeologist John Aubrey made the claim that Stonehenge was the work of druids,
7	**burial**	While there is consensus among the majority of modern scholars that Stonehenge once served the function of burial ground, they have yet to determine what other purposes it had.
8	**calendar**	the astronomer Gerald Hawkins suggested that the cluster of megalithic stones operated as a form of calendar
9	**TRUE**	The third phase of construction took place around 2000 BCE. At this point, sandstone slabs – known as 'sarsens' – were arranged into an outer crescent or ring; some were assembled into the iconic three-pieced structures called trilithons that stand tall in the centre of Stonehenge.
10	**FALSE**	Radiocarbon dating has revealed that work continued at Stonehenge until roughly 1600 BCE, with the bluestones in particular being repositioned multiple times.
11	**FALSE**	However, in the mid-20th century, radiocarbon dating demonstrated that Stonehenge stood more than 1,000 years before the Celts inhabited the region.
12	**TRUE**	Many modern historians and archaeologists now agree that several distinct tribes of people contributed to Stonehenge, each

#	Answer	Explanation
		undertaking a different phase of its construction. Bones, tools and other artefacts found on the site seem to support this hypothesis.
13	**NOT GIVEN**	While his theory has received a considerable amount of attention over the decades, critics maintain that Stonehenge's builders probably lacked the knowledge necessary to predict such events or that England's dense cloud cover would have obscured their view of the skies.
14	**C**	That's yesterday's news, what's next? True, these prodigious accomplishments are all in so-called narrow AI, where machines perform highly specialised tasks. But many experts believe this restriction is very temporary. By mid-century, we may have artificial general intelligence (AGI) – machines that can achieve human-level performance on the full range of tasks that we ourselves can tackle.
15	**A**	If so, there's little reason to think it will stop there. Machines will be free of many of the physical constraints on human intelligence.
16	**B**	Folklore is full of tales of people who ask for the wrong thing, with disastrous consequences- King Midas, for example, might have wished that everything he touched turned to gold, but didn't really intend this to apply to his breakfast.
17	**D**	So we need to create powerful AI machines that are 'human-friendly'- that have goals reliably aligned with our own values. One thing that makes this task difficult is that we are far from reliably human-friendly ourselves. We do many terrible things to each other and to many other creatures with whom we share the planet.
18	**C**	we want the machines to be ethically as well as cognitively superhuman. We want them to aim for the moral high ground, not for the troughs in which many of us spend some of our time. Luckily they'll be smart enough for the job. If there are routes to the moral high ground, they'll be better than us at finding them, and steering us in the right direction.
19	**D**	The 'getting started' problem is that we need to tell the machines what they're looking for with sufficient clarity that we can be confident they will find it – whatever 'it' actually turns out to be. This won't be easy, given that we are tribal creatures and conflicted about the ideals ourselves. We often ignore the suffering of strangers, and even contribute to it, at least indirectly. How then, do we point machines in the direction of something better?
20	**YES**	Machines who are better than us at sticking to the moral high ground may be expected to discourage some of the lapses we

#	Answer	Explanation
		presently take for granted. We might lose our freedom to discriminate in favour of our own communities, for example.
21	**NOT GIVEN**	But are we ready for ethical silicon police limiting our options?
22	**NO**	They might be so good at doing it that we won't notice them; but few of us are likely to welcome such a future.
23	**YES**	It is not yet clear whether this is possible, but if it is, it will require a cooperative spirit, and a willingness to set aside self-interest.
24	**C**	AI already has some input into how resources are used in our National Health Service (NHS) here in the UK, for example.
25	**A**	However, we'd be depriving some humans (e.g. senior doctors) of the control they presently enjoy.
26	**E**	However, we'd be depriving some humans (e.g. senior doctors) of the control they presently enjoy.
27	**NOT GIVEN**	The word 'genius' is universally associated with the name of Leonardo da Vinci. A true Renaissance man, he embodied scientific spirit, artistic talent and humanist sensibilities. Five hundred years have passed since Leonardo died in his home at Chateau du Clos Luce, outside Tours, France.
28	**NOT GIVEN**	the spread of the plague in the 14th century, which caused a global crisis resulting in some 200 million deaths across Europe and Asia. Today, the world is on the cusp of a climate crisis, which is predicted to cause widespread displacement, extinctions and death, if left unaddressed.
29	**TRUE**	Then, as now, radical solutions were called for to revolutionise the way people lived and safeguard humanity against catastrophe.
30	**FALSE**	Around 1486 – after a pestilence that killed half the population in Milan, Italy – Leonardo turned his thoughts to urban planning problems. Following a typical Renaissance trend, he began to work on an 'ideal city' project, which – due to its excessive costs – would remain unfulfilled.
31	**TRUE**	Yet given that unsustainable urban models are a key cause of global climate change today,
32	**NOT GIVEN**	prominent Renaissance men pushed forward large-scale urban projects in Italy, such as the reconfiguration of the town of Pienza and the expansion of the city of Ferrara.
33	**FALSE**	It is not easy to identify a coordinated vision of Leonardo's ideal city because of his disordered way of working with notes and sketches.

#	Answer	Explanation
34	**transport**	He designed the city for the easy transport of goods and clean urban spaces
35	**staircases**	Leonardo wanted the city to be built on several levels, linked with vertical outdoor staircases.
36	**engineering**	But the true originality of Leonardo’s vision was its fusion of architecture and engineering.
37	**rule**	a rule still followed in many contemporary cities across Italy
38	**Roman**	Although some of these features existed in Roman cities, before Leonardo’s drawings there had never been a multi-level
39	**Paris**	is an idea that can be found in Georges-Eugene Haussmann’s renovation of Paris under Emperor Napoleon III between 1853 and 1870.
40	**outwards**	Many scholars think that the compact city, built upwards instead of outwards,

Test 21

PASSAGE 1

Materials to take us beyond concrete

Concrete is everywhere, but it's bad for the planet, generating large amounts of carbon dioxide – alternatives are being developed

A

Concrete is the second most used substance in the global economy, after water – and one of the world's biggest single sources of greenhouse gas emissions. The chemical process by which cement, the key ingredient of concrete, is created results in large quantities of carbon dioxide. The UN estimates that there will be 9.8 billion people living on the planet by mid-century. They will need somewhere to live. If concrete is the only answer to the construction of new cities, then carbon emissions will soar, aggravating global warming. And so scientists have started innovating with other materials, in a scramble for alternatives to a universal commodity that has underpinned our modem life for many years.

B

The problem with replacing concrete is that it is so very good at what it does. Chris Cheeseman, an engineering professor at Imperial College London, says the key thing to consider is the extent to which concrete is used around the world, and is likely to continue to be used. 'Concrete is not a high-carbon product. Cement is high carbon, but concrete is not. But it is the scale on which it is used that makes it high carbon. The sheer scale of manufacture is so huge, that is the issue.'

C

Not only are the ingredients of concrete relatively cheap and found in abundance in most places around the globe, the stuff itself has marvellous properties: Portland cement, the vital component of concrete, is mouldable and pourable, but quickly sets hard. Cheeseman also notes another advantage: concrete and steel have similar thermal expansion properties, so steel can be used to reinforce concrete, making it far stronger and more flexible as a building material than it could be on its own. According to Cheeseman, all these factors together make concrete hard to beat. 'Concrete is amazing stuff. Making anything with similar properties is going to be very difficult.'

D

A possible alternative to concrete is wood. Making buildings from wood may seem like a rather medieval idea, but climate change is driving architects to turn to treated timber as a possible resource. Recent years have seen the emergence of tall buildings constructed almost entirely

from timber. Vancouver, Vienna and Brumunddal in Norway are all home to constructed tall, wooden buildings.

E

Using wood to construct buildings, however, is not straightforward. Wood expands as it absorbs moisture from the air and is susceptible to pests, not to mention fire. But treating wood and combining it with other materials can improve its properties. Cross-laminated timber is engineered wood. An adhesive is used to stick layers of solid-sawn timber together, crosswise, to form building blocks. This material is light but has the strength of concrete and steel. Construction experts say that wooden buildings can be constructed at a greater speed than ones of concrete and steel and the process, it seems, is quieter.

F

Stora Enso is Europe's biggest supplier of cross-laminated timber, and its vice-president Markus Mannstrom reports that the company is seeing increasing demand globally for building in wood, with climate change concerns the key driver. Finland, with its large forests, where Stora Enso is based, has been leading the way, but the company is seeing a rise in demand for its timber products across the world, including in Asia. Of course, using timber in a building also locks away the carbon that it absorbed as it grew. But even treated wood has its limitations and only when a wider range of construction projects has been proven in practice will it be possible to see wood as a real alternative to concrete in constructing tall buildings.

G

Fly ash and slag from iron ore are possible alternatives to cement in a concrete mix. Fly ash, a byproduct of coal-burning power plants, can be incorporated into concrete mixes to make up as much as 15 to 30% of the cement, without harming the strength or durability of the resulting mix. Iron-ore slag, a byproduct of the iron-ore smelting process, can be used in a similar way. Their incorporation into concrete mixes has the potential to reduce greenhouse gas emissions.

But Anna Surgenor, of the UK's Green Building Council, notes that although these waste products can save carbon in the concrete mix, their use is not always straightforward. 'It's possible to replace the cement content in concrete with waste products to lower the overall carbon impact. But there are several calculations that need to be considered across the entire life cycle of the building- these include factoring in where these materials are being shipped from. If they are transported over long distances, using fossil fuels, the use of alternative materials might not make sense from an overall carbon reduction perspective.'

H

While these technologies are all promising ideas, they are either unproven or based on materials that are not abundant. In their overview of innovation in the concrete industry, Felix Preston and Johanna Lehne of the UK's Royal Institute of International Affairs reached the conclusion that, 'Some novel cements have been discussed for more than a decade within the research community, without breaking through. At present, these alternatives are rarely as cost-

effective as conventional cement, and they face raw-material shortages and resistance from customers.′

PART 1 — QUESTIONS

Questions 1-4

The Reading Passage has eight sections, **A-H**.

Which section contains the following information?

*Write the correct letter, **A-H**, in boxes on your answer sheet.*

	A	B	C	D	E	F	G	H
1 an explanation of the industrial processes that create potential raw materials for concrete	○	○	○	○	○	○	○	○
2 a reference to the various locations where high-rise wooden buildings can be found	○	○	○	○	○	○	○	○
3 an indication of how widely available the raw materials of concrete are	○	○	○	○	○	○	○	○
4 the belief that more high-rise wooden buildings are needed before wood can be regarded as a viable construction material	○	○	○	○	○	○	○	○

Questions 5-8

Complete the summary below.

*Choose **ONE WORD ONLY** from the passage for each answer.*

Write your answers in boxes on your answer sheet.

Making buildings with wood

Wood is a traditional building material, but current environmental concerns are encouraging **5** _____ to use wood in modern construction projects. Using wood, however, has its challenges. For example, as **6** _____ in the atmosphere enters wood, it increases in size. In addition, wood is prone to pests and the risk of fire is greater. However, wood can be turned into a better construction material if it is treated and combined with other materials. In one process, **7** _____ of solid wood are glued together to

create building blocks. These blocks are lighter than concrete and steel but equal them in strength. Experts say that wooden buildings are an improvement on those made of concrete and steel in terms of the **8** _____ with which they can be constructed and how much noise is generated by the process.

Questions 9-13

Look at the following statements and the list of people below.

*Match each statement with the correct person, **A**, **B**, **C** or **D**.*

*Write the correct letter, **A**, **B**, **C** or **D**, in boxes on your answer sheet.*

NB *You may use any letter more than once.*

List of People

A Chris Cheeseman

B Markus Mannstrom

C Anna Surgenor

D Felix Preston and Johanna Lehne

	A	B	C	D
9 The environmental advantage of cement alternatives may not be as great as initially assumed.	○	○	○	○
10 It would be hard to create a construction alternative to concrete that offers so many comparable benefits.	○	○	○	○
11 Worries about the environment have led to increased interest in wood as a construction material.	○	○	○	○
12 Expense has been a factor in the negative response to the development of new cements.	○	○	○	○
13 The environmental damage caused by concrete is due to it being produced in large quantities.	○	○	○	○

PASSAGE 2

The steam car

The successes and failures of the Doble brothers and their steam cars

14

A

When primitive automobiles first began to appear in the 1800s, their engines were based on steam power. Steam had already enjoyed a long and successful career in the railways, so it was only natural that the technology evolved into a miniaturized version which was separate from the trains. But these early cars inherited steam's weaknesses along with its strengths. The boilers had to be lit by hand, and they required about twenty minutes to build up pressure before they could be driven. Furthermore, their water reservoirs only lasted for about thirty miles before needing replenishment. Despite such shortcomings, these newly designed self-propelled carriages offered quick transportation, and by the early 1900s it was not uncommon to see such machines shuttling wealthy citizens around town.

15

B

But the glory days of steam cars were few. A new technology called the Internal Combustion Engine soon appeared, which offered the ability to drive down the road just moments after starting up. At first, these noisy gasoline cars were unpopular because they were more complicated to operate and they had difficult hand-crank starters, which were known to break arms when the engines backfired. But in 1912 General Motors introduced the electric starter, and over the following few years steam power was gradually phased out.

16

C

Even as the market was declining, four brothers made one last effort to rekindle the technology. Between 1906 and 1909, while still attending high school, Abner Doble and his three brothers built their first steam car in their parents' basement. It comprised parts taken from a wrecked early steam car but reconfigured to drive an engine of their own design. Though it did not run well, the Doble brothers went on to build a second and third prototype in the following years. Though the Doble boys' third prototype, nicknamed the Model B, still lacked the convenience of an internal combustion engine, it drew the attention of automobile trade magazines due to its numerous improvements over previous steam cars. The Model B proved to be superior to gasoline automobiles in many ways. Its high-pressure steam drove the engine pistons in virtual

silence, in contrast to clattering gas engines which emitted the aroma of burned hydrocarbons. Perhaps most impressively, the Model B was amazingly swift. It could accelerate from zero to sixty miles per hour in just fifteen seconds, a feat described as ‘remarkable acceleration’ by *Automobile* magazine in 1914.

17

D

The following year Abner Doble drove the Model B from Massachusetts to Detroit in order to seek investment in his automobile design, which he used to open the General Engineering Company. He and his brothers immediately began working on the Model C, which was intended to expand upon the innovations of the Model B. The brothers added features such as a key-based ignition in the cabin, eliminating the need for the operator to manually ignite the boiler. With these enhancements, the Dobles’ new car company promised a steam vehicle which would provide all of the convenience of a gasoline car, but with much greater speed, much simpler driving controls, and a virtually silent powerplant. By the following April, the General Engineering Company had received 5,390 deposits for Doble Detroits, which were scheduled for delivery in early 1918.

18

E

Later that year Abner Doble delivered unhappy news to those eagerly awaiting the delivery of their modem new cars. Those buyers who received the handful of completed cars complained that the vehicles were sluggish and erratic, sometimes going in reverse when they should go forward. The new engine design, though innovative, was still plagued with serious glitches.

19

F

The brothers made one final attempt to produce a viable steam automobile. In early 1924, the Doble brothers shipped a Model E to New York City to be road-tested by the Automobile Club of America. After sitting overnight in freezing temperatures, the car was pushed out into the road and left to sit for over an hour in the frosty morning air. At the turn of the key, the boiler lit and reached its operating pressure inside of forty seconds. As they drove the test vehicle further, they found that its evenly distributed weight lent it surprisingly good handling, even though it was so heavy. As the new Doble steamer was further developed and tested, its maximum speed was pushed to over a hundred miles per hour, and it achieved about fifteen miles per gallon of kerosene with negligible emissions.

20

G

Sadly, the Dobles' brilliant steam car never was a financial success. Priced at around $18,000 in 1924, it was popular only among the very wealthy. Plus, it is said that no two Model Es were quite the same, because Abner Doble tinkered endlessly with the design. By the time the company folded in 1931, fewer than fifty of the amazing Model E steam cars had been produced. For his whole career, until his death in 1961, Abner Doble remained adamant that steam-powered automobiles were at least equal to gasoline cars, if not superior. Given the evidence, he may have been right. Many of the Model E Dobles which have survived are still in good working condition, some having been driven over half a million miles with only normal maintenance. Astonishingly, an unmodified Doble Model E runs clean enough to pass the emissions laws in California today, and they are pretty strict. It is true that the technology poses some difficult problems, but you cannot help but wonder how efficient a steam car might be with the benefit of modem materials and computers. Under the current pressure to improve automotive performance and reduce emissions, it is not unthinkable that the steam car may rise again.

PART 2 — QUESTIONS

Questions 14-20

The Reading Passage has seven paragraphs, **A-G**.

Choose the correct heading for each paragraph from the list of headings below.

*Write the correct number, **i-viii**, in boxes on your answer sheet.*

List of Headings

i. **A period in cold conditions before the technology is assessed**

ii. **Marketing issues lead to failure**

iii. **Good and bad aspects of steam technology are passed on**

iv. **A possible solution to the issues of today**

v. **Further improvements lead to commercial orders**

vi. **Positive publicity at last for this quiet, clean, fast vehicle**

vii. **A disappointing outcome for customers**

viii. **A better option than the steam car arises**

Questions 21-23

*Choose the correct letter, **A**, **B**, **C** or **D**.*

Write the correct letter in boxes on your answer sheet.

21 What point does the writer make about the steam car in Paragraph B?

- **A** ○ Its success was short-lived.
- **B** ○ Not enough cars were made.
- **C** ○ Car companies found them hard to sell.
- **D** ○ People found them hard to drive.

22 When building their first steam car, the Doble brothers

- **A** ○ constructed all the parts themselves.
- **B** ○ made written notes at each stage of the construction.

C ○ needed several attempts to achieve a competitive model.

D ○ sought the advice of experienced people in the car industry.

23 In order to produce the Model C, the Doble brothers

A ○ moved production to a different city.

B ○ raised financial capital.

C ○ employed an additional worker.

D ○ abandoned their earlier designs.

Questions 24-26

Complete the summary below.

Choose ONE WORD ANDIOR A NUMBER from the passage for each answer.

Write your answers in boxes on your answer sheet.

The Model E

The Model E was road-tested in 1924 by the Automobile Club of America. They found it easy to drive, despite its weight, and it impressed the spectators. A later version of the Model E raised its **24** _____, while keeping its emissions extremely low.

The steam car was too expensive for many people and its design was constantly being altered. Under **25** _____ cars were produced before the company went out of business. However, even today, there are Model Es on the road in the US. They are straightforward to maintain, and they satisfy California's **26** _____ emissions laws. Perhaps today's technology and materials would help us revive the steam car.

PASSAGE 3

The case for mixed-ability classes

Picture this scene. It's an English literature lesson in a UK school, and the teacher has just read an extract from Shakespeare's *Romeo and Juliet* with a class of 15-year-olds. He's given some of the students copies of *No Fear Shakespeare*, a kid-friendly translation of the original. For three students, even these literacy demands are beyond them. Another girl simply can't focus and he gives her pens and paper to draw with. The teacher can ask the *No Fear* group to identify the key characters and maybe provide a tentative plot summary. He can ask most of the class about character development, and five of them might be able to support their statements with textual evidence. Now two curious students are wondering whether Shakespeare advocates living a life of moderation or one of passionate engagement.

As a teacher myself, I'd think my lesson would be going rather well if the discussion went as described above. But wouldn't this kind of class work better if there weren't such a huge gap between the top and the bottom? If we put all the kids who needed literacy support into one class, and all the students who want to discuss the virtue of moderation into another?

The practice of 'streaming', or 'tracking', involves separating students into classes depending on their diagnosed levels of attainment. At a macro level, it requires the establishment of academically selective schools for the brightest students, and comprehensive schools for the rest. Within schools, it means selecting students into a 'stream' of general ability, or 'sets' of subject-specific ability. The practice is intuitively appealing to almost every stakeholder.

I have heard the mixed-ability model attacked by way of analogy: a group hike. The fittest in the group take the lead and set a brisk pace, only to have to stop and wait every 20 minutes. This is frustrating, and their enthusiasm wanes. Meanwhile, the slowest ones are not only embarrassed but physically struggling to keep up. What's worse, they never get a long enough break. They honestly just want to quit. Hiking, they feel, is not for them.

Mixed-ability classes bore students, frustrate parents and bum out teachers. The brightest ones will never summit Mount Qomolangma, and the stragglers won't enjoy the lovely stroll in the park they are perhaps more suited to. Individuals suffer at the demands of the collective, mediocrity prevails. So: is learning like hiking?

The current pedagogical paradigm is arguably that of constructivism, which emerged out of the work of psychologist Lev Vygotsky. In the 1930s, Vygotsky emphasised the importance of targeting a student's specific 'zone of proximal development' (ZPD). This is the gap between what they can achieve only with support – teachers, textbooks, worked examples, parents and so on – and what they can achieve independently. The purpose of teaching is to provide and then gradually remove this 'scaffolding' until they are autonomous. If we accept this model, it follows that streaming students with similar ZPDs would be an efficient and effective solution. And that forcing everyone on the same hike – regardless of aptitude – would be madness.

Despite all this, there is limited empirical evidence to suggest that streaming results in better outcomes for students. Professor John Hattie, director of the Melbourne Education Research Institute, notes that 'tracking has minimal effects on learning outcomes'. What is more, streaming appears to significantly – and negatively – affect those students assigned to the lowest sets. These students tend to have much higher representation of low socioeconomic class. Less significant is the small benefit for those lucky clever students in the higher sets. The overall result is that the smart stay smart and the dumb get dumber, further entrenching the social divide.

In the latest update of Hattie's influential meta-analysis of factors influencing student achievement, one of the most significant factors is the teachers' estimate of achievement. Streaming students by diagnosed achievement automatically limits what the teacher feels the student is capable of. Meanwhile, in a mixed environment, teachers' estimates need to be more diverse and flexible.

While streaming might seem to help teachers effectively target a student's ZPD, it can underestimate the importance of peer-to-peer learning. A crucial aspect of constructivist theory is the role of the MKO – 'more knowledgeable other' – in knowledge construction. While teachers are traditionally the MKOs in classrooms, the value of knowledgeable student peers must not go unrecognised either.

I find it amazing to watch students get over an idea to their peers in ways that I would never think of. They operate with different language tools and different social tools from teachers and, having just learnt it themselves, they possess similar cognitive structures to their struggling classmates. There is also something exciting about passing on skills and knowledge that you yourself have just mastered – a certain pride and zeal, a certain freshness to the interaction between 'teacher' and 'learner' that is often lost by the expert for whom the steps are obvious and the joy of discovery forgotten.

Having a variety of different abilities in a collaborative learning environment provides valuable resources for helping students meet their learning needs, not to mention improving their communication and social skills. And today, more than ever, we need the many to flourish – not suffer at the expense of a few bright stars. Once a year, I go on a hike with my class, a mixed bunch of students. It is challenging. The fittest students realise they need to encourage the reluctant. There are lookouts who report back, and extra items to carry for others. We make it – together.

PART 3 — QUESTIONS

Questions 27-30

*Choose the correct letter, **A**, **B**, **C** or **D**.*

Write the correct letter in boxes on your answer sheet.

27 The writer describes the *Romeo and Juliet* lesson in order to demonstrate

- **A** ○ how few students are interested in literature.
- **B** ○ how a teacher handles a range of learning needs.
- **C** ○ how unsuitable Shakespeare is for most teenagers.
- **D** ○ how weaker students can disrupt their classmates' learning.

28 What does the writer say about streaming in the third paragraph?

- **A** ○ It has a very broad appeal.
- **B** ○ It favours cleverer students.
- **C** ○ It is relatively simple to implement.
- **D** ○ It works better in some schools than others.

29 What idea is suggested by the reference to Mount Qomolangma in the fifth paragraph?

- **A** ○ students following unsuitable paths
- **B** ○ students attempting interesting tasks
- **C** ○ students not achieving their full potential
- **D** ○ students not being aware of their limitations

30 What does the word 'scaffolding' in the sixth paragraph refer to?

- **A** ○ the factors which prevent a student from learning effectively
- **B** ○ the environment where most of a student's learning takes place
- **C** ○ the assistance given to a student in their initial stages of learning

D ◯ the setting of appropriate learning targets for a student's aptitude

Questions 31-35

*Complete the summary using the list of phrases, **A-I**, below.*

*Write the correct letter, **A-I**, in boxes on your answer sheet.*

Is streaming effective?

According to Professor John Hattie of the Melbourne Education Research Institute there is very little indication that streaming leads to **31** _____. He points out that, in schools which use streaming, the most significant impact is on those students placed in the **32** _____, especially where a large proportion of them have **33** _____. Meanwhile, for the **34** _____, there appears to be only minimal advantage. A further issue is that teachers tend to have **35** _____ of students in streamed groups.

A. **wrong classes** B. **lower expectations** C. **average learners**

D. **bottom sets** E. **brightest pupils** F. **disadvantaged backgrounds**

G. **weaker students** H. **higher achievements** I. **positive impressions**

Questions 36-40

Do the following statements agree with the views of the writer in The Reading Passage?

In boxes on your answer sheet, write

YES *if the statement agrees with the views of the writer*

NO *if the statement contradicts the views of the writer*

NOT GIVEN *if it is impossible to say what the writer thinks about this*

36 The Vygotsky model of education supports the concept of a mixed-ability class.

A ◯ YES

B ◯ NO

C ◯ NOT GIVEN

37 Some teachers are uncertain about allowing students to take on MKO roles in the classroom.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

38 It can be rewarding to teach knowledge which you have only recently acquired.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

39 The priority should be to ensure that the highest-achieving students attain their goals.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

40 Taking part in collaborative outdoor activities with teachers and classmates can improve student outcomes in the classroom.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

Answer Key

#	Answer	Explanation
1	**G**	Iron-ore slag, a byproduct of the iron-ore smelting process, can be used in a similar way
2	**D**	Vancouver, Vienna and Brumunddal in Norway are all home to constructed tall, wooden buildings.
3	**C**	Not only are the ingredients of concrete relatively cheap and found in abundance in most places around the globe
4	**F**	But even treated wood has its limitations and only when a wider range of construction projects has been proven in practice will it be possible to see wood as a real alternative to concrete in constructing tall buildings.
5	**architects**	but climate change is driving architects to turn to treated timber as a possible resource.
6	**moisture**	Wood expands as it absorbs moisture from the air and is susceptible to pests, not to mention fire.
7	**layers**	n adhesive is used to stick layers of solid-sawn timber together, crosswise, to form building blocks.
8	**speed**	Construction experts say that wooden buildings can be constructed at a greater speed than ones of concrete and steel and the process, it seems, is quieter.
9	**C**	If they are transported over long distances, using fossil fuels, the use of alternative materials might not make sense from an overall carbon reduction perspective.
10	**A**	The problem with replacing concrete is that it is so very good at what it does. Chris Cheeseman
11	**B**	with climate change concerns the key driver.
12	**D**	At present, these alternatives are rarely as cost-effective as conventional cement, and they face raw-material shortages and resistance from customers.
13	**A**	But it is the scale on which it is used that makes it high carbon. The sheer scale of manufacture is so huge, that is the issue
14	**iii**	these early cars inherited steam’s weaknesses along with its strengths.

#	Answer	Explanation
15	**viii**	A new technology called the Internal Combustion Engine soon appeared,
16	**vi**	it drew the attention of automobile trade magazines due to its numerous improvements over previous steam cars. The Model B proved to be superior to gasoline automobiles in many ways.
17	**v**	By the following April, the General Engineering Company had received 5,390 deposits for Doble Detroits, which were scheduled for delivery in early 1918.
18	**vii**	Those buyers who received the handful of completed cars complained that the vehicles were sluggish and erratic,
19	**i**	After sitting overnight in freezing temperatures, the car was pushed out into the road and left to sit for over an hour in the frosty morning air.
20	**iv**	Under the current pressure to improve automotive performance and reduce emissions, it is not unthinkable that the steam car may rise again.
21	**A**	the glory days of steam cars were few.
22	**C**	Though it did not run well, the Doble brothers went on to build a second and third prototype in the following years.
23	**B**	in order to seek investment in his automobile design,
24	**speed**	its maximum speed
25	**fifty / 50**	fewer than fifty of the amazing Model E steam cars had been produced.
26	**strict**	Astonishingly, an unmodified Doble Model E runs clean enough to pass the emissions laws in California today, and they are pretty strict.
27	**B**	He’s given some of the students copies of No Fear Shakespeare, a kid-friendly translation of the original. For three students, even these literacy demands are beyond them. Another girl simply can’t focus and he gives her pens and paper to draw with. The teacher can ask the No Fear group to identify the key characters and maybe provide a tentative plot summary. He can ask most of the class about character development, and five of them might be able to support their statements with textual evidence.
28	**A**	The practice is intuitively appealing to almost every stakeholder.
29	**C**	The brightest ones will never summit Mount Qomolangma,

#	Answer	Explanation
30	**C**	The purpose of teaching is to provide and then gradually remove this ‘scaffolding’ until they are autonomous.
31	**H**	‘tracking has minimal effects on learning outcomes’.
32	**D**	What is more, streaming appears to significantly – and negatively – affect those students assigned to the lowest sets.
33	**F**	These students tend to have much higher representation of low socioeconomic class.
34	**E**	Less significant is the small benefit for those lucky clever students in the higher sets.
35	**B**	Streaming students by diagnosed achievement automatically limits what the teacher feels the student is capable of
36	**NO**	If we accept this model, it follows that streaming students with similar ZPDs would be an efficient and effective solution.
37	**NOT GIVEN**	While teachers are traditionally the MKOs in classrooms, the value of knowledgeable student peers must not go unrecognised either.
38	**YES**	There is also something exciting about passing on skills and knowledge that you yourself have just mastered
39	**NO**	And today, more than ever, we need the many to flourish – not suffer at the expense of a few bright stars.
40	**NOT GIVEN**	Once a year, I go on a hike with my class, a mixed bunch of students. It is challenging. The fittest students realise they need to encourage the reluctant. There are lookouts who report back, and extra items to carry for others. We make it – together.

Test 22

PASSAGE 1

Green roofs

A

Rooftops covered with grass, vegetable gardens and lush foliage are now a common sight in many cities around the world. More and more private companies and city authorities are investing in green roofs, drawn to their wide-ranging benefits. Among the benefits are saving on energy costs, mitigating the risk of floods, making habitats for urban wildlife, tackling air pollution and even growing food. These increasingly radical urban designs can help cities adapt to the monumental problems they face, such as access to resources and a lack of green space due to development. But the involvement of city authorities, businesses and other institutions is crucial to ensuring their success – as is research investigating different options to suit the variety of rooftop spaces found in cities. The UK is relatively new to developing green roofs, and local governments and institutions are playing a major role in spreading the practice. London is home to much of the UK's green roof market, mainly due to forward-thinking policies such as the London Plan, which has paved the way to more than doubling the area of green roofs in the capital.

B

Ongoing research is showcasing how green roofs in cities can integrate with 'living walls': environmentally friendly walls which are partially or completely covered with greenery, including a growing medium, such as soil or water. Research also indicates that green roofs can be integrated with drainage systems on the ground, such as street trees, so that the water is managed better and the built environment is made more sustainable. There is also evidence to demonstrate the social value of green roofs. Doctors are increasingly prescribing time spent gardening outdoors for patients dealing with anxiety and depression. And research has found that access to even the most basic green spaces can provide a better quality of life for dementia sufferers and help people avoid obesity.

C

In North America, green roofs have become mainstream, with a wide array of expansive, accessible and food-producing roofs installed in buildings. Again, city leaders and authorities have helped push the movement forward – only recently, San Francisco, USA, created a policy requiring new buildings to have green roofs. Toronto, Canada, has policies dating from the 1990s, encouraging the development of urban farms on rooftops. These countries also benefit from having newer buildings than in many parts of the world, which makes it easier to install green roofs. Being able to keep enough water at roof height and distribute it right across the rooftop is crucial to maintaining the plants on any green roof – especially on 'edible roofs' where fruit and vegetables are farmed. And it's much easier to do this in newer buildings, which can

typically hold greater weight, than to retro-fit old ones. Having a stronger roof also makes it easier to grow a greater variety of plants, since the soil can be deeper.

D

For green roofs to become the norm for new developments, there needs to be support from public authorities and private investors. Those responsible for maintaining buildings may have to acquire new skills, such as landscaping, and in some cases, volunteers may be needed to help out. Other considerations include installing drainage paths, meeting health and safety requirements and perhaps allowing access for the public, as well as planning restrictions and disruption from regular activities in and around the buildings during installation. To convince investors and developers that installing green roofs is worthwhile, economic arguments are still the most important. The term ‘natural capital’ has been developed to explain the economic value of nature; for example, measuring the money saved by installing natural solutions to protect against flood damage, adapt to climate change or help people lead healthier and happier lives.

E

As the expertise about green roofs grows, official standards have been developed to ensure that they are designed, constructed and maintained properly, and function well. Improvements in the science and technology underpinning green roof development have also led to new variations in the concept. For example, ‘blue roofs’ enable buildings to hold water over longer periods of time, rather than draining it away quickly – crucial in times of heavier rainfall. There are also combinations of green roofs with solar panels, and ‘brown roofs’ which are wilder in nature and maximise biodiversity. If the trend continues, it could create new jobs and a more vibrant and sustainable local food economy – alongside many other benefits. There are still barriers to overcome, but the evidence so far indicates that green roofs have the potential to transform cities and help them function sustainably long into the future. The success stories need to be studied and replicated elsewhere, to make green, blue, brown and food-producing roofs the norm in cities around the world.

PART 1 — QUESTIONS

Questions 1-5

The Reading Passage has five paragraphs, **A-E**.

Which paragraph contains the following information?

*Write the correct letter, **A-E**, in boxes on your answer sheet.*

NB *You may use any letter more than once.*

	A	B	C	D	E
1 mention of several challenges to be overcome before a green roof can be installed	○	○	○	○	○
2 reference to a city where green roofs have been promoted for many years	○	○	○	○	○
3 a belief that existing green roofs should be used as a model for new ones	○	○	○	○	○
4 examples of how green roofs can work in combination with other green urban initiatives	○	○	○	○	○
5 the need to make a persuasive argument for the financial benefits of green roofs	○	○	○	○	○

Questions 6-9

Complete the summary below.

*Choose **ONE WORD ONLY** from the passage for each answer.*

Write your answers in boxes on your answer sheet.

Advantages of green roofs

City rooftops covered with greenery have many advantages. These include lessening the likelihood that floods will occur, reducing how much money is spent on **6** _____ and creating environments that are suitable for wildlife. In many cases, they can also be used for producing **7** _____.

There are also social benefits of green roofs. For example, the medical profession recommends **8** _____ as an activity to help people cope with mental health issues. Studies have also shown that the availability of green spaces can prevent physical problems such as **9** _____.

Questions 10-11

*Choose **TWO** letters, **A-E**.*

Write the correct letters in boxes on your answer sheet.

10 **11** Which **TWO** advantages of using newer buildings for green roofs are mentioned in Paragraph C of the passage?

- **A** ☐ a longer growing season for edible produce
- **B** ☐ more economical use of water
- **C** ☐ greater water-storage capacity
- **D** ☐ ability to cultivate more plant types
- **E** ☐ a large surface area for growing plants

Questions 12-13

*Choose **TWO** letters, **A-E**.*

Write the correct letters in boxes on your answer sheet.

12 **13** Which **TWO** aims of new variations on the concept of green roofs are mentioned in Paragraph E of the passage?

- **A** ☐ to provide habitats for a wide range of species
- **B** ☐ to grow plants successfully even in the wettest climates
- **C** ☐ to regulate the temperature of the immediate environment
- **D** ☐ to generate power from a sustainable source
- **E** ☐ to collect water to supply other buildings

PASSAGE 2

The growth mindset

Over the past century, a powerful idea has taken root in the educational landscape. The concept of intelligence as something innate has been supplanted by the idea that intelligence is not fixed, and that, with the right training, we can be the authors of our own cognitive capabilities. Psychologist Alfred Binet, the developer of the first intelligence tests, was one of many 19th-century scientists who held that earlier view and sought to quantify cognitive ability. Then, in the early 20th century, progressive thinkers revolted against the notion that inherent ability is destiny. Instead, educators such as John Dewey argued that every child's intelligence could be developed, given the right environment.

'Growth mindset theory' is a relatively new – and extremely popular – version of this idea. In many schools today you will see hallways covered in motivational posters and hear speeches on the mindset of great sporting heroes who simply *believed* their way to the top. A major focus of the growth mindset in schools is coaxing students away from seeing failure as an indication of their ability, and towards seeing it as a chance to improve that ability. As educationalist Jeff Howard noted several decades ago: 'Smart is not something that you just are, smart is something that you can get.'

The idea of the growth mindset is based on the work of psychologist Carol Dweck in California in the 1990s. In one key experiment, Dweck divided a group of 10- to 12-year-olds into two groups. All were told that they had achieved a high score on a test but the first group were praised for their intelligence in achieving this, while the others were praised for their effort. The second group – those who had been instilled with a 'growth mindset' – were subsequently far more likely to put effort into future tasks. Meanwhile, the former took on only those tasks that would not risk their sense of worth. This group had inferred that success or failure is due to innate ability, and this 'fixed mindset' had led them to fear of failure and lack of effort. Praising ability actually made the students perform worse, while praising effort emphasised that change was possible.

One of the greatest impediments to successfully implementing a growth mindset, however, is the education system itself: in many parts of the world, the school climate is obsessed with performance in the form of constant testing, analysing and ranking of students – a key characteristic of the fixed mindset. Nor is it unusual for schools to create a certain cognitive dissonance, when they applaud the benefits of a growth mindset but then hand out fixed target grades in lessons based on performance.

Aside from the implementation problem, the original growth mindset research has also received harsh criticism. The statistician Andrew Gelman claims that 'their research designs have enough degrees of freedom that they could take their data to support just about any theory at all'. Professor of Psychology Timothy Bates, who has been trying to replicate Dweck's work, is finding that the results are repeatedly null. He notes that: 'People with a growth mindset don't cope any better with failure … Kids with the growth mindset aren't getting better grades, either before or after our intervention study.'

Much of this criticism is not lost on Dweck, and she deserves great credit for responding to it and adapting her work accordingly. In fact, she argues that her work has been misunderstood and misapplied in a range of ways. She has also expressed concerns that her theories are being misappropriated in schools by being conflated with the self-esteem movement: ‘For me the growth mindset is a tool for learning and improvement. It’s not just a vehicle for making children feel good.’

But there is another factor at work here. The failure to translate the growth mindset into the classroom might reflect a misunderstanding of the nature of teaching and learning itself. Growth mindset supporters David Yeager and Gregory Walton claim that interventions should be delivered in a subtle way to maximise their effectiveness. They say that if adolescents perceive a teacher’s intervention as conveying that they are in need of help, this could undo its intended effects.

A lot of what drives students is their innate beliefs and how they perceive themselves. There is a strong correlation between self-perception and achievement, but there is evidence to suggest that the actual effect of achievement on self-perception is stronger than the other way round. To stand up in a classroom and successfully deliver a good speech is a genuine achievement, and that is likely to be more powerfully motivating than vague notions of ‘motivation’ itself.

Recent evidence would suggest that growth mindset interventions are not the elixir of student learning that its proponents claim it to be. The growth mindset appears to be a viable construct in the lab, which, when administered in the classroom via targeted interventions, doesn’t seem to work. It is hard to dispute that having faith in the capacity to change is a good attribute for students. Paradoxically, however, that aspiration is not well served by direct interventions that try to instil it.

Motivational posters and talks are often a waste of time, and might well give students a deluded notion of what success actually means. Teaching concrete skills such as how to write an effective introduction to an essay then praising students’ effort in getting there is probably a far better way of improving confidence than telling them how unique they are, or indeed how capable they are of changing their own brains. Perhaps growth mindset works best as a philosophy and not an intervention.

PART 2 — QUESTIONS

Questions 14-16

*Choose the correct letter, **A**, **B**, **C** or **D**.*

Write the correct letter in boxes on your answer sheet

14 What can we learn from the first paragraph?

- **A** ○ where the notion of innate intelligence first began
- **B** ○ when ideas about the nature of intelligence began to shift
- **C** ○ how scientists have responded to changing views of intelligence
- **D** ○ why thinkers turned away from the idea of intelligence being fixed

15 The second paragraph describes how schools encourage students to

- **A** ○ identify their personal ambitions.
- **B** ○ help each other to realise their goals.
- **C** ○ have confidence in their potential to succeed.
- **D** ○ concentrate on where their particular strengths lie.

16 In the third paragraph, the writer suggests that students with a fixed mindset

- **A** ○ tend to be less competitive.
- **B** ○ generally have a low sense of self-esteem.
- **C** ○ will only work hard if they are given constant encouragement.
- **D** ○ are afraid to push themselves beyond what they see as their limitations.

Questions 17-22

Look at the following statements and the list of people below.

*Match each statement with the correct person or people, **A-E**.*

*Write the correct letter, **A-E**, in boxes on your answer sheet.*

NB *You may use any letter more than once.*

List of People

A Alfred Binet

B Carol Dweck

C Andrew Gelman

D Timothy Bates

E David Yeager and Gregory Walton

	A	B	C	D	E
17 The methodology behind the growth mindset studies was not strict enough.	○	○	○	○	○
18 The idea of the growth mindset has been incorrectly interpreted.	○	○	○	○	○
19 Intellectual ability is an unchangeable feature of each individual.	○	○	○	○	○
20 The growth mindset should be promoted without students being aware of it.	○	○	○	○	○
21 The growth mindset is not simply about boosting students' morale.	○	○	○	○	○
22 Research shows that the growth mindset has no effect on academic achievement.	○	○	○	○	○

Questions 23-26

Do the following statements agree with the views of the writer in The Reading Passage?

In boxes on your answer sheet, write

YES *if the statement agrees with the views of the writer*

NO *if the statement contradicts the views of the writer*

NOT GIVEN *if it is impossible to say what the writer thinks about this*

23 Dweck has handled criticisms of her work in an admirable way.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

24 Students' self-perception is a more effective driver of self-confidence than actual achievement is.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

25 Recent evidence about growth mindset interventions has attracted unfair coverage in the media.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

26 Deliberate attempts to encourage students to strive for high achievement may have a negative effect.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

PASSAGE 3

Alfred Wegener: science, exploration and the theory of continental drift

by Mott T Greene

Introduction

This is a book about the life and scientific work of Alfred Wegener, whose reputation today rests with his theory of continental displacements, better known as 'continental drift'. Wegener proposed this theory in 1912 and developed it extensively for nearly 20 years. His book on the subject, *The Origin of Continents* and *Oceans*, went through four editions and was the focus of an international controversy in his lifetime and for some years after his death.

Wegener's basic idea was that many mysteries about the Earth's history could be solved if one supposed that the continents moved laterally, rather than supposing that they remained fixed in place. Wegener showed in great detail how such continental movements were plausible and how they worked, using evidence from a large number of sciences including geology, geophysics, paleontology, and climatology. Wegener's idea – that the continents move – is at the heart of the theory that guides Earth sciences today: namely plate tectonics. Plate tectonics is in many respects quite different from Wegener's proposal, in the same way that modern evolutionary theory is very different from the ideas Charles Darwin proposed in the 1850s about biological evolution. Yet plate tectonics is a descendant of Alfred Wegener's theory of continental drift, in quite the same way that modern evolutionary theory is a descendant of Darwin's theory of natural selection.

When I started writing about Wegener's life and work, one of the most intriguing things about him for me was that, although he came up with a theory on continental drift, he was not a geologist. He trained as an astronomer and pursued a career in atmospheric physics. When he proposed the theory of continental displacements in 1912, he was a lecturer in physics and astronomy at the University of Marburg, in southern Germany. However, he was not an 'unknown'. In 1906 he had set a world record (with his brother Kurt) for time aloft in a hot-air balloon: 52 hours. Between 1906 and 1908 he had taken part in a highly publicized and extremely dangerous expedition to the coast of northeast Greenland. He had also made a name for himself amongst a small circle of meteorologists and atmospheric physicists in Germany as the author of a textbook, *Thermodynamics of the Atmosphere* (1911), and of a number of interesting scientific papers.

As important as Wegener's work on continental drift has turned out to be, it was largely a sideline to his interest in atmospheric physics, geophysics, and paleoclimatology*, and thus I have been at great pains to put Wegener's work on continental drift in the larger context of his other scientific work, and in the even larger context of atmospheric sciences in his lifetime. This is a 'continental drift book' only to the extent that Wegener was interested in that topic and later became famous for it. My treatment of his other scientific work is no less detailed, though I

certainly have devoted more attention to the reception of his ideas on continental displacement, as they were much more controversial than his other work.

Readers interested in the specific detail of Wegener's career will see that he often stopped pursuing a given line of investigation (sometimes for years on end), only to pick it up later. I have tried to provide guideposts to his rapidly shifting interests by characterizing different phases of his life as careers in different sciences, which is reflected in the titles of the chapters. Thus, the index should be a sufficient guide for those interested in a particular aspect of Wegener's life but perhaps not all of it. My own feeling, however, is that the parts do not make as much sense on their own as do all of his activities taken together. In this respect I urge readers to try to experience Wegener's life as he lived it, with all the interruptions, changes of mind, and renewed efforts this entailed.

Wegener left behind a few published works but, as was standard practice, these reported the results of his work – not the journey he took to reach that point. Only a few hundred of the many thousands of letters he wrote and received in his lifetime have survived and he didn't keep notebooks or diaries that recorded his life and activities. He was not active (with a few exceptions) in scientific societies, and did not seek to find influence or advance his ideas through professional contacts and politics, spending most of his time at home in his study reading and writing, or in the field collecting observations.

Some famous scientists, such as Newton, Darwin, and Einstein, left mountains of written material behind, hundreds of notebooks and letters numbering in the tens of thousands. Others, like Michael Faraday, left extensive journals of their thoughts and speculations, parallel to their scientific notebooks. The more such material a scientist leaves behind, the better chance a biographer has of forming an accurate picture of how a scientist's ideas took shape and evolved.

I am firmly of the opinion that most of us, Wegener included, are not in any real sense the authors of our own lives. We plan, think, and act, often with apparent freedom, but most of the time our lives 'happen to us', and we only retrospectively turn this happenstance into a coherent narrative of fulfilled intentions. This book, therefore, is a story both of the life and scientific work that Alfred Wegener planned and intended and of the life and scientific work that actually 'happened to him'. These are, as I think you will soon see, not always the same thing.

———

* Paleoclimatology – The study of past climates

PART 3 — QUESTIONS

Questions 27-30

Do the following statements agree with the claims of the writer in The Reading Passage?

In boxes on your answer sheet, write

YES *if the statement agrees with the claims of the writer*

NO *if the statement contradicts the claims of the writer*

NOT GIVEN *if it is impossible to say what the writer thinks about this*

27 Wegener's ideas about continental drift were widely disputed while he was alive.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

28 The idea that the continents remained fixed in place was defended in a number of respected scientific publications.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

29 Wegener relied on a limited range of scientific fields to support his theory of continental drift

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

30 The similarities between Wegener's theory of continental drift and modern-day plate tectonics are enormous.

- **A** ○ YES
- **B** ○ NO

C ○ NOT GIVEN

Questions 31-36

*Complete the summary using the list of phrases, **A-J**, below.*

*Write the correct letter, **A-J**, in boxes on your answer sheet.*

Wegener's life and work

One of the remarkable things about Wegener from a **31** _____ is that although he proposed a theory of continental drift, he was not a geologist. His **32** _____ were limited to atmospheric physics. However, at the time he proposed his theory of continental drift in 1912, he was already a person of **33** _____. Six years previously, there had been his **34** _____ of 52 hours in a hot-air balloon, followed by his well-publicised but **35** _____ of Greenland's coast. With the publication of his textbook on thermodynamics, he had also come to the attention of a **36** _____ of German scientists.

A. **modest fame** B. **vast range** C. **record-breaking achievement**

D. **research methods** E. **select group** F. **professional interests**

G. **scientific debate** H. **hazardous exploration**

I. **biographer's perspective** J. **narrow investigation**

Questions 37-40

*Choose the correct letter, **A**, **B**, **C** or **D**.*

Write the correct letter in boxes on your answer sheet.

37 What is Mott T Greene doing in the fifth paragraph?

A ○ describing what motivated him to write the book

B ○ explaining why it is desirable to read the whole book

C ○ suggesting why Wegener pursued so many different careers

D ○ indicating what aspects of Wegener's life interested him most

38 What is said about Wegener in the sixth paragraph?

- **A** ○ He was not a particularly ambitious person.
- **B** ○ He kept a record of all his scientific observations.
- **C** ○ He did not adopt many of the scientific practices of the time.
- **D** ○ He enjoyed discussing new discoveries with other scientists.

39 What does Greene say about some other famous scientists?

- **A** ○ Their published works had a greater impact than Wegener's did.
- **B** ○ They had fewer doubts about their scientific ideas than Wegener did.
- **C** ○ Their scientific ideas were more controversial than Wegener's.
- **D** ○ They are easier subjects to write about than Wegener.

40 What is Greene's main point in the final paragraph?

- **A** ○ It is not enough in life to have good intentions.
- **B** ○ People need to plan carefully if they want to succeed.
- **C** ○ People have little control over many aspects of their lives.
- **D** ○ It is important that people ensure they have the freedom to act.

Answer Key

#	Answer	Explanation
1	**D**	Those responsible for maintaining buildings may have to acquire new skills, such as landscaping, and in some cases, volunteers may be needed to help out. Other considerations include installing drainage paths, meeting health and safety requirements and perhaps allowing access for the public, as well as planning restrictions and disruption from regular activities in and around the buildings during installation.
2	**C**	Toronto, Canada, has policies dating from the 1990s, encouraging the development of urban farms on rooftops.
3	**E**	There are still barriers to overcome, but the evidence so far indicates that green roofs have the potential to transform cities and help them function sustainably long into the future.
4	**B**	Ongoing research is showcasing how green roofs in cities can integrate with ‘living walls’: environmentally friendly walls which are partially or completely covered with greenery, including a growing medium, such as soil or water. Research also indicates that green roofs can be integrated with drainage systems on the ground,
5	**D**	To convince investors and developers that installing green roofs is worthwhile, economic arguments are still the most important.
6	**energy**	Among the benefits are saving on energy costs,
7	**food**	mitigating the risk of floods, making habitats for urban wildlife, tackling air pollution and even growing food.
8	**gardening**	Doctors are increasingly prescribing time spent gardening outdoors for patients dealing with anxiety and depression.
9	**obesity**	And research has found that access to even the most basic green spaces can provide a better quality of life for dementia sufferers and help people avoid obesity.
10	**C / D**	which can typically hold greater weight, than to retro-fit old ones. Having a stronger roof also makes it easier to grow a greater variety of plants,
11	**C / D**	which can typically hold greater weight, than to retro-fit old ones. Having a stronger roof also makes it easier to grow a greater variety of plants,

#	Answer	Explanation
12	**A / D**	'brown roofs' which are wilder in nature and maximise biodiversity. There are also combinations of green roofs with solar panels,
13	**A / D**	'brown roofs' which are wilder in nature and maximise biodiversity. There are also combinations of green roofs with solar panels,
14	**B**	Instead, educators such as John Dewey argued that every child's intelligence could be developed, given the right environment.
15	**C**	A major focus of the growth mindset in schools is coaxing students away from seeing failure as an indication of their ability, and towards seeing it as a chance to improve that ability.
16	**D**	Meanwhile, the former took on only those tasks that would not risk their sense of worth.
17	**C**	The statistician Andrew Gelman claims that 'their research designs have enough degrees of freedom that they could take their data to support just about any theory at all'.
18	**B**	she argues that her work has been misunderstood and misapplied in a range of ways.
19	**A**	in the early 20th century, progressive thinkers revolted against the notion that inherent ability is destiny.
20	**E**	Growth mindset supporters David Yeager and Gregory Walton claim that interventions should be delivered in a subtle way to maximise their effectiveness.
21	**B**	her theories are being misappropriated in schools by being conflated with the self-esteem movement
22	**D**	He notes that: 'People with a growth mindset don't cope any better with failure … Kids with the growth mindset aren't getting better grades, either before or after our intervention study.'
23	**YES**	Much of this criticism is not lost on Dweck, and she deserves great credit for responding to it and adapting her work accordingly.
24	**NO**	there is evidence to suggest that the actual effect of achievement on self-perception is stronger than the other way round.
25	**NOT GIVEN**	Recent evidence would suggest that growth mindset interventions are not the elixir of student learning that its proponents claim it to be.
26	**YES**	Motivational posters and talks are often a waste of time, and might well give students a deluded notion of what success

#	Answer	Explanation
		actually means.
27	**YES**	the focus of an international controversy in his lifetime
28	**NOT GIVEN**	they remained fixed in place.
29	**NO**	using evidence from a large number of sciences including geology, geophysics, paleontology, and climatology.
30	**NO**	in the same way that modern evolutionary theory is very different from the ideas Charles Darwin proposed in the 1850s about biological evolution. Yet plate tectonics is a descendant of Alfred Wegener's theory of continental drift, in quite the same way that modern evolutionary theory is a descendant of Darwin's theory of natural selection.
31	**I**	When I started writing about Wegener's life and work,
32	**F**	He trained as an astronomer and pursued a career in atmospheric physics.
33	**A**	However, he was not an 'unknown'.
34	**C**	In 1906 he had set a world record (with his brother Kurt) for time aloft in a hot-air balloon: 52 hours.
35	**H**	Between 1906 and 1908 he had taken part in a highly publicized and extremely dangerous expedition to the coast of northeast Greenland.
36	**E**	He had also made a name for himself amongst a small circle of meteorologists and atmospheric physicists in Germany as the author of a textbook, Thermodynamics of the Atmosphere (1911), and of a number of interesting scientific papers.
37	**B**	My own feeling, however, is that the parts do not make as much sense on their own as do all of his activities taken together. In this respect I urge readers to try to experience Wegener's life as he lived it, with all the interruptions, changes of mind, and renewed efforts this entailed.
38	**A**	He was not active (with a few exceptions) in scientific societies, and did not seek to find influence or advance his ideas through professional contacts and politics, spending most of his time at home in his study reading and writing, or in the field collecting observations.
39	**D**	The more such material a scientist leaves behind, the better chance a biographer has of forming an accurate picture of how a scientist's ideas took shape and evolved.

#	Answer	Explanation
40	**C**	We plan, think, and act, often with apparent freedom, but most of the time our lives ‘happen to us’, and we only retrospectively turn this happenstance into a coherent narrative of fulfilled intentions.

Test 23

PASSAGE 1

How tennis rackets have changed

In 2016, the British professional tennis player Andy Murray was ranked as the world's number one. It was an incredible achievement by any standard – made even more remarkable by the fact that he did this during a period considered to be one of the strongest in the sport's history, competing against the likes of Rafael Nadal, Roger Federer and Novak Djokovic, to name just a few. Yet five years previously, he had been regarded as a talented outsider who entered but never won the major tournaments.

Of the changes that account for this transformation, one was visible and widely publicised: in 2011, Murray invited former number one player Ivan Lendl onto his coaching team – a valuable addition that had a visible impact on the player's playing style. Another change was so subtle as to pass more or less unnoticed. Like many players, Murray has long preferred a racket that consists of two types of string: one for the mains (verticals) and another for the crosses (horizontals). While he continued to use natural string in the crosses, in 2012 he switched to a synthetic string for the mains. A small change, perhaps, but its importance should not be underestimated.

The modification that Murray made is just one of a number of options available to players looking to tweak their rackets in order to improve their games. 'Touring professionals have their rackets customised to their specific needs,' says Colin Triplow, a UK-based professional racket stringer. 'It's a highly important part of performance maximisation.' Consequently, the specific rackets used by the world's elite are not actually readily available to the public; rather, each racket is individually made to suit the player who uses it. Take the US professional tennis players Mike and Bob Bryan, for example: 'We're very particular with our racket specifications,' they say. 'All our rackets are sent from our manufacturer to Tampa, Florida, where our frames go through a … thorough customisation process.' They explain how they have adjusted not only racket length, but even experimented with different kinds of paint. The rackets they use now weigh more than the average model and also have a denser string pattern (i.e. more crosses and mains).

The primary reason for these modifications is simple: as the line between winning and losing becomes thinner and thinner, even these slight changes become more and more important. As a result, players and their teams are becoming increasingly creative with the modifications to their rackets as they look to maximise their competitive advantage.

Racket modifications mainly date back to the 1970s, when the amateur German tennis player Werner Fischer started playing with the so-called spaghetti-strung racket. It created a string bed that generated so much topspin that it was quickly banned by the International Tennis Federation. However, within a decade or two, racket modification became a regularity. Today it is, in many ways, an aspect of the game that is equal in significance to nutrition or training.

Modifications can be divided into two categories: those to the string bed and those to the racket frame. The former is far more common than the latter: the choice of the strings and the tension with which they are installed is something that nearly all professional players experiment with. They will continually change it depending on various factors including the court surface, climatic conditions, and game styles. Some will even change it depending on how they feel at the time.

At one time, all tennis rackets were strung with natural gut made from the outer layer of sheep or cow intestines. This all changed in the early 1990s with the development of synthetic strings that were cheaper and more durable. They are made from three materials: nylon (relatively durable and affordable), Kevlar (too stiff to be used alone) or co-polyester (polyester combined with additives that enhance its performance). Even so, many professional players continue to use a 'hybrid set-up', where a combination of both synthetic and natural strings are used.

Of the synthetics, co-polyester is by far the most widely used. It's a perfect fit for the style of tennis now played, where players tend to battle it out from the back of the court rather than coming to the net. Studies indicate that the average spin from a co-polyester string is 25% greater than that from natural string or other synthetics. In a sense, the development of co-polyester strings has revolutionised the game.

However, many players go beyond these basic adjustments to the strings and make changes to the racket frame itself. For example, much of the serving power of US professional player Pete Sampras was attributed to the addition of four to five lead weights onto his rackets, and today many professionals have the weight adjusted during the manufacturing process.

Other changes to the frame involve the handle. Players have individual preferences for the shape of the handle and some will have the handle of one racket moulded onto the frame of a different racket. Other players make different changes. The professional Portuguese player Gonçalo Oliveira replaced the original grips of his rackets with something thinner because they had previously felt uncomfortable to hold.

Racket customisation and modification have pushed the standards of the game to greater levels that few could have anticipated in the days of natural strings and heavy, wooden frames, and it's exciting to see what further developments there will be in the future.

PART 1 — QUESTIONS

Questions 1-7

Do the following statements agree with the information given in Reading Passage?

In boxes on your answer sheet, write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

1 People had expected Andy Murray to become the world's top tennis player for at least five years before 2016.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

2 The change that Andy Murray made to his rackets attracted a lot of attention.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

3 Most of the world's top players take a professional racket stringer on tour with them.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

4 Mike and Bob Bryan use rackets that are light in comparison to the majority of rackets.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

5 Werner Fischer played with a spaghetti-strung racket that he designed himself.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

6 The weather can affect how professional players adjust the strings on their rackets.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

7 It was believed that the change Pete Sampras made to his rackets contributed to his strong serve.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

Questions 8-13

Complete the notes below.

Choose ONE WORD ONLY from the passage for each answer.

Write your answers in boxes on your answer sheet.

The tennis racket and how it has changed

- Mike and Bob Bryan made changes to the types of **8** _____ used on their racket frames.
- Players were not allowed to use the spaghetti-strung racket because of the amount of **9** _____ it created.
- Changes to rackets can be regarded as being as important as players' diets or the **10** _____ they do.
- All rackets used to have natural strings made from the **11** _____ of animals.

- Pete Sampras had metal **12** _____ put into the frames of his rackets.
- Gongalo Oliveira changed the **13** _____ on his racket handles.

PASSAGE 2

The pirates of the ancient Mediterranean

In the first and second millennia BCE, pirates sailed around the Mediterranean, attacking ships and avoiding pursuers

A. When one mentions pirates, an image springs to most people's minds of a crew of misfits, daredevils and adventurers in command of a tall sailing ship in the Caribbean Sea. Yet from the first to the third millennium BCE, thousands of years before these swashbucklers began spreading fear across the Caribbean, pirates prowled the Mediterranean, raiding merchant ships and threatening vital trade routes. However, despite all efforts and the might of various ancient states, piracy could not be stopped. The situation remained unchanged for thousands of years. Only when the pirates directly threatened the interests of ancient Rome did the Roman Republic organise a massive fleet to eliminate piracy. Under the command of the Roman general Pompey, Rome eradicated piracy, transforming the Mediterranean into 'Mare Nostrum' (Our Sea).

B. Although piracy in the Mediterranean is first recorded in ancient Egypt during the reign of Pharaoh Amenhotep III (c 1390-1353 BCE), it is reasonable to assume it predated this powerful civilisation. This is partly due to the great importance the Mediterranean held at this time, and partly due to its geography. While the Mediterranean region is predominantly fertile, some parts are rugged and hilly, even mountainous. In the ancient times, the inhabitants of these areas relied heavily on marine resources, including fish and salt. Most had their own boats, possessed good seafaring skills, and unsurpassed knowledge of the local coastline and sailing routes. Thus, it is not surprising that during hardships, these men turned to piracy. Geography itself further benefited the pirates, with the numerous coves along the coast providing places for them to hide their boats and strike undetected. Before the invention of ocean-going caravels in the 15th century, ships could not easily cross long distances over open water. Thus, in the ancient world most were restricted to a few well- known navigable routes that followed the coastline. Caught in a trap, a slow merchant ship laden with goods had no other option but to surrender. In addition, knowledge of the local area helped the pirates to avoid retaliation once a state fleet arrived.

C. One should also add that it was not unknown in the first and second millennia BCE for governments to resort to pirates' services, especially during wartime, employing their skills and numbers against their opponents. A pirate fleet would serve in the first wave of attack, preparing the way for the navy. Some of the regions were known for providing safe harbours to pirates, who, in return, boosted the local economy.

D. The first known record of a named group of Mediterranean pirates, made during the rule of ancient Egyptian Pharaoh Akhenaten (c 1353-1336 BCE), was in the Amarna Letters. These were extracts of diplomatic correspondence between the pharaoh and his allies, and covered many pressing issues, including piracy. It seems the pharaoh was troubled by two distinct pirate groups, the Lukka and the Sherden. Despite the Egyptian fleet's best efforts, the pirates continued to cause substantial disruption to regional commerce. In the letters, the king of

Alashiya (modern Cyprus) rejected Akhenaten's claims of a connection with the Lukka (based in modern-day Turkey). The king assured Akhenaten he was prepared to punish any of his subjects involved in piracy.

E. The ancient Greek world's experience of piracy was different from that of Egyptian rulers. While Egypt's power was land-based, the ancient Greeks relied on the Mediterranean in almost all aspects of life, from trade to warfare. Interestingly, in his works the Iliad and the Odyssey, the ancient Greek writer Homer not only condones, but praises the lifestyle and actions of pirates. The opinion remained unchanged in the following centuries. The ancient Greek historian Thucydides, for instance, glorified pirates' daring attacks on ships or even cities. For Greeks, piracy was a part of everyday life. Even high-ranking members of the state were not beyond engaging in such activities. According to the Greek orator Demosthenes, in 355 BCE, Athenian ambassadors made a detour from their official travel to capture a ship sailing from Egypt, taking the wealth found onboard for themselves! The Greeks' liberal approach towards piracy does not mean they always tolerated it, but attempts to curtail piracy were hampered by the large number of pirates operating in the Mediterranean.

F. The rising power of ancient Rome required the Roman Republic to deal with piracy in the Mediterranean. While piracy was a serious issue for the Republic, Rome profited greatly from its existence. Pirate raids provided a steady source of slaves, essential for Rome's agriculture and mining industries. But this arrangement could work only while the pirates left Roman interests alone. Pirate attacks on grain ships, which were essential to Roman citizens, led to angry voices in the Senate, demanding punishment of the culprits. Rome, however, did nothing, further encouraging piracy. By the 1st century BCE, emboldened pirates kidnapped prominent Roman dignitaries, asking for a large ransom to be paid. Their most famous hostage was none other than Julius Caesar, captured in 75 BCE.

G. By now, Rome was well aware that pirates had outlived their usefulness. The time had come for concerted action. In 67 BCE, a new law granted Pompey vast funds to combat the Mediterranean menace. Taking personal command, Pompey divided the entire Mediterranean into 13 districts, assigning a fleet and commander to each. After cleansing one district of pirates, the fleet would join another in the next district. The process continued until the entire Mediterranean was free of pirates. Although thousands of pirates died at the hands of Pompey's troops, as a long-term solution to the problem, many more were offered land in fertile areas located far from the sea. Instead of a maritime menace, Rome got productive farmers that further boosted its economy.

PART 2 — QUESTIONS

Questions 14-19

Which paragraph contains the following information?

*Write the correct letter, **A-G**, in boxes on your answer sheet.*

NB You may use any letter more than once.

	A	B	C	D	E	F	G
14 a reference to a denial of involvement in piracy	○	○	○	○	○	○	○
15 details of how a campaign to eradicate piracy was carried out	○	○	○	○	○	○	○
16 a mention of the circumstances in which states in the ancient world would make use of pirates	○	○	○	○	○	○	○
17 a reference to how people today commonly view pirates	○	○	○	○	○	○	○
18 an explanation of how some people were encouraged not to return to piracy	○	○	○	○	○	○	○
19 a mention of the need for many sailing vessels to stay relatively close to land	○	○	○	○	○	○	○

Questions 20-21

Choose **TWO** letters, ***A-E***.

Write the correct letters in boxes on your answer sheet.

20 **21** Which **TWO** of the following statements does the writer make about inhabitants of the Mediterranean region in the ancient world?

A ☐ They often used stolen vessels to carry out pirate attacks.

B ☐ They managed to escape capture by the authorities because they knew the area so well.

C ☐ They paid for information about the routes merchant ships would take.

D ☐ They depended more on the sea for their livelihood than on farming.

E ☐ They stored many of the goods taken in pirate attacks in coves along the coastline.

Questions 22-23

*Choose **TWO** letters, **A–E**.*

Write the correct letters in boxes on your answer sheet.

22 **23** Which TWO of the following statements does the writer make about piracy and ancient Greece?

A ☐ The state estimated that very few people were involved in piracy.

B ☐ Attitudes towards piracy changed shortly after the Iliad and the Odyssey were written.

C ☐ Important officials were known to occasionally take part in piracy.

D ☐ Every citizen regarded pirate attacks on cities as unacceptable.

E ☐ A favourable view of piracy is evident in certain ancient Greek texts.

Questions 24-26

Complete the summary below.

Choose **ONE WORD ONLY** from the passage for each answer.

Write your answers in boxes on your answer sheet.

Ancient Rome and piracy

Piracy was an issue ancient Rome had to deal with, but it also brought some benefits for Rome. For example, pirates supplied slaves that were important for Rome's industries. However, attacks on vessels transporting **24** _____ resulted in calls for **25** _____ for the pirates responsible. Nevertheless, piracy continued, with some pirates demanding a **26** _____ for the return of the Roman officials they captured.

PASSAGE 3

The persistence and peril of misinformation

Brian Southwell looks at how human brains verify information and discusses some of the challenges of battling widespread falsehoods

Misinformation – both deliberately promoted and accidentally shared -is perhaps an inevitable part of the world in which we live, but it is not a new problem. People likely have lied to one another for roughly as long as verbal communication has existed. Deceiving others can offer an apparent opportunity to gain strategic advantage, to motivate others to action, or even to protect interpersonal bonds. Moreover, people inadvertently have been sharing inaccurate information with one another for thousands of years.

However, we currently live in an era in which technology enables information to reach large audiences distributed across the globe,and thus the potential for immediate and widespread effects from misinformation now looms larger than in the past. Yet the means to correct misinformation might,over time,be found in those same patterns of mass communication and of the facilitated spread of information.

The main worry regarding misinformation is its potential to unduly influence attitudes and behavior, leading people to think and act differently than they would if they were correctly informed, as suggested by the research teams of Stephan Lewandowsky of the University of Bristol and Elizabeth Marsh of Duke University, among others. In other words, we worry that misinformation might lead people to hold misperceptions (or false beliefs) and that these misperceptions, especially when they occur among large groups of people, may have detrimental, downstream consequences for health, social harmony, and the political climate.

At least three observations related to misinformation in the contemporary mass-media environment warrant the attention of researchers, policy makers, and really everyone who watches television, listens to the radio, or reads information online. First of all, people who encounter misinformation tend to believe it, at least initially. Secondly, electronic and print media often do not block many types of misinformation before it appears in content available to large audiences. Thirdly, countering misinformation once it has enjoyed wide exposure can be a resource-intensive effort.

Knowing what happens when people initially encounter misinformation holds tremendous importance for estimating the potential for subsequent problems. Although it is fairly routine for individuals to come across information that is false, the question of exactly how – and when – we mentally label information as true or false has garnered philosophical debate. The dilemma is neatly summarized by a contrast between how the 17th-century philosophers Rene Descartes and Baruch Spinoza described human information engagement, with conflicting predictions that only recently have been empirically tested in robust ways. Descartes argued that a person only accepts or rejects information after considering its truth or falsehood; Spinoza argued that people accept all encountered information (or misinformation) by default and then subsequently verify or reject it through a separate cognitive process. In recent decades,

empirical evidence from the research teams of Erik Asp of the University of Chicago and Daniel Gilbert at Harvard University, among others, has supported Spinoza's account: people appear to encode all new information as if it were true, even if only momentarily, and later tag the information as being either true or false, a pattern that seems consistent with the observation that mental resources for skepticism physically reside in a different part of the brain than the resources used in perceiving and encoding.

What about our second observation that misinformation often can appear in electronic or print media without being preemptively blocked? In support of this, one might consider the nature of regulatory structures in the United States: regulatory agencies here tend to focus on post hoc detection of broadcast information. Organizations such as the Food and Drug Administration (FDA) offer considerable monitoring and notification functions, but these roles typically do not involve preemptive censoring. The IDA oversees direct-to-consumer prescription drug advertising, for example, and has developed mechanisms such as the 'Bad Ad' program, through which people can report advertising in apparent violation of FDA guidelines on drug risks. Such programs, although laudable and useful, do not keep false advertising off the airwaves. In addition, even misinformation that is successfully corrected can continue to affect attitudes.

This leads us to our third observation: a campaign to correct misinformation, even if rhetorically compelling, requires resources and planning to accomplish necessary reach and frequency. For corrective campaigns to be persuasive, audiences need to be able to comprehend them, which requires either effort to frame messages in ways that are accessible or effort to educate and sensitize audiences to the possibility of misinformation. That some audiences might be unaware of the potential for misinformation also suggests the utility of media literacy efforts as early as elementary school. Even with journalists and scholars pointing to the phenomenon of 'fake news', people do not distinguish between demonstrably false stories and those based in fact when scanning and processing written information.

We live at a time when widespread misinformation is common. Yet at this time many people also are passionately developing potential solutions and remedies. The journey forward undoubtedly will be a long and arduous one. Future remedies will require not only continued theoretical consideration but also the development and maintenance of consistent monitoring tools and a recognition among fellow members of society that claims which find prominence in the media that are insufficiently based in scientific consensus and social reality should be countered. Misinformation arises as a result of human fallibility and human information needs. To overcome the worst effects of the phenomenon, we will need coordinated efforts over time, rather than any singular one-time panacea we could hope to offer.

PART 3 — QUESTIONS

Questions 27-30

*Choose the correct letter, **A**, **B**, **C** or **D**.*

Write the correct letter in boxes on your answer sheet.

27 What point does the writer make about misinformation in the first paragraph?

- **A** ○ Misinformation is a relatively recent phenomenon.
- **B** ○ Some people find it easy to identify misinformation.
- **C** ○ Misinformation changes as it is passed from one person to another.
- **D** ○ There may be a number of reasons for the spread of misinformation.

28 What does the writer say about the role of technology?

- **A** ○ It may at some point provide us with a solution to misinformation.
- **B** ○ It could fundamentally alter the way in which people regard information.
- **C** ○ It has changed the way in which organisations use misinformation.
- **D** ○ It has made it easier for people to check whether information is accurate.

29 What is the writer doing in the fourth paragraph?

- **A** ○ comparing the different opinions people have of misinformation
- **B** ○ explaining how the effects of misinformation have changed over time
- **C** ○ outlining which issues connected with misinformation are significant today
- **D** ○ describing the attitude of policy makers towards misinformation in the media

30 What point does the writer make about regulation in the USA?

- **A** ○ The guidelines issued by the FDA need to be simplified.
- **B** ○ Regulation does not affect people's opinions of new prescription drugs.
- **C** ○ The USA has more regulatory bodies than most other countries.

D ○ Regulation fails to prevent misinformation from appearing in the media.

Questions 31-36

Complete the summary using the list of phrases, A-J, below

*Write the correct letter. **A-J**, in boxes on your answer sheet.*

A. constant conflict	B. additional evidence	C. different locations
D. experimental subjects	E. short period	F. extreme distrust
G. frequent exposure	H. mental operation	I. dubious reason
J. different ideas		

What happens when people encounter misinformation?

Although people have **31** _____ to misinformation, there is debate about precisely how and when we label something as true or untrue. The philosophers Descartes and Spinoza had **32** _____ about how people engage with information. While Descartes believed that people accept or reject information after considering whether it is true or not, Spinoza argued that people accepted all information they encountered (and by default misinformation) and did not verify or reject it until afterwards. Moreover, Spinoza believed that a distinct **33** _____ is involved in these stages. Recent research has provided **34** _____ for Spinoza's theory and it would appear that people accept all encountered information as if it were true, even if this is for an extremely **35** _____, and do not label the information as true or false until later. This is consistent with the fact that the resources for scepticism and the resources for perceiving and encoding are in **36** _____ in the brain.

A. **constant conflict** B. **additional evidence** C. **different locations**

D. **experimental subjects** E. **short period** F. **extreme distrust**

G. **frequent exposure** H. **mental operation** I. **dubious reason**

J. **different ideas**

Questions 37-40

In boxes on your answer sheet, write

YES if the statement agrees with the claims of the writer

NO if the statement contradicts the claims of the writer

NOT GIVEN if it is impossible to say what the writer thinks about this

37 Campaigns designed to correct misinformation will fail to achieve their purpose if people are unable to understand them.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

38 Attempts to teach elementary school students about misinformation have been opposed.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

39 It may be possible to overcome the problem of misinformation in a relatively short period.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

40 The need to keep up with new information is hugely exaggerated in today's world.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

Answer Key

#	Answer	Explanation
1	**FALSE**	Yet five years previously, he had been regarded as a talented outsider who entered but never won the major tournaments.
2	**FALSE**	Another change was so subtle as to pass more or less unnoticed.
3	**NOT GIVEN**	'Touring professionals have their rackets customised to their specific needs,' says Colin Triplow, a UK-based professional racket stringer.
4	**FALSE**	The rackets they use now weigh more than the average model and also have a denser string pattern (i.e. more crosses and mains).
5	**NOT GIVEN**	Racket modifications mainly date back to the 1970s, when the amateur German tennis player Werner Fischer started playing with the so-called spaghetti-strung racket.
6	**TRUE**	The former is far more common than the latter: the choice of the strings and the tension with which they are installed is something that nearly all professional players experiment with. They will continually change it depending on various factors including the court surface, climatic conditions, and game styles.
7	**TRUE**	For example, much of the serving power of US professional player Pete Sampras was attributed to the addition of four to five lead weights onto his rackets, and today many professionals have the weight adjusted during the manufacturing process.
8	**paint**	They explain how they have adjusted not only racket length, but even experimented with different kinds of paint.
9	**topspin**	It created a string bed that generated so much topspin that it was quickly banned by the International Tennis Federation.
10	**training**	However, within a decade or two, racket modification became a regularity. Today it is, in many ways, an aspect of the game that is equal in significance to nutrition or training.
11	**intestines**	At one time, all tennis rackets were strung with natural gut made from the outer layer of sheep or cow intestines. This all changed in the early 1990s with the development of synthetic strings that were cheaper and more durable.
12	**weights**	For example, much of the serving power of US professional player Pete Sampras was attributed to the addition of four to five lead

#	Answer	Explanation
		weights onto his rackets, and today many professionals have the weight adjusted during the manufacturing process.
13	**grips**	The professional Portuguese player Gonçalo Oliveira replaced the original grips of his rackets with something thinner because they had previously felt uncomfortable to hold.
14	**D**	In the letters, the king of Alashiya (modern Cyprus) rejected Akhenaten's claims of a connection with the Lukka (based in modern-day Turkey). The king assured Akhenaten he was prepared to punish any of his subjects involved in piracy.
15	**G**	After cleansing one district of pirates, the fleet would join another in the next district. The process continued until the entire Mediterranean was free of pirates. Although thousands of pirates died at the hands of Pompey's troops
16	**C**	One should also add that it was not unknown in the first and second millennia BCE for governments to resort to pirates' services, especially during wartime, employing their skills and numbers against their opponents.
17	**A**	When one mentions pirates, an image springs to most people's minds of a crew of misfits, daredevils and adventurers in command of a tall sailing ship in the Caribbean Sea.
18	**G**	Although thousands of pirates died at the hands of Pompey's troops, as a long-term solution to the problem, many more were offered land in fertile areas located far from the sea. Instead of a maritime menace, Rome got productive farmers that further boosted its economy.
19	**B**	Geography itself further benefited the pirates, with the numerous coves along the coast providing places for them to hide their boats and strike undetected. Before the invention of ocean-going caravels in the 15th century, ships could not easily cross long distances over open water.
20	**B / D**	Although piracy in the Mediterranean is first recorded in ancient Egypt during the reign of Pharaoh Amenhotep III (c 1390-1353 BCE), it is reasonable to assume it predated this powerful civilisation. While the Mediterranean region is predominantly fertile, some parts are rugged and hilly, even mountainous. In the ancient times, the inhabitants of these areas relied heavily on marine resources, including fish and salt.
21	**B / D**	Although piracy in the Mediterranean is first recorded in ancient Egypt during the reign of Pharaoh Amenhotep III (c 1390-1353 BCE), it is reasonable to assume it predated this powerful civilisation. While the Mediterranean region is predominantly fertile, some parts are rugged and hilly, even mountainous. In the

#	Answer	Explanation
		ancient times, the inhabitants of these areas relied heavily on marine resources, including fish and salt.
22	C / E	Even high-ranking members of the state were not beyond engaging in such activities. Interestingly, in his works the Iliad and the Odyssey, the ancient Greek writer Homer not only condones, but praises the lifestyle and actions of pirates.
23	C / E	Even high-ranking members of the state were not beyond engaging in such activities. Interestingly, in his works the Iliad and the Odyssey, the ancient Greek writer Homer not only condones, but praises the lifestyle and actions of pirates.
24	grain	Pirate raids provided a steady source of slaves, essential for Rome's agriculture and mining industries. But this arrangement could work only while the pirates left Roman interests alone. Pirate attacks on grain ships
25	punishment	Pirate attacks on grain ships, which were essential to Roman citizens, led to angry voices in the Senate, demanding punishment of the culprits.
26	ransom	Rome, however, did nothing, further encouraging piracy. By the 1st century BCE, emboldened pirates kidnapped prominent Roman dignitaries, asking for a large ransom to be paid.
27	D	Misinformation – both deliberately promoted and accidentally shared -is perhaps an inevitable part of the world in which we live
28	A	Yet the means to correct misinformation might,over time,be found in those same patterns of mass communication and of the facilitated spread of information.
29	C	At least three observations related to misinformation in the contemporary mass-media environment warrant the attention of researchers, policy makers, and really everyone who watches television, listens to the radio, or reads information online.
30	D	Organizations such as the Food and Drug Administration (FDA) offer considerable monitoring and notification functions, but these roles typically do not involve preemptive censoring.
31	G	Although it is fairly routine for individuals to come across information that is false, the question of exactly how – and when – we mentally label information as true or false has garnered philosophical debate.
32	J	The dilemma is neatly summarized by a contrast between how the 17th-century philosophers Rene Descartes and Baruch Spinoza described human information engagement, with conflicting

#	Answer	Explanation
		predictions that only recently have been empirically tested in robust ways.
33	**H**	Spinoza argued that people accept all encountered information (or misinformation) by default and then subsequently verify or reject it through a separate cognitive process.
34	**B**	In recent decades, empirical evidence from the research teams of Erik Asp of the University of Chicago and Daniel Gilbert at Harvard University, among others, has supported Spinoza's account:
35	**E**	people appear to encode all new information as if it were true, even if only momentarily, and later tag the information as being either true or false
36	**C**	a pattern that seems consistent with the observation that mental resources for skepticism physically reside in a different part of the brain than the resources used in perceiving and encoding.
37	**YES**	For corrective campaigns to be persuasive, audiences need to be able to comprehend them
38	**NOT GIVEN**	That some audiences might be unaware of the potential for misinformation also suggests the utility of media literacy efforts as early as elementary school.
39	**NO**	Yet at this time many people also are passionately developing potential solutions and remedies. The journey forward undoubtedly will be a long and arduous one.
40	**NOT GIVEN**	Misinformation arises as a result of human fallibility and human information needs.

Test 24

PASSAGE 1

The Industrial Revolution in Britain

The Industrial Revolution began in Britain in the mid-1700s and by the 1830s and 1840s had spread to many other parts of the world, including the United States. In Britain, it was a period when a largely rural, agrarian* society was transformed into an industrialised, urban one. Goods that had once been crafted by hand started to be produced in mass quantities by machines in factories, thanks to the invention of steam power and the introduction of new machines and manufacturing techniques in textiles, iron-making and other industries.

The foundations of the Industrial Revolution date back to the early 1700s, when the English inventor Thomas Newcomen designed the first modern steam engine. Called the 'atmospheric steam engine', Newcomen's invention was originally used to power machines that pumped water out of mines. In the 1760s, the Scottish engineer James Watt started to adapt one of Newcomen's models, and succeeded in making it far more efficient. Watt later worked with the English manufacturer Matthew Boulton to invent a new steam engine driven by both the forward and backward strokes of the piston, while the gear mechanism it was connected to produced rotary motion. It was a key innovation that would allow steam power to spread across British industries.

The demand for coal, which was a relatively cheap energy source, grew rapidly during the Industrial Revolution, as it was needed to run not only the factories used to produce manufactured goods, but also steam-powered transportation. In the early 1800s, the English engineer Richard Trevithick built a steam-powered locomotive, and by 1830 goods and passengers were being transported between the industrial centres of Manchester and Liverpool. In addition, steam-powered boats and ships were widely used to carry goods along Britain's canals as well as across the Atlantic.

Britain had produced textiles like wool, linen and cotton, for hundreds of years, but prior to the Industrial Revolution, the British textile business was a true 'cottage industry', with the work performed in small workshops or even homes by individual spinners, weavers and dyers. Starting in the mid-1700s, innovations like the spinning jenny and the power loom made weaving cloth and spinning yarn and thread much easier. With these machines, relatively little labour was required to produce cloth, and the new, mechanised textile factories that opened around the country were quickly able to meet customer demand for cloth both at home and abroad.

The British iron industry also underwent major change as it adopted new innovations. Chief among the new techniques was the smelting of iron ore with coke (a material made by heating coal) instead of the traditional charcoal. This method was cheaper and produced metals that were of a higher quality, enabling Britain's iron and steel production to expand in response to

demand created by the Napoleonic Wars (1803-15) and the expansion of the railways from the 1830s.

The latter part of the Industrial Revolution also saw key advances in communication methods, as people increasingly saw the need to communicate efficiently over long distances. In 1837, British inventors William Cooke and Charles Wheatstone patented the first commercial telegraphy system. In the 1830s and 1840s, Samuel Morse and other inventors worked on their own versions in the United States. Cooke and Wheatstone's system was soon used for railway signalling in the UK. As the speed of the new locomotives increased, it was essential to have a fast and effective means of avoiding collisions.

The impact of the Industrial Revolution on people's lives was immense. Although many people in Britain had begun moving to the cities from rural areas before the Industrial Revolution, this accelerated dramatically with industrialisation, as the rise of large factories turned smaller towns into major cities in just a few decades. This rapid urbanisation brought significant challenges, as overcrowded cities suffered from pollution and inadequate sanitation.

Although industrialisation increased the country's economic output overall and improved the standard of living for the middle and upper classes, many poor people continued to struggle. Factory workers had to work long hours in dangerous conditions for extremely low wages. These conditions along with the rapid pace of change fuelled opposition to industrialisation. A group of British workers who became known as 'Luddites' were British weavers and textile workers who objected to the increased use of mechanised looms and knitting frames. Many had spent years learning their craft, and they feared that unskilled machine operators were robbing them of their livelihood. A few desperate weavers began breaking into factories and smashing textile machines. They called themselves Luddites after Ned Ludd, a young apprentice who was rumoured to have wrecked a textile machine in 1779.

The first major instances of machine breaking took place in 1811 in the city of Nottingham, and the practice soon spread across the country. Machine-breaking Luddites attacked and burned factories, and in some cases they even exchanged gunfire with company guards and soldiers. The workers wanted employers to stop installing new machinery, but the British government responded to the uprisings by making machine-breaking punishable by death. The unrest finally reached its peak in April 1812, when a few Luddites were shot during an attack on a mill near Huddersfield. In the days that followed, other Luddites were arrested, and dozens were hanged or transported to Australia. By 1813, the Luddite resistance had all but vanished.

PART 1 — QUESTIONS

Questions 1-7

Complete the notes below.

*Choose **ONE WORD ONLY** from the passage for each answer.*

Write your answers in boxes on your answer sheet.

Britain's Industrial Revolution

Steam power

- Newcomen's steam engine was used in mines to remove water.

- In Watt and Boulton's steam engine, the movement of the **1** _____ was linked to a gear system.

- A greater supply of **2** _____ was required to power steam engines.

Textile industry

- Before the Industrial Revolution, spinners and weavers worked at home and in **3** _____

- Not as much **4** _____ was needed to produce cloth once the spinning jenny and power loom were invented.

Iron industry

- Smelting of iron ore with coke resulted in material that was better **5** _____

- Demand for iron increased with the growth of the **6** _____

Communications

- Cooke and Wheatstone patented the first telegraphy system.

- The telegraphy system was used to prevent locomotives colliding.

Urbanisation

- Small towns turned into cities very quickly.

- The new cities were dirty, crowded and lacked sufficient **7** _____

Questions 8-13

Do the following statements agree with the claims of the writer in Reading Passage?

In boxes on your answer sheet, write

TRUE *if the statement agrees with the claims of the writer*

FALSE *if the statement contradicts the claims of the writer*

NOT GIVEN *if it is impossible to say what the writer thinks about this*

8 Britain's canal network grew rapidly so that more goods could be transported around the country.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

9 Costs in the iron industry rose when the technique of smelting iron ore with coke was introduced.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

10 Samuel Morse's communication system was more reliable than that developed by William Cooke and Charles Wheatstone.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

11 The economic benefits of industrialisation were limited to certain sectors of society.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

12 Some skilled weavers believed that the introduction of the new textile machines would lead to job losses.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

13 There was some sympathy among local people for the Luddites who were arrested near Huddersfield.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

PASSAGE 2

Athletes and stress

A

It isn't easy being a professional athlete. Not only are the physical demands greater than most people could handle, athletes also face intense psychological pressure during competition. This is something that British tennis player Emma Raducanu wrote about on social media following her withdrawal from the 2021 Wimbledon tournament. Though the young player had been doing well in the tournament, she began having difficulty regulating her breathing and heart rate during a match, which she later attributed to 'the accumulation of the excitement and the buzz'.

B

For athletes, some level of performance stress is almost unavoidable. But there are many different factors that dictate just how people's minds and bodies respond to stressful events. Typically, stress is the result of an exchange between two factors: demands and resources. An athlete may feel stressed about an event if they feel the demands on them are greater than they can handle. These demands include the high level of physical and mental effort required to succeed, and also the athlete's concerns about the difficulty of the event, their chance of succeeding, and any potential dangers such as injury. Resources, on the other hand, are a person's ability to cope with these demands. These include factors such as the competitor's degree of confidence, how much they believe they can control the situation's outcome, and whether they're looking forward to the event or not.

C

Each new demand or change in circumstances affects whether a person responds positively or negatively to stress. Typically, the more resources a person feels they have in handling the situation, the more positive their stress response. This positive stress response is called a challenge state. But should the person feel there are too many demands placed on them, the more likely they are to experience a negative stress response -known as a threat state. Research shows that the challenge states lead to good performance, while threat states lead to poorer performance. So, in Emma Raducanu's case, a much larger audience, higher expectations and facing a more skilful opponent, may all have led her to feel there were greater demands being placed on her at Wimbledon -but she didn't have the resources to tackle them. This led to her experiencing a threat response.

D

Our challenge and threat responses essentially influence how our body responds to stressful situations, as both affect the production of adrenaline and cortisol-also known as 'stress hormones'. During a challenge state, adrenaline increases the amount of blood pumped from the heart and expands the blood vessels, which allows more energy to be delivered to the muscles and brain. This increase of blood and decrease of pressure in the blood vessels has been consistently related to superior sport performance in everything from cricket batting, to

golf putting and football penalty taking. But during a threat state, cortisol inhibits the positive effect of adrenaline, resulting in tighter blood vessels, higher blood pressure, slower psychological responses, and a faster heart rate. In short, a threat state makes people more anxious -they make worse decisions and perform more poorly. In tennis players, cortisol has been associated with more unsuccessful serves and greater anxiety.

E

That said, anxiety is also a common experience for athletes when they're under pressure. Anxiety can increase heart rate and perspiration, cause heart palpitations, muscle tremors and shortness of breath, as well as headaches, nausea, stomach pain, weakness and a desire to escape in more extreme cases. Anxiety can also reduce concentration and self-control and cause overthinking. The intensity with which a person experiences anxiety depends on the demands and resources they have. Anxiety may also manifest itself in the form of excitement or nervousness depending on the stress response. Negative stress responses can be damaging to both physical and mental health - and repeated episodes of anxiety coupled with negative responses can increase risk of heart disease and depression.

F

But there are many ways athletes can ensure they respond positively under pressure. Positive stress responses can be promoted through the language that they and others – such as coaches or parents – use. Psychologists can also help athletes change how they see their physiological responses – such as helping them see a higher heart rate as excitement, rather than nerves. Developing psychological skills, such as visualisation, can also help decrease physiological responses to threat. Visualisation may involve the athlete recreating a mental picture of a time when they performed well, or picturing themselves doing well in the future. This can help create a feeling of control over the stressful event. Recreating competitive pressure during training can also help athletes learn how to deal with stress. An example of this might be scoring athletes against their peers to create a sense of competition. This would increase the demands which players experience compared to a normal training session, while still allowing them to practise coping with stress.

PART 2 — QUESTIONS

Questions 14-18

Which paragraph contains the following information?

*Write the correct letter, **A-F**, in boxes on your answer sheet.*

***NB** You may use any letter more than once.*

	A	B	C	D	E	F
14 reference to two chemical compounds which impact on performance	○	○	○	○	○	○
15 examples of strategies for minimising the effects of stress	○	○	○	○	○	○
16 how a sportsperson accounted for their own experience of stress	○	○	○	○	○	○
17 study results indicating links between stress responses and performance	○	○	○	○	○	○
18 mention of people who can influence how athletes perceive their stress responses	○	○	○	○	○	○

Questions 19-22

Complete the sentences below.

Choose ONE WORD ONLY from the passage for each answer.

Write your answers in boxes on your answer sheet.

- Performance stress involves many demands on the athlete, for example, coping with the possible risk of **19** _____
- Cortisol can cause tennis players to produce fewer good **20** _____
- Psychologists can help athletes to view their physiological responses as the effect of a positive feeling such as **21** _____

- **22** _____ is an example of a psychological technique which can reduce an athlete's stress responses.

Questions 23-24

Choose TWO letters, A-E.

Write the correct letters in boxes on your answer sheet.

23 **24** Which TWO facts about Emma Raducanu's withdrawal from the Wimbledon tournamentare mentioned in the text?

- **A** ☐ the stage at which she dropped out of the tournament
- **B** ☐ symptoms of her performance stress at the tournament
- **C** ☐ measures which she had taken to manage her stress levels
- **D** ☐ aspects of the Wimbledon tournament which increased her stress levels
- **E** ☐ reactions to her social media posts about her experience at Wimbledon

Questions 25-26

Choose TWO letters, A-E.

Write the correct letters in boxes on your answer sheet.

25 **26**
Which TWO facts about anxiety are mentioned in Paragraph E of the text?

- **A** ☐ the factors which determine how severe it may be
- **B** ☐ how long it takes for its effects to become apparent
- **C** ☐ which of its symptoms is most frequently encountered
- **D** ☐ the types of athletes who are most likely to suffer from it
- **E** ☐ the harm that can result if athletes experience it too often

PASSAGE 3

An inquiry into the existence of the gifted child

Let us start by looking at a modern 'genius', Maryam Mirzakhani, who died at the early age of 40. She was the only woman to win the Fields Medal the mathematical equivalent of a Nobel prize. It would be easy to assume that someone as special as Mirzakhani must have been one of those 'gifted' children, those who have an extraordinary ability in a specific sphere of activity or knowledge. But look closer and a different story emerges. Mirzakhani was born in Tehran, Iran. She went to a highly selective girls' school but maths wasn't her interest - reading was. She loved novels and would read anything she could lay her hands on. As for maths, she did rather poorly at it for the first couple of years in her middle school, but became interested when her elder brother told her about what he'd learned. He shared a famous maths problem from a magazine that fascinated her and she was hooked.

In adult life it is clear that she was curious, excited by what she did and also resolute in the face of setbacks. One of her comments sums it up. 'Of course, the most rewarding part is the "Alia" moment, the excitement of discovery and enjoyment of understanding something new ... But most of the time, doing mathematics for me is like being on a long hike with no trail and no end in sight.' That trail took her to the heights of original research into mathematics.

Is her background unusual? Apparently not. Most Nobel prize winners were unexceptional in childhood. Einstein was slow to talk as a baby. He failed the general part of the entry test to Zurich Polytechnic – though they let him in because of high physics and maths scores. He struggled at work initially, but he kept plugging away and eventually rewrote the laws of Newtonian mechanics with his theory of relativity.

There has been a considerable amount of research on high performance over the last century that suggests it goes way beyond tested intelligence. On top of that, research is clear that brains are flexible, new neural pathways can be created, and IQ isn't fixed. For example, just because you can read stories with hundreds of pages at the age of five doesn't mean you will still be ahead of your contemporaries in your teens. While the jury is out on giftedness being innate and other factors potentially making the difference, what is certain is that the behaviours associated with high levels of performance are replicable and most can be taught even traits such as curiosity.

According to my colleague Prof Deborah Eyre, with whom I've collaborated on the book *Great Minds and How to Crow Them*, the latest neuroscience and psychological research suggests most individuals can reach levels of performance associated in school with the gifted and talented. However, they must be taught the right attitudes and approaches to their learning and develop the attributes of high performers-curiosity, persistence and hard work, for example an approach Eyre calls 'high performance learning'. Critically, they need the right support in developing those approaches at home as well as at school.

Prof Anders Ericsson, an eminent education psychologist at Florida State University, US, is the co-author of Peak: *Secrets from the New Science of Expertise*. After research going back to

1980 into diverse achievements, from music to memory to sport, he doesn't think unique and innate talents are at the heart of performance. Deliberate practice, that stretches you every step of the way, and around 10,000 hours of it, is what produces the goods. It's not a magic number the highest performers move on to doing a whole lot more, of course. Ericsson's memory research is particularly interesting because random students, trained in memory techniques for the study, went on to outperform others thought to have innately superior memories those who you might call gifted.

But it is perhaps the work of Benjamin Bloom, another distinguished American educationist working in the 1980s, that gives the most pause for thought. Bloom's team looked at a group of extraordinarily high achieving people in disciplines as varied as ballet, swimming, piano, tennis, maths, sculpture and neurology. He found a pattern of parents encouraging and supporting their children, often in areas they enjoyed themselves. Bloom's outstanding people had worked very hard and consistently at something they had become hooked on when at a young age, and their parents all emerged as having strong work ethics themselves.

Eyre says we know how high performers learn. From that she has developed a high performing learning approach. She is working on this with a group of schools, both in Britain and abroad. Some spin-off research, which looked in detail at 24 of the 3,000 children being studied who were succeeding despite difficult circumstances, found something remarkable. Half were getting free school meals because of poverty, more than half were living with a single parent, and four in five were living in disadvantaged areas. Interviews uncovered strong evidence of an adult or adults in the child's life who valued and supported education, either in the immediate or extended family or in the child's wider community. Children talked about the need to work hard at school, to listen in class and keep trying.

Let us end with Einstein, the epitome of a genius. He clearly had curiosity, character and determination. He struggled against rejection in early life but was undeterred. Did he think he was a genius or even gifted? He once wrote: 'It's not that I'm so smart, it's just that I stay with problems longer. Most people say it is the intellect which makes a great scientist. They are wrong: it is character.'

PART 3 — QUESTIONS

Questions 27-32

Complete the summary using the list of phrases, A-K, below.

Write the correct letter, A-K, in boxes on your answer sheet.

A appeal	**B** determined	**C** intrigued
D single	**E** achievement	**F** devoted
G involved	**H** unique	**I** innovative
J satisfaction	**K** intent	

Maryam Mirzakhani

Maryam Mirzakhani is regarded as **27** _____ in the field of mathematics because she was the only female holder of the prestigious Fields Medal - a record that she retained at the time of her death. However, maths held little **28** _____ for her as a child and in fact her performance was below average until she was **29** _____ by a difficult puzzle that one of her siblings showed her.

Later, as a professional mathematician, she had an inquiring mind and proved herself to be **30** _____ when things did not go smoothly. She said she got the greatest **31** _____ from making ground-breaking discoveries and in fact she was responsible for some extremely **32** _____ mathematical studies.

A. **appeal** B. **determined** C. **intrigued** D. **single** E. **achievement**
F. **devoted** G. **involved** H. **unique** I. **innovative** J. **satisfaction**
K. **intent**

Questions 33-37

Do the following statements agree with the claims of the writer in Reading Passage?

In boxes on your answer sheet, write

YES if the statement agrees with the claims of the writer

NO if the statement contradicts the claims of the writer

NOT GIVEN if it is impossible to say what the writer thinks about this

33 Many people who ended up winning prestigious intellectual prizes only reached an average standard when young.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

34 Einstein's failures as a young man were due to his lack of confidence.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

35 It is difficult to reach agreement on whether some children are actually born gifted.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

36 Einstein was upset by the public's view of his life's work.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

37 Einstein put his success down to the speed at which he dealt with scientific questions.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

Questions 38-40

Choose the correct letter, A, B, C or D.

Write the correct letter in boxes on your answer sheet.

38 What does Eyre believe is needed for children to equal 'gifted' standards?

- **A** ○ strict discipline from the teaching staff
- **B** ○ assistance from their peers in the classroom
- **C** ○ the development of a spirit of inquiry towards their studies
- **D** ○ the determination to surpass everyone else's achievements

39 What is the result of Ericsson's research?

- **A** ○ Very gifted students do not need to work on improving memory skills.
- **B** ○ Being born with a special gift is not the key factor in becoming expert.
- **C** ○ Including time for physical exercise is crucial in raising performance.
- **D** ○ 10,000 hours of relevant and demanding work will create a genius.

40 In the penultimate paragraph, it is stated the key to some deprived children's success is

- **A** ○ a regular and nourishing diet at home.
- **B** ○ the loving support of more than one parent.
- **C** ○ a community which has well-funded facilities for learning.
- **D** ○ the guidance of someone who recognises the benefits of learning.

Answer Key

#	Answer	Explanation
1	**piston**	Watt later worked with the English manufacturer Matthew Boulton to invent a new steam engine driven by both the forward and backward strokes of the piston, while the gear mechanism it was connected to produced rotary motion.
2	**coal**	The demand for coal, which was a relatively cheap energy source, grew rapidly during the Industrial Revolution, as it was needed to run not only the factories used to produce manufactured goods, but also steam-powered transportation
3	**workshops**	but prior to the Industrial Revolution, the British textile business was a true 'cottage industry', with the work performed in small workshops or even homes by individual spinners, weavers and dyers
4	**labour**	With these machines, relatively little labour was required to produce cloth
5	**quality**	This method was cheaper and produced metals that were of a higher quality
6	**railways**	This method was cheaper and produced metals that were of a higher quality, enabling Britain's iron and steel production to expand in response to demand created by the Napoleonic Wars (1803-15) and the expansion of the railways from the 1830s.
7	**sanitation**	This rapid urbanisation brought significant challenges, as overcrowded cities suffered from pollution and inadequate sanitation.
8	**NOT GIVEN**	In addition, steam-powered boats and ships were widely used to carry goods along Britain's canals as well as across the Atlantic.
9	**FALSE**	This method was cheaper and produced metals that were of a higher quality
10	**NOT GIVEN**	In 1837, British inventors William Cooke and Charles Wheatstone patented the first commercial telegraphy system
11	**TRUE**	Although industrialisation increased the country's economic output overall and improved the standard of living for the middle and upper classes, many poor people continued to struggle.
12	**TRUE**	A group of British workers who became known as 'Luddites' were British weavers and textile workers who objected to the increased use of mechanised looms and knitting frames. Many had spent

#	Answer	Explanation
		years learning their craft, and they feared that unskilled machine operators were robbing them of their livelihood.
13	**NOT GIVEN**	In the days that followed, other Luddites were arrested, and dozens were hanged or transported to Australia. By 1813, the Luddite resistance had all but vanished.
14	**D**	Our challenge and threat responses essentially influence how our body responds to stressful situations, as both affect the production of adrenaline and cortisol-also known as 'stress hormones'. During a challenge state, adrenaline increases the amount of blood pumped from the heart and expands the blood vessels, which allows more energy to be delivered to the muscles and brain.
15	**F**	Recreating competitive pressure during training can also help athletes learn how to deal with stress. An example of this might be scoring athletes against their peers to create a sense of competition.
16	**A**	she began having difficulty regulating her breathing and heart rate during a match, which she later attributed to 'the accumulation of the excitement and the buzz'.
17	**C**	they are to experience a negative stress response -known as a threat state. Research shows that the challenge states lead to good performance, while threat states lead to poorer performance.
18	**F**	Psychologists can also help athletes change how they see their physiological responses – such as helping them see a higher heart rate as excitement, rather than nerves.
19	**injury**	These demands include the high level of physical and mental effort required to succeed, and also the athlete's concerns about the difficulty of the event, their chance of succeeding, and any potential dangers such as injury.
20	**serves**	In tennis players, cortisol has been associated with more unsuccessful serves and greater anxiety.
21	**excitement**	Psychologists can also help athletes change how they see their physiological responses – such as helping them see a higher heart rate as excitement, rather than nerves.
22	**visualisation / visualization**	Developing psychological skills, such as visualisation, can also help decrease physiological responses to threat.
23	**B / D**	This is something that British tennis player Emma Raducanu wrote about on social media following her withdrawal from the 2021 Wimbledon tournament. Though the young player had been doing

#	Answer	Explanation
		well in the tournament, she began having difficulty regulating her breathing and heart rate during a match, which she later attributed to 'the accumulation of the excitement and the buzz'. So, in Emma Raducanu's case, a much larger audience, higher expectations and facing a more skilful opponent, may all have led her to feel there were greater demands being placed on her at Wimbledon -but she didn't have the resources to tackle them.
24	**B / D**	This is something that British tennis player Emma Raducanu wrote about on social media following her withdrawal from the 2021 Wimbledon tournament. Though the young player had been doing well in the tournament, she began having difficulty regulating her breathing and heart rate during a match, which she later attributed to 'the accumulation of the excitement and the buzz'. So, in Emma Raducanu's case, a much larger audience, higher expectations and facing a more skilful opponent, may all have led her to feel there were greater demands being placed on her at Wimbledon -but she didn't have the resources to tackle them.
25	**A / E**	The intensity with which a person experiences anxiety depends on the demands and resources they have. Negative stress responses can be damaging to both physical and mental health – and repeated episodes of anxiety coupled with negative responses can increase risk of heart disease and depression.
26	**A / E**	The intensity with which a person experiences anxiety depends on the demands and resources they have. Negative stress responses can be damaging to both physical and mental health – and repeated episodes of anxiety coupled with negative responses can increase risk of heart disease and depression.
27	**H**	Let us start by looking at a modern 'genius', Maryam Mirzakhani, who died at the early age of 40. She was the only woman to win the Fields Medal the mathematical equivalent of a Nobel prize.
28	**A**	Mirzakhani was born in Tehran, Iran. She went to a highly selective girls' school but maths wasn't her interest – reading was.
29	**C**	As for maths, she did rather poorly at it for the first couple of years in her middle school, but became interested when her elder brother told her about what he'd learned. He shared a famous maths problem from a magazine that fascinated her and she was hooked.
30	**B**	In adult life it is clear that she was curious, excited by what she did and also resolute in the face of setbacks

#	Answer	Explanation
31	**J**	One of her comments sums it up. ‘Of course, the most rewarding part is the “Alia” moment, the excitement of discovery and enjoyment of understanding something new
32	**I**	That trail took her to the heights of original research into mathematics.
33	**YES**	Most Nobel prize winners were unexceptional in childhood. Einstein was slow to talk as a baby. He failed the general part of the entry test to Zurich Polytechnic – though they let him in because of high physics and maths scores.
34	**NOT GIVEN**	He failed the general part of the entry test to Zurich Polytechnic – though they let him in because of high physics and maths scores. He struggled at work initially, but he kept plugging away and eventually rewrote the laws of Newtonian mechanics with his theory of relativity.
35	**YES**	While the jury is out on giftedness being innate and other factors potentially making the difference, what is certain is that the behaviours associated with high levels of performance are replicable and most can be taught even traits such as curiosity.
36	**NOT GIVEN**	He struggled at work initially, but he kept plugging away and eventually rewrote the laws of Newtonian mechanics with his theory of relativity.
37	**NO**	He once wrote: ‘It’s not that I’m so smart, it’s just that I stay with problems longer. Most people say it is the intellect which makes a great scientist. They are wrong: it is character.’
38	**C**	According to my colleague Prof Deborah Eyre, with whom I’ve collaborated on the book Great Minds and How to Crow Them, the latest neuroscience and psychological research suggests most individuals can reach levels of performance associated in school with the gifted and talented. However, they must be taught the right attitudes and approaches to their learning and develop the attributes of high performers-curiosity
39	**B**	After research going back to 1980 into diverse achievements, from music to memory to sport, he doesn’t think unique and innate talents are at the heart of performance.
40	**D**	Some spin-off research, which looked in detail at 24 of the 3,000 children being studied who were succeeding despite difficult circumstances, found something remarkable. Half were getting free school meals because of poverty, more than half were living with a single parent, and four in five were living in disadvantaged areas.

Test 25

PASSAGE 1

Archaeologists discover evidence of prehistoric island settlers

In early April 2019, Dr Ceri Shipton and his colleagues from Australian National University became the first archaeologists to explore Obi, one of many tropical islands in Indonesia's Maluku Utara province. The research team's discoveries suggest that the prehistoric people who lived on Obi were adept on both land and sea, hunting in the dense rainforest, foraging on the seashore, and possibly even voyaging between islands.

The excavations were part of a project to learn more about how people first dispersed from mainland Asia, through the Indonesian archipelago and into the prehistoric continent that once connected Australia and New Guinea. The team's earlier research suggested that the northernmost islands in the group, known as the Wallacean islands,including Obi, would have offered the easiest migration route. It also seemed likely that these islands were crucial 'stepping stones' on humans' island-hopping voyages through this region millennia ago. But to support this idea, they needed archaeological evidence for humans living in this remote area in the ancient past. So, they travelled to Obi to look for sites that might reveal evidence of early occupation.

Just inland from the village of Kelo on Obi's northern coast, Shipton and his colleagues found two caves containing prehistoric rock shelters that were suitable for excavation. With the permission and help of the local people of Kelo, they dug a small test excavation in each shelter. There they found numerous artefacts, including fragments of axes, some dating to about 14,000 years ago. The earliest axes at Kelo were made using clam shells. Axes made from clam shells from roughly the same time had also previously been found elsewhere in this region, including on the nearby island of Gebe to the northeast. As on Gebe, it is highly likely that Obi's axes were used in the construction of canoes, thus allowing these early peoples to maintain connections between communities on neighbouring islands.

The oldest cultural layers from the Kelo site provided the team with the earliest record for human occupation on Obi, dating back around 18,000 years. At this time the climate was drier and colder than today, and the island's dense rainforests would likely have been much less impenetrable than they are now. Sea levels were about 120 metres lower, meaning Obi was a much larger island, encompassing what is today the separate island of Bisa, as well as several other small islands nearby.

Roughly 11,700 years ago, as the most recent ice age ended, the climate became significantly warmer and wetter, no doubt making Obi's jungle much thicker. According to the researchers, it is no coincidence that around this time the first axes crafted from stone rather than sea shells appear, likely in response to their heavy-duty use for clearing and modification of the increasingly dense rainforest. While stone takes about twice as long to grind into an axe compared to shell, the harder material keeps its sharp edge for longer.

Judging by the bones which the researchers unearthed in the Kelo caves, people living there mainly hunted the Rothschild's cuscus, a possum-like creature that still lives on Obi today. As the forest grew more dense, people probably used axes to clear patches of forest and make hunting easier. Shipton's team's excavation of the shelters at the Kelo site unearthed a volcanic glass substance called obsidian, which must have been brought over from another island, as there is no known source on Obi. It also revealed particular types of beads, similar to those previously found on islands in southern Wallacea. These finds again support the idea that Obi islanders routinely travelled to other islands.

The excavations suggest people successfully lived in the two Kelo shelters for about 10,000 years. But then, about 8,000 years ago, both were abandoned. Did the residents leave Obi completely, or move elsewhere on the island? Perhaps the jungle had grown so thick that axes were no longer a match for the dense undergrowth. Perhaps people simply moved to the coast and turned to fishing rather than hunting as a means of survival.

Whatever the reason for the departure, there is no evidence for use of the Kelo shelters after this time, until about 1,000 years ago, when they were re-occupied by people who owned pottery as well as items made out of gold and silver. It seems likely, in view of Obi's location, that this final phase of occupation also saw the Kelo shelters used by people involved in the historic trade in spices between the Maluku islands and the rest of the world.

PART 1 — QUESTIONS

Questions 1-7

Do the following statements agree with the information given in Reading Passage?

In boxes on your answer sheet, write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

1 Archaeological research had taken place on the island of Obi before the arrival of Ceri Shipton and his colleagues.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

2 At the Kelo sites, the researchers found the first clam shell axes ever to be discovered in the region.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

3 The size of Obi today is less than it was 18,000 years ago.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

4 A change in the climate around 11,700 years ago had a greater impact on Obi than on the surrounding islands.

- **A** ○ TRUE
- **B** ○ FALSE

C ○ NOT GIVEN

5 The researchers believe there is a connection between warmer, wetter weather and a change in the material used to make axes.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

6 Shipton's team were surprised to find evidence of the Obi islanders' hunting practices.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

7 It is thought that the Kelo shelters were occupied continuously until about 1,000 years ago.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

Questions 8-13

Complete the notes below.

*Choose **ONE WORD ONLY** from the passage for each answer.*

Write your answers in boxes on your answer sheet.

Archaeological findings on Obi

Excavations of rock shelters inside 8 _____ near the village of Kelo revealed:

- axes from around 14,000 years ago, probably used to make canoes

- axes made out of 9 _____, dating from around 11,700 years ago

- 10 _____ of an animal: evidence of what ancient islanders ate

- evidence of travel between islands:

+ obsidian: a material that is not found naturally on Obi

+ **11** _____ which resembled ones found on other islands.

It is thought that from 8,000 years ago, Obi islanders:

- may have switched from hunting to fishing

- had **12** _____ as well as items made out of metal

- probably took part in the production and sale of **13** _____

PASSAGE 2

The global importance of wetlands

A

Wetlands are areas where water covers the soil, or is present either at or near the surface of the soil, for all or part of the year. These are complex ecosystems, rich in unique plant and animal life. But according to the World Wide Fund for Nature (WWFN), half of the world's wetlands have disappeared since 1990 – converted or destroyed for commercial development, drainage schemes and the extraction of minerals and peat. Many of those that remain have been damaged by agricultural pesticides and fertilizers, industrial pollutants, and construction works.

B

Throughout history, humans have gathered around wetlands, and their fertile ecosystems have played an important part in human development. Consequently, they are of considerable religious, historical and archaeological value to many communities around the world. 'Wetlands directly support the livelihoods and well-being of millions of people,' says Dr Matthew McCartney, principal researcher and hydrologist at the International Water Management Institute (IWMI). 'In many developing countries, large numbers of people are dependent on wetland agriculture for their livelihoods.'

C

They also serve a crucial environmental purpose. 'Wetlands are one of the key tools in mitigating climate change across the planet,' says Pieter van Eijk, head of Climate Adaptation at Wetlands International (WI), pointing to their use as buffers that protect coastal areas from sea-level rise and extreme weather events such as hurricanes and flooding. Wetland coastal forests provide food and water, as well as shelter from storms, and WI and other agencies are working to restore those forests which have been lost. 'It can be as simple as planting a few trees per hectare to create shade and substantially change a microclimate,' he says. 'Implementing climate change projects isn't so much about money.'

D

The world's wetlands are, unfortunately, rich sources for in-demand commodities, such as palm oil and pulpwood. Peatlands – wetlands with a waterlogged organic soil layer – are particularly targeted. When peatlands are drained for cultivation, they become net carbon emitters instead of active carbon stores, and, according to Marcel Silvius, head of Climate-smart Land-use at WI, this practice causes six per cent of all global carbon emissions. The clearance of peatlands for planting also increases the risk of forest fires, which release huge amounts of CO_2. 'We're seeing huge peatland forests with extremely high biodiversity value being lost for a few decades of oil palm revenues,' says Silvius.

E

The damage starts when logging companies arrive to clear the trees. They dig ditches to enter the peat swamps by boat and then float the logs out the same way. These are then used to drain water out of the peatlands to allow for the planting of corn, oil palms or pulpwood trees. Once the water has drained away, bacteria and fungi then break down the carbon in the peat and turn it into CO_2 and methane. Meanwhile, the remainder of the solid matter in the peat starts to move downwards, in a process known as subsidence. Peat comprises 90 per cent water, so this is one of the most alarming consequences of peatland clearances. ‘In the tropics, peat subsides at about four centimetres a year, so within half a century, very large landscapes on Sumatra and Borneo will become flooded as the peat drops below water level,’ says Silvius. ‘It’s a huge catastrophe that’s in preparation. Some provinces will lose 40 per cent of their landmass.’

F

And while these industries affect wetlands in ways that can easily be documented, Dr Dave Tickner of the WWFN believes that more subtle impacts can be even more devastating. ‘Sediment run-off and fertilizers can be pretty invisible,’ says Tickner. ‘Over-extraction of water is equally invisible. You do get shock stories about rivers running red, or even catching fire, but there’s seldom one big impact that really hurts a wetland.’ Tickner does not blame anyone for deliberate damage, however. ‘I’ve worked on wetland issues for 20 years and have never met anybody who wanted to damage a wetland,’ he says. ‘It isn’t something that people generally set out to do. Quite often, the effects simply come from people trying to make a living.’

G

Silvius also acknowledges the importance of income generation. ‘It’s not that we just want to restore the biodiversity of wetlands – which we do – but we recognise there’s a need to provide an income for local people.’ This approach is supported by IWMI. ‘The idea is that people in a developing country will only protect wetlands if they value and profit from them,’ says McCartney. ‘For sustainability, it’s essential that local people are involved in wetland planning and decision making and have clear rights to use wetlands.’

H

The fortunes of wetlands would be improved, Silvius suggests, if more governments recognized their long-term value. ‘Different governments have different attitudes,’ he says, and goes on to explain that some countries place a high priority on restoring wetlands, while others still deny the issue. McCartney is cautiously optimistic, however. ‘Awareness of the importance of wetlands is growing,’ he says. ‘It’s true that wetland degradation still continues at a rapid pace, but my impression is that things are slowly changing.’

PART 2 — QUESTIONS

Questions 14-17

Which paragraph contains the following information?

*Write the correct letter, **A-H**, in boxes on your answer sheet.*

	A	B	C	D	E	F	G	H
14 reference to the need to ensure that inhabitants of wetland regions continue to benefit from them	○	○	○	○	○	○	○	○
15 the proportion of wetlands which have already been lost	○	○	○	○	○	○	○	○
16 reference to the idea that people are beginning to appreciate the value of wetlands	○	○	○	○	○	○	○	○
17 mention of the cultural significance of wetlands	○	○	○	○	○	○	○	○

Questions 18-22

Complete the sentences below.

Choose ONE WORD ONLY from the passage for each answer.

Write your answers in boxes on your answer sheet.

- Peatlands which have been drained begin to release **18** _____ instead of storing it.
- Once peatland areas have been cleared, **19** _____ are more likely to occur.
- Clearing peatland forests to make way for oil palm plantations destroys the **20** _____ of the local environment.
- Water is drained out of peatlands through the **21** _____ which are created by logging companies.
- Draining peatlands leads to **22** _____ : a serious problem which can eventually result in coastal flooding and land loss.

Questions 23-26

Look at the following statements and the list of experts below.

Match each statement with the correct expert, A-D.

Write the correct letter, A-D, in boxes on your answer sheet.

List of Experts

A Matthew McCartney

B Pieter van Eijk

C Marcel Silvius

D Dave Tickner

	A	B	C	D
23 Communities living in wetland regions must be included in discussions about the future of these areas	○	○	○	○
24 Official policies towards wetlands vary from one nation to the next	○	○	○	○
25 People cause harm to wetlands without having any intention to do so	○	○	○	○
26 Initiatives to reverse environmental damage need not be complex.	○	○	○	○

PASSAGE 3

Is the era of artificial speech translation upon us?

Once the stuff of science fiction, technology that enables people to talk using different languages is now here. But how effective is it?

Noise, Alex Waibel tells me, is one of the major challenges that artificial speech translation has to meet. A device may be able to recognize speech in a laboratory, or a meeting room, but will struggle to cope with the kind of background noise I can hear in my office surrounding Professor Waibel as he speaks to me from Kyoto station in Japan. I'm struggling to follow him in English, on a scratchy line that reminds me we are nearly 10,000 kilometers apart-and that distance is still an obstacle to communication even if you're speaking the same language, as we are. We haven't reached the future yet. If we had, Waibel would have been able to speak more comfortably in his native German and I would have been able to hear his words in English.

At Karlsruhe Institute of Technology, where he is a professor of computer science, Waibel and his colleagues already give lectures in German that their students can follow in English via an electronic translator. The system generates text that students can read on their laptops or phones, so the process is somewhat similar to subtitling. It helps that lecturers speak clearly, don't have to compete with background chatter, and say much the same thing each year.

The idea of artificial speech translation has been around for a long time. Douglas Adams' science fiction novel, The Hitchhiker's Guide to the Galaxy, published in 1979, featured a life form called the 'Babel fish' which, when placed in the ear, enabled a listener to understand any language in the universe. It came to represent one of those devices that technology enthusiasts dream of long before they become practically realizable, like TVs flat enough to hang on walls: objects that we once could only dream of having but that are now commonplace. Now devices that look like prototype Babel fish have started to appear, riding a wave of advances in artificial translation and voice recognition.

At this stage, however, they seem to be regarded as eye-catching novelties rather than steps towards what Waibel calls 'making a language-transparent society.' They tend to be domestic devices or applications suitable for hotel check-ins, for example, providing a practical alternative to speaking traveler's English. The efficiency of the translator is less important than the social function. However, 'Professionals are less inclined to be patient in a conversation,' founder and CEO at Waverly Labs, Andrew Ochoa, observes. To redress this, Waverly is now preparing a new model for professional applications, which entails performance improvements in speech recognition, translation accuracy and the time it takes to deliver the translated speech.

For a conversation, both speakers need to have devices called Pilots (translator earpieces) in their ears. 'We find that there's a barrier with sharing one of the earphones with a stranger,' says Ochoa. That can't have been totally unexpected. The problem would be solved if earpiece translators became sufficiently prevalent that strangers would be likely to already have their own in their ears. Whether that happens, and how quickly, will probably depend not so much on

the earpieces themselves, but on the prevalence of voice-controlled devices and artificial translation in general.

Waibel highlights the significance of certain Asian nations, noting that voice translation has really taken off in countries such as Japan with a range of systems. There is still a long way to go, though. A translation system needs to be simultaneous, like the translator's voice speaking over the foreign politician being interviewed on the TV, rather than in sections that oblige speakers to pause after every few remarks and wait for the translation to be delivered. It needs to work offline, for situations where internet access isn't possible, and to address apprehensions about the amount of private speech data accumulating in the cloud, having been sent to servers for processing.

Systems not only need to cope with physical challenges such as noise, they will also need to be socially aware by addressing people in the right way. Some cultural traditions demand solemn respect for academic status, for example, and it is only polite to respect this. Etiquette-sensitive artificial translators could relieve people of the need to know these differing cultural norms. At the same time, they might help to preserve local customs, slowing the spread of habits associated with international English, such as its readiness to get on first-name terms.

Professors and other professionals will not outsource language awareness to software, though. If the technology matures into seamless, ubiquitous artificial speech translation, it will actually add value to language skills. Whether it will help people conduct their family lives or relationships is open to question-though one noteworthy possibility is that it could overcome the language barriers that often arise between generations after migration, leaving children and their grandparents without a shared language.

Whatever uses it is put to, though, it will never be as good as the real thing. Even if voice-morphing technology simulates the speaker's voice, their lip movements won't match, and they will look like they are in a dubbed movie. The contrast will underline the value of shared languages, and the value of learning them. Sharing a language can promote a sense of belonging and community, as with the international scientists who use English as a lingua franca, where their predecessors used Latin. Though the practical need for a common language will diminish, the social value of sharing one will persist. And software will never be a substitute for the subtle but vital understanding that comes with knowledge of a language.

PART 3 — QUESTIONS

Questions 27-30

Choose the correct letter, A, B, C or D.

Write the correct letter in boxes on your answer sheet.

27 What does the reader learn about the conversation in the first paragraph?

- **A** ○ The speakers are communicating in different languages.
- **B** ○ Neither of the speakers is familiar with their environment.
- **C** ○ The topic of the conversation is difficult for both speakers.
- **D** ○ Aspects of the conversation are challenging for both speakers.

28 What assists the electronic translator during lectures at Karlsruhe Institute of Technology?

- **A** ○ the repeated content of lectures
- **B** ○ the students' reading skills
- **C** ○ the languages used
- **D** ○ the lecturers' technical ability

29 When referring to The Hitchhiker's Guide to the Galaxy, the writer suggests that

- **A** ○ the Babel fish was considered undesirable at the time.
- **B** ○ this book was not seriously intending to predict the future.
- **C** ○ artificial speech translation was not a surprising development.
- **D** ○ some speech translation techniques are better than others.

30 What does the writer say about sharing earpieces?

- **A** ○ It is something people will get used to doing.
- **B** ○ The reluctance to do this is understandable.
- **C** ○ The equipment will be unnecessary in the future.

D ◯ It is something few people need to worry about.

Questions 31-34

*Complete each sentence with the correct ending, **A-F**, below.*

*Write the correct letter, **A-F**, in boxes on your answer sheet.*

•
Speech translation methods are developing fast in Japan
31 _____

• TV interviews that use translation voiceover methods are successful 32 _____

• Future translation systems should address people appropriately 33 _____

• Users may be able to maintain their local customs 34 _____

A. **but there are concerns about this**

B. **as systems do not need to conform to standard practices.**

C. **but they are far from perfect.**

D. **despite the noise issues**

E. **because translation is immediate.**

F. **and have an awareness of good manners.**

Questions 35-40

Do the following statements agree with the views of the writer in Reading Passage?

In boxes on your answer sheet, write

YES if the statement agrees with the views of the writer

NO if the statement contradicts the views of the writer

NOT GIVEN if it is impossible to say what the writer thinks about this

35 Language translation systems will be seen as very useful throughout the academic and professional worlds.

A ◯ YES

B ○ NO

C ○ NOT GIVEN

36 The overall value of automated translation to family life is yet to be shown.

A ○ YES

B ○ NO

C ○ NOT GIVEN

37 Automated translation could make life more difficult for immigrant families.

A ○ YES

B ○ NO

C ○ NOT GIVEN

38 Visual aspects of language translation are being considered by scientists.

A ○ YES

B ○ NO

C ○ NOT GIVEN

39 International scientists have found English easier to translate into other languages than Latin.

A ○ YES

B ○ NO

C ○ NOT GIVEN

40 As far as language is concerned, there is a difference between people's social and practical needs.

A ○ YES

B ○ NO

C ○ NOT GIVEN

Answer Key

#	Answer	Explanation
1	**FALSE**	In early April 2019, Dr Ceri Shipton and his colleagues from Australian National University became the first archaeologists to explore Obi, one of many tropical islands in Indonesia's Maluku Utara province.
2	**FALSE**	The earliest axes at Kelo were made using clam shells. Axes made from clam shells from roughly the same time had also previously been found elsewhere in this region, including on the nearby island of Gebe to the northeast.
3	**TRUE**	The oldest cultural layers from the Kelo site provided the team with the earliest record for human occupation on Obi, dating back around 18,000 years.
4	**NOT GIVEN**	Roughly 11,700 years ago, as the most recent ice age ended, the climate became significantly warmer and wetter, no doubt making Obi's jungle much thicker.
5	**TRUE**	Roughly 11,700 years ago, as the most recent ice age ended, the climate became significantly warmer and wetter, no doubt making Obi's jungle much thicker. According to the researchers, it is no coincidence that around this time the first axes crafted from stone rather than sea shells appear, likely in response to their heavy-duty use for clearing and modification of the increasingly dense rainforest.
6	**NOT GIVEN**	Judging by the bones which the researchers unearthed in the Kelo caves, people living there mainly hunted the Rothschild's cuscus, a possum-like creature that still lives on Obi today.
7	**FALSE**	Whatever the reason for the departure, there is no evidence for use of the Kelo shelters after this time, until about 1,000 years ago, when they were re-occupied by people who owned pottery as well as items made out of gold and silver.
8	**caves**	Just inland from the village of Kelo on Obi's northern coast, Shipton and his colleagues found two caves containing prehistoric rock shelters that were suitable for excavation.
9	**stone**	According to the researchers, it is no coincidence that around this time the first axes crafted from stone rather than sea shells appear
10	**bones**	Judging by the bones which the researchers unearthed in the Kelo caves, people living there mainly hunted the Rothschild's

#	Answer	Explanation
		cuscus, a possum-like creature that still lives on Obi today.
11	**beads**	It also revealed particular types of beads, similar to those previously found on islands in southern Wallacea.
12	**pottery**	Whatever the reason for the departure, there is no evidence for use of the Kelo shelters after this time, until about 1,000 years ago, when they were re-occupied by people who owned pottery as well as items made out of gold and silver.
13	**spices**	It seems likely, in view of Obi's location, that this final phase of occupation also saw the Kelo shelters used by people involved in the historic trade in spices between the Maluku islands and the rest of the world.
14	**G**	but we recognise there's a need to provide an income for local people.' This approach is supported by IWMI
15	**A**	But according to the World Wide Fund for Nature (WWFN), half of the world's wetlands have disappeared since 1990
16	**H**	'Awareness of the importance of wetlands is growing,' he says
17	**B**	Throughout history, humans have gathered around wetlands, and their fertile ecosystems have played an important part in human development. Consequently, they are of considerable religious, historical and archaeological value to many communities around the world.
18	**carbon**	When peatlands are drained for cultivation, they become net carbon emitters instead of active carbon stores
19	**fires**	The clearance of peatlands for planting also increases the risk of forest fires
20	**biodiversity**	The clearance of peatlands for planting also increases the risk of forest fires, which release huge amounts of CO_2. 'We're seeing huge peatland forests with extremely high biodiversity value being lost for a few decades of oil palm revenues,' says Silvius.
21	**ditches**	The damage starts when logging companies arrive to clear the trees. They dig ditches to enter the peat swamps by boat and then float the logs out the same way. These are then used to drain water out of the peatlands
22	**subsidence**	Meanwhile, the remainder of the solid matter in the peat starts to move downwards, in a process known as subsidence. Peat comprises 90 per cent water, so this is one of the most alarming consequences of peatland clearances.
23	**A**	says McCartney. 'For sustainability, it's essential that local people are involved in wetland planning and decision making and have

#	Answer	Explanation
		clear rights to use wetlands.'
24	**C**	The fortunes of wetlands would be improved, Silvius suggests, if more governments recognized their long-term value. 'Different governments have different attitudes,' he says, and goes on to explain that some countries place a high priority on restoring wetlands, while others still deny the issue.
25	**D**	Tickner does not blame anyone for deliberate damage, however. 'I've worked on wetland issues for 20 years and have never met anybody who wanted to damage a wetland,'
26	**B**	Wetland coastal forests provide food and water, as well as shelter from storms, and WI and other agencies are working to restore those forests which have been lost. 'It can be as simple as planting a few trees per hectare to create shade and substantially change a microclimate,' he says.
27	**D**	I'm struggling to follow him in English, on a scratchy line that reminds me we are nearly 10,000 kilometers apart-and that distance is still an obstacle to communication even if you're speaking the same language, as we are.
28	**A**	At Karlsruhe Institute of Technology, where he is a professor of computer science, Waibel and his colleagues already give lectures in German that their students can follow in English via an electronic translator.
29	**C**	The idea of artificial speech translation has been around for a long time. Douglas Adams' science fiction novel, The Hitchhiker's Guide to the Galaxy, published in 1979, featured a life form called the 'Babel fish' which, when placed in the ear, enabled a listener to understand any language in the universe.
30	**B**	For a conversation, both speakers need to have devices called Pilots (translator earpieces) in their ears. 'We find that there's a barrier with sharing one of the earphones with a stranger,' says Ochoa. That can't have been totally unexpected.
31	**C**	Waibel highlights the significance of certain Asian nations, noting that voice translation has really taken off in countries such as Japan with a range of systems. There is still a long way to go, though.
32	**E**	A translation system needs to be simultaneous, like the translator's voice speaking over the foreign politician being interviewed on the TV, rather than in sections that oblige speakers to pause after every few remarks and wait for the translation to be delivered.

#	Answer	Explanation
33	**F**	Systems not only need to cope with physical challenges such as noise, they will also need to be socially aware by addressing people in the right way. Some cultural traditions demand solemn respect for academic status, for example, and it is only polite to respect this.
34	**B**	At the same time, they might help to preserve local customs, slowing the spread of habits associated with international English, such as its readiness to get on first-name terms.
35	**NO**	Whatever uses it is put to, though, it will never be as good as the real thing. Even if voice-morphing technology simulates the speaker's voice, their lip movements won't match, and they will look like they are in a dubbed movie.
36	**YES**	Whether it will help people conduct their family lives or relationships is open to question-though one noteworthy possibility is that it could overcome the language barriers that often arise between generations after migration
37	**NO**	though one noteworthy possibility is that it could overcome the language barriers that often arise between generations after migration, leaving children and their grandparents without a shared language.
38	**NOT GIVEN**	Sharing a language can promote a sense of belonging and community, as with the international scientists who use English as a lingua franca, where their predecessors used Latin. Though the practical need for a common language will diminish, the social value of sharing one will persist. And software will never be a substitute for the subtle but vital understanding that comes with knowledge of a language.
39	**NOT GIVEN**	Sharing a language can promote a sense of belonging and community, as with the international scientists who use English as a lingua franca, where their predecessors used Latin. Though the practical need for a common language will diminish, the social value of sharing one will persist.
40	**YES**	Though the practical need for a common language will diminish, the social value of sharing one will persist.

Test 26

PASSAGE 1

The impact of climate change on butterflies in Britain

According to conservationists, populations of around two thirds of butterfly species have declined in Britain over the past 40 years. If this trend continues, it might have unpredictable knock-on effects for other species in the ecosystem. Butterfly eggs develop into caterpillars and these insects, which are the second stage in a new butterfly's lifecycle, consume vast quantities of plant material, and in turn act as prey for birds as well as bats and other small mammals. Only by arming themselves with an understanding of why butterfly numbers are down can conservationists hope to halt or reverse the decline.

Butterflies prefer outdoor conditions to be 'just right', which means neither too hot nor too cold. Under the conditions of climate change, the temperature at any given time in summer is generally getting warmer, leaving butterflies with the challenge of how to deal with this. One of the main ways in which species are ensuring conditions suit them is by changing the time of year at which they are active and reproduce. Scientists refer to the timing of such lifecycle events as 'phenology', so when an animal or plant starts to do something earlier in the year than it usually does, it is said to be 'advancing its phenology'.

These advances have been observed already in a wide range of butterflies – indeed, most species are advancing their phenology to some extent. In Britain, as the average spring temperature has increased by roughly 0.5°C over the past 20 years, species have advanced by between three days and a week on average, to keep in line with cooler temperatures. Is this a sign that butterflies are well equipped to cope with climate change, and readily adjust to new temperatures? Or are these populations under stress, being dragged along unwillingly by unnaturally fast changes? The answer is still unknown, but a new study is seeking to answer these questions.

First, the researchers pulled together data from millions of records that had been submitted by butterfly enthusiasts-people who spend their free time observing the activities of different species. This provided information on 130 species of butterflies in Great Britain every year for a 20-year period. They then estimated the abundance and distribution of each species across this time, along with how far north in the country they had moved. The data also, crucially, allowed researchers to estimate subtle changes in what time of the year each species was changing into an adult butterfly.

Analyzing the trends in each variable, the researchers discovered that species with more flexible lifecycles were more likely to be able to benefit from an earlier emergence driven by climate change. Some species are able to go from caterpillar to butterfly twice or more per year, so that the individual butterflies you see flying in the spring are the grandchildren or great-grandchildren of the individuals seen a year previously.

Among these species, researchers observed that those which have been advancing their phenology the most over the 20-year study period also had the most positive trends in abundance, distribution and northwards extent. For these species, such as Britain's tiniest butterfly, the dainty Small Blue, whose colonies are up to a hundred strong, some develop into butterflies early in spring, allowing their summer generations to complete another reproductive cycle by autumn so that more population growth occurs.

Other species, however, are less flexible and restricted to a single reproductive cycle per year. For these species, there was no evidence of any benefit to emerging earlier. Indeed, worryingly, it was found that the species in this group that specialize in very specific habitat types, often related to the caterpillar's preferred diet, actually tended to be most at harm from advancing phenology. The beautiful High Brown Fritillary, often described as Britain's most endangered butterfly, is in this group. It is found only in coppiced woodland and limestone pavement habitats. It is also a single-generation butterfly that has advanced its phenology. This suggests that climate change, while undoubtedly not the sole cause, might have played a part in the downfall of this species.

All is not lost, however. Many of Britain's single-generation species show the capacity, in continental Europe, to add a second generation in years that are sufficiently warm. Therefore, as the climate continues to warm, species like the Silver-studded Blue might be able to switch to multiple generations in the UK as well, and so begin to extract benefits from the additional warmth, potentially leading to population increases.

More immediately, conservationists can arm themselves with all this knowledge to spot the warning signs of species that may be at risk. The White Admiral of southern England, a much sought-after butterfly, experienced a significant increase in numbers from the 1920s but has shown a considerable decline in the past 20 years. This may be because the caterpillar exists solely on a diet of a plant called honeysuckle. But it is also likely to be due to climate change.

PART 1 — QUESTIONS

Questions 1-6

Do the following statements agree with the information given in Reading Passage?

In boxes on your answer sheet, write

TRUE *if the statement agrees with the information*

FALSE *if the statement contradicts the information*

NOT GIVEN *if there is no information on this*

1 Forty years ago, there were fewer butterflies in Britain than at present.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

2 Caterpillars are eaten by a number of different predators.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

3 'Phenology' is a term used to describe a creature's ability to alter the location of a lifecycle event.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

4 Some species of butterfly have a reduced lifespan due to spring temperature increases.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

5 There is a clear reason for the adaptations that butterflies are making to climate change.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

6 The data used in the study was taken from the work of amateur butterfly watchers.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

Questions 7-13

Complete the notes below.

Choose ONE WORD ONLY from the passage for each answer.

Write your answers in boxes on your answer sheet.

The Small Blue

* lives in large **7** _____

* first appears at the start of **8** _____

* completes more than one reproductive cycle per year

The High Brown Fritillary

*has one reproductive cycle

*is considered to be more **9** _____ than other species

*its caterpillars occupy a limited range of **10** _____

The Silver-studded Blue

*is already able to reproduce twice a year in warm areas of **11** _____

The White Admiral

*is found in **12** _____ areas of England

*both climate change and the **13** _____ of the caterpillar are possible reasons for decline

PASSAGE 2

Deep-sea Mining

Bacteria from the ocean floor can beat superbugs and cancer. But habitats are at risk from the hunger for marine minerals

A

When Professor Mat IJpton found that a microbe from a deep-sea sponge was killing pathogenic bugs in his laboratory, he realised it could be a breakthrough in the fight against antibiotic-resistant superbugs, which are responsible for thousands of deaths a year in the UK alone. Further tests confirmed that an antibiotic from the sponge bacteria, found living more than 700 metres under the sea at the Rockall trough in the north-east Atlantic, was previously unknown to science, boosting its potential as a life-saving medicine. But Upton, and other scientists who view the deep ocean and its wealth of unique and undocumented species as a prospecting ground for new medicines, fear such potential will be lost in the rush to exploit the deep sea's equally rich metal and mineral resources.

B

'We're looking at the bioactive potential of marine resources, to see if there are any more medicines or drugs down there before we destroy it for ever,' says Upton, a medical microbiologist at the University of Plymouth. Ile is among many scientists urging a halt to deep-sea mining, asking for time to weigh up the pros and cons. 'In sustainability terms, this could be a better way of exploiting the economic potential of the deep sea,' he argues. Oceanographers using remotely operated vehicles have spotted many new species. Among them have been sea cucumbers with tails allowing them to sail along the ocean floor, and a rare 'Dumbo'octopus, found 3,000 metres under the Pacific Ocean, off the coast of California. Any one of these could offer lifesaving potential. Upton estimates it could take up to a decade for a newly discovered antibiotic to become a medicine but the race towards commercial mining in the ocean abyss has already begun.

C

The deep sea contains more nickel, cobalt and rare earth metals than all land reserves combined, according to the US Geological Survey. Mining corporations argue that deep-sea exploration could help diversify the supply of metals and point to the fact that demand for resources such as copper, aluminum, cobalt for electric car batteries and other metals to power technology and smartphones, is soaring. They say that deep-sea mining could yield far superior ore to land mining with little, if any, waste. Different methods of extraction exist, but most involve employing some form of converted machinery previously used in terrestrial mining to excavate materials from the sea floor, at depths of up to 6,000 meters, then drawing a seawater slurry, containing rock and other solid particles, from the sea floor to ships on the surface. The slurry is then 'de-watered ' and transferred to another vessel for shipping. Extracted seawater is pumped back down and discharged close to the sea floor.

D

But environmental and legal groups have urged caution, arguing there are potentially massive and unknown ramifications for the environment and for nearby communities, and that the global regulatory framework is not yet drafted. ‘Despite arising in the last half century, the “new global gold rush” of deep-sea mining shares many features with past resource scrambles -including a general disregard for environmental and social impacts, and the marginalisation of indigenous peoples and their rights,a paper, written by Julie Hunter and Julian Aguon, from Blue Ocean Law,and Pradeep Singh, from the Center for Marine Environmental Sciences, Bremen, argues, ‘flic authors say that knowledge of the deep seabed remains extremely limited.’The surface of the Moon, Mars and even Venus have all been mapped and studied in much greater detail, leading marine scientists to commonly remark that, with respect to the deep sea, “We don’t yet know what we need to know”.

E

Scientific research-including a recent paper in Marine Policy journal has suggested the deep seabed, and hydrothermal vents, which are created when seawater meets volcanic magma, have crucial impacts upon biodiversity and the global climate. The mineral-rich vents and their surrounds are also home to many well-known animals including crustaceans, tubeworms, clams, slugs, anemones and fish. ‘It is becoming increasingly clear that deep- sea mining poses a grave threat to these vital seabed functions,’ the paper says. ‘Extraction methods would produce large sediment plumes and involve the discharge of waste back into the ocean, significantly disturbing seafloor environments,’ the paper continues.‘On deep sea vents, scientists are clear,’ says Dr Jon Copley of the National Oceanography Centre, Southampton: ‘We don’t want mining on them.’

F

The oceans occupy around 70% of the planet and arc relatively unexplored, says Mike Johnston, chief executive of Nautilus, a Canadian underwater exploration company: ‘It makes sense to explore this untapped potential in an environmentally sustainable way, instead of continually looking at the fast depleting land resources of the planet to meet society’s rising needs.’Those leading the global rush to place giant mining machines thousands of metres below the sea surface say the environmental impacts will be far lower than on land. But critics say exotic and little-known ecosystems in the deep oceans could be destroyed and must be protected. ‘Mining will be the greatest assault on deep-sea ecosystems ever inflicted by humans,’ according to hydrothermal vent expert Vcrena TunniclifTe, at the University of Victoria in Canada. She argues that active vents must be off-limits for mining to protect the new knowledge and biotechnology spin-offs they can deliver, and that strict controls must be in place elsewhere.

PART 2 — QUESTIONS

Questions 14-17

Reading Passage has six paragraphs, **A-F**.

Which paragraph contains the following information?

*Write the correct letter, **A-F**, in boxes on your answer sheet.*

	A	B	C	D	E	F
14 reference to the rapidly increasing need for one raw material in the transport industry	○	○	○	○	○	○
15 a rough estimate of the area of the Earth covered by the oceans	○	○	○	○	○	○
16 how a particular underwater habitat, where minerals and organisms co-exist, is formed	○	○	○	○	○	○
17 reference to the fact that the countries of the world have yet to agree on rules for the exploration of the seabed	○	○	○	○	○	○

Questions 18-23

Look at the following statements and the list of people below.

*Match each statement with the correct person or people, **A-E**.*

*Write the correct letter, **A-E**, in boxes on your answer sheet.*

***NB** You may use any letter more than once.*

List of People

A Professor Mat Upton

B Julie Hunter, Julian Aguon and Pradeep Singh

C Dr Jon Copley

D Mike Johnston

E Verena Tunnicliffe

	A	B	C	D	E
18 A move away from the exploration of heavily mined reserves on land is a good idea.	○	○	○	○	○
19 The negative effects of undersea exploration on local areas and their inhabitants are being ignored.	○	○	○	○	○
20 There are more worthwhile things to extract from the sea than minerals.	○	○	○	○	○
21 No other form of human exploration will have such a destructive impact on marine life as deep-sea mining.	○	○	○	○	○
22 More is known about outer space than about what lies beneath the oceans.	○	○	○	○	○
23 There is one marine life habitat where experts agree mining should not take place.	○	○	○	○	○

Questions 24-26

Complete the summary below.

*Choose **ONE WORD ONLY** from the passage for each answer.*

Write your answers in boxes on your answer sheet.

Mining the sea floor

Mining corporations believe that the mineral resources lying under the sea may be superior to those found in the earth. They also say that these can be removed without producing much **24** _____.

The extraction is often done by adapting the **25** _____ that has already been used to work on land. The method of excavation involves removing the seawater from the slurry that is brought up to ships and returning it to the seabed. However, concerned groups strongly believe that **26** _____ is necessary due to the possible number of unidentified consequences.

PASSAGE 3

The Unselfish Gene

A psychologist gives his view on how humans became self-centred

There has long been a general assumption that human beings are essentially selfish. We're apparently ruthless, with strong impulses to compete against each other for resources and to accumulate power and possessions. If we are kind to one another, it's usually because we have ulterior motives. If we are good, it's only because we have managed to control and transcend our innate selfishness and brutality.

This bleak view of human nature is closely associated with the science writer Richard Dawkins, whose 1976 book The Selfish Gene became popular because it fitted so well with-and helped to justify-the competitive and individualistic ethos that was so prevalent in late 20th-century societies. Like many others, Dawkins justifies his views with reference to the field of evolutionary psychology. Evolutionary psychology theorises that present-day human traits developed in prehistoric times, during what is termed the 'environment of evolutionary adaptedness'.

Prehistory is usually seen as a period of intense competition, when life was such a brutal battle that only those with traits such as selfishness, aggression and ruthlessness survived. And because survival depended on access to resources – such as rivers, forests and animals – there was bound to be conflict between rival groups, which led to the development of traits such as racism and warfare. This seems logical. But, in fact, the assumption on which this all rests – that prehistoric life was a desperate struggle for survival – is false.

It's important to remember that in the prehistoric era, the world was very sparsely populated. According to some estimates, around 15,000 years ago, the population of Europe was only 29,000, and the population of the whole world was less than half a million. Humans at that time were hunter-gatherers: people who lived by hunting wild animals and collecting wild plants. With such small population densities, it seems unlikely that prehistoric hunter-gatherer groups had to compete against each other for resources or had any need to develop ruthlessness and competitiveness, or to go to war.

There is significant evidence to back this notion from contemporary hunter-gatherer groups, who live in the same way as prehistoric humans did. As the anthropologist Bruce Knauft has remarked, hunter-gatherers are characterized by 'extreme political and sexual egalitarianism'. Knauft has observed that individuals in such groups don't accumulate property or possessions and have an ethical obligation to share everything. They also have methods of preserving egalitarianism by ensuring that disparities of status don't arise.

The !Kung people of southern Africa, for example, swap arrows before going hunting and when an animal is killed, the acclaim does not go to the person who fired the arrow, but to the person the arrow belongs to. And if a person becomes too domineering, the other members of the group ostracise them, exiling the offender from society. Typically in such groups, men do not

dictate what women do. Women in hunter-gatherer groups worldwide often benefit from a high level of autonomy, being able to select their own marriage partners, decide what work they do and work whenever they choose to. And if a marriage breaks down, they have custody rights over their children.

Many anthropologists believe that societies such as the !Kung were normal until a few thousand years ago, when population growth led to the development of agriculture and a settled lifestyle. In view of the above, there seems little reason to assume that traits such as racism, warfare and male domination should have been selected by evolution-as they would have been of little benefit in the prehistoric era. Individuals who behaved selfishly and ruthlessly would be less likely to survive, since they would have been ostracised from their groups.

It makes more sense, then, to see traits such as cooperation, egalitarianism, altruism and peacefulness as innate characteristics of human beings. These were the traits that were prevalent in human life for tens of thousands of years. So presumably these traits are still strong in us now.

But if prehistoric life wasn't really as brutal as has often been assumed, why do modern humans behave so selfishly and ruthlessly? Perhaps these negative traits should be seen as a later development, the result of environmental and psychological factors. Research has shown repeatedly that when the natural habitats of primates such as apes and gorillas are disrupted, they tend to become more violent and hierarchical.

So, it could well be that the same thing has happened to us. I believe that the end of the hunter-gatherer lifestyle and the advent of farming was connected to a psychological change that occurred in some groups of people. There was a new sense of individuality and separateness, which led to a new selfishness, and ultimately to hierarchical societies, patriarchy and warfare. At any rate, these negative traits appear to have developed so recently that it doesn't seem feasible to explain them in adaptive or evolutionary terms.

PART 3 — QUESTIONS

Questions 27-30

Choose the correct letter, A, B, C or D.

Write the correct letter in boxes on your answer sheet.

27 What is the writer doing in the first paragraph?

- **A** ○ setting out two opposing views about human nature
- **B** ○ justifying his opinion about our tendency to be greedy
- **C** ○ describing a commonly held belief about people's behaviour
- **D** ○ explaining why he thinks that humans act in a selfish manner

28 What point is made about Richard Dawkins' book The Selfish Gene?

- **A** ○ Its appeal lay in the radical nature of its ideas.
- **B** ○ Its success was due to the scientific support it offered.
- **C** ○ It presented a view that was in line with the attitudes of its time.
- **D** ○ It took an innovative approach to the analysis of human psychology.

29 What does the writer suggest about the prehistoric era in the fourth paragraph?

- **A** ○ Societies were more complex than many people believe.
- **B** ○ Supplies of natural resources were probably relatively plentiful.
- **C** ○ Most estimates about population sizes are likely to be inaccurate.
- **D** ○ Humans moved across continents more than was previously thought.

30 The writer refers to Bruce Knauft's work as support for the idea that

- **A** ○ selfishness is a relatively recent development in human societies.
- **B** ○ only people in isolated communities can live in an unselfish manner.
- **C** ○ very few lifestyles have survived unchanged since prehistoric times.

D ◯ hunter-gatherer cultures worldwide are declining in number.

Questions 31-35

Complete the summary below.

Choose ONE WORD ONLY from the passage for each answer.

Write your answers in boxes on your answer sheet.

Contemporary hunter-gatherer societies

Bruce Knauft's research shows that contemporary hunter-gatherer societies tend to exhibit a high level of **31** _____ in all areas of life. In these cultures, distributing resources fairly among all members is a moral obligation. These societies also employ strategies to prevent differences in **32** _____ occurring: for example, the !Kung follow a custom whereby the credit for one person's success at **33** _____ is given to another member of the group. Individuals who behave in a **34** _____ manner are punished by being excluded from the group, and women have a considerable amount of **35** _____ in choices regarding work and marriage.

Questions 36-40

Do the following statements agree with the views of the writer in Reading Passage?

In boxes on your answer sheet, write

***YES** if the statement agrees with the views of the writer*

***NO** if the statement contradicts the views of the writer*

***NOT GIVEN** if it is impossible to say what the writer thinks about this*

36 Some anthropologists are mistaken about the point when the number of societies such as the !Kung began to decline.

A ◯ YES

B ◯ NO

C ◯ NOT GIVEN

37 Humans who developed warlike traits in prehistory would have had an advantage over those who did not.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

38 Being peaceful and cooperative is a natural way for people to behave.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

39 Negative traits are more apparent in some modern cultures than in others.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

40 Animal research has failed to reveal a link between changes in the environment and the emergence of aggressive tendencies.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

Answer Key

#	Answer	Explanation
1	**FALSE**	According to conservationists, populations of around two thirds of butterfly species have declined in Britain over the past 40 years.
2	**TRUE**	Butterfly eggs develop into caterpillars and these insects, which are the second stage in a new butterfly's lifecycle, consume vast quantities of plant material, and in turn act as prey for birds as well as bats and other small mammals.
3	**FALSE**	Scientists refer to the timing of such lifecycle events as 'phenology', so when an animal or plant starts to do something earlier in the year than it usually does, it is said to be 'advancing its phenology'.
4	**NOT GIVEN**	In Britain, as the average spring temperature has increased by roughly 0.5°C over the past 20 years, species have advanced by between three days and a week on average, to keep in line with cooler temperatures. Is this a sign that butterflies are well equipped to cope with climate change, and readily adjust to new temperatures?
5	**FALSE**	Is this a sign that butterflies are well equipped to cope with climate change, and readily adjust to new temperatures? Or are these populations under stress, being dragged along unwillingly by unnaturally fast changes? The answer is still unknown, but a new study is seeking to answer these questions.
6	**TRUE**	First, the researchers pulled together data from millions of records that had been submitted by butterfly enthusiasts-people who spend their free time observing the activities of different species.
7	**colonies**	For these species, such as Britain's tiniest butterfly, the dainty Small Blue, whose colonies are up to a hundred strong
8	**spring**	For these species, such as Britain's tiniest butterfly, the dainty Small Blue, whose colonies are up to a hundred strong, some develop into butterflies early in spring,
9	**endangered**	The beautiful High Brown Fritillary, often described as Britain's most endangered butterfly, is in this group.
10	**habitats**	It is found only in coppiced woodland and limestone pavement habitats.
11	**Europe**	Many of Britain's single-generation species show the capacity, in continental Europe, to add a second generation in years that are

#	Answer	Explanation
		sufficiently warm.
12	**southern**	The White Admiral of southern England
13	**diet**	This may be because the caterpillar exists solely on a diet of a plant called honeysuckle. But it is also likely to be due to climate change.
14	**C**	Mining corporations argue that deep-sea exploration could help diversify the supply of metals and point to the fact that demand for resources such as copper, aluminum, cobalt for electric car batteries and other metals to power technology and smartphones, is soaring.
15	**F**	The oceans occupy around 70% of the planet and arc relatively unexplored, says Mike Johnston, chief executive of Nautilus, a Canadian underwater exploration company
16	**E**	Scientific research-including a recent paper in Marine Policy journal has suggested the deep seabed, and hydrothermal vents, which are created when seawater meets volcanic magma, have crucial impacts upon biodiversity and the global climate. The mineral-rich vents and their surrounds are also home to many well-known animals including crustaceans, tubeworms, clams, slugs, anemones and fish.
17	**D**	But environmental and legal groups have urged caution, arguing there are potentially massive and unknown ramifications for the environment and for nearby communities, and that the global regulatory framework is not yet drafted.
18	**D**	The oceans occupy around 70% of the planet and arc relatively unexplored, says Mike Johnston, chief executive of Nautilus, a Canadian underwater exploration company: 'It makes sense to explore this untapped potential in an environmentally sustainable way, instead of continually looking at the fast depleting land resources of the planet to meet society's rising needs.
19	**B**	'Despite arising in the last half century, the "new global gold rush" of deep-sea mining shares many features with past resource scrambles -including a general disregard for environmental and social impacts, and the marginalisation of indigenous peoples and their rights,a paper, written by Julie Hunter and Julian Aguon, from Blue Ocean Law,and Pradeep Singh, from the Center for Marine Environmental Sciences, Bremen, argues

#	Answer	Explanation
20	**A**	But Upton, and other scientists who view the deep ocean and its wealth of unique and undocumented species as a prospecting ground for new medicines, fear such potential will be lost in the rush to exploit the deep sea's equally rich metal and mineral resources.
21	**E**	'Mining will be the greatest assault on deep-sea ecosystems ever inflicted by humans,' according to hydrothermal vent expert Vcrena TunniclifTe, at the University of Victoria in Canada.
22	**B**	Julie Hunter and Julian Aguon, from Blue Ocean Law,and Pradeep Singh, from the Center for Marine Environmental Sciences, Bremen, argues, 'flic authors say that knowledge of the deep seabed remains extremely limited.'The surface of the Moon, Mars and even Venus have all been mapped and studied in much greater detail, leading marine scientists to commonly remark that, with respect to the deep sea, "We don't yet know what we need to know".
23	**C**	'On deep sea vents, scientists are clear,' says Dr Jon Copley of the National Oceanography Centre, Southampton: 'We don't want mining on them.'
24	**waste**	They say that deep-sea mining could yield far superior ore to land mining with little, if any, waste.
25	**machinery**	Different methods of extraction exist, but most involve employing some form of converted machinery previously used in terrestrial mining to excavate materials from the sea floor
26	**caution**	But environmental and legal groups have urged caution, arguing there are potentially massive and unknown ramifications for the environment and for nearby communities, and that the global regulatory framework is not yet drafted.
27	**C**	There has long been a general assumption that human beings are essentially selfish.
28	**C**	This bleak view of human nature is closely associated with the science writer Richard Dawkins, whose 1976 book The Selfish Gene became popular because it fitted so well with-and helped to justify-the competitive and individualistic ethos that was so prevalent in late 20th-century societies.
29	**B**	Humans at that time were hunter-gatherers: people who lived by hunting wild animals and collecting wild plants. With such small population densities, it seems unlikely that prehistoric hunter-gatherer groups had to compete against each other for resources or had any need to develop ruthlessness and competitiveness, or to go to war.

#	Answer	Explanation
30	**A**	As the anthropologist Bruce Knauft has remarked, hunter-gatherers are characterized by ‘extreme political and sexual egalitarianism’. Knauft has observed that individuals in such groups don’t accumulate property or possessions and have an ethical obligation to share everything.
31	**egalitarianism**	As the anthropologist Bruce Knauft has remarked, hunter-gatherers are characterized by ‘extreme political and sexual egalitarianism’.
32	**status**	They also have methods of preserving egalitarianism by ensuring that disparities of status don’t arise.
33	**hunting**	The !Kung people of southern Africa, for example, swap arrows before going hunting and when an animal is killed, the acclaim does not go to the person who fired the arrow, but to the person the arrow belongs to.
34	**domineering**	And if a person becomes too domineering, the other members of the group ostracise them, exiling the offender from society.
35	**autonomy**	Women in hunter-gatherer groups worldwide often benefit from a high level of autonomy, being able to select their own marriage partners, decide what work they do and work whenever they choose to.
36	**NOT GIVEN**	Many anthropologists believe that societies such as the !Kung were normal until a few thousand years ago, when population growth led to the development of agriculture and a settled lifestyle.
37	**NO**	In view of the above, there seems little reason to assume that traits such as racism, warfare and male domination should have been selected by evolution-as they would have been of little benefit in the prehistoric era.
38	**YES**	It makes more sense, then, to see traits such as cooperation, egalitarianism, altruism and peacefulness as innate characteristics of human beings.
39	**NOT GIVEN**	Perhaps these negative traits should be seen as a later development, the result of environmental and psychological factors.
40	**NO**	Perhaps these negative traits should be seen as a later development, the result of environmental and psychological factors. Research has shown repeatedly that when the natural habitats of primates such as apes and gorillas are disrupted, they tend to become more violent and hierarchical.

Test 27

PASSAGE 1

The kéképé

The kakapo is a nocturnal, flightless parrot that is critically endangered and one of New Zealand ‘s unique treasures.

The kakapo, also known as the owl parrot, is a large, forest-dwelling bird, with a pale owl-like face. Up to 64 cm in length, it has predominantly yellow-green feathers, forward-facing eyes, a large grey beak, large blue feet, and relatively short wings and tail. It is the world’s only flightless parrot, and is also possibly one of the world’s longest-living birds, with a reported lifespan of up to 100 years.

Kakapo are solitary birds and tend to occupy the same home range for many years. They forage on the ground and climb high into trees. They often leap from trees and flap their wings, but at best manage a controlled descent to the ground. They are entirely vegetarian, with their diet including the leaves, roots and bark of trees as well as bulbs, and fern fronds.

Kakapo breed in summer and autumn, but only in years when food is plentiful. Males play no part in incubation or chick-rearing - females alone incubate eggs and feed the chicks. The 1-4 eggs are laid in soil, which is repeatedly turned over before and during incubation. The female kakapo has to spend long periods away from the nest searching for food, which leaves the unattended eggs and chicks particularly vulnerable to predators.

Before humans arrived, kakapo were common throughout New Zealand’s forests. However, this all changed with the arrival of the first Polynesian settlers about 700 years ago. For the early settlers, the flightless kakapo was easy prey. They ate its meat and used its feathers to make soft cloaks. With them came the Polynesian dog and rat, which also preyed on kakapo. By the time European colonisers arrived in the early 1800s, kakapo had become confined to the central North Island and forested parts of the South Island. The fall in kakapo numbers was accelerated by European colonisation. A great deal of habitat was lost through forest clearance, and introduced species such as deer depleted the remaining forests of food. Other predators such as cats, stoats and two more species of rat were also introduced. The kakapo were in serious trouble.

In 1894, the New Zealand government launched its first attempt to save the kakapo. Conservationist Richard Henry led an effort to relocate several hundred of the birds to predator-free Resolution Island in Fiordland. Unfortunately, the island didn’t remain predator free – stoats arrived within six years, eventually destroying the kakapo population. By the mid-1900s, the kakapo was practically a lost species. Only a few clung to life in the most isolated parts of New Zealand.

From 1949 to 1973, the newly formed New Zealand Wildlife Service made over 60 expeditions to find kakapo, focusing mainly on Fiordland. Six were caught, but there were no females

amongst them and all but one died within a few months of captivity.

In 1974, a new initiative was launched, and by 1977, 18 more kakapo were found in Fiordland. However, there were still no females. In 1977, a large population of males was spotted in Rakiura – a large island free from stoats, ferrets and weasels. There were about 200 individuals, and in 1980 it was confirmed females were also present. These birds have been the foundation of all subsequent work in managing the species.

Unfortunately, predation by feral cats on Rakiura Island led to a rapid decline in kakapo numbers. As a result, during 1980-97, the surviving population was evacuated to three island sanctuaries: Codfish Island, Maud Island and Little Barrier Island. However, breeding success was hard to achieve. Rats were found to be a major predator of kakapo chicks, and an insufficient number of chicks survived to offset adult mortality. By 1995, although at least 12 chicks had been produced on the islands, only three had survived.

The kakapo population had dropped to 51 birds.

The critical situation prompted an urgent review of kakapo management in New Zealand. In 1996, a new Recovery Plan was launched, together with a specialist advisory group called the Kakapo Scientific and Technical Advisory Committee and a higher amount of funding. Renewed steps were taken to control predators on the three islands. Cats were eradicated from Little Barrier Island in 1980, and possums were eradicated from Codfish Island by 1986. However, the population did not start to increase until rats were removed from all three islands, and the birds were more intensively managed. This involved moving the birds between islands, supplementary feeding of adults, and rescuing and hand-raising any failing chicks.

After the first five years of the Recovery Plan, the population was on target. By 2000, five new females had been produced, and the total population had grown to 62 birds. For the first time, there was cautious optimism for the filture of kakapo, and by June 2020, a total of 210 birds was recorded.

Today, kakapo management continues to be guided by the kakapo Recovery Plan. Its key goals are: minimise the loss of genetic diversity in the kakapo population, restore or maintain sufficient habitat to accommodate the expected increase in the kakapo population, and ensure stakeholders continue to be fully engaged in the preservation of the species.

PART 1 — QUESTIONS

Questions 1-6

Do the following statements agree with the information given in Reading Passage?

in boxes on your answer sheet, write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

1 There are other parrots that share the kakapos inability to fly.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

2 Adult kakapo produce chicks every year.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

3 Adult male kakapo bring food back to nesting females.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

4 The Polynesian rat was a greater threat to the kakapo than Polynesian settlers.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

5 Kakapo were transferred from Rakiura Island to other locations because they were at risk from feral cats.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

6 One Recovery Plan initiative that helped increase the kakapo population size was caring for struggling young birds.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

Questions 7-13

Complete the notes below.

Choose **ONE WORD AND/OR NUMBER ONLY** from the passage for each answer.

Write your answers in boxes on your answer sheet.

New Zealand's kakapo

A Type of parrot:

Diet consists of fern fronds, various parts of a tree and **7** _____

Nests are created in **8** _____ . where eggs are laid.

Arrival of Polynesian settlers

The **9** _____ of the kakapo were used to make clothes.

Arrival of European colonisers

10 _____ were an animal which they introduced that ate the kakapo's food sources.

Protecting kakapo

Richard Henry, a conservationist, tried to protect the kakapo.

A definite sighting of female kakapo on Rakiura Island was reported in the year

11 _____

The Recovery Plan included an increase in **12** _____

A current goal of the Recovery Plan is to maintain the involvement of **13** _____ in kakapo protection.

PASSAGE 2

To Britain

Mark Rowe investigates attempts to reintroduce elms to Britain

A. Around 25 million elms, accounting for 90% of all elm trees in the UK, died during the 1960s and ’70s of Dutch elm disease. In the aftermath, the elm, once so dominant in the British landscape, was largely forgotten. However, there’s now hope the elm may be reintroduced to the countryside of central and southern England. Any reintroduction will start from a very low base. ‘The impact of the disease is difficult to picture if you hadn’t seen what was there before,’ says Matt Elliot of the Woodland Trust. ‘You look at old photographs from the 1960s and it’s only then that you realise the impact [elms had]. They were significant, large trees then they were gone.’

B. The disease is caused by a fungus that blocks the elms’ vascular (water, nutrient and food transport) system, causing branches to wilt and die. A first epidemic, which occurred in the 1920s, gradually died down, but in the '70s a second epidemic was triggered by shipments of elm from Canada. The wood came in the form of logs destined for boat building and its intact bark was perfect for the elm bark beetles that spread the deadly fungus. This time, the beetles carried a much more virulent strain that destroyed the vast majority of British elms.

C. Today, elms still exist in the southern English countryside but mostly only in low hedgerows between fields. ‘We have millions of small elms in hedgerows but they get targeted by the beetle as soon as they reach a certain size,’ says Karen Russell, co-author of the report Where we are with elm. Once the trunk of the elm reaches 10-15 centimetres or so in diameter, it becomes a perfect size for beetles to lay eggs and for the fungus to take hold. Yet mature specimens have been identified, in counties such as Cambridgeshire, that are hundreds of years old, and have mysteriously escaped the epidemic.

The key, Russell says, is to identify and study those trees that have survived and work out why they stood tall when millions of others succumbed. Nevertheless, opportunities are limited as the number of these mature survivors is relatively small. 'What are the reasons for their survival?' asks Russell. 'Avoidance, tolerance, resistance? We don't know where the balance lies between the three. I don't see how it can be entirely down to luck.'

D. For centuries, elm ran a close second to oak as the hardwood tree of choice in Britain and was in many instances the most prominent tree in the landscape. Not only was elm common in European forests, it became a key component of birch, ash and hazel woodlands. The use of elm is thought to go back to the Bronze Age, when it was widely used for tools. Elm was also the preferred material for shields and early swords. In the 18th century, it was planted more widely and its wood was used for items such as storage crates and flooring. It was also suitable for items that experienced high levels of impact and was used to build the keel of the l9th-century sailing ship Cutty Sark as well as mining equipment.

E. Given how ingrained elm is in British culture, it's unsurprising the tree has many advocates. Amongst them is Peter Bourne of the National Elm Collection in Brighton. 'I saw Dutch elm disease unfold as a small boy,' he says. 'The elm seemed to be part of rural England, but I remember watching trees just lose their leaves and that really stayed with me.' Today, the city of Brighton's elms total about 17,000. Local factors appear to have contributed to their survival. Strong winds from the sea make it difficult for the determined elm bark beetle to attack this coastal city's elm population. However, the situation is precarious. 'The beetles can just march in if we're not careful, as the threat is right on our doorstep,' says Bourne.

F. Any prospect of the elm returning relies heavily on trees being either resistant to, or tolerant of, the disease. This means a widespread reintroduction would involve existing or new hybrid strains derived from resistant, generally non-native elm species. A new generation of seedlings have been bred and tested to see if they can withstand the fungus by cutting a small slit on the bark and in ecting a tiny amount of the pathogen. 'The effects are very quick,' says Russell. 'You return in four to six weeks and trees that are resistant show no symptoms, whereas those that are susceptible show leaf loss and may even have died completely.'

G. All of this raises questions of social acceptance, acknowledges Russell. 'If we're putting elm back into the landscape, a small element of it is not native - are we bothered about that?' For her, the environmental case for reintroducing elm is strong. 'They will host wildlife, which is a good thing.' Others are more wary. 'On the face of it, it seems like a good idea,' says Elliot. The problem, he suggests, is that, 'You're replacing a native species with a horticultural analogue. You're effectively cloning.' There's also the risk of introducing new diseases. Rather than plant new elms, the Woodland Trust emphasises providing space to those elms that have survived independently. 'Sometimes the best thing you can do is just give nature time to recover over time, you might get resistance,' says Elliot.

*horticultural analogue: a cultivated plant species that is genetically similar to an existing species.

PART 2 — QUESTIONS

Questions 14-18

Reading Passage has seven paragraphs, **A–G.**

Which section contains the following information?

Write the correct letter, **A-G**, in boxes on your answer sheet.

NB You may use any letter more than once.

	A	B	C	D	E	F	G
14 Reference to the research problems that arise from there being only a few surviving large elms	○	○	○	○	○	○	○
15 Details of a difference of opinion about the value of reintroducing elms to Britain	○	○	○	○	○	○	○
16 Reference to how Dutch elm disease was brought into Britain	○	○	○	○	○	○	○
17 A description of the conditions that have enabled a location in Britain to escape Dutch elm disease	○	○	○	○	○	○	○
18 Reference to the stage at which young elms become vulnerable to Dutch elm disease	○	○	○	○	○	○	○

Questions 19-23

Look at the following statements and the list of people below.

Match each statement with the correct person, **A, B, or C.**

NB You may use any letter more than once.

List of People:

A. Matt Elliot

B. Karen Russell

C. Peter Bourne

	A	B	C
19 If a tree gets infected with Dutch elm disease, the damage rapidly becomes visible	○	○	○
20 It may be better to wait and see if the mature elms that have survived continue to flourish	○	○	○
21 There must be an explanation for the survival of some mature elms	○	○	○
22 We need to be aware that insects carrying Dutch elm disease are not very far away	○	○	○
23 You understand the effect Dutch elm disease has had when you see evidence of how prominent the tree once was	○	○	○

Questions 24-26

Complete the summary below.

Choose **ONE WORD ONLY** from the passage for each answer.

Uses of a Popular Tree

For hundreds of years, the only tree that was more popular in Britain than elm was **24** _____. Starting in the Bronze Age, many tools were made from elm, and people also used it to make weapons. In the 18th century, it was grown to provide wood for boxes and **25** _____. Due to its strength, elm was often used for mining equipment, and the Cutty Sark's **26** _____ was also constructed from elm.

PASSAGE 3

How Stress Affects Our Judgement

Some of the most important decisions of our lives occur while we're feeling stressed and anxious. From medical decisions to financial and professional ones, we are all sometimes required to weigh up information under stressful conditions. But do we become better or worse at processing and using information under such circumstances?

My colleague and I, both neuroscientists, wanted to investigate how the mind operates under stress, so we visited some local fire stations. Firefighters' workdays vary quite a bit. Some are pretty relaxed, they'll spend their time washing the truck, cleaning equipment, cooking meals and reading. Other days can be hectic, with numerous life-threatening incidents to attend to, they'll enter burning homes to rescue trapped residents, and assist with medical emergencies. These ups and downs presented the perfect setting for an experiment on how people's ability to use information changes when they feel under pressure.

We found that perceived threat acted as a trigger for a stress reaction that made the task of processing information easier for the firefighters – but only as long as it conveyed bad news.

This is how we arrived at these results. We asked the firefighters to estimate their likelihood of experiencing 40 different adverse events in their life, such as being involved in an accident or becoming a victim of card fraud. We then gave them either good news (that their likelihood of experiencing these events was lower than they'd thought) or bad news (that it was higher) and asked them to provide new estimates.

People are normally quite optimistic -they will ignore bad news and embrace the good. This is what happened when the firefighters were relaxed, but when they were under stress, a different pattern emerged. Under these conditions, they became hyper-vigilant to bad news, even when it had nothing to do with their job (such as learning that the likelihood of card fraud was higher than they'd thought), and altered their beliefs in response. In contrast, stress didn't change how they responded to good news (such as learning that the likelihood of card fraud was lower than they'd thought).

Back in our lab, we observed the same pattern in students who were told they had to give a surprise public speech, which would be judged by a panel, recorded and posted online. Sure enough, their cortisol levels spiked, their heart rates went up and they suddenly became better at processing unrelated, yet alarming, information about rates of disease and violence.

When we experience stressful events, a physiological change is triggered that causes us to take in warnings and focus on what might go wrong. Brain imaging reveals that this 'switch' is related to a sudden boost in a neural signal important for learning, specifically in response to unexpected warning signs, such as faces expressing fear.

Such neural engineering could have helped prehistoric humans to survive. When our ancestors found themselves surrounded by hungry animals, they would have benefited from an increased ability to team about hazards. In a safe environment, however, it would have been wasteful to be

on high alert constantly. So, a neural switch that automatically increases or decreases our ability to process warnings in response to changes in our environment could have been useful. In fact, people with clinical depression and anxiety seem unable to switch away from a state in which they absorb all the negative messages around them.

It is also important to realise that stress travels rapidly from one person to the next. If a co-worker is stressed, we are more likely to tense up and feel stressed ourselves. We don't even need to be in the same room with someone for their emotions to influence our behaviour. Studies show that if we observe positive feeds on social media, such as images of a pink sunset, we are more likely to post uplifting messages ourselves. If we observe negative posts, such as complaints about a long queue at the coffee shop, we will in turn create more negative posts.

In some ways, many of us now live as if we are in danger, constantly ready to tackle demanding emails and text messages, and respond to news alerts and comments on social media. Repeatedly checking your phone, according to a survey conducted by the American Psychological Association, is related to stress. In other words, a pre-programmed physiological reaction, which evolution has equipped us with to help us avoid famished predators, is now being triggered by an online post. Social media posting, according to one study, raises your pulse, makes you sweat, and enlarges your pupils more than most daily activities.

The fact that stress increases the likelihood that we will focus more on alarming messages, together with the fact that it spreads extremely rapidly, can create collective fear that is not always justified. After a stressful public event, such as a natural disaster or major financial crash, there is often a wave of alarming information in traditional and social media, which individuals become very aware of. But that has the effect of exaggerating existing danger. And so, a reliable pattern emerges – stress is triggered, spreading from one person to the next, which temporarily enhances the likelihood that people will take in negative reports, which increases stress further. As a result, trips are cancelled, even if the disaster took place across the globe, stocks are sold, even when holding on is the best thing to do.

The good news, however, is that positive emotions, such as hope, are contagious too, and are powerful in inducing people to act to find solutions. Being aware of the close relationship between people's emotional state and how they process information can help us frame our messages more effectively and become conscientious agents of change.

PART 3 — QUESTIONS

Questions 27-30

Choose the correct letter, **A, B, C or D.**

Write the correct letter in boxes on your answer sheet.

27 In the first paragraph, the writer introduces the topic of the text by

- **A** ○ defining some commonly used terms.
- **B** ○ questioning a widely held assumption.
- **C** ○ mentioning a challenge faced by everyone.
- **D** ○ specifying a situation which makes us most anxious.

28 What point does the writer make about firefighters in the second paragraph?

- **A** ○ The regular changes of stress levels in their working lives make them ideal study subjects.
- **B** ○ The strategies they use to handle stress are of particular interest to researchers.
- **C** ○ The stressful nature of their job is typical of many public service professions.
- **D** ○ Their personalities make them especially well-suited to working under stress.

29 What is the writer doing in the fourth paragraph?

- **A** ○ Explaining their findings
- **B** ○ Justifying their approach
- **C** ○ Setting out their objectives
- **D** ○ Describing their methodology

30 In the seventh paragraph, the writer describes a mechanism in the brain which

- **A** ○ Enables people to respond more quickly to stressful situations.
- **B** ○ Results in increased ability to control our levels of anxiety.
- **C** ○ Produces heightened sensitivity to indications of external threats.

D ◯ Is activated when there is a need to communicate a sense of danger.

Questions 31-35

Complete each sentence with the correct ending, **A-G**, below.

• At times when they were relaxed, the firefighters usually **31** _____

• The researchers noted that when the firefighters were stressed, they **32** _____

• When the firefighters were told good news, they always **33** _____

• The students' cortisol levels and heart rates were affected when the researchers **34** _____

• In both experiments, negative information was processed better when the subjects **35** _____

A. **made them feel optimistic.**

B. **took relatively little notice of bad news.**

C. **responded to negative and positive information in the same way.**

D. **were feeling under stress.**

E. **put them in a stressful situation.**

F. **behaved in a similar manner, regardless of the circumstances.**

G. **thought it more likely that they would experience something bad.**

Questions 36-40

Do the following statements agree with the information given in Reading Passage?

In boxes on your answer sheet, write

YES if the statement agrees with the claims of the writer

NO if the statement contradicts the claims of the writer

NOT GIVEN if it is impossible to say what the writer thinks about this

36 The tone of the content we post on social media tends to reflect the nature of the posts in our feeds.

A ○ YES

B ○ NO

C ○ NOT GIVEN

37 Phones have a greater impact on our stress levels than other electronic media devices.

A ○ YES

B ○ NO

C ○ NOT GIVEN

38 The more we read about a stressful public event on social media, the less able we are to take the information in.

A ○ YES

B ○ NO

C ○ NOT GIVEN

39 Stress created by social media posts can lead us to take unnecessary precautions.

A ○ YES

B ○ NO

C ○ NOT GIVEN

40 Our tendency to be affected by other people's moods can be used in a positive way.

A ○ YES

B ○ NO

C ○ NOT GIVEN

Answer Key

#	Answer	Explanation
1	**FALSE**	It is the world's only flightless parrot
2	**FALSE**	Kakapo breed in summer and autumn, but only in years when food is plentiful
3	**FALSE**	Males play no part in incubation or chick-rearing – females alone incubate eggs and feed the chicks
4	**NOT GIVEN**	For the early settlers, the flightless kakapo was easy prey. They ate its meat and used its feathers to make soft cloaks. With them came the Polynesian dog and rat, which also preyed on kakapo
5	**TRUE**	Unfortunately, predation by feral cats on Rakiura Island led to a rapid decline in kakapo numbers. As a result, during 1980-97, the surviving population was evacuated to three island sanctuaries: Codfish Island, Maud Island and Little Barrier Island
6	**TRUE**	This involved moving the birds between islands, supplementary feeding of adults, and rescuing and hand-raising any failing chicks
7	**bulbs**	they are entirely vegetarian, with their diet including the leaves, roots and bark of trees as well as bulbs, and fern fronds
8	**soil**	The 1-4 eggs are laid in soil, which is repeatedly turned over before and during incubation
9	**feathers**	For the early settlers, the flightless kakapo was easy prey. They ate its meat and used its feathers to make soft cloaks
10	**deer**	A great deal of habitat was lost through forest clearance, and introduced species such as deer depleted the remaining forests of food
11	**1980**	In 1980 it was confirmed females were also present
12	**funding**	In 1996, a new Recovery Plan was launched, together with a specialist advisory group called the Kakapo Scientific and Technical Advisory Committee and a higher amount of funding
13	**stakeholders**	its key goals are: minimise the loss of genetic diversity in the kakapo population, restore or maintain sufficient habitat to accommodate the expected increase in the kakapo population, and ensure stakeholders continue to be fully engaged in the preservation of the species

#	Answer	Explanation
14	**C**	Nevertheless, opportunities are limited as the number of these mature survivors is relatively small
15	**G**	All of this raises questions of social acceptance, acknowledges Russell. ‘If we’re putting elm back into the landscape, a small element of it is not native – are we bothered about that?’ For her, the environmental case for reintroducing elm is strong. ‘They will host wildlife, which is a good thing.’ Others are more wary
16	**B**	A first epidemic, which occurred in the 1920s, gradually died down, but in the ’70s a second epidemic was triggered by shipments of elm from Canada
17	**E**	Strong winds from the sea make it difficult for the determined elm bark beetle to attack this coastal city’s elm population
18	**C**	‘We have millions of small elms in hedgerows but they get targeted by the beetle as soon as they reach a certain size,’ says Karen Russell
19	**B**	‘The effects are very quick,’ says Russell. ‘You return in four to six weeks and trees that are resistant show no symptoms, whereas those that are susceptible show leaf loss and may even have died completely.’
20	**A**	Rather than plant new elms, the Woodland Trust emphasises providing space to those elms that have survived independently. ‘Sometimes the best thing you can do is just give nature time to recover over time, you might get resistance,’ says Elliot
21	**B**	‘What are the reasons for their survival?’ asks Russell. ‘Avoidance, tolerance, resistance? We don’t know where the balance lies between the three. I don’t see how it can be entirely down to luck.’
22	**C**	‘The beetles can just march in if we’re not careful, as the threat is right on our doorstep,’ says Bourne
23	**A**	‘The impact of the disease is difficult to picture if you hadn’t seen what was there before,’ says Matt Elliot of the Woodland Trust. ‘You look at old photographs from the 1960s and it’s only then that you realise the impact [elms had]. They were significant, large trees then they were gone.’
24	**oak**	For centuries, elm ran a close second to oak as the hardwood tree of choice in Britain
25	**flooring**	In the 18th century, it was planted more widely and its wood was used for items such as storage crates and flooring

#	Answer	Explanation
26	**keel**	It was also suitable for items that experienced high levels of impact and was used to build the keel of the l9th-century sailing ship Cutty Sark as well as mining equipment
27	**C**	From medical decisions to financial and professional ones, we are all sometimes required to weigh up information under stressful conditions.
28	**A**	These ups and downs presented the perfect setting for an experiment on how people's ability to use information changes when they feel under pressure
29	**D**	We asked the firefighters to estimate their likelihood of experiencing 40 different adverse events in their life, such as being involved in an accident or becoming a victim of card fraud. We then gave them either good news (that their likelihood of experiencing these events was lower than they'd thought) or bad news (that it was higher) and asked them to provide new estimates
30	**C**	When we experience stressful events, a physiological change is triggered that causes us to take in warnings and focus on what might go wrong
31	**B**	People are normally quite optimistic -they will ignore bad news and embrace the good. This is what happened when the firefighters were relaxed
32	**G**	Under these conditions, they became hyper-vigilant to bad news, even when it had nothing to do with their job
33	**F**	In contrast, stress didn't change how they responded to good news
34	**E**	students who were told they had to give a surprise public speech, which would be judged by a panel, recorded and posted online. Sure enough, their cortisol levels spiked, their heart rates went up
35	**D**	they suddenly became better at processing unrelated, yet alarming, information about rates of disease and violence.
36	**YES**	If we observe positive feeds on social media, such as images of a pink sunset, we are more likely to post uplifting messages ourselves. If we observe negative posts, such as complaints about a long queue at the coffee shop, we will in turn create more negative posts
37	**NOT GIVEN**	Repeatedly checking your phone, according to a survey conducted by the American Psychological Association, is related to stress

#	Answer	Explanation
38	**NO**	And so, a reliable pattern emerges – stress is triggered, spreading from one person to the next, which temporarily enhances the likelihood that people will take in negative reports, which increases stress further
39	**YES**	As a result, trips are cancelled, even if the disaster took place across the globe, stocks are sold, even when holding on is the best thing to do.
40	**YES**	The good news, however, is that positive emotions, such as hope, are contagious too, and are powerful in inducing people to act to find solutions

Test 28

PASSAGE 1

Manatees

Manatees, also known as sea cows, are aquatic mammals that belong to a group of animals called Sirenia. This group also contains dugongs. Dugongs and manatees look quite alike - they are similar in size, colour and shape, and both have flexible flippers for forelimbs. However, the manatee has a broad, rounded tail, whereas the dugongs is fluked, like that of a whale. There are three species of manatees: the West Indian manatee (Trichechus manatus), the African manatee (Trichechus senegalensis) and the Amazonian manatee (Trichechus inunguis).

Unlike most mammals, manatees have only six bones in their neck – most others, including humans and giraffes, have seven. This short neck allows a manatee to move its head up and down, but not side to side. To see something on its left or its right, a manatee must turn its entire body, steering with its flippers. Manatees have pectoral flippers but no back limbs, only a tail for propulsion. They do have pelvic bones, however – a leftover from their evolution from a four-legged to a fully aquatic animal. Manatees share some visual similarities to elephants. Like elephants, manatees have thick, wrinkled skin. They also have some hairs covering their bodies which help them sense vibrations in the water around them.

Seagrasses and other marine plants make up most of a manatee's diet. Manatees spend about eight hours each day grazing and uprooting plants. They eat up to 15% of their weight in food each day. African manatees are omnivorous – studies have shown that molluscs and fish make up a small part of their diets. West Indian and Amazonian manatees are both herbivores.

Manatees' teeth are all molars - flat, rounded teeth for grinding food. Due to manatees' abrasive aquatic plant diet, these teeth get worn down and they eventually fall out, so they continually grow new teeth that get pushed forward to replace the ones they lose. Instead of having incisors to grasp their food, manatees have lips which function like a pair of hands to help tear food away from the seafloor.

Manatees are fully aquatic, but as mammals, they need to come up to the surface to breathe. When awake, they typically surface every two to four minutes, but they can hold their breath for much longer. Adult manatees sleep underwater for 10-12 hours a day, but they come up for air every 15-20 minutes. Active manatees need to breathe more frequently. It's thought that manatees use their muscular diaphragm and breathing to adjust their buoyancy. They may use diaphragm contractions to compress and store gas in folds in their large intestine to help them float.

The West Indian manatee reaches about 3.5 metros long and weighs on average around 500 kilo grammes. It moves between fresh water and salt water, taking advantage of coastal mangroves and coral reefs, rivers, lakes and inland lagoons. There are two subspecies of West Indian manatee: the Antillean manatee is found in waters from the Bahamas to Brazil, whereas

the Florida manatee is found in US waters, although some individuals have been recorded in the Bahamas. In winter, the Florida manatee is typically restricted to Florida. When the ambient water temperature drops below 20°C, it takes refuge in naturally and artificially warmed water, such as at the warm-water outfalls from powerplants.

The African manatee is also about 3.5 metros long and found in the sea along the west coast of Africa, from Mauritania down to Angola. The species also makes use of rivers, with the mammals seen in landlocked countries such as Mali and Niger. The Amazonian manatee is the smallest species, though it is still a big animal. It grows to about 2.5 metros long and 350 kilo grammes. Amazonian manatees favour calm, shallow waters that are above 23°C This species is found in fresh water in the Amazon Basin in Brazil, as well as in Colombia, Ecuador and Peru.

All three manatee species are endangered or at a heightened risk of extinction. The African manatee and Amazonian manatee are both listed as Vulnerable by the International Union for Conservation of Nature (IUCN). It is estimated that 140,000 Amazonian manatees were killed between 1935 and 1954 for their meat, fat and skin, with the latter used to make leather. In more recent years, African manatee decline has been tied to incidental capture in fishing nets and hunting. Manatee hunting is now illegal in every country the African species is found in.

The two subspecies of West Indian manatee are listed as Endangered by the IUCN. Both are also expected to undergo a decline of 20% over the next 40 years. A review of almost 1,800 cases of entanglement in fishing nets and of plastic consumption among marine mammals in US waters from 2009 to 2020 found that at least 700 cases involved manatees. The chief cause of death in Florida manatees is boat strikes. However, laws in certain parts of Florida now limit boat speeds during winter, allowing slow-moving manatees more time to respond.

PART 1 — QUESTIONS

Questions 1-6

Complete the notes below.

Choose **ONE WORD AND/OR A NUMBER** from the passage for each answer.

Appearance

- look similar to dugongs, but with a differently shaped [1] _____

Movement

- have fewer neck bones than most mammals

- need to use their [2] _____ to help to turn their bodies around in order to look sideways

- sense vibrations in the water by means of [3] _____ on their skin

Feeding

- eat mainly aquatic vegetation, such as [4] _____

- grasp and pull up plants with their [5] _____

Breathing

- come to the surface for air every 2-4 minutes when awake and every 15-20 while sleeping

- may regulate the [6] _____ of their bodies by using muscles of diaphragm to store air internally

Questions 7-13

Do the following statements agree with the information given in Reading Passage?

in boxes on your answer sheet, write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

7 West Indian manatees can be found in a variety of different aquatic habitats.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

8 The Florida manatee lives in warmer waters than the Antillean manatee.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

9 The African manatee's range is limited to coastal waters between the West African countries of Mauritania and Angola.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

10 The extent of the loss of Amazonian manatees in the mid-twentieth century was only revealed many years later.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

11 It is predicted that West Indian manatee populations will fall in the coming decades.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

12 The risk to manatees from entanglement and plastic consumption increased significantly in the period 2009-2020.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

13 There is some legislation in place which aims to reduce the likelihood of boat strikes on manatees in Florida.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

PASSAGE 2

Procrastination

A psychologist explains why we put off important tasks and how we can break this habit

A Procrastination is the habit of delaying a necessary task, usually by focusing on less urgent, more enjoyable, and easier activities instead. We all do it from time to time. We might be composing a message to a friend who we have to let down, or putting together an important report for college or work, we're doing our best to avoid doing the job at hand, but deep down we know that we should just be getting on with it. Unfortunately, berating ourselves won't stop us procrastinating again. In fact, it's one of the worst things we can do. This matters because, as my research shows, procrastination doesn't just waste time, but is actually linked to other problems, too.

B Contrary to popular belief, procrastination is not due to laziness or poor time management. Scientific studies suggest procrastination is, in fact, caused by poor mood management. This makes sense if we consider that people are more likely to put off starting or completing tasks that they are really not keen to do. If just thinking about the task threatens our sense of self-worth or makes us anxious, we will be more likely to put it off. Research involving brain imaging has found that areas of the brain linked to detection of threats and emotion regulation are actually different in people who chronically procrastinate compared to those who don't procrastinate frequently.

C Tasks that are emotionally loaded or difficult, such as preparing for exams, are prime candidates for procrastination. People with low self-esteem are more likely to procrastinate. Another group of people who tend to procrastinate are perfectionists, who worry their work will be judged harshly by others. We know that if we don't finish that report or complete those home repairs, then what we did can't be evaluated. When we avoid such tasks, we also avoid the negative emotions associated with them. This is rewarding, and it conditions us to use procrastination to repair our mood. If we engage in more enjoyable tasks instead, we get another mood boost. In the long run, however, procrastination isn't an effective way of managing emotions. The 'mood repair' we experience is temporary. Afterwards, people tend to be left with a sense of guilt that not only increases their negative mood, but also reinforces their tendency to procrastinate.

D So why is this such a problem? When most people think of the costs of procrastination, they think of the toll on productivity. For example, studies have shown that procrastination negatively impacts on student performance. But putting off reading textbooks and writing essays may affect other areas of students' lives. In one study of over 3,000 German students over a six-month period, those who reported procrastinating over their university work were also more likely to engage in study-related misconduct, such as cheating and plagiarism. But the behaviour that procrastination was most closely linked with was using fraudulent excuses to get deadline extensions. Other research shows that employees on average spend almost a quarter of their workday procrastinating, and again this is linked with negative outcomes. In fact, in one US survey of over 22,000 employees, participants who said they regularly procrastinated had

less annual income and less employment stability. For every one-point increase on a measure of chronic procrastination, annual income decreased by US$15,000.

E Procrastination also correlates with serious health and well-being problems. A tendency to procrastinate is linked to poor mental health, including higher levels of depression and anxiety. Across numerous studies, I've found people who regularly procrastinate report a greater number of health issues, such as headaches, flu and colds, and digestive issues. They also experience higher levels of stress and poor sleep quality. They are less likely to practise healthy behaviours, such as eating a healthy diet and regularly exercising, and use destructive coping strategies to manage their stress. In one study of over 700 people, I found people prone to procrastination had a 63% greater risk ofpoor heart health after accounting for other personality traits and demographics.

F Finding better ways of managing our emotions is one route out of the vicious cycle of procrastination. An important first step is to manage our environment and how we view the task. There are a number of evidence-based strategies that can help us fend off distractions that can occupy our minds when we should be focusing on the thing we should be getting on with. For example, reminding ourselves about why the task is important and valuable can increase positive feelings towards it. Forgiving ourselves and feeling compassion when we procrastinate can help break the procrastination cycle. We should admit that we feel bad, but not be overly critical of ourselves. We should remind ourselves that we're not the first person to procrastinate, nor the last. Doing this can take the edge off the negative feelings we have about ourselves when we procrastinate. This can all make it easier to get back on track.

PART 2 — QUESTIONS

Questions 14-16

Reading Passage has six paragraphs,

Which paragraph contains the following information?

Write the correct letter, **A-F,** in boxes on your answer sheet.

NB You may use any letter more than once.

	A	B	C	D	E	F
14 mention of false assumptions about why people procrastinate	○	○	○	○	○	○
15 reference to the realisation that others also procrastinate	○	○	○	○	○	○
16 neurological evidence of a link between procrastination and emotion	○	○	○	○	○	○

Questions 17-22

Complete the summary below.

Choose **ONE WORD ONLY** from the passage for each answer.

Write your answers in boxes on your answer sheet.

What makes us procrastinate?

Many people think that procrastination is the result of **17** _____

Others believe it to be the result of an inability to organise time efficiently.

But scientific studies suggest that procrastination is actually due to poor mood management. The tasks we are most likely to put off are those that could damage our self-esteem or cause us to feel **18** _____. when we think about them. Research comparing chronic procrastinators with other people even found differences in the brain regions associated with regulating emotions and identifying **19** _____.

Emotionally loaded and difficult tasks often cause us to procrastinate.

Getting ready to take **20** _____ might be a typical example of one such task.

People who are likely to procrastinate tend to be either **21** _____ or those with low self-esteem.

Procrastination is only a short-term measure for managing emotions. It's often followed by a feeling of **22** _____, which worsens our mood and leads to more procrastination.

Questions 23-24

Choose **TWO** letters**, A-E**

Write the correct letters in boxes on your answer sheet.

23 **24** Which **TWO** comparisons between employees who often procrastinate and those who do not are mentioned in the text?

- **A** ☐ Their salaries are lower.
- **B** ☐ The quality of their work is inferior.
- **C** ☐ They don't keep their jobs for as long.
- **D** ☐ They don't enjoy their working lives as much.
- **E** ☐ They have poorer relationships with colleagues.

Questions 25-26

Choose **TWO** letters, **A-E**

Write the correct letters in boxes on your answer sheet.

25 **26** Which **TWO** recommendations for getting out of a cycle of procrastination does the writer give?

- **A** ☐ not judging ourselves harshly
- **B** ☐ setting ourselves manageable aims
- **C** ☐ rewarding ourselves for tasks achieved
- **D** ☐ prioritising tasks according to their importance

E ☐ avoiding things that stop us concentrating on our tasks

PASSAGE 3

Invasion of the Robot Umpires

A few years ago, Fred DeJesus from Brooklyn, New York became the first umpire in a minor league baseball game to use something called the Automated Ball-Strike System (ABS), often referred to as the 'rob-umpire'. Instead of making any judgments himself about a strike*, DeJesus had decisions fed to him through an earpiece, connected to a modified missile-tracking system. The contraption looked like a large black pizza box with one glowing green eye, it was mounted above the press stand.

Major League Baseball (MLB), who had commissioned the system, wanted human umpires to announce the calls, just as they would have done in the past. When the first pitch came in, a recorded voice told DeJesus it was a strike. Previously, calling a strike was a judgment call on the part of the umpire. Even if the batter does not hit the ball, a pitch that passes through the 'strike zone' (an imaginary zone about seventeen inches wide, stretching from the batter's knees to the middle of his chest) is considered a strike. During that first game, when DeJesus announced calls, there was no heckling and no shouted disagreement. Nobody said a word.

For a hundred and fifty years or so, the strike zone has been the game's animating force - countless arguments between a team's manager and the umpire have taken place over its boundaries and whether a ball had crossed through it. The rules of play have evolved in various stages. Today, everyone knows that you may scream your disagreement in an umpire's face, but you must never shout personal abuse at them or touch them. That's a no-no. When the robe-umpires came, however, the arguments stopped.

During the first robe-umpire season, players complained about some strange calls. In response, MLB decided to tweak the dimensions of the zone, and the following year the consensus was that ABS is profoundly consistent. MLB says the device is near-perfect, precise to within fractions of an inch. "It'll reduce controversy in the game, and be good for the game," says Rob Manfred, who is Commissioner for MLB. But the question is whether controversy is worth reducing, or whether it is the sign of a human hand.

A human, at least, yells back. When I spoke with Frank Viola, a coach for a North Carolina team, he said that ABS works as designed, but that it was also unforgiving and pedantic, almost legalistic. "Manfred is a lawyer," Viola noted. Some pitchers have complained that, compared with a humans, the robot's strike zone seems too precise. Viola was once a major-league player himself. When he was pitching, he explained, umpires rewarded skill. "Throw it where you aimed, and it would be a strike, even if it was an inch or two outside. There was a dialogue between pitcher and umpire."

The executive tasked with running the experiment for MLB is Morgan Sword, who's in charge of baseball operations. According to Sword, ABS was part of a larger project to make baseball more exciting since executives are terrified of losing younger fans, as has been the case with horse racing and boxing. He explains how they began the process by asking fans what version of baseball they found most exciting. The results showed that everyone wanted more action:

more hits, more defense, more baserunning. This type of baseball essentially hasn't existed since the 1960s, when the hundred-mile-an-hour fastball, which is difficult to hit and control, entered the game. It flattened the game into strikeouts, walks, and home runs - a type of play lacking much action.

Sword's team brainstormed potential fixes. Any rule that existed, they talked about changing - from changing the bats to changing the geometry of the field. But while all of these were ruled out as potential fixes, ABS was seen as a perfect vehicle for change. According to Sword, once you get the technology right, you can load any strike zone you want into the system. "It might be a triangle, or a blob, or something shaped like Texas. Over time, as baseball evolves, ABS can allow the zone to change with it."

"In the past twenty years, sports have moved away from judgment calls. Soccer has Video Assistant Referees (for offside decisions, for example). Tennis has Hawk-Eye (for line calls, for example). For almost a decade, baseball has used instant replay on the base paths. This is widely liked, even if the precision can sometimes cause problems. But these applications deal with something physical: bases, lines, goals. The boundaries of action are precise, delineated like the keys of a piano. This is not the case with ABS and the strike zone. Historically, a certain discretion has been appreciated."

I decided to email Alva Noe, a professor at Berkeley University and a baseball fan, for his opinion. "Hardly a day goes by that I don't wake up and run through the reasons that this [robe-umpires] is such a terrible idea," he replied. He later told me, "This is part of a movement to use algorithms to take the hard choices of living out of life." Perhaps he's right. We watch baseball to kill time, not to maximize it. Some players I have met take a dissenting stance toward the robots too, believing that accuracy is not the answer.

According to Joe Russo, who plays for a New Jersey team, "With technology, people just want everything to be perfect. That's not reality. I think perfect would be weird. Your teams are always winning, work is always just great, there's always money in your pocket, your car never breaks down. What is there to talk about?"

*strike: a strike is when the batter swings at a ball and misses or when the batter does not swing at a ball that passes through the strike zone.

PART 3 — QUESTIONS

Questions 27-32

Do the following statements agree with the claims of the writer in Reading Passage?

In boxes on your answer sheet, write

YES if the statement agrees with the claims of the writer

NO if the statement contradicts the claims of the writer

NOT GIVEN if it is impossible to say what the writer thinks about this

27 When DeJesus first used ABS, he shared decision-making about strikes with it.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

28 MLB considered it necessary to amend the size of the strike zone when criticisms were received from players.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

29 MLB is keen to justify the money spent on improving the accuracy of ABS's calculations.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

30 The hundred-mile-an-hour fastball led to a more exciting style of play.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

31 The differing proposals for alterations to the baseball bat led to fierce debate on Sword's team.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

32 ABS makes changes to the shape of the strike zone feasible.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

Questions 33-37

Complete the summary using the list ofphrases, **A-H,** below.

Write the correct letter, **A-H**, in boxes on your answer sheet.

Calls by the umpire

Even after ABS was developed, MLB still wanted human umpires to shout out decisions as they had in their **33** _____. The umpire's job had, at one time, required a **34** _____ about whether a ball was a strike. A ball is considered a strike when the batter does not hit it and it crosses through a **35** _____ extending approximately from the batter's knee to his chest.

In the past, **36** _____ over strike calls were not uncommon, but today everyone accepts the complete ban on pushing or shoving the umpire. One difference, however, is that during the first game DeJesus used ABS, strike calls were met with **37** _____

A. **pitch boundary** B. **numerous disputes** C. **team tactics**

D. **subjective assessment** E. **widespread approval** F. **former roles**

G. **total silence** H. **perceived area**

Questions 38-40

Choose the correct letter, **A, B, C or D.**

38 What does the writer suggest about ABS in the fifth paragraph?

- **A** ○ It is bound to make key decisions that are wrong.
- **B** ○ It may reduce some of the appeal of the game.
- **C** ○ It will lead to the disappearance of human umpires.
- **D** ○ It may increase calls for the rules of baseball to be changed.

39 Morgan Sword says that the introduction of ABS

- **A** ○ was regarded as an experiment without a guaranteed outcome.
- **B** ○ was intended to keep up with developments in other sports.
- **C** ○ was a response to changing attitudes about the role of sport.
- **D** ○ was an attempt to ensure baseball retained a young audience.

40 Why does the writer include the views of Not and Russo?

- **A** ○ to show that attitudes to technology vary widely
- **B** ○ to argue that people have unrealistic expectations of sport
- **C** ○ to indicate that accuracy is not the same thing as enjoyment
- **D** ○ to suggest that the number of baseball fans needs to increase

Answer Key

#	Answer	Explanation
1	**Tail**	However, the manatee has a broad, rounded tail, whereas the dugongs is fluked, like that of a whale
2	**Flippers**	a manatee must turn its entire body, steering with its flippers
3	**Hairs**	They also have some hairs covering their bodies which help them sense vibrations in the water around them
4	**Seagrasses**	Seagrasses and other marine plants make up most of a manatee's diet
5	**Lips**	Instead of having incisors to grasp their food, manatees have lips which function like a pair of hands to help tear food away from the seafloor
6	**Buoyancy**	It's thought that manatees use their muscular diaphragm and breathing to adjust their buoyancy
7	**TRUE**	It moves between fresh water and salt water, taking advantage of coastal mangroves and coral reefs, rivers, lakes and inland lagoons
8	**NOT GIVEN**	In winter, the Florida manatee is typically restricted to Florida. When the ambient water temperature drops below 20°C, it takes refuge in naturally and artificially warmed water, such as at the warm-water outfalls from powerplants
9	**FALSE**	The African manatee is also about 3.5 metros long and found in the sea along the west coast of Africa, from Mauritania down to Angola. The species also makes use of rivers, with the mammals seen in landlocked countries such as Mali and Niger
10	**NOT GIVEN**	It is estimated that 140,000 Amazonian manatees were killed between 1935 and 1954 for their meat, fat and skin
11	**TRUE**	Both are also expected to undergo a decline of 20% over the next 40 years
12	**NOT GIVEN**	A review of almost 1,800 cases of entanglement in fishing nets and of plastic consumption among marine mammals in US waters from 2009 to 2020 found that at least 700 cases involved manatees
13	**TRUE**	However, laws in certain parts of Florida now limit boat speeds during winter, allowing slow-moving manatees more time to respond

#	Answer	Explanation
14	**B**	Contrary to popular belief, procrastination is not due to laziness or poor time management. Scientific studies suggest procrastination is, in fact, caused by poor mood management
15	**F**	We should admit that we feel bad, but not be overly critical of ourselves. We should remind ourselves that we're not the first person to procrastinate, nor the last
16	**B**	Research involving brain imaging has found that areas of the brain linked to detection of threats and emotion regulation are actually different in people who chronically procrastinate compared to those who don't procrastinate frequently
17	**Laziness**	Contrary to popular belief, procrastination is not due to laziness or poor time management
18	**Anxious**	If just thinking about the task threatens our sense of self-worth or makes us anxious, we will be more likely to put it off
19	**Threats**	Research involving brain imaging has found that areas of the brain linked to detection of threats and emotion regulation are actually different in people who chronically procrastinate compared to those who don't procrastinate frequently
20	**Exams**	Tasks that are emotionally loaded or difficult, such as preparing for exams, are prime candidates for procrastination
21	**Perfectionists**	Another group of people who tend to procrastinate are perfectionists, who worry their work will be judged harshly by others
22	**Guilt**	The 'mood repair' we experience is temporary. Afterwards, people tend to be left with a sense of guilt that not only increases their negative mood, but also reinforces their tendency to procrastinate
23	**A / C**	In fact, in one US survey of over 22,000 employees, participants who said they regularly procrastinated had less annual income and less employment stability
24	**A / C**	In fact, in one US survey of over 22,000 employees, participants who said they regularly procrastinated had less annual income and less employment stability
25	**A / E**	There are a number of evidence-based strategies that can help us fend off distractions that can occupy our minds when we should be focusing on the thing we should be getting on with. For example, reminding ourselves about why the task is important and valuable can increase positive feelings towards it. Forgiving ourselves and feeling compassion when we procrastinate can help break the procrastination cycle.

#	Answer	Explanation
26	A / E	There are a number of evidence-based strategies that can help us fend off distractions that can occupy our minds when we should be focusing on the thing we should be getting on with. For example, reminding ourselves about why the task is important and valuable can increase positive feelings towards it. Forgiving ourselves and feeling compassion when we procrastinate can help break the procrastination cycle.
27	NO	DeJesus had decisions fed to him through an earpiece
28	YES	In response, MLB decided to tweak the dimensions of the zone
29	NOT GIVEN	But the question is whether controversy is worth reducing, or whether it is the sign of a human hand
30	NO	a type of play lacking much action
31	NOT GIVEN	Sword's team brainstormed potential fixes. Any rule that existed, they talked about changing – from changing the bats to changing the geometry of the field. But while all of these were ruled out as potential fixes, ABS was seen as a perfect vehicle for change
32	YES	According to Sword, once you get the technology right, you can load any strike zone you want into the system. "It might be a triangle, or a blob, or something shaped like Texas. Over time, as baseball evolves, ABS can allow the zone to change with it."
33	F	Major League Baseball (MLB), who had commissioned the system, wanted human umpires to announce the calls, just as they would have done in the past
34	D	Previously, calling a strike was a judgment call on the part of the umpire
35	H	a pitch that passes through the 'strike zone' (an imaginary zone about seventeen inches wide, stretching from the batter's knees to the middle of his chest) is considered a strike
36	B	For a hundred and fifty years or so, the strike zone has been the game's animating force-countless arguments between a team's manager and the umpire have taken place over its boundaries
37	G	During that first game, when DeJesus announced calls, there was no heckling and no shouted disagreement. Nobody said a word
38	B	When he was pitching, he explained, umpires rewarded skill. "Throw it where you aimed, and it would be a strike, even if it was an inch or two outside. There was a dialogue between pitcher and umpire."
39	D	According to Sword, ABS was part of a larger project to make baseball more exciting since executives are terrified of losing

#	Answer	Explanation
		younger fans
40	**C**	Some players I have met take a dissenting stance toward the robots too, believing that accuracy is not the answer

Test 29

PASSAGE 1

Frozen Food

A US perspective on the development of the frozen food industry

At some point in history, humans discovered that ice preserved food. There is evidence that winter ice was stored to preserve food in the summer as far back as 10,000 years ago. Two thousand years ago, the inhabitants of South America's Andean mountains had a unique means of conserving potatoes for later consumption. They froze them overnight, then trampled them to squeeze out the moisture, then dried them in the sun. This preserved their nutritional value - if not their aesthetic appeal.

Natural ice remained the main form of refrigeration until late in the 19th century. In the early 1800s, ship owners from Boston, USA, had enormous blocks of Arctic ice towed all over the Atlantic for the purpose of food preservation. In 1851, railroads first began putting blocks of ice in insulated rail cars to send butter from Ogdensburg, New York, to Boston.

Finally, in 1870, Australian inventors found a way to make 'mechanical ice'. They used a compressor to force a gas-ammonia at first and later Freon-through a condenser. The compressed gas gave up some of its heat as it moved through the condenser. Then the gas was released quickly into a low-pressure evaporator coil where it became liquid and cold. Air was blown over the evaporator coil and then this cooled air passed into an insulated compartment, lowering its temperature to freezing point.

Initially, this process was invented to keep Australian beer cool even in hot weather. But Australian cattlemen were quick to realize that, if they could put this new invention on a ship, they could export meat across the oceans. In 1880, a shipment of Australian beef and mutton was sent, frozen, to England. While the food frozen this way was still palatable, there was some deterioration. During the freezing process, crystals formed within the cells of the food, and when the ice expanded and the cells burst, this spoilt the flavor and texture of the food.

The modern frozen food industry began with the indigenous Inuit people of Canada. In 1912, a biology student in Massachusetts, USA, named Clarence Birdseye, ran out of money and went to Labrador in Canada to trap and trade furs. While he was there, he became fascinated with how the Inuit would quickly freeze fish in the Arctic air. The fish looked and tasted fresh even months later.

Birdseye returned to the USA in 1917 and began developing mechanical freezers capable of quick-freezing food. Birdseye methodically kept inventing better freezers and gradually built a business selling frozen fish from Gloucester, Massachusetts. In 1929, his business was sold and became General Foods, but he stayed with the company as director of research, and his division continued to innovate.

Birdseye was responsible for several key innovations that made the frozen food industry possible. He developed quick-freezing techniques that reduced the damage that crystals caused, as well as the technique of freezing the product in the package it was to be sold in. He also introduced the use of cellophane, the first transparent material for food packaging, which allowed consumers to see the quality of the product. Birdseye products also came in convenient size packages that could be prepared with a minimum of effort.

But there were still obstacles. In the 1930s, few grocery stores could afford to buy freezers for a market that wasn't established yet. So, Birdseye leased inexpensive freezer cases to them. He also leased insulated railroad cars so that he could ship his products nationwide. However, few consumers had freezers large

enough or efficient enough to take advantage of the products.

Sales increased in the early 1940s, when World War II gave a boost to the frozen food industry because tin was being used for munitions. Canned foods were rationed to save tin for the war effort, while frozen foods were abundant and cheap. Finally, by the 1950s, refrigerator technology had developed far enough to make these appliances affordable for the average family. By 1953, 33 million US families owned a refrigerator, and manufacturers were gradually increasing the size of the freezer compartments in them.

1950s families were also looking for convenience at mealtimes, so the moment was right for the arrival of the 'TV Dinner'. Swanson Foods was a large, nationally recognized producer of canned and frozen poultry. In 1954, the company adapted some of Birdseye's freezing techniques, and with the help of a clever name and a huge advertising budget, it launched the first 'TV Dinner'. This consisted of frozen turkey, potatoes and vegetables served in the same segmented aluminum tray that was used by airlines. The product was an instant success. Within a year, Swanson had sold 13 million TV dinners. American consumers couldn't resist the combination of a trusted brand name, a single-serving package and the convenience of a meal that could be ready after only 25 minutes in a hot oven. By 1959, Americans were spending $2.7 billion annually on frozen foods, and half a billion of that was spent on ready-prepared meals such as the TV Dinner.

Today, the US frozen food industry has a turnover of over $67 billion annually, with $26.6 billion of that sold to consumers for home consumption. The remaining $40 billion in frozen food sales come through restaurants, cafeterias, hospitals and schools, and that represents a third of the total food service sales.

PART 1 — QUESTIONS

Questions 1-7

Complete the notes below.
Choose ONE WORD ONLY from the passage for each answer.

The history of frozen food

2,000 years ago, South America

- People conserved the nutritional value of [1] _____, using a method of freezing then drying.

1851, USA

- [2] _____ was kept cool by ice during transportation in specially adapted trains.

1880, Australia

- Two kinds of [3] _____ were the first frozen food shipped to England.

1917 onwards, USA

- Clarence Birdseye introduced innovations including:

  - quick-freezing methods, so that [4] _____ did not spoil the food.
  - packaging products with [5] _____, so the product was visible.

Early 1940s, USA

- Frozen food became popular because of a shortage of [6] _____.

1950s, USA

- A large number of homes now had a [7] _____.

Questions 8-13

Do the following statements agree with the information given in Reading Passage?
TRUE if the statement agrees with the information
FALSE if the statement contradicts the information
NOT GIVEN if there is no information on this

[8] The ice transportation business made some Boston ship owners very wealthy in the early 1800s.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

9 A disadvantage of the freezing process invented in Australia was that it affected the taste of food.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

10 Clarence Birdseye travelled to Labrador in order to learn how the Inuit people froze fish.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

11 Swanson Foods invested a great deal of money in the promotion of the TV Dinner.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

12 Swanson Foods developed a new style of container for the launch of the TV Dinner.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

13 The US frozen food industry is currently the largest in the world.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

PASSAGE 2

Can the planet’s coral reefs be saved?

14

A. Conservationists have put the final touches to a giant artificial reef they have been assembling at the world-renowned Zoological Society of London (London Zoo). Samples of the planet’s most spectacular corals – vivid green branching coral, yellow scroll, blue ridge and many more species – have been added to the giant tank along with fish that thrive in their presence: blue tang, clownfish and many others. The reef is in the zoo’s new gallery, Tiny Giants, which is dedicated to the minuscule invertebrate creatures that sustain life across the planet. The coral reef tank and its seven-metre-wide window form the core of the exhibition.

‘Coral reefs are the most diverse ecosystems on Earth and we want to show people how wonderful they are,’ said Paul Pearce-Kelly, senior curator of invertebrates and fish at the Zoological Society of London. ‘However, we also want to highlight the research and conservation efforts that are now being carried out to try to save them from the threat of global warming.’ They want people to see what is being done to try to save these wonders.

15

B. Corals are composed of tiny animals, known as polyps, with tentacles for capturing small marine creatures in the sea water. These polyps are transparent but get their brilliant tones of pink, orange, blue, green, etc. from algae that live within them, which in turn get protection, while their photosynthesising of the sun’s rays provides nutrients for the polyps. This comfortable symbiotic relationship has led to the growth of coral reefs that cover 0.1% of the planet’s ocean bed while providing homes for more than 25% of marine species, including fish, molluscs, sponges and shellfish.

16

C. As a result, coral reefs are often described as the ‘rainforests of the sea’, though the comparison is dismissed by some naturalists, including David Attenborough. ‘People say you cannot beat the rainforest,’ Attenborough has stated. ‘But that is simply not true. You go there and the first thing you think is: where are the birds? Where are the animals? They are hiding in the trees, of course. No, if you want beauty and wildlife, you want a coral reef. Put on a mask and stick your head under the water. The sight is mindblowing.’

17

D. Unfortunately, these majestic sights are now under very serious threat, with the most immediate problem coming in the form of thermal stress. Rising ocean temperatures are

triggering bleaching events that strip reefs of their colour and eventually kill them. And that is just the start. Other menaces include ocean acidification, sea level increase, pollution by humans, deoxygenation and ocean current changes, while the climate crisis is also increasing habitat destruction. As a result, vast areas – including massive chunks of Australia's Great Barrier Reef – have already been destroyed, and scientists advise that more than 90% of reefs could be lost by 2050 unless urgent action is taken to tackle global heating and greenhouse gas emissions.

Pearce-Kelly says that coral reefs have to survive really harsh conditions – wave erosion and other factors. And 'when things start to go wrong in the oceans, then corals will be the first to react. And that is exactly what we are seeing now. Coral reefs are dying and they are telling us that all is not well with our planet.'

18

E. However, scientists are trying to pinpoint hardy types of coral that could survive our overheated oceans, and some of this research will be carried out at London Zoo. 'Behind our … coral reef tank we have built laboratories where scientists will be studying coral species,' said Pearce-Kelly. One aim will be to carry out research on species to find those that can survive best in warm, acidic waters. Another will be to try to increase coral breeding rates. 'Coral spawn just once a year,' he added. 'However, aquarium-based research has enabled some corals to spawn artificially, which can assist coral reef restoration efforts. And if this can be extended for all species, we could consider the launching of coral-spawning programmes several times a year. That would be a big help in restoring blighted reefs.'

19

F. Research in these fields is being conducted in laboratories around the world, with the London Zoo centre linked to this global network. Studies carried out in one centre can then be tested in others. The resulting young coral can then be displayed in the tank in Tiny Giants. 'The crucial point is that the progress we make in making coral better able to survive in a warming world can be shown to the public and encourage them to believe that we can do something to save the planet's reefs,' said Pearce-Kelly. 'Saving our coral reefs is now a critically important ecological goal.'

PART 2 — QUESTIONS

Questions 14-19

Choose the correct heading for each section from the list of headings below.
i. Tried and tested solutions
ii. Cooperation beneath the waves
iii. Working to lessen the problems
iv. Disagreement about the accuracy of a certain phrase
v. Two clear educational goals
vi. Promoting hope
vii. A warning of further trouble ahead

i. **Tried and tested solutions**

ii. **Cooperation beneath the waves**

iii. **Working to lessen the problems**

iv. **Disagreement about the accuracy of a certain phrase**

v. **Two clear educational goals**

vi. **Promoting hope**

vii. **A warning of further trouble ahead**

Questions 20-21

Choose **TWO** letters, **A–E**.

20 **21** Which **TWO** of these causes of damage to coral reefs are mentioned by the writer of the text?

- **A** ☐ a rising number of extreme storms
- **B** ☐ the removal of too many fish from the sea
- **C** ☐ the contamination of the sea from waste
- **D** ☐ increased disease among marine species
- **E** ☐ alterations in the usual flow of water in the seas

Questions 22-23

Choose **TWO** letters, **A–E**.

22 **23** Which **TWO** of the following statements are true of the researchers at London Zoo?

- **A** ☐ They are hoping to expand the numbers of different corals being bred in laboratories.
- **B** ☐ They want to identify corals that can cope well with the changed sea conditions.
- **C** ☐ They are looking at ways of creating artificial reefs that corals could grow on.
- **D** ☐ They are trying out methods that would speed up reproduction in some corals.
- **E** ☐ They are investigating materials that might protect reefs from higher temperatures.

Questions 24-26

Complete the sentences below.

Choose **ONE WORD ONLY** from the passage for each answer.

- Corals have a number of **24** _____ which they use to collect their food.
- Algae gain **25** _____ from being inside the coral.
- Increases in the warmth of the sea water can remove the **26** _____ from coral.

PASSAGE 3

Robots and us

Three leaders in their fields answer questions about our relationships with robot

When asked ‘Should robots be used to colonise other planets?’, cosmology and astrophysics Professor Martin Rees said he believed the solar system would be mapped by robotic craft by the end of the century. ‘The next step would be mining of asteroids, enabling fabrication of large structures in space without having to bring all the raw materials from Earth.... I think this is more realistic and benign than the ... “terraforming”* of planets.’ He maintains that colonised planets ‘should be preserved with a status that is analogous to Antarctica here on Earth.’

On the question of using robots to colonise other planets and exploit mineral resources, engineering Professor Daniel Wolpert replied, ‘I don’t see a pressing need to colonise other planets unless we can bring [these] resources back to Earth. The vast majority of Earth is currently inaccessible to us. Using robots to gather resources nearer to home would seem to be a better use of our robotic tools.’

Meanwhile, for anthropology Professor Kathleen Richardson, the idea of ‘colonisation’ of other planets seemed morally dubious: ‘I think whether we do something on Earth or on Mars we should always do it in the spirit of a genuine interest in “the Other”, not to impose a particular model, but to meet “the Other”.'

In response to the second question, ‘How soon will machine intelligence outstrip human intelligence?’, Rees mentions robots that are advanced enough to beat humans at chess, but then goes on to say, ‘Robots are still limited in their ability to sense their environment: they can’t yet recognise and move the pieces on a real chessboard as cleverly as a child can. Later this century, however, their more advanced successors may relate to their surroundings, and to people, as adeptly as we do. Moral questions then arise. ... Should we feel guilty about exploiting [sophisticated robots]? Should we fret if they are underemployed, frustrated, or bored?’

Wolpert’s response to the question about machine intelligence outstripping human intelligence was this: ‘In a limited sense it already has. Machines can already navigate, remember and search for items with an ability that far outstrips humans. However, there is no machine that can identify visual objects or speech with the

reliability and flexibility of humans.... Expecting a machine close to the creative intelligence of a human within the next 50 years would be highly ambitious.’

Richardson believes that our fear of machines becoming too advanced has more to do with human nature than anything intrinsic to the machines themselves. In her view, it stems from humans’ tendency to personify inanimate objects: we create machines based on representations of ourselves, imagine that machines think and behave as we do, and therefore see them as an autonomous threat. ‘One of the consequences of thinking that the problem lies

with machines is that we tend to imagine they are greater and more powerful than they really are and subsequently they become so.'

This led on to the third question, 'Should we be scared by advances in artificial intelligence?' To this question, Rees replied, 'Those who should be worried are the futurologists who believe in the so-called "singularity".** ... And another worry is that we are increasingly dependent on computer networks, and that these could behave like a single "brain" with a mind of its own, and with goals that may be contrary to human welfare. I think we should ensure that robots remain as no more than "idiot savants" lacking the capacity to outwit us, even though they may greatly surpass us in the ability to calculate and process information.'

Wolpert's response was to say that we have already seen the damaging effects of artificial intelligence in the form of computer viruses. 'But in this case,' he says, 'the real intelligence is the malicious designer. Critically, the benefits of computers outweigh the damage that computer viruses cause. Similarly, while there may be misuses of robotics in the near future, the benefits that they will bring are likely to outweigh these negative aspects.'

Richardson's response to this question was this: 'We need to ask why fears of artificial intelligence and robots persist; none have in fact risen up and challenged human supremacy.' She believes that as robots have never shown themselves to be a threat to humans, it seems unlikely that they ever will. In fact, she went on, 'Not all fear [robots]; many people welcome machine intelligence.'

In answer to the fourth question, What can science fiction tell us about robotics?', Rees replied, 'I sometimes advise students that it's better to read first-rate science fiction than second-rate science - more stimulating, and perhaps no more likely to be wrong.'

As his response, Wolpert commented, 'Science fiction has often been remarkable at predicting the future. Science fiction has painted a vivid spectrum of possible futures, from cute and helpful robots to dystopian robotic societies. Interestingly, almost no science fiction envisages a future without robots.' Finally, on the question of science fiction, Richardson pointed out that in modern society, people tend to think there is reality on the one hand, and fiction and fantasy on the other. She then explained that the division did not always exist, and that scientists and technologists made this separation because they wanted to carve out the sphere of their work. 'But the divide is not so clear cut, and that is why the worlds seem to collide at times,' she said. 'In some cases, we need to bring these different understandings together to get a whole perspective. Perhaps then, we won't be so frightened that something we create as a copy of ourselves will be a [threat] to us.'

*terraforming: modifying a planet's atmosphere to suit human needs

** singularity: the point when robots will be able to start creating ever more sophisticated versions of themselves

PART 3 — QUESTIONS

Questions 27-33

Match each statement with the correct expert, **A**, **B** or **C**.
NB You may use any letter more than once.

List of Experts
A. Martin Rees
B. Daniel Wolpert
C. Kathleen Richardson

	A	B	C
27 For our own safety, humans will need to restrict the abilities of robots.	○	○	○
28 The risk of robots harming us is less serious than humans believe it to be.	○	○	○
29 It will take many decades for robot intelligence to be as imaginative as human intelligence.	○	○	○
30 We may have to start considering whether we are treating robots fairly.	○	○	○
31 Robots are probably of more help to us on Earth than in space.	○	○	○
32 The ideas in high-quality science fiction may prove to be just as accurate as those found in the work of mediocre scientists.	○	○	○
33 There are those who look forward to robots developing greater intelligence.	○	○	○

Questions 34-36

Complete each sentence with the correct ending, **A–D**, below.

• Richardson and Rees express similar views regarding the ethical aspect of **34** _____

• Rees and Wolpert share an opinion about the extent of **35** _____

• Wolpert disagrees with Richardson on the question of **36** _____

A. **robots to explore outer space.**

B. **advances made in machine intelligence so far.**

C. **changes made to other planets for our own benefit.**

D. **the harm already done by artificial intelligence.**

Questions 37-40

Choose the correct letter, **A**, **B**, **C** or **D**.

37

What point does Richardson make about fear of machines?

A ○ It has grown alongside the development of ever more advanced robots.

B ○ It is the result of our inclination to attribute human characteristics to non-human entities.

C ○ It has its origins in basic misunderstandings about how inanimate objects function.

D ○ It demonstrates a key difference between human intelligence and machine intelligence.

38 What potential advance does Rees see as a cause for concern?

A ○ robots outnumbering people

B ○ robots having abilities which humans do not

C ○ artificial intelligence developing independent thought

D ○ artificial intelligence taking over every aspect of our lives

39 What does Wolpert emphasize in his response to the question about science fiction?

A ○ how science fiction influences our attitudes to robots

B ○ how fundamental robots are to the science fiction genre

C ○ how the image of robots in science fiction has changed over time

D ○ how reactions to similar portrayals of robots in science fiction may vary

40 What is Richardson doing in her comment about reality and fantasy?

A ○ warning people not to confuse one with the other

B ○ outlining ways in which one has impacted on the other

C ○ recommending a change of approach in how people view them

D ○ explaining why scientists have a different perspective on them from other people

Answer Key

#	Answer	Explanation
1	**potatoes**	they froze them overnight, then trampled them to squeeze out the moisture, then dried them in the sun. This preserved their nutritional value – if not their aesthetic appeal
2	**butter**	In 1851, railroads first began putting blocks of ice in insulated rail cars to send butter from Ogdensburg, New York, to Boston
3	**meat**	they could export meat across the oceans. In 1880, a shipment of Australian beef and mutton was sent, frozen, to England
4	**crystals**	During the freezing process, crystals formed within the cells of the food, and when the ice expanded and the cells burst, this spoilt the flavor and texture of the food
5	**cellophane**	He also introduced the use of cellophane, the first transparent material for food packaging, which allowed consumers to see the quality of the product
6	**tin**	Canned foods were rationed to save tin for the war effort, while frozen foods were abundant and cheap
7	**refrigerator**	By the 1950s, refrigerator technology had developed far enough to make these appliances affordable for the average family
8	**NOT GIVEN**	In the early 1800s, ship owners from Boston, USA, had enormous blocks of Arctic ice towed all over the Atlantic for the purpose of food preservation
9	**TRUE**	While the food frozen this way was still palatable, there was some deterioration. During the freezing process, crystals formed within the cells of the food, and when the ice expanded and the cells burst, this spoilt the flavor and texture of the food
10	**FALSE**	In 1912, a biology student in Massachusetts, USA, named Clarence Birdseye, ran out of money and went to Labrador in Canada to trap and trade furs
11	**TRUE**	In 1954, the company adapted some of Birdseye's freezing techniques, and with the help of a clever name and a huge advertising budget, it launched the first 'TV Dinner'
12	**FALSE**	This consisted of frozen turkey, potatoes and vegetables served in the same segmented aluminum tray that was used by airlines
13	**NOT GIVEN**	Today, the US frozen food industry has a turnover of over $67 billion annually, with $26.6 billion of that sold to consumers for

#	Answer	Explanation
		home consumption
14	**v**	‘Coral reefs are the most diverse ecosystems on Earth and we want to show people how wonderful they are,’ said Paul Pearce-Kelly, senior curator of invertebrates and fish at the Zoological Society of London. ‘However, we also want to highlight the research and conservation efforts that are now being carried out to try to save them from the threat of global warming.’
15	**ii**	These polyps are transparent but get their brilliant tones of pink, orange, blue, green, etc. from algae that live within them, which in turn get protection, while their photosynthesising of the sun’s rays provides nutrients for the polyps
16	**iv**	‘People say you cannot beat the rainforest,’ Attenborough has stated. ‘But that is simply not true.
17	**vii**	Unfortunately, these majestic sights are now under very serious threat, with the most immediate problem coming in the form of thermal stress. Rising ocean temperatures are triggering bleaching events that strip reefs of their colour and eventually kill them
18	**iii**	However, scientists are trying to pinpoint hardy types of coral that could survive our overheated oceans
19	**vi**	The crucial point is that the progress we make in making coral better able to survive in a warming world can be shown to the public and encourage them to believe that we can do something to save the planet’s reefs
20	**C / E**	Other menaces include ocean acidification, sea level increase, pollution by humans, deoxygenation and ocean current changes
21	**C / E**	Other menaces include ocean acidification, sea level increase, pollution by humans, deoxygenation and ocean current changes
22	**B / D**	One aim will be to carry out research on species to find those that can survive best in warm, acidic waters. Another will be to try to increase coral breeding rates.
23	**B / D**	One aim will be to carry out research on species to find those that can survive best in warm, acidic waters. Another will be to try to increase coral breeding rates.
24	**tentacles**	Corals are composed of tiny animals, known as polyps, with tentacles for capturing small marine creatures in the sea water
25	**protection**	These polyps are transparent but get their brilliant tones of pink, orange, blue, green, etc. from algae that live within them, which in turn get protection

#	Answer	Explanation
26	**colour / color**	Rising ocean temperatures are triggering bleaching events that strip reefs of their colour and eventually kill them
27	**A**	I think we should ensure that robots remain as no more than “idiot savants” lacking the capacity to outwit us
28	**C**	She believes that as robots have never shown themselves to be a threat to humans, it seems unlikely that they ever will
29	**B**	Expecting a machine close to the creative intelligence of a human within the next 50 years would be highly ambitious
30	**A**	Moral questions then arise. … Should we feel guilty about exploiting [sophisticated robots]
31	**B**	Using robots to gather resources nearer to home would seem to be a better use of our robotic tools.
32	**A**	I sometimes advise students that it’s better to read first-rate science fiction than second-rate science more stimulating, and perhaps no more likely to be wrong
33	**C**	Not all fear [robots]; many people welcome machine intelligence
34	**C**	I think whether we do something on Earth or on Mars we should always do it in the spirit of a genuine interest in “the Other”, not to impose a particular model, but to meet “the Other”.
35	**B**	machines can already navigate, remember and search for items with an ability that far outstrips humans
36	**D**	Wolpert’s response was to say that we have already seen the damaging effects of artificial intelligence in the form of computer viruses.
37	**B**	Richardson believes that our fear of machines becoming too advanced has more to do with human nature than anything intrinsic to the machines themselves. In her view, it stems from humans’ tendency to personify inanimate objects: we create machines based on representations of ourselves, imagine that machines think and behave as we do, and therefore see them as an autonomous threat
38	**C**	Moral questions then arise. … Should we feel guilty about exploiting [sophisticated robots]? Should we fret if they are underemployed, frustrated, or bored
39	**B**	Interestingly, almost no science fiction envisages a future without robots
40	**C**	She then explained that the division did not always exist, and that scientists and technologists made this separation because they

#	Answer	Explanation
		wanted to carve out the sphere of their work. ‘But the divide is not so clear cut, and that is why the worlds seem to collide at times,’ she said. ‘In some cases, we need to bring these different understandings together to get a whole perspective.

Test 30

PASSAGE 1

Georgia O'Keeffe

For seven decades, Georgia O'Keeffe (1887-1986) was a major figure in American art. Remarkably, she remained independent from shifting art trends and her work stayed true to her own vision, which was based on finding the essential, abstract forms in nature. With exceptionally keen powers of observation and great finesse with a paintbrush, she recorded subtle nuances of colour, shape, and light that enlivened her paintings and attracted a wide audience.

Born in 1887 near Sun Prairie, Wisconsin to cattle breeders Francis and Ida O'Keeffe, Georgia was raised on their farm along with her six siblings. By the time she graduated from high school in 1905, she had determined to make her way as an artist. She studied the techniques of traditional painting at the Art Institute of Chicago school (1905) and the Art Students League of New York (1907-8). After attending university and then training college, she became an art teacher and taught in elementary schools, high schools, and colleges in Virginia, Texas, and South Carolina from 1911 to 1918.

During this period, O'Keeffe began to experiment with creating abstract compositions in charcoal, and produced a series of innovative drawings that led her art in a new direction. She sent some of these drawings to a friend in New York, who showed them to art collector and photographer Alfred Stieglitz in January 1916. Stieglitz was impressed, and exhibited the drawings later that year at his gallery on Fifth Avenue, New York City, where the works of many avant-garde artists and photographers were introduced to the American public.

With Stieglitz's encouragement and promise of financial support, O'Keeffe arrived in New York in June 1918 to begin a career as an artist. For the next three decades, Stieglitz vigorously promoted her work in twenty-two solo exhibitions and numerous group installations. The two were married in 1924. The ups and downs of their personal and professional relationship were recorded in Stieglitz's celebrated black-and-white portraits of O'Keeffe, taken over the course of twenty years (1917-37).

By the mid-1920s, O'Keeffe was recognized as one of America's most important and successful artists, widely known for the architectural pictures that dramatically depict the soaring skyscrapers of New York. But most often, she painted botanical subjects, inspired by annual trips to the Stieglitz family summer home. In her magnified images depicting flowers, begun in 1924, O'Keeffe brings the viewer right into the picture.

Enlarging the tiniest details to fill an entire metre-wide canvas emphasized their shapes and lines and made them appear abstract. Such daring compositions helped establish O'Keeffe's reputation as an innovative modernist.

In 1929, O'Keeffe made her first extended trip to the state of New Mexico. It was a visit that had a lasting impact on her life, and an immediate effect on her work. Over the next two decades she made almost annual trips to New Mexico, staying up to six months there, painting in relative solitude, then returning to New York each winter to exhibit the new work at Stieglitz's gallery. This pattern continued until she moved permanently to New Mexico in 1949.

There, O'Keeffe found new inspiration: at first, it was the numerous sun-bleached bones she came across in the state's rugged terrain that sparked her imagination. Two of her earliest and most celebrated Southwestern paintings exquisitely reproduce a cow skull's weathered surfaces, jagged edges, and irregular openings. Later, she also explored another variation on this theme in her large series of Pelvis pictures, which focused on the contrasts between convex and concave surfaces, and solid and open spaces.

However, it was the region's spectacular landscape, with its unusual geological formations, vivid colours, clarity of light, and exotic vegetation, that held the artist's imagination for more than four decades. Often, she painted the rocks, cliffs, and mountains in striking close-up, just as she had done with her botanical subjects.

O'Keeffe eventually owned two homes in New Mexico – the first, her summer retreat at Ghost Ranch, was nestled beneath 200-metre cliffs, while the second, used as her winter residence, was in the small town of Abiquiú. While both locales provided a wealth of imagery for her paintings, one feature of the Abiquiú house – the large walled patio with its black door – was particularly inspirational. In more than thirty pictures between 1946 and 1960, she reinvented the patio into an abstract arrangement of geometric shapes.

From the 1950s into the 1970s, O'Keeffe travelled widely, making trips to Asia, the Middle East, and Europe. Flying in planes inspired her last two major series – aerial views of rivers and expansive paintings of the sky viewed from just above clouds. In both series, O'Keeffe increased the size of her canvases, sometimes to mural proportions, reflecting perhaps her newly expanded view of the world. When in 1965 she successfully translated one of her cloud motifs to a monumental canvas measuring 6 metres in length (with the help of assistants), it was an enormous challenge and a special feat for an artist nearing eighty years of age.

The last two decades of the artist's life were relatively unproductive as ill health and blindness hindered her ability to work. O'Keeffe died in 1986 at the age of ninety-eight, but her rich legacy of some 900 paintings has continued to attract subsequent generations of artists and art lovers who derive inspiration from these very American images.

PART 1 — QUESTIONS

Questions 1-7

Complete the notes below.

Choose **ONE WORD ONLY** from the passage for each answer.

Write your answers in boxes on your answer sheet.

The Life and Work of Georgia O'Keefe

- studied art, then worked as a [1] _____ in various places in the USA

- created drawings using [2] _____ which were exhibited in New York City

- moved to New York and became famous for her paintings of the city's [3] _____

- produced a series of innovative close-up paintings of [4] _____

- went to New Mexico and was initially inspired to paint the many [5] _____ that could be found there

- continued to paint various features that together formed the dramatic [6] _____ of New Mexico for over forty years

- travelled widely by plane in later years, and painted pictures of clouds and [7] _____ seen from above.

Questions 8-13

Do the following statements agree with the information given in Reading Passage?

in boxes on your answer sheet, write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

[8] Georgia O'Keeffe's style was greatly influenced by the changing fashions in art over the seven decades of her career.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

9 When O'Keeffe finished high school, she had already made her mind up about the career that she wanted.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

10 Alfred Stieglitz first discovered O'Keeffe's work when she sent some abstract drawings to his gallery in New York City.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

11 O'Keeffe was the subject of Stieglitz's photographic work for many years.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

12 O'Keeffe's paintings of the patio of her house in Abiquiu were among the artist's favourite works.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

13 O'Keeffe produced a greater quantity of work during the 1950s to 1970s than at any other time in her life.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

PASSAGE 2

Adapting to the effects of climate change

A. All around the world, nations are already preparing for, and adapting to, climate change and its impacts. Even if we stopped all CO2 emissions tomorrow, we would continue to see the impact of the CO2 already released since industrial times, with scientists forecasting that global warming would continue for around 40 years. In the meantime, ice caps would continue to melt and sea levels rise. Some countries and regions will suffer more extreme impacts from these changes than others. It's in these places that innovation is thriving.

B. In Miami Beach, Florida, USA, seawater isn't just breaching the island city's walls, it's seeping up through the ground, so the only way to save the city is to lift it up above sea level. Starting in the lowest and most vulnerable neighbourhoods, roads have been raised by as much as 61 centimetres. The elevation work was carried out as part of Miami Beach's ambitious but much-needed stormwater-management programme. In addition to the road adaptations, the city has set up new pumps that can remove up to 75,000 litres of water per minute. In the face of floods, climate-mitigation strategies have often been overlooked, says Yanira Pineda, a senior sustainability coordinator. She knows that they're essential and that the job is far from over. 'We know that in 20, 30, 40 years, we'll need to go back in there and adjust to the changing environment,' she says.

C. Seawalls are a staple strategy for many coastal communities, but on the soft, muddy northern shores of Java, Indonesia, they frequently collapse, further exacerbating coastal erosion. There have been many attempts to restore the island's coastal mangroves: ecosystems of trees and shrubs that help defend coastal areas by trapping sediment in their net-like root systems, elevating the sea bed and dampening the energy of waves and tidal currents. But Susanna Tol of the not-for-profit organisation Wetlands International says that, while hugely popular, the majority of mangrove-planting projects fail. So, Wetlands International started out with a different approach, building semi-permeable dams, made from bamboo poles and brushwood, to mimic the role of mangrove roots and create favourable conditions for mangroves to grow back naturally. The programme has seen moderate success, mainly in areas with less subsidence. "Unfortunately, traditional infrastructure is often single-solution focused,' says Tol. 'For long-term success, it's critical that we transition towards multifunctional approaches that embed natural processes and that engage and benefit communities and local decision-makers."

D. As the floodwaters rose in the rice fields of the Mekong Delta in September 2018, four small houses rose with them. Homes in this part of Vietnam are traditionally built on stilts but these ones had been built to float. The modifications were made by the Buoyant Foundation Project, a not-for-profit organisation that has been researching and retrofitting amphibious houses since 2006. 'When I started this,' explains founder Elizabeth English, 'climate change was not on the tip of everybody's tongue,' but this technology is becoming necessary in places that didn't previously need it. It's much cheaper than permanently elevating houses, English explains – about a third of what it would cost to completely replace a building's foundations. It also avoids

the problem of taller houses being at greater risk from wind damage. Another plus comes from the fact that amphibious structures can be sensitively adapted to meet cultural needs and match the kind of houses that are already common in a community.

E. Bangladesh is especially vulnerable to climate change. Most of the country is less than a metre above sea level and 80 per cent of its land lies on floodplains. 'Almost 35 million people living on the coastal belt of Bangladesh are currently affected by soil and water salinity,' says Raisa Chowdhury of the international development organisation ICCO Cooperation. Rather than fighting against it, one project is helping communities adapt to salt-affected soils. ICCO Cooperation has been working with 10,000 farmers in Bangladesh to start cultivating naturally salt-tolerant crops in the region. Certain varieties of carrot, potato, kohlrabi, cabbage and beetroot have been found to be better suited to salty soil than the rice and wheat that is typically grown there. Chowdhury says that the results are very visible, comparing a barren plot of land to the 'beautiful, lush green vegetable garden' sitting beside it, in which he and his team have been working with the farmers. Since the project began, farmers trained in saline agriculture have reported increases of two to three more harvests per year.

F. Greg Spotts from Los Angeles (LA) in the USA is chief sustainability officer of the city's street services department. He leads the Cool Streets LA programme, a series of pilot projects, which include the planting of trees and the installation of a 'cool pavement' system, designed to help reach the city's goal of bringing down its average temperature by 1.5°C. 'Urban cooling is literally a matter of life and death for our future in LA,' says Spotts. Using a Geographic Information System data mapping tool, the programme identified streets with low tree canopy cover in three of the city's neighbourhoods and covered them with a light-grey, light-reflecting coating, which had already been shown to lower road surface temperature in Los Angeles by 6°C. Spotts says one of these streets, in the Winnetka neighbourhood of San Fernando Valley, can now be seen as a pale crescent, the only cool spot on an otherwise red thermal image, from the International Space Station.

PART 2 — QUESTIONS

Questions 14-17

Reading Passage has six paragraphs, **A–F.**

Which paragraph contains the following information?

Write the correct letter, **A–F,** in boxes on your answer sheet.

	A	B	C	D	E	F
14 how a type of plant functions as a natural protection for coastlines	○	○	○	○	○	○
15 a prediction about how long it could take to stop noticing the effects of climate change	○	○	○	○	○	○
16 a reference to the fact that a solution is particularly cost-effective	○	○	○	○	○	○
17 a mention of a technology used to locate areas most in need of intervention	○	○	○	○	○	○

Questions 18-22

Complete the sentences below.

Choose **ONE WORD ONLY** from the passage for each answer.

Write your answers in boxes on your answer sheet.

- The stormwater-management programme in Miami Beach has involved the installation of efficient **18** _____
- The construction of **19** _____ was the first stage of a project to ensure the success of mangroves in Indonesia.
- As a response to rising floodwaters in the Mekong Delta, a not-for-profit organisation has been building houses that can **20** _____.
- Rising sea levels in Bangladesh have made it necessary to introduce various **21** _____ that are suitable for areas of high salt content.

- A project in LA has increased the number of **22** _____ on the city's streets.

Questions 23-26

Look at the following statements and the list of people below.

Match each statement with the correct person,

Write the correct letter, **A E,** in boxes on your answer sheet.

List of People

A. Yanira Pineda

B. Susanna Tol

C. Elizabeth English

D. Raisa Chowdhury

E. Greg Spotts

	A	B	C	D	E
23 It is essential to adopt strategies which involve and help residents of the region.	○	○	○	○	○
24 Interventions which reduce heat are absolutely vital for our survival in this location.	○	○	○	○	○
25 More work will need to be done in future decades to deal with the impact of rising water levels.	○	○	○	○	○
26 The number of locations requiring action to adapt to flooding has grown in recent years.	○	○	○	○	○

PASSAGE 3

A new role for livestock guard dogs

Livestock guard dogs, traditionally used to protect farm animals from predators, are now being used to protect the predators themselves

A. For thousands of years, livestock guard dogs worked alongside shepherds to protect their sheep, goats and cattle from predators such as wolves and bears. But in the 19th and 20th centuries, when such predators were largely exterminated, most guard dogs lost their jobs. In recent years, however, as increased efforts have been made to protect wild animals, predators have become more widespread again. As a result, farmers once more need to protect their livestock, and guard dogs are enjoying an unexpected revival.

B. Today there are around 50 breeds of guard dogs on duty in various parts of the world. These dogs are raised from an early age with the animals they will be watching and eventually these animals become the dog's family. The dogs will place themselves between the livestock and any threat, barking loudly. If necessary, they will chase away predators, but often their mere presence is sufficient. 'Their initial training is to make them understand that livestock is going to be their life,' says Dan Macon, a shepherd with three guard dogs. 'A fluffy white puppy is fun to be around, but too much human affection makes it a great dog for guarding the front porch, rather than a great livestock guard dog.'

C. The evidence indicates that guard dogs are highly effective. For example, in Portugal, biologist Silvia Ribeiro has found that more than 90 per cent of the farmers participating in a programme to train and use guard dogs to protect their herds against attack from wolves rate the performance of the dogs as very good or excellent. In a study carried out in Australia by Linda van Bommel and Chris Johnson at the University of Tasmania, more than 65 per cent of herders reported that predation stopped completely after they got the dogs, and almost all the rest saw a decrease in attacks. 'If they are managed and used properly, livestock guard dogs are the most efficient control method that we have in terms of the amount of livestock that they save from predation,' says van Bommel.

D. But today's guard dogs also have a new role – to help preserve the predators. It is hoped that reductions in livestock losses can make farmers more tolerant of predators and less likely to kill them. In Namibia, more than 90 per cent of cheetahs live outside protected areas, close to humans raising livestock. As a result, the cheetahs are often held responsible for animal losses, and large numbers have been killed by farmers. When guard dogs were introduced, more than 90 per cent of farmers reported a dramatic reduction in livestock losses, and said that as a result they were less likely to kill predators. Julie Young, at Utah State University in the US, believes this result applies widely. "There is common ground from the livestock perspective and from the conservation perspective,' she says. 'If ranchers don't have a dead cow, they will not make a call to apply for a permit to kill a wolf.'

E. Looking at all the published evidence, Bethany Smith at Nottingham Trent University in the UK found that up to 88 per cent of farmers said they no longer killed predators after using dogs

– but warned that such self-reported results must be taken with a pinch of salt. What's more, it is possible that livestock guard dogs merely displace predators to unprotected neighbouring properties, where their fate isn't recorded. 'In some regions, we work with almost every farmer, but in others only one or two have dogs,' says Ribeiro. 'If we are not working with everybody, we are transferring the wolf pressure to the neighbour's herd and he can use poison and kill an entire pack of wolves.'

F. Another concern is whether there may be unintended ecological effects of using guard dogs. Studies suggest that reducing deaths of one type of predator may have a negative impact on other species. The extent of this problem isn't known, but the consequences are clear in Namibia. Cheetahs aren't the only species that cause sheep and goat losses there: other predators also attack livestock. In 2015, researchers reported that in spite of the impact farmers obtaining guard dogs had on cheetahs, the number of jackals killed by dogs and people actually increased. Guard dogs have other ecological impacts too. They have been found to spread diseases to wild animals, including endangered Ethiopian wolves. They may also compete with other carnivores for food. And by creating a 'landscape of fear', their mere presence can influence the behaviour of prey animals.

G. The evidence so far, however, indicates that these consequences aren't always negative. Guard dogs can deliver unexpected benefits by protecting vulnerable wildlife from predators. For example, their presence has been found to protect birds which build their nests on the ground in fields, where foxes would normally raid them. Indeed, Australian researchers are now using dogs to enhance biodiversity and create refuges for species threatened by predation. So if we can get this right, there may be a bright future for guard dogs in promoting harmonious coexistence between humans and wildlife.

PART 3 — QUESTIONS

Questions 27-31

Which paragraph contains the following information ?

Write the correct letter, **A-G,** in boxes on your answer sheet.

NB You may use any letter more than once.

	A	B	C	D	E	F	G
27 An example of how one predator has been protected by the introduction of livestock guard dogs	○	○	○	○	○	○	○
28 An optimistic suggestion about the possible positive developments in the use of livestock guard dogs	○	○	○	○	○	○	○
29 A description of how the methods used by livestock guard dogs help to keep predators away	○	○	○	○	○	○	○
30 Claims by different academics that the use of livestock guard dogs is a successful way of protecting farmers' herds	○	○	○	○	○	○	○
31 A reference to how livestock guard dogs gain their skills	○	○	○	○	○	○	○

Questions 32-36

Look at the following statements and the list of people below.

Match each statement with the correct person,

Write the correct letter, **A E,** in boxes on your answer sheet

List of People

A. Dan Macon

B. Silvia Ribeiro

C. Linda van Bommel

D. Julie Young

E. Bethany Smith

	A	B	C	D	E
32 The use of guard dogs may save the lives of both livestock and wild animals.	○	○	○	○	○
33 Claims of a change in behaviour from those using livestock guard dogs may not be totally accurate.	○	○	○	○	○
34 There may be negative results if the use of livestock guard dogs is not sufficiently widespread.	○	○	○	○	○
35 Livestock guard dogs are the best way of protecting farm animals, as long as the dogs are appropriately handled.	○	○	○	○	○
36 Teaching a livestock guard dog how to do its work needs a different focus from teaching a house guard dog.	○	○	○	○	○

Questions 37-40

Complete the summary below.

Choose **ONE WORD ONLY** from the passage for each answer.

Write your answers in boxes on your answer sheet.

Unintended Ecological Effects of Using Guard Dogs

In Namibia, livestock guard dogs have been used to protect domestic animals from attacks by cheetahs.

This has led to a rise in the deaths of other predators, particularly **37** _____. In addition, it has been suggested that the dogs could have **38** _____ which may affect other species, and that they may reduce the amount of **39** _____ available to certain wild animals.

On the other hand, these dogs may help birds by protecting their nests. These might otherwise be threatened by predators such as **40** _____.

Answer Key

#	Answer	Explanation
1	**Teacher**	she became an art teacher and taught in elementary schools, high schools, and colleges in Virginia, Texas, and South Carolina from 1911 to 1918
2	**Charcoal**	During this period, O'Keeffe began to experiment with creating abstract compositions in charcoal, and produced a series of innovative drawings that led her art in a new direction
3	**skyscrapers**	By the mid-1920s, O'Keeffe was recognized as one of America's most important and successful artists, widely known for the architectural pictures that dramatically depict the soaring skyscrapers of New York
4	**Flowers**	In her magnified images depicting flowers, begun in 1924, O'Keeffe brings the viewer right into the picture.
5	**Bones**	at first, it was the numerous sun-bleached bones she came across in the state's rugged terrain that sparked her imagination
6	**Landscape**	However, it was the region's spectacular landscape, with its unusual geological formations, vivid colours, clarity of light, and exotic vegetation, that held the artist's imagination for more than four decades
7	**Rivers**	Flying in planes inspired her last two major series – aerial views of rivers and expansive paintings of the sky viewed from just above clouds.
8	**FALSE**	Remarkably, she remained independent from shifting art trends and her work stayed true to her own vision
9	**TRUE**	By the time she graduated from high school in 1905, she had determined to make her way as an artist
10	**FALSE**	She sent some of these drawings to a friend in New York, who showed them to art collector and photographer Alfred Stieglitz in January 1916
11	**TRUE**	The ups and downs of their personal and professional relationship were recorded in Stieglitz's celebrated black-and-white portraits of O'Keeffe, taken over the course of twenty years (1917-37)
12	**NOT GIVEN**	one feature of the Abiquiú house – the large walled patio with its black door – was particularly inspirational. In more than thirty pictures between 1946 and 1960, she reinvented the patio into an abstract arrangement of geometric shapes

#	Answer	Explanation
13	**NOT GIVEN**	The last two decades of the artist's life were relatively unproductive as ill health and blindness hindered her ability to work
14	**C**	There have been many attempts to restore the island's coastal mangroves: ecosystems of trees and shrubs that help defend coastal areas by trapping sediment in their net-like root systems, elevating the sea bed and dampening the energy of waves and tidal currents
15	**A**	Even if we stopped all CO2 emissions tomorrow, we would continue to see the impact of the CO2 already released since industrial times, with scientists forecasting that global warming would continue for around 40 years
16	**D**	It's much cheaper than permanently elevating houses, English explains – about a third of what it would cost to completely replace a building's foundations
17	**F**	Using a Geographic Information System data mapping tool, the programme identified streets with low tree canopy cover in three of the city's neighbourhoods
18	**Pumps**	In addition to the road adaptations, the city has set up new pumps that can remove up to 75,000 litres of water per minute
19	**Dams**	So, Wetlands International started out with a different approach, building semi-permeable dams, made from bamboo poles and brushwood, to mimic the role of mangrove roots and create favourable conditions for mangroves to grow back naturally
20	**Float**	As the floodwaters rose in the rice fields of the Mekong Delta in September 2018, four small houses rose with them. Homes in this part of Vietnam are traditionally built on stilts but these ones had been built to float.
21	**Crops**	'Almost 35 million people living on the coastal belt of Bangladesh are currently affected by soil and water salinity,' says Raisa Chowdhury of the international development organisation ICCO Cooperation. Rather than fighting against it, one project is helping communities adapt to salt-affected soils. ICCO Cooperation has been working with 10,000 farmers in Bangladesh to start cultivating naturally salt-tolerant crops in the region
22	**Trees**	He leads the Cool Streets LA programme, a series of pilot projects, which include the planting of trees
23	**B**	For long-term success, it's critical that we transition towards multifunctional approaches that embed natural processes and that engage and benefit communities and local decision-makers

#	Answer	Explanation
24	**E**	‘Urban cooling is literally a matter of life and death for our future in LA,’ says Spotts
25	**A**	‘We know that in 20, 30, 40 years, we’ll need to go back in there and adjust to the changing environment,’ she says
26	**C**	but this technology is becoming necessary in places that didn’t previously need it
27	**D**	When guard dogs were introduced, more than 90 per cent of farmers reported a dramatic reduction in livestock losses, and said that as a result they were less likely to kill predators
28	**G**	So if we can get this right, there may be a bright future for guard dogs in promoting harmonious coexistence between humans and wildlife
29	**B**	The dogs will place themselves between the livestock and any threat, barking loudly. If necessary, they will chase away predators, but often their mere presence is sufficient
30	**C**	The evidence indicates that guard dogs are highly effective. For example, in Portugal, biologist Silvia Ribeiro has found that more than 90 per cent of the farmers participating in a programme to train and use guard dogs to protect their herds against attack from wolves rate the performance of the dogs as very good or excellent
31	**B**	These dogs are raised from an early age with the animals they will be watching and eventually these animals become the dog’s family
32	**D**	‘If ranchers don’t have a dead cow, they will not make a call to apply for a permit to kill a wolf.’
33	**E**	Looking at all the published evidence, Bethany Smith at Nottingham Trent University in the UK found that up to 88 per cent of farmers said they no longer killed predators after using dogs – but warned that such self-reported results must be taken with a pinch of salt
34	**B**	‘If we are not working with everybody, we are transferring the wolf pressure to the neighbour’s herd and he can use poison and kill an entire pack of wolves.’
35	**C**	‘If they are managed and used properly, livestock guard dogs are the most efficient control method that we have in terms of the amount of livestock that they save from predation,’ says van Bommel

#	Answer	Explanation
36	**A**	‘Their initial training is to make them understand that livestock is going to be their life,’ says Dan Macon, a shepherd with three guard dogs
37	**Jackals**	In 2015, researchers reported that in spite of the impact farmers obtaining guard dogs had on cheetahs, the number of jackals killed by dogs and people actually increased
38	**Diseases**	They have been found to spread diseases to wild animals, including endangered Ethiopian wolves
39	**Food**	They may also compete with other carnivores for food
40	**Foxes**	For example, their presence has been found to protect birds which build their nests on the ground in fields, where foxes would normally raid them.

Test 31

PASSAGE 1

You should spend about 20 minutes on Questions 1-13, which are based on Reading Passage 1 below.

The Davies Sisters

Between 1908 and 1924, Gwendoline and Margaret Davies amassed one of the largest collections of late-nineteenth and early-twentieth-century French paintings in Britain

Gwendoline (1882-1951) and Margaret (1884-1963) Davies were the granddaughters of David Davies, a Welshman who amassed a fortune in the shipping and mining industries. In 1907, when Gwendoline came into her inheritance (Margaret would follow in 1909), the sisters were said to be the wealthiest unmarried women in Britain. Their religious upbringing in rural Wales gave them a deep sense of social responsibility and they chose to use their inheritance for cultural and philanthropic* purposes.

While there was no real family history of art collecting, the sisters' education was rigorously geared toward such pursuits. Their London school focused on cultural rather than academic study, and they travelled extensively with their governess, Jane Blaker, visiting art galleries and making extensive notes on the collections there.

The sisters began to make regular art purchases from 1908, which roughly coincided with the dates of their inheritance. They took advice from various people, including the art dealer Hugh Blaker (the brother of Jane Blaker) and David Croal Thompson, who was also an art dealer. While it was long assumed that these men were largely responsible for the nature of the sisters' collection, it has recently been accepted that Gwendoline and Margaret retained a far more active role in the process.

The sisters' journals reveal their preference for Old Master** paintings. Yet they initially made very few attempts to secure any such works. While the sisters were wealthy in relative terms, their income was nothing compared to the fortunes of American art collectors of this period, such as J. Pierpont Morgan. Quite simply, high quality Old Master works were, if not beyond their means, then beyond what they were willing to pay for them. Instead, their early purchases were of the fashionable, safe variety, and included, for example, paintings by the French artist Jean-Baptiste-Camille Corot.

However, it was only a few years before their collecting took a new direction and they turned to the work of the French Impressionists***. We know that Hugh Blaker, as a champion of contemporary French art had a hand in the decision, and we know also that they would have seen examples on their various trips to Paris. Whatever the precise reason for this change, their first purchases of Impressionist art, made in October 1912, were scenes of Venice by the French artist Claude Monet. Over the next 12 years, the sisters amassed the bulk of their Impressionist

collection, including six further works by Monet, two more by Manet, and three by Renoir, including his well-known painting La Parisienne.

The First World War (1914-1918) played a part in the development of the sisters' collection. Their initial response to the war effort was to finance the safe passage of artists from occupied Belgium to Wales, as a humanitarian act, but also with the hope of establishing a vibrant artists' community in the area. Later in the conflict, both sisters decided to volunteer at a canteen for troops at Troyes, in northern France; Gwendoline in 1916, followed by Margaret in 1917.

It was tedious and distressing work, which would have a permanent effect on Gwendoline's health. Yet on one of numerous trips to nearby Paris, she visited the Bernheim-Jeune Gallery. Here she acquired two works by Cézanne - Provençal Landscape and The François Zola Dam. The paintings were shipped directly to Bath, England, where they became the first works by Cézanne to go on display in a public gallery in Britain.

Commentators have often described the sisters as unlikely pioneer collectors. Much is made of their isolation in rural Wales and the fact that they didn't make friends with artists or gallery owners. Yet they didn't feel obliged to follow fashionable tastes and were free to pursue their own preferences. Although they relied on a trusted circle of advisers, they made frequent trips to London and Paris, and also regularly had paintings sent to their home for consideration.

By the early 1920s, Gwendoline felt increasingly uncomfortable buying art works when faced with the poverty and social upheaval created by the First World War. Her philanthropic pursuits then became focused almost exclusively on social causes and the development of the sisters' home at Gregynog Hall into a conference center and venue for the Gregynog Festival of Music and Poetry. Gwendoline made her final art purchase in March 1926. Margaret also stopped collecting around this time, but started again in the 1930s acquiring, on a relatively small scale, work by contemporary British artists.

The sisters collected French Impressionist paintings at a time when such art was routinely ignored by individuals and institutions alike. The Gwendoline and Margaret Davies collection, donated in 1951 and 1963 respectively to the National Museum Wales, contains major examples of work by leading French Impressionists. In collecting paintings that they loved, the sisters created a lasting and meaningful cultural legacy for the people of Wales and beyond.

* philanthropic: seeking to promote the welfare of others, often by charitable funding

** Old Master: a highly respected artist of great skill who worked in Europe before about 1800

*** Impressionist: an artist with a style of painting that developed in France in the late 1800s by Renoir, including his well-known painting La Parisienne

PART 1 — QUESTIONS

Questions 1-7

Complete the notes below.

Choose ONE WORD ONLY from the passage for each answer.

Gwendoline and Margaret Davies

Family and early life

- their grandfather's wealth came from [1] _____ and transportation businesses
- their upbringing gave them a sense of social responsibility
- their [2] _____ was designed to give them an interest in activities such as collecting art
- their governess took them on trips to art galleries
- they took lengthy [3] _____ about the things they saw in art galleries

The sisters as art collectors

- their [4] _____ showed they liked Old Master paintings, but they were expensive to buy
- their early purchases were safe, popular paintings
- the first Impressionist paintings they bought showed places in [5] _____

Impact of First World War

- they helped bring artists from Belgium to Wales
- they worked in a [6] _____ for soldiers in France

Opinions about the sisters as art collectors

- were not considered typical collectors - they lived in isolation in the countryside and did not have any [7] _____ who were artists

Questions 8-13

Do the following statements agree with the information given in Reading Passage 1?

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

8 The Davies sisters' childhood influenced the way they decided to use their wealth.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

9 The Jean-Baptiste-Camille Corot paintings in the Davies sisters' collection were purchased from a gallery in France.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

10 Hugh Blaker opposed the Davies sisters' decision to buy art by French Impressionists.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

11 The exhibition of Cézanne paintings at the Bath gallery was very popular with the public.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

12 The impact of the First World War encouraged Gwendoline to reconsider her interest in collecting art.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

13 The Davies sisters bought French Impressionist art during a period when very few people were doing so.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

PASSAGE 2

You should spend about 20 minutes on Questions 14-26, which are based on Reading Passage 2 below.

Why we need silence

A Humans are finely attuned to noise, and for good reason. From an evolutionary perspective, sounds give us vital information, helping us navigate the world and avoid danger. To help ensure loud or unexpected noises get the attention they deserve, our internal chemistry alters in response to them. Our blood pressure goes up, muscles tense and glands release hormones that prepare us for fight or flight. In the short term, this is a good thing. When we are exposed to too much noise over the long term, however, those responses can lead to a multitude of health issues, from sleep disturbance to even cardiovascular disease.

B The World Health Organization has recently designated excessive noise as an 'underestimated threat' to public health, and has said that people living in cities such as Mumbai, Tokyo and Buenos Aires are being exposed to far more than the recommended 40 decibels of noise at night. A report from the European Environment Agency concluded that noise was an ongoing and widespread issue in Europe, with at least 1 in 5 people consistently exposed to levels considered harmful to health. 'There are no "earlids" that can protect your brain from noise,' says Nick Antonio, an acoustic consultant who has contributed to the British and international standards for noise.

C The good news is that several cities have been working to turn the volume down. One of the first to do so was London. 'By providing recommendations for quieter buses, reducing noise from roads and also controlling noise from aircraft, they were able to make the city quieter,' says Antonio. Other cities have introduced noise-reducing road coatings, for instance, alongside greenery that muffles sound. Some solutions are more specific: Washington DC's ban on petrol-powered leaf blowers came into effect recently, while in New York City, legislation has been approved to fine people who modify their vehicles to make them noisier. 'People are seeing the benefits of these more quiet environments in their cities,' Antonio says. 'I expect we will see much more of this in the future.'

D Researchers are also seeking to understand what aspects of silent experiences are most beneficial to our health. One of the best-researched is the flotation tank: a lightproof, soundproof tank of salt water in which a person floats as a form of deep relaxation. While some people experience altered perception in the tanks, involving subtle humming sounds and visual effects, these effects are benign and do not detract from the benefits of the experience, says Justin Feinstein, a clinical neuropsychologist. 'When you don't have external sensory stimuli coming in, the brain tries to fill the void to make sense of this dark and silent world,' he explains. 'In these tanks, some people can even hear the sound of their eyes blinking,' says Feinstein. 'But it is the ability to focus on the breath that helps people reach a relaxed or meditative state.'

E To further explore flotation tanks as a therapeutic tool, Feinstein and his colleagues recruited 50 people with a variety of conditions related to stress and had them answer a questionnaire

prior to and following a flotation session. Participants reported decreases in muscle tension, pain and symptoms of their conditions after a single, 1-hour float, alongside an increase in feelings of relaxation and overall wellbeing.

Less is known about what effects sensory deprivation can have on the brain. To investigate, Feinstein's team had 48 people participate in either three 90-minute float sessions or three 90-minute periods of relaxing on a chair which reclined. Participants had their brains scanned using functional magnetic resonance imaging at the beginning and end of the trial. Float sessions uniquely decreased activity in the default mode network (DMN), a collection of brain regions commonly linked with depression. Feinstein says it is an exciting finding, because flotation tanks seem to offer a way of 'resetting' our nervous system to prevent it from getting out of balance.

F Neurobiologist Tal Dotan Ben-Soussan is also an advocate of silence as a therapy. 'When we find ways to be quiet, we are not only quiet in our environment, but quiet in our inner selves,' she explains. 'This allows us to be more aware of what is happening around us and what the situation may require from us so we can provide [a more] adequate response.'

Not everyone will benefit from silence to the same extent, but Ben-Soussan says one characteristic is key: the person must need to want to engage in the experience. 'We see from animal models and human studies that volition and intentionality is important,' she says. 'When people do not want silence, it can be very distressing.'

G Eric Pfeifer, a psychotherapy researcher, also concedes that some people may not benefit from silence, particularly those who are in a heightened state of stress. 'People in these states may not be able to relax or calm down in a silent condition,' he says. Professional guidance can be useful, he adds, allowing people to approach silence slowly so that they can gradually enjoy the benefits. And Pfeifer is convinced that silence is more attainable in everyday life than people think. First, complete silence isn't necessary. In a recent study, he found that participants reported more relaxation and less boredom when they sat quietly in an outdoor garden compared with a completely silent room. Second, Pfeifer believes we don't need a lot of silence to gain benefits. 'You don't need to spend hours in silence,' he says. 'It is likely better to have more frequency of silence for a few minutes at a time than a longer period of silence only once a week. Just finding those places in your daily life where you can find some silence ... can make a big difference.'

PART 2 — QUESTIONS

Questions 14-17

Reading Passage 2 has seven sections, A-G.

Which section contains the following information?

	A	B	C	D	E	F	G
14 examples of strategies to decrease the noise that the public are exposed to	○	○	○	○	○	○	○
15 data indicating the extent of the problem of excessive noise	○	○	○	○	○	○	○
16 a description of physiological changes in our bodies when we hear sudden noises	○	○	○	○	○	○	○
17 evidence that a relatively quiet environment can be more beneficial than a totally silent one	○	○	○	○	○	○	○

Questions 18-21

Complete the summary below.

Choose ONE WORD ONLY from the passage for each answer.

Flotation Tanks

According to Justin Feinstein, flotation tanks allow people to concentrate on their own **18** _____ , which helps them relax and enables them to meditate.

Feinstein and his colleagues conducted an experiment in which 50 people, who were all suffering from stress and related issues, were given a **19** _____ to complete before and after using a flotation tank. Participants reported a reduction in their symptoms after an hour in the tank, together with signs of relaxation and improved general **20** _____ .

In another experiment, the researchers had 48 people spend periods of 90 minutes either lying back in a chair or floating in a tank. Brain scans then revealed that those people who

had been in a tank had decreased activity in parts of the brain associated with **21** _____ .

Questions 22-26

Look at the following statements and the list of people below.

Match each statement with the correct person, A, B, C or D.

NB You may use any letter more than once.

A. Nick Antonio

B. Justin Feinstein

C. Tal Dotan Ben-Soussan

D. Eric Pfeifer

	A	B	C	D
22 It is unpleasant and upsetting for people to be placed in a silent environment against their will.	○	○	○	○
23 The trend towards creating quieter urban locations is likely to increase in the coming years.	○	○	○	○
24 When our body's senses are completely deprived of input, our minds compensate for this by creating the illusion of images and sounds.	○	○	○	○
25 Even a short amount of silent time can have a positive impact.	○	○	○	○
26 External and internal quietness makes us more conscious of events occurring in our surroundings and helps us react appropriately to these events.	○	○	○	○

PASSAGE 3

You should spend about 20 minutes on Questions 27-40, which are based on Reading Passage 3 below.

Book review: The World of Sugar by Ulbe Bosma

Ulbe Bosma's The World of Sugar is a genuinely global history. Bosma discusses all the sugar-growing places of the world, beginning with Cuba and Java, the largest exporters of the early 20th century. But this is a history not just of cane sugar but also of beet sugar, an equally important form of traded sugar over the last hundred years. Beet sugar is grown mainly in Europe and the United States. It has also been massively subsidised and sold at artificially low prices on world markets, threatening the livelihood of producers of cane sugar.

Bosma's discussion of the sugar market in Britain gives a sense of the book's range. The sweet-toothed British first bought cane sugar from their own slavery-dependent colonial plantations. Following the abolition of slavery in the British Empire, cane sugar was imported to Britain from places which retained the practice, such as Cuba and Brazil. Towards the end of the 19th century, the British started to import beet sugar from continental Europe. Only in the 20th century was there a move to develop a national beet sugar industry.

The book provides a global labour history, investigating the wide range of labour regimes associated with growing sugar. Contrary to popular belief, cane sugar production was never just restricted to large, dedicated plantations owned by rich men. For example, in Java, a huge exporter of sugar in the early 20th century, sugar cane was grown together with rice in an extraordinarily labour-intensive way by small farmers.

The World of Sugar is also a story of similarity and continuity in sugar cultivation. For example, imported labour has been used for much large-scale production. German beet fields employed Polish workers; Mexicans and many others, including Sicilians, were vital to US sugar production. Cane cutting, Bosma shows, remains a poorly paid and brutal business to this day in many places in the world. But as well as this, the book is about the continuity of the use of traditional methods on small farms. In the mid 20th-century, this type of sugar production dominated in South Asia and Latin America.

This is also a history of capitalists and sugar dynasties, as well as corporations that in some cases have remained influential over very long periods. Great firms and great interests have had profound influence on the policies of states. In many places - not just the British Caribbean but Cuba and the Philippines too - a powerful sugar bourgeoisie played a major role in politics and their interests were consequently protected by trade barriers and subsidies. In the battle for control of the industry, it was inevitably the poor countries which came off worse. All this is explored by Bosma with wonderful subtlety and control.

But sugar production was never just a matter of agriculture. It also involved the extraction, close to the place of harvest, of sucrose from the sugar plant, a process which required machinery powered by humans, animals, wind or steam. Further processes involved boiling (from the 19th

century, this often involved vacuum systems) and the separation of sugar from other materials in a process known as refinement. From very early on, sugar production was an energy-intensive industrial process, mostly taking place in the countryside and in refineries in centres of consumption, both small and large. The growth of the industry entailed a very rapid diffusion of ideas and techniques from one country to another. Cuba, for example, developed an extraordinarily dense system of railways to transport workers and cane, as well as steam-powered sugar factories. Particular varieties of cane sugar and beet sugar spread very rapidly across the world, in accordance with local needs and demands.

Where once only tiny quantities of sugar could be produced, now new techniques, varieties, fertilisers, irrigation systems and much more have turned gleaming white sugar into a ubiquitous chemical. Over the same time, there has been a massive increase in consumption. Once regarded as a luxury, sugar came to be promoted as a valuable source of energy. But as the consumption of sugar has increased, so has the harm it does, whether to people's teeth or weight. In the face of appalling obstruction from the sugar industry to attempts to reduce consumption, some countries have been forced to tax sugar in order to bring that about. The sugar industry has a history of attacking its critics and, when it comes to obesity, of trying to blame fats, and lack of exercise and self-control. And the recent past has seen worrying new developments in mass sweetening. High-fructose corn syrup made from maize using an enzymatic process invented in Japan in the 1960s has a similar number of calories to table sugar but is far cheaper to produce. It is now widely consumed, having been adopted in the making of soft drinks and a large number of processed foods, and is regarded as a leading cause of obesity.

This is a wonderfully rich book, a model of global history, the history of production and the history of capitalism. Bosma avoids outbursts of emotion, celebratory or critical, even if they might have made his analysis of the multiple tragedies involving sugar all the more powerful. He shows that we could always have done without sugar and that today we have many alternative sources of sweetness. Yet many of the poorest people in the world still depend on it to make a living.

PART 3 — QUESTIONS

Questions 27-30

Choose the correct letter, A, B, C or D.

27 What does the reviewer suggest about the cultivation and trading of sugar in the first paragraph?

- **A** ○ Sugar has played a major role in international relations.
- **B** ○ Beet sugar has been made more internationally competitive.
- **C** ○ Cane sugar is thought to be of superior quality to beet sugar.
- **D** ○ New locations for cultivating sugar have increased production.

28 In the second paragraph, when discussing the sugar market in Britain, the reviewer stresses

- **A** ○ how the sources used changed over time.
- **B** ○ how developments in agriculture affected trade.
- **C** ○ the increased demand for sugar over the years.
- **D** ○ the growing support for ethical methods of cultivation.

29 What is the reviewer doing in the third paragraph?

- **A** ○ describing an efficient approach to sugar cultivation
- **B** ○ explaining why the use of sugar plantations declined
- **C** ○ addressing a misconception about the growing of sugar cane
- **D** ○ evaluating different approaches to the cultivation of sugar cane

30 In the final paragraph, what does the reviewer suggest is the overall message of Bosma's book?

- **A** ○ Sugar is a harmful and unnecessary product.
- **B** ○ Economic pressure is needed to control sugar production.

C ○ Conditions for workers in sugar production should be improved.

D ○ Intensive marketing of sugar has had disastrous consequences.

Questions 31-36

Complete the summary using the list of words, A-I, below.

Sugar cultivation and production

The book The World of Sugar points out the similarities in the way that sugar was cultivated around the world. In the big industries in both Germany and the US, sugar farming depended on **31** _____ . However, in other parts of the world such as South Asia and Latin America, **32** _____ continued.

Sugar production has also involved **33** _____ who were eager to protect their markets. In countries such as Cuba the sugar industry therefore had a major influence on **34** _____ .

To support the interests of sugar producers, **35** _____ were established. As a result of this, **36** _____ were penalised.

A. **national governments** B. **agricultural developments**

C. **less wealthy nations** D. **untrained workers** E. **small-scale cultivation**

F. **outdated methods** G. **financial controls** H. **migrant workers**

I. **powerful individuals and businesses**

Questions 37-40

Do the following statements agree with the views of the writer in Reading Passage 3?

YES if the statement agrees with the views of the writer

NO if the statement contradicts the views of the writer

NOT GIVEN if it is impossible to say what the writer thinks about this

37 Sugar has now become available in large quantities due to a range of agricultural developments.

A ○ YES

B ○ NO

C ○ NOT GIVEN

38 Advertisers initially marketed sugar as a luxury product.

A ○ YES

B ○ NO

C ○ NOT GIVEN

39 The invention of high-fructose corn syrup was a positive development.

A ○ YES

B ○ NO

C ○ NOT GIVEN

40 High-fructose corn syrup is an ingredient in many processed foods.

A ○ YES

B ○ NO

C ○ NOT GIVEN

Answer Key

#	Answer	Explanation
1	**mining**	Gwendoline (1882-1951) and Margaret (1884-1963) Davies were the granddaughters of David Davies, a Welshman who amassed a fortune in the shipping and mining industries
2	**education**	While there was no real family history of art collecting, the sisters' education was rigorously geared toward such pursuits
3	**notes**	Their London school focused on cultural rather than academic study, and they travelled extensively with their governess, Jane Blaker, visiting art galleries and making extensive notes on the collections there
4	**journals**	The sisters' journals reveal their preference for Old Master** paintings Quite simply, high quality Old Master works were, if not beyond their means, then beyond what they were willing to pay for them
5	**Venice**	Whatever the precise reason for this change, their first purchases of Impressionist art, made in October 1912, were scenes of Venice by the French artist Claude Monet
6	**canteen**	Later in the conflict, both sisters decided to volunteer at a canteen for troops at Troyes, in northern France; Gwendoline in 1916, followed by Margaret in 1917
7	**friends**	Much is made of their isolation in rural Wales and the fact that they didn't make friends with artists or gallery owners
8	**TRUE**	Their religious upbringing in rural Wales gave them a deep sense of social responsibility and they chose to use their inheritance for cultural and philanthropic* purposes
9	**NOT GIVEN**	Instead, their early purchases were of the fashionable, safe variety, and included, for example, paintings by the French artist Jean-Baptiste-Camille Corot
10	**FALSE**	We know that Hugh Blaker, as a champion of contemporary French art had a hand in the decision, and we know also that they would have seen examples on their various trips to Paris
11	**NOT GIVEN**	The paintings were shipped directly to Bath, England, where they became the first works by Cézanne to go on display in a public gallery in Britain
12	**TRUE**	By the early 1920s, Gwendoline felt increasingly uncomfortable buying art works when faced with the poverty and social upheaval

#	Answer	Explanation
		created by the First World War
13	**TRUE**	The sisters collected French Impressionist paintings at a time when such art was routinely ignored by individuals and institutions alike
14	**C**	'By providing recommendations for quieter buses, reducing noise from roads and also controlling noise from aircraft, they were able to make the city quieter,' says Antonio. Other cities have introduced noise-reducing road coatings, for instance, alongside greenery that muffles sound. Some solutions are more specific: Washington DC's ban on petrol-powered leaf blowers came into effect recently, while in New York City, legislation has been approved to fine people who modify their vehicles to make them noisier
15	**B**	A report from the European Environment Agency concluded that noise was an ongoing and widespread issue in Europe, with at least 1 in 5 people consistently exposed to levels considered harmful to health
16	**A**	To help ensure loud or unexpected noises get the attention they deserve, our internal chemistry alters in response to them. Our blood pressure goes up, muscles tense and glands release hormones that prepare us for fight or flight
17	**G**	In a recent study, he found that participants reported more relaxation and less boredom when they sat quietly in an outdoor garden compared with a completely silent room
18	**breath**	'But it is the ability to focus on the breath that helps people reach a relaxed or meditative state.'
19	**questionnaire**	To further explore flotation tanks as a therapeutic tool, Feinstein and his colleagues recruited 50 people with a variety of conditions related to stress and had them answer a questionnaire prior to and following a flotation session
20	**wellbeing**	Participants reported decreases in muscle tension, pain and symptoms of their conditions after a single, 1-hour float, alongside an increase in feelings of relaxation and overall wellbeing
21	**depression**	Float sessions uniquely decreased activity in the default mode network (DMN), a collection of brain regions commonly linked with depression
22	**C**	'When people do not want silence, it can be very distressing.'
23	**A**	'People are seeing the benefits of these more quiet environments in their cities,' Antonio says. 'I expect we will see much more of

#	Answer	Explanation
		this in the future.'
24	**B**	While some people experience altered perception in the tanks, involving subtle humming sounds and visual effects, these effects are benign and do not detract from the benefits of the experience, says Justin Feinstein, a clinical neuropsychologist. 'When you don't have external sensory stimuli coming in, the brain tries to fill the void to make sense of this dark and silent world,' he explains
25	**D**	Second, Pfeifer believes we don't need a lot of silence to gain benefits. 'You don't need to spend hours in silence,' he says. 'It is likely better to have more frequency of silence for a few minutes at a time than a longer period of silence only once a week
26	**C**	'When we find ways to be quiet, we are not only quiet in our environment, but quiet in our inner selves,' she explains. 'This allows us to be more aware of what is happening around us and what the situation may require from us so we can provide [a more] adequate response.'
27	**B**	It has also been massively subsidised and sold at artificially low prices on world markets, threatening the livelihood of producers of cane sugar
28	**A**	The sweet-toothed British first bought cane sugar from their own slavery-dependent colonial plantations. Following the abolition of slavery in the British Empire, cane sugar was imported to Britain from places which retained the practice, such as Cuba and Brazil. Towards the end of the 19th century, the British started to import beet sugar from continental Europe. Only in the 20th century was there a move to develop a national beet sugar industry
29	**C**	Contrary to popular belief, cane sugar production was never just restricted to large, dedicated plantations owned by rich men
30	**A**	Bosma avoids outbursts of emotion, celebratory or critical, even if they might have made his analysis of the multiple tragedies involving sugar all the more powerful. He shows that we could always have done without sugar and that today we have many alternative sources of sweetness
31	**H**	German beet fields employed Polish workers; Mexicans and many others, including Sicilians, were vital to US sugar production
32	**E**	But as well as this, the book is about the continuity of the use of traditional methods on small farms. In the mid 20th-century, this type of sugar production dominated in South Asia and Latin America

#	Answer	Explanation
33	**I**	This is also a history of capitalists and sugar dynasties, as well as corporations that in some cases have remained influential over very long periods. Great firms and great interests have had profound influence on the policies of states
34	**A**	In many places — not just the British Caribbean but Cuba and the Philippines too — a powerful sugar bourgeoisie played a major role in politics and their interests were consequently protected by trade barriers and subsidies
35	**G**	In many places – not just the British Caribbean but Cuba and the Philippines too – a powerful sugar bourgeoisie played a major role in politics and their interests were consequently protected by trade barriers and subsidies
36	**C**	In the battle for control of the industry, it was inevitably the poor countries which came off worse
37	**YES**	Where once only tiny quantities of sugar could be produced, now new techniques, varieties, fertilisers, irrigation systems and much more have turned gleaming white sugar into a ubiquitous chemical
38	**NOT GIVEN**	Once regarded as a luxury, sugar came to be promoted as a valuable source of energy
39	**NO**	And the recent past has seen worrying new developments in mass sweetening. High-fructose corn syrup made from maize using an enzymatic process invented in Japan in the 1960s has a similar number of calories to table sugar but is far cheaper to produce. It is now widely consumed, having been adopted in the making of soft drinks and a large number of processed foods, and is regarded as a leading cause of obesity
40	**YES**	It is now widely consumed, having been adopted in the making of soft drinks and a large number of processed foods, and is regarded as a leading cause of obesity

Test 32

PASSAGE 1

You should spend about 20 minutes on Questions 1-13, which are based on Reading Passage 1 below.

Do animals dream?

Studies using electrodes attached to the heads of sleepers have shown that when we sleep, we do so in two ways that alternate throughout the night. The first is rapid eye movement (REM) or active sleep. During this stage our eyes move, even though our eyelids are closed. Our muscles also twitch slightly, though they are largely paralysed so we don't hurt ourselves. In contrast, we also engage in non-REM sleep, during which we barely move at all. Most dream states, and certainly those with the most vivid dreams, happen during REM sleep.

There's some evidence that other mammals may also dream. For example, researchers compared the brain patterns of rats running through a maze when awake with their brain patterns during REM sleep. They found the patterns were very similar and concluded that the sleeping rats were dreaming about going through the maze.

But finding evidence of dreaming in non-mammals has proved more difficult. Their brains are very different from those of humans, and it can often be difficult to record their activity while they are sleeping. Recently, however, researchers succeeded in recording brain activity in sleeping pigeons. As in mammals, the recordings revealed both REM and non-REM sleep. Intriguingly, REM sleep activity was high in brain regions involved in processing visual information, especially images related to physical activities such as flying, which suggests that this may possibly be what the pigeons were dreaming about.

That said, dreaming and REM sleep are unlikely to be universal in the animal kingdom. For example, sponges don't have brains, so they lack the machinery for dreaming. There are also some animals with unusual sleep patterns. These include whales and dolphins, which do not shut down their entire brain when they sleep, but only half of it, keeping the rest awake. They also show no sign of REM sleep, suggesting that they may only experience non-REM dreams, which are less vivid. This is surprising because we tend to think of whales and dolphins as having complex inner lives. It's thought that they don't experience REM sleep because during REM sleep animals are more vulnerable to extremes of temperature.

Nevertheless, in many cases REM sleep does seem to have benefits. Growing evidence from birds and mammals suggests that REM sleep and dreaming are important for forming memories and learning. It is believed that when events are replayed in dreams, this helps to integrate memories into longer-term storage. As soon as animals evolved moderately complex lifestyles, they would have needed to dream in order to manage these lifestyles.

However, we still don't understand how this outward behaviour relates to internal experience. It seems impossible to know what it is like to be a rat or a pigeon, let alone imagine their

dreamscapes. We are quick to interpret the twitching limbs and quiet barks of sleeping dogs, but the truth is that we don't know if there is an internal experience of chasing rabbits that comes along with that.

Another non-human dreamer offers insight here. In 2019, while making a documentary, David Scheel of Alaska Pacific University in the USA housed an octopus named Heidi in a tank in his living room. At one point, in the middle of the night, Heidi seemed to dream: her limbs and head moved, and her skin rapidly changed colour, as though she was pursuing a crab.

Similarly, a report recently emerged of a sleeping octopus apparently having a nightmare. Costello, as the octopus was called, thrashed around, extended his mantle as if trying to make himself look bigger, and squirted ink as though he were being attacked by a predator. The nightmare study is intriguing, says Scheel, but is only based on one animal. He argues that as well as outward behaviour, brain imaging is needed to show that the octopuses are replaying sequences of activities from their waking lives in dreams.

The trouble is that we will never be able to experience any animal's dreams. That goes for other humans' dreams too. But we can try to imagine what these dreamscapes are like by meeting animals on their own terms. For example, vision is the dominant sense for many humans, and so our dreams are heavily visual too. Dogs primarily navigate the world using smell while spiders rely much more on vibrations.

It is likely that dreaming has served multiple purposes since the first complex animals evolved. And if this is the case, it is possible that better understanding of these purposes might shed light on the true purpose of our own dreams.

PART 1 — QUESTIONS

Questions 1-5

Complete the table below.

Choose ONE WORD ONLY from the passage for each answer.

Research into sleep and dreaming		
	Research findings	**Comment**
Humans	• humans experience REM sleep and non-REM sleep • in REM sleep, the eyes and muscles move	
1 _____	• similar brain patterns were observed when active and sleeping	indicative of dreaming
Pigeons	• when sleeping, pigeons displayed activity in parts of the brain that deal with **2** _____ input	may have been dreaming of flying
Whales and dolphins	• still have **3** _____ their brain awake when they sleep • don't experience REM sleep, as this could affect their sensitivity to **4** _____	their dreams are probably not very **5** _____

Questions 6-13

Do the following statements agree with the information given in Reading Passage 1?

In boxes 6-13 on your answer sheet, write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

6 Dreaming about past experiences helps us to create lasting memories of them.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

7 It is now possible to tell what type of dream a dog is having.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

8 David Scheel's documentary was influential on other research into the sleeping patterns of octopuses.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

9 While it was asleep, the octopus called Costello reacted as if it was hunting.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

10 Scheel believes more research into octopuses' dreams should be carried out.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

11 We may soon be able to share the dreams of other human beings.

- **A** ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

12 Hearing may be an important part of the dreams of some animals.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

13 Interest in the reasons why humans dream has increased greatly in recent times.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

PASSAGE 2

You should spend about 20 minutes on Questions 14-26, which are based on Reading Passage 2 below.

Mapungubwe

Located in southern Africa just below the Limpopo River, the kingdom of Mapungubwe, flourished between the 11th and 13th century CE

A Mapungubwe, which was one of the first states in southern Africa, was formed by Bantu-speaking peoples who were farmers. The area controlled by the rulers of Mapungubwe had at its heart a large sandstone plateau, which was easily defended due to its inaccessibility. As with other kingdoms in the region of southern Africa, cattle herding and other types of farming brought plenty of food and a surplus that could be traded for needed goods. Archaeology has revealed extensive layers of bones and manure, which indicate that from the 9th century CE there were large cattle herds, the traditional source of political power in southern African communities. The archaeological record for the 10th century shows a marked increase in the number of domesticated cattle in the area as well as cotton cultivation and weaving, as indicated by abundant finds of spindle whorls.

B The total population of Mapungubwe at its peak in the mid-13th century was around 5,000 people. The chief or king of Mapungubwe was likely the wealthiest individual in the society, and would have owned more cattle and precious materials than anyone else. The king and his advisers dwelt in a stone enclosure composed of stone walls and housing built on the highest level of the community's territory, a natural sandstone hill which is some 30 metres high and 100 metres in length. Occupation on the hill dates from the 11th century and the entire complex was surrounded by a wooden palisade*, as indicated by postholes made in the rock. The rest of the community lived in mud and thatch housing spread out below the hill, although there is one stone structure here. This settlement, known as Babandyanalo, covers around 5 hectares (12.3 acres) and predates the hilltop structures.

C The kings of Mapungubwe were buried at the top of the hill site in a demarcated area away from the dwellings, while other members of the community were buried at the surrounding valley level. A wooden staircase connected the two levels, the sockets for the steps being clearly visible in the sandstone cliff face. There were some grander residences dotted around the outskirts of Babandyanalo, and these probably belonged to male relatives of the king. There are many other smaller but still impressive sites across the Mapungubwe plateau, which are located anywhere from 15 to 100 kilometres from the major hill site. Containing stone residences and walls, they likely belonged to local chiefs who acted as servants to the king.

D The Mapungubwe plateau has a very high number of carnivore animal remains and ivory splinters, suggesting that the skins of these large animals and ivory elephant tusks were accumulated, probably for trade with coastal areas reached by the Limpopo River. The presence of glass beads, almost certainly from India, indicate there was trade of some sort with other states on the coast who, in turn, traded with merchants travelling from India by sea.

Mapungubwe also benefitted from locally-sourced copper and the gold trade as it passed from the kingdom of Great Zimbabwe (12-15th century), situated to the north of Mapungubwe, to the coastal city of Kosala. It is likely that trade links led to a strengthening of political authority in order to control and even monopolise these lucrative interregional connections.

E Archaeological discoveries reveal that pottery was produced on a scale large enough to suggest the presence of professional potters, and is another indicator of the prosperity of Mapungubwe society. Archaeological finds include spherical vessels with short necks, beakers, and bowls, many of which have decorative stamps. There are also ceramic discs, and whistles. In addition, cattle, sheep, and goat figurines, and small figures of highly stylised humans with elongated bodies and short limbs have been found. The figures may have been used in ceremonies as offerings to ancestors, but their precise function is not known. Other discoveries include small jewellery items made from locally sourced copper.

F Beautifully decorated artefacts made of gold have also been found at Mapungubwe. A type of decoration, found nowhere else except Great Zimbabwe, involved the crafting of gold into small rectangular sheets and carving geometrical patterns into it. These sheets were then used to cover wooden objects (which have not survived) using small tacks, also made of gold. One such object that has been discovered may have been a sceptre, while additional evidence of local gold-working is a rhinoceros figurine made from small hammered sheets, and thousands of small gold beads. These objects were all found at the royal burial site and date to c. 1150. They are the first known indicators that gold had an intrinsic value of its own (as opposed to that of a currency) in southern Africa.

G The kingdom of Mapungubwe was already in decline by the late 13th century, probably because overpopulation placed too much stress on local resources, a situation that may have been brought to a crisis point by a series of droughts. Trade routes may also have shifted northwards. Certainly, the areas that now prospered were to the north, such as Great Zimbabwe.

* palisade: typically a row of closely placed, high vertical wooden or iron posts used as a means of defence

PART 2 — QUESTIONS

Questions 14-19

Reading Passage 2 has seven paragraphs, A-G.

Which paragraph contains the following information?

	A	B	C	D	E	F	G
14 a mention of the uncertainty regarding the purpose of certain objects	○	○	○	○	○	○	○
15 the likelihood that a climatic factor increased the problems Mapungubwe faced	○	○	○	○	○	○	○
16 a mention of the location where members of the king's family are thought to have lived	○	○	○	○	○	○	○
17 a reference to people who brought goods by ship	○	○	○	○	○	○	○
18 an estimate of the size to which the Mapungubwe community grew	○	○	○	○	○	○	○
19 a mention of agricultural produce being exchanged for other items	○	○	○	○	○	○	○

Questions 20-21

Choose TWO letters, A-E.

20 **21** The archaeological record reveals information about gold and the kingdom of Mapungubwe. Which TWO pieces of information are mentioned by the writer?

A ☐ Not everyone in Mapungubwe used gold as a form of payment.

B ☐ Items of gold were placed close to where Mapungubwe kings were buried.

C ☐ The most valuable item discovered in Mapungubwe was a sceptre made of gold.

D ☐ The way gold was decorated in Mapungubwe was also practised in another kingdom.

E ☐ Working with gold was a respected occupation in the Mapungubwe community.

Questions 22-26

Complete the summary below.

Choose ONE WORD ONLY from the passage for each answer.

Archaeological discoveries

The Mapungubwe community's **22** _____ is indicated by the amount of professionally made pottery discovered at the site. Many of these objects, such as beakers and bowls, are highly decorated and have been marked with stamps. Other finds include round ceramic objects, **23** _____ and figures of various animals, as well as models of people with stretched **24** _____ . It is possible that these had a role in ceremonies to honour **25** _____ . In addition, pieces of **26** _____ made from a local metal have been found at the site.

PASSAGE 3

You should spend about 20 minutes on Questions 27-40, which are based on Reading Passage 3 below.

Artificial Intelligence

In many countries in the West, hysteria about the future of artificial intelligence (AI) is everywhere. There seems to be no shortage of sensationalist news about how AI could cure diseases, accelerate human innovation and improve human creativity. Just looking at the media headlines, you might think that we are already living in a future where AI has infiltrated every aspect of society.

While it is undeniable that AI has opened up a wealth of promising opportunities, it has also led to the emergence of a mindset that can be best described as 'AI solutionism'. This is the philosophy that, given enough data, machine learning algorithms can solve all of humanity's problems. But, in fact, instead of supporting AI progress, this mindset actually jeopardises the value of machine intelligence by disregarding important AI safety principles and setting unrealistic expectations about what AI can really do for humanity.

In only a few years, AI solutionism has made its way from the technology evangelists' mouths in Silicon Valley in California to the minds of government officials and policymakers around the world. The pendulum has swung from the dystopian notion that AI will destroy humanity to the utopian belief that our algorithmic saviour is here.

We are now seeing governments pledge support to national AI initiatives and compete in a technological race to dominate the burgeoning machine-learning sector. While many politicians proclaim the transformative effects of the coming 'AI revolution', they fail to realise the complexity around deploying advanced machine learning systems in the real world.

One of the most promising varieties of AI technologies are neural networks. This form of machine learning is loosely modelled on the neuronal structure of the human brain, but on a much smaller scale. But what many politicians do not understand is that simply adding a neural network to a problem will not automatically mean that you'll find a solution. Similarly, adding a neural network to a system of government does not mean it will be instantaneously more inclusive or fair.

AI systems need a lot of data to function, but the public sector typically does not have the appropriate data infrastructure to support advanced machine learning. Most of the data remains stored in offline archives. The few digitised sources of data that exist tend to be buried in bureaucracy. More often than not, data is spread across different government departments that each require special permissions to be accessed. Above all, the public sector typically lacks the human talent with the right technological capabilities to fully reap the benefits of machine intelligence.

For these reasons, the sensationalism over AI has attracted many critics. Stuart Russell, a professor of computer science at the University of California, Berkeley, has long advocated a

more sensible and realistic approach that focuses on simple everyday applications of AI instead of the hypothetical takeover by super-intelligent robots. Similarly, Rodney Brooks, professor of robotics at Massachusetts Institute of Technology, writes that 'almost all innovations in robotics and AI take far, far, longer to be really widely deployed than people in the field and outside the field imagine'.

One of the many difficulties in deploying machine learning systems is that AI is extremely susceptible to adversarial attacks. This means that a malicious AI can target another AI to make it behave in a certain way, such as forcing it to make wrong predictions. Many researchers have warned against the rolling out of AI without appropriate security standards and defence mechanisms. Still, AI security remains an often overlooked topic when machine learning systems are installed.

If we are to reap the benefits and minimise the potential harms of AI, we must start thinking about how machine learning can be meaningfully applied to specific areas of government, business and society. This means we need to have a discussion about AI ethics and the distrust that many people have towards machine learning.

Most importantly, we need to be aware of the limitations of AI and where people still need to take the lead. Instead of painting an unrealistic picture of the power of AI, it is important to take a step back and separate the actual technological capabilities of AI from fantasy.

The medical profession has also recognised the drawbacks to AI. The IBM Watson for Oncology programme was a piece of AI that was meant to help doctors treat cancer. Even though it was developed to deliver the best recommendations, human experts found it hard to trust the machine. As a result, the AI programme was abandoned in most hospitals where it was trialled.

Similar difficulties arose in the legal domain when algorithms were used in courts in the US to sentence criminals. An algorithm calculated risk assessment scores and advised judges on the sentencing. The system was found to amplify structural racial discrimination and was later abandoned.

There are some crucial lessons here for everyone aiming to boost investments in national AI programmes. These examples demonstrate that there is no AI solution for everything. Using AI simply for the sake of AI may not always be productive or useful, and not every issue is best addressed by applying machine intelligence to it. All solutions come with a cost and not everything that can be automated should be.

PART 3 — QUESTIONS

Questions 27-29

Choose the correct letter, A, B, C or D.

27 What is the writer doing in the first paragraph?

- **A** ○ predicting the future impact of AI
- **B** ○ describing a public perception of AI
- **C** ○ outlining some possible benefits of AI
- **D** ○ highlighting the breadth of the influence of AI

28 When discussing AI solutionism in the second paragraph, the writer

- **A** ○ points out a risk involved.
- **B** ○ specifies its probable origins.
- **C** ○ mentions its chief supporters.
- **D** ○ weighs up some pros and cons.

29 In the fourth paragraph, the writer suggests that many politicians may

- **A** ○ have failed to appreciate the true potential of AI initiatives.
- **B** ○ have misunderstood the function of the machine-learning sector.
- **C** ○ be unaware of the challenges of implementing national AI initiatives.
- **D** ○ be too keen to enter the race to dominate the machine-learning sector.

Questions 30-35

Complete the summary using the list of words, A-I, below.

AI in government, medicine and the law

Neural networks are a promising area of AI technology for governments. However, many politicians overestimate their capabilities, believing that the mere addition of a neural

network will produce solutions and promote **30** _____ .

Most public sector organisations have not set up the necessary **31** _____ to manage the huge amount of data required to enable AI to function. Complex bureaucracy is another issue, as each person involved needs **32** _____ to access the relevant data, which is often spread across different departments. But the main problem is that few public sector employees have the **33** _____ to take full advantage of machine intelligence.

The medical profession experimented with an AI programme, but their experts had little faith in its **34** _____ , and the programme was abandoned. US courts also abandoned the use of algorithms when it was found that these reflected and magnified the existing **35** _____ within the legal profession.

A. **reliability** B. **funding** C. **skills** D. **prejudices** E. **computers**

F. **equality** G. **framework** H. **confidentiality** I. **approval**

Questions 36-39

Do the following statements agree with the claims of the writer in Reading Passage 3?

In boxes 36-39 on your answer sheet, write

YES if the statement agrees with the claims of the writer

NO if the statement contradicts the claims of the writer

NOT GIVEN if it is impossible to say what the writer thinks about this

36 Stuart Russell's proposals regarding the use of AI are impractical.

A ○ YES

B ○ NO

C ○ NOT GIVEN

37 Rodney Brooks' view has attracted unfair criticism from supporters of AI.

A ○ YES

B ○ NO

C ○ NOT GIVEN

38 Nowadays, the need to protect AI systems is always taken into account when they are set up.

A ○ YES

B ○ NO

C ○ NOT GIVEN

39 In order to benefit from AI and minimise the harms, we have to explore people's concerns about its use.

A ○ YES

B ○ NO

C ○ NOT GIVEN

Questions 40-40

Choose the correct letter, A, B, C or D.

40 What would be a suitable subtitle for Reading Passage 3?

A ○ How to make the most of what AI has to offer

B ○ Why AI may not be the answer to our problems

C ○ Why governments should not invest in AI systems

D ○ How AI could improve the efficiency of the public sector

Answer Key

#	Answer	Explanation
1	**rats**	For example, researchers compared the brain patterns of rats running through a maze when awake with their brain patterns during REM sleep. They found the patterns were very similar and concluded that the sleeping rats were dreaming about going through the maze
2	**visual**	Intriguingly, REM sleep activity was high in brain regions involved in processing visual information, especially images related to physical activities such as flying, which suggests that this may possibly be what the pigeons were dreaming about
3	**half**	These include whales and dolphins, which do not shut down their entire brain when they sleep, but only half of it, keeping the rest awake
4	**temperature**	It's thought that they don't experience REM sleep because during REM sleep animals are more vulnerable to extremes of temperature
5	**vivid**	They also show no sign of REM sleep, suggesting that they may only experience non-REM dreams, which are less vivid
6	**TRUE**	It is believed that when events are replayed in dreams, this helps to integrate memories into longer-term storage
7	**FALSE**	We are quick to interpret the twitching limbs and quiet barks of sleeping dogs, but the truth is that we don't know if there is an internal experience of chasing rabbits that comes along with that
8	**NOT GIVEN**	In 2019, while making a documentary, David Scheel of Alaska Pacific University in the USA housed an octopus named Heidi in a tank in his living room
9	**FALSE**	Costello, as the octopus was called, thrashed around, extended his mantle as if trying to make himself look bigger, and squirted ink as though he were being attacked by a predator
10	**TRUE**	The nightmare study is intriguing, says Scheel, but is only based on one animal. He argues that as well as outward behaviour, brain imaging is needed to show that the octopuses are replaying sequences of activities from their waking lives in dreams
11	**FALSE**	The trouble is that we will never be able to experience any animal's dreams. That goes for other humans' dreams too

#	Answer	Explanation
12	**NOT GIVEN**	For example, vision is the dominant sense for many humans, and so our dreams are heavily visual too. Dogs primarily navigate the world using smell while spiders rely much more on vibrations
13	**NOT GIVEN**	And if this is the case, it is possible that better understanding of these purposes might shed light on the true purpose of our own dreams
14	**E**	The figures may have been used in ceremonies as offerings to ancestors, but their precise function is not known
15	**G**	The kingdom of Mapungubwe was already in decline by the late 13th century, probably because overpopulation placed too much stress on local resources, a situation that may have been brought to a crisis point by a series of droughts
16	**C**	There were some grander residences dotted around the outskirts of Babandyanalo, and these probably belonged to male relatives of the king
17	**D**	The presence of glass beads, almost certainly from India, indicate there was trade of some sort with other states on the coast who, in turn, traded with merchants travelling from India by sea
18	**B**	The total population of Mapungubwe at its peak in the mid-13th century was around 5,000 people
19	**A**	cattle herding and other types of farming brought plenty of food and a surplus that could be traded for needed goods
20	**B / D**	A type of decoration, found nowhere else except Great Zimbabwe, involved the crafting of gold into small rectangular sheets and carving geometrical patterns into it These objects were all found at the royal burial site and date to c. 1150
21	**B / D**	A type of decoration, found nowhere else except Great Zimbabwe, involved the crafting of gold into small rectangular sheets and carving geometrical patterns into it These objects were all found at the royal burial site and date to c. 1150
22	**prosperity**	Archaeological discoveries reveal that pottery was produced on a scale large enough to suggest the presence of professional potters, and is another indicator of the prosperity of Mapungubwe society
23	**whistles**	There are also ceramic discs, and whistles
24	**bodies**	In addition, cattle, sheep, and goat figurines, and small figures of highly stylised humans with elongated bodies and short limbs have been found

#	Answer	Explanation
25	**ancestors**	In addition, cattle, sheep, and goat figurines, and small figures of highly stylised humans with elongated bodies and short limbs have been found. The figures may have been used in ceremonies as offerings to ancestors, but their precise function is not known
26	**jewellery / jewelry**	Other discoveries include small jewellery items made from locally sourced copper
27	**B**	In many countries in the West, hysteria about the future of artificial intelligence (AI) is everywhere. There seems to be no shortage of sensationalist news about how AI could cure diseases, accelerate human innovation and improve human creativity. Just looking at the media headlines, you might think that we are already living in a future where AI has infiltrated every aspect of society
28	**A**	But, in fact, instead of supporting AI progress, this mindset actually jeopardises the value of machine intelligence by disregarding important AI safety principles and setting unrealistic expectations about what AI can really do for humanity
29	**C**	While many politicians proclaim the transformative effects of the coming 'AI revolution', they fail to realise the complexity around deploying advanced machine learning systems in the real world
30	**F**	Similarly, adding a neural network to a system of government does not mean it will be instantaneously more inclusive or fair
31	**G**	AI systems need a lot of data to function, but the public sector typically does not have the appropriate data infrastructure to support advanced machine learning
32	**I**	More often than not, data is spread across different government departments that each require special permissions to be accessed
33	**C**	Above all, the public sector typically lacks the human talent with the right technological capabilities to fully reap the benefits of machine intelligence
34	**A**	The IBM Watson for Oncology programme was a piece of AI that was meant to help doctors treat cancer. Even though it was developed to deliver the best recommendations, human experts found it hard to trust the machine. As a result, the AI programme was abandoned in most hospitals where it was trialled
35	**D**	The system was found to amplify structural racial discrimination and was later abandoned
36	**NO**	Stuart Russell, a professor of computer science at the University of California, Berkeley, has long advocated a more sensible and

#	Answer	Explanation
		realistic approach that focuses on simple everyday applications of AI instead of the hypothetical takeover by super-intelligent robots
37	**NOT GIVEN**	Similarly, Rodney Brooks, professor of robotics at Massachusetts Institute of Technology, writes that 'almost all innovations in robotics and AI take far, far, longer to be really widely deployed than people in the field and outside the field imagine'
38	**NO**	Still, AI security remains an often overlooked topic when machine learning systems are installed
39	**YES**	If we are to reap the benefits and minimise the potential harms of AI, we must start thinking about how machine learning can be meaningfully applied to specific areas of government, business and society. This means we need to have a discussion about AI ethics and the distrust that many people have towards machine learning
40	**B**	These examples demonstrate that there is no AI solution for everything. Using AI simply for the sake of AI may not always be productive or useful, and not every issue is best addressed by applying machine intelligence to it

Test 33

PASSAGE 1

You should spend about 20 minutes on Questions 1-13, which are based on Reading Passage 1 below.

Saving the saiga

The saiga, a species of antelope native to Central Asia, once roamed the vast grasslands of this region in enormous herds, many millions strong. Regrettably, such spectacular sights are a thing of the past. Today, the saiga is largely confined to a single country: Kazakhstan. This country is estimated to be home to well over 90% of the global saiga population, with Russia, Mongolia and Uzbekistan accounting for the rest.

The saiga is perfectly adapted to the tough conditions of the remote wilderness of the steppes of Central Asia. One such adaptation is its bizarre bulbous nose, which enables the animal to survive the extreme seasonal temperature swings of the region. The swollen nostrils of the nose serve several purposes: they filter out dust and cool the blood during hot, dry summers, and they warm the cold air before it enters the saiga's lungs in winter. Other seasonal adaptations include a heavy winter coat that the saiga sheds when the weather warms up.

Despite these superb adaptations to harsh conditions, the saiga has no defence against the threats posed by humans. It was almost driven to extinction by hunters in the 19th century. Legal protection ensured its survival for a while, and numbers steadily recovered throughout most of the 20th century. But the respite was only temporary. In the ten years following the break-up of the former Soviet Union in 1991, over 95% of the global population was lost - one of the fastest examples of species loss ever recorded for a mammal.

The dramatic decline during this decade was due to illegal poaching on an industrial scale. Male saiga are a particular target, because their horns are highly prized by traditional medicine practitioners. Poaching reached epidemic levels after misguided conservationists tried to relieve the pressure on threatened African rhinos by actively encouraging the use of saiga horns in traditional medicine as an alternative to those of rhinos. Male saiga were almost wiped out, leading to a population crash from which the species has been struggling to recover ever since.

Another threat to the survival of the saiga is loss of habitat, as a result of agricultural expansion and human settlement. Physical barriers such as railways, pipelines and fences can block the seasonal migration routes of this transboundary species. In the worst cases, herds may starve to death after being trapped.

Then there is the risk of disease. In 2015, an outbreak of haemorrhagic septicaemia, caused by the normally harmless bacterium *Pasteurella multocida*, killed over 75% of the global adult saiga population in just three weeks. In 2017, 60% of the Mongolian saiga population - a subspecies found nowhere else in the world - was killed by a virus that spilled over from livestock. These so-called mass mortality events represent an unpredictable and serious threat to the species.

Climate change poses a further threat. Although well adapted to cold winters and hot summers, saiga struggle to cope with temperature extremes and unpredictable fluctuations in climate. Experts believe that unusually warm weather may have triggered the 2015 mass mortality event. The steppe region has also become increasingly arid in recent years, and many of the smaller streams that the species normally depended on have dried up and vanished.

Recent efforts to save the saiga have been spearheaded by the Altyn Dala Conservation Initiative, a project led by the Association for the Conservation of Biodiversity of Kazakhstan, working in partnership with the Kazakh government's Committee for Forestry and Wildlife, Frankfurt Zoological Society and Fauna and Flora, an international conservation charity. Its purpose is to protect and restore Kazakhstan's steppe, semi-desert and desert ecosystems and the many species they support, including the critically endangered saiga. In 2022 the United Nations recognised the initiative as a World Restoration Flagship project, an accolade reserved for the ten best examples of large-scale ecosystem restoration around the globe.

So, how many saiga are there now? By 2000, the global saiga population had hit an all-time low of just 21,000 individuals. There was some recovery in the first decade of the new millennium but this was then crushed by devastating mass mortality events that saw the loss of hundreds of thousands of the species. But thanks to the intervention of the Altyn Dala Conservation Initiative, the most recent episodes in the ongoing story of the saiga have been relatively uplifting. Three years ago, the Ustyurt Plateau population in Kazakhstan experienced its largest mass birth of saiga calves in many years. An aerial census two years ago recorded an estimated 842,000 saiga across Kazakhstan as a whole, and according to an aerial survey earlier this year, the saiga population in Kazakhstan now exceeds 1.9 million. The world's strangest-looking antelope remains critically endangered, but the direction of travel is positive.

PART 1 — QUESTIONS

Questions 1-7

Complete the notes below.

Choose ONE WORD ONLY from the passage for each answer.

The saiga

Adaptations

- has a large bulbous nose with swollen nostrils that

  - keep [1] _____ out

  - lower the temperature of its [2] _____ in summer

  - warm the air entering its lungs in winter

- grows a thick [3] _____ in winter, which it loses in spring

Reasons for population decline

- poaching, especially for the [4] _____ of male saiga
- expansion of farms and settlements, causing

  - reduction in the size of the saiga's [5] _____.

  - loss of access to the [6] _____ which they use for migration

- various forms of disease, leading to mass mortality events
- climate change, causing the disappearance of [7] _____ which the saiga relied on

Questions 8-13

Do the following statements agree with the information given in Reading Passage 1?

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

8 Today, numbers of saiga are distributed evenly across four nations in Central Asia: Kazakhstan, Russia, Mongolia and Uzbekistan.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

9 For most of the 20th century, the population of saiga were falling.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

10 Efforts to protect rhinos in Africa had a significant effect on saiga populations.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

11 Unpredictable fluctuations in climate are threatening the wildlife of Central Asia more than in other parts of the world.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

12 The Altyn Dala Conservation Initiative was formed for the benefit of a number of different animals.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

13 The Altyn Dala Conservation Initiative's recognition as a World Restoration Flagship project attracted additional international funding for the scheme.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

PASSAGE 2

You should spend about 20 minutes on Questions 14-26, which are based on Reading Passage 2 below.

The problems of getting around the city of Dar es Salaam

Dar es Salaam in Tanzania is one of the fastest growing cities in Africa. Its population has increased eightfold since 1980 and swells by half a million people every year. United Nations projections anticipate it will become a megacity within seven years as its population passes 10 million, reaching 13.4 million by 2035. Daniel Hoornweg for the Global Cities Institute forecasts the city could be home to an incredible 73.7 million people by 2100.

Today, four out of five of its people live in single-storey informal settlements on the spreading edges of the city, where the journey to and from the centre regularly takes over two hours. It can be longer if rain turns the dirt roads to mud.

Even in the middle of the day, traffic frequently slows to a stop without warning. It is not unusual for cars and minibuses to queue for 20 minutes at a key intersection. A single suburban rail line serves residents in a few areas to the south but is tiny in the context of the wider city. Outside the centre many rely on boda boda (motorbike taxis) to navigate the narrow side streets and potholed mud roads that make up much of the metropolis. Their safety record is scandalous.

Dar es Salaam's reliance on four arterial roads into the city is a legacy of the colonial government that planned the city at the start of the 20th century to cater for a population of 35,000. Most of the current growth is made up of young people arriving from the countryside to find work, and as the population has exploded, Dar es Salaam has grown around those four highways. Nearly all the expansion is happening on the periphery, and nearly all takes place informally without any agreed strategy.

But Dar es Salaam is pinning its hopes on a solution that could offer a different model for Africa's megacities, giving them an alternative to a future controlled by the private car. Unlike many cities on the continent, Dar es Salaam isn't trying to build a metro. It has chosen a less exciting but cheaper and more achievable method: the bus.

The DART bus rapid transit (BRT) system runs on bus lanes separated from other traffic, mostly in the middle of the road to reduce stoppages. Ticket purchase and control takes place at stations prior to boarding and the buses are step-free, which means the entire route is accessible to people using wheelchairs or who are travelling with baby buggies.

'The new buses are much, much better,' says Paulas George, a young IT worker. He takes the bus every day and it has cut his journey time by two-thirds. He says it is not perfect, though, complaining that drivers often refuse to turn on the air conditioning to save fuel.

That is not the only problem. A shortage of buses after a serious flood at the main depot during the rainy season means the system is carrying 200,000 people a day - half the expected capacity. Smartcards can't be used as the mechanical readers aren't working either, forcing

passengers to buy individual paper tickets for every journey. Each is printed with a scannable QR code, but there are no scanners. Staff stand by the gates and tear tickets as people enter. As a result, queues are considerable at peak times.

Morogoro Road to the north-west of the city was phase I of the BRT project. Phases II and III will install bus lanes along Nyerere Road to the south-west and Kilwa Road to the south. Construction on both routes is due to start imminently. Phase IV, towards Bagamoyo in the north, is in the preliminary design stage. 'Much of the city will have access to a world-class transport system within the space of a few years,' says Chris Kost, the Africa director of ITDP (the Institute for Transportation and Development Policy). All phases are being planned to high standards and, once complete, a third of city residents will be within a short walk of the BRT network.

The ITDP regrets Africa's obsession with metros. 'With a metro, an international firm will often just parachute in its own system,' says Kost. 'Bus rapid transit allows existing stakeholders to get involved. That's what we did in Dar es Salaam and what we're planning in Nairobi, where the bus bodies will be built in the city and local operators will look after tickets, fare collection and IT ...Bus rapid transit has been transformational for Dar es Salaam. For millions of people in African cities, this is their best hope of ever being connected.'

PART 2 — QUESTIONS

Questions 14-18

Do the following statements agree with the information given in Reading Passage 2?

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

14 The population of Dar es Salaam is rising more rapidly than was previously predicted.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

15 Most of the residents of Dar es Salaam live in high-rise blocks on the edge of the city.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

16 Residents have been consulted about their views on the suburban rail line in Dar es Salaam.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

17 The majority of the present residential development in Dar es Salaam is unplanned.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

18 Dar es Salaam's authorities have decided to follow the public transport plan adopted by a large number of African cities.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

Questions 19-26

Complete the notes below.

Choose ONE WORD ONLY from the passage for each answer.

Dar es Salaam's DART Bus Rapid Transit system

Features

- the buses use designated **19** _____ to cut down on delays
- passengers pay fares before **20** _____
- passengers in **21** _____ can use every part of the system

Problems

- the temperature control is sometimes not activated in order to reduce **22** _____ use
- insufficient number of vehicles are available due to the effects of a severe **23** _____
- passengers are unable to use **24** _____ because some equipment is out of action
- tickets have to be checked manually at station **25** _____
- **26** _____ frequently build up during rush hours

PASSAGE 3

You should spend about 20 minutes on Questions 27-40, which are based on Reading Passage 3 below.

Rethinking the Past

It is by now a truism that the story of human evolution is being rethought. Discoveries have come thick and fast over the last decade or so, and these have forced us to rethink many crucial points, such as how old our species is - about 300,000 years old as opposed to 200,000 - and what extinct hominins, such as our cousins the Neanderthals, were really like. But because there are so many species and eras involved, it's hard to discern the common threads linking them.

However, I do think it's possible to draw out some overall messages from the blizzard of archaeological finds in recent years. Two things stand out to me. One is the growing evidence that many supposedly 'advanced' behaviours, such as architecture and art, can be traced much further back in time than we thought, often to hominin species that existed before modern humans. And the other is that we have badly misunderstood gender roles in prehistoric societies, imposing patriarchal values onto cultures that had very different ideas about how women should behave.

Let's start with architecture. At Kalambo Falls in Zambia, researchers found buried logs that had been shaped with stone tools so that they interlocked. They seem to have once been part of a larger structure, perhaps a building. This would be unsurprising if they weren't 476,000 years old. That's almost 200,000 years before our species, *Homo sapiens*, evolved. Extinct hominins also managed to settle in extreme places. For instance, we now know that extinct hominins such as the Denisovans lived on the frozen heights of high-altitude regions 200,000 years ago - upending the old notion that such environments were only settled by modern humans around 3,600 years ago.

Art also seems to have been invented by older hominins. We have had evidence for a long time now that Neanderthals painted on cave walls. Even earlier species, such as *Homo erectus*, may also have made art, for example by engraving patterns on shells. By far the most contentious claim in this area is that *Homo naledi* made art. *H. naledi* lived around 250,000 years ago, making it a contemporary of our species. However, it had quite a small brain, typical of older hominins - and was therefore, according to palaeoanthropological dogma, incapable of complex behaviours. Nevertheless, in the Rising Star cave system in South Africa where the *H. naledi* remains were found, researchers have found what seem to be etchings - resembling rudimentary artwork - on the cave walls, though these have yet to be firmly dated.

To say these claims about *H. naledi* are controversial is to understate the situation. Many experts say the evidence presented so far is completely inadequate to support them. The dispute has only been heightened by the way the results were released, in a non-traditional journal that publishes peer reviews publicly alongside the paper. My views on the *H. naledi* controversy are complicated. I do think more evidence is needed: in particular with regard to

the dating of the etchings. At the same time, I think the species' small brains are a distraction. Palaeoanthropologists got fixated on brain size because it was what they could see: if what you have is skeletons, then all you know about brains are their shapes and sizes. But other properties, such as the brain's internal wiring, are surely equally important and may explain how a species like *H. naledi* might have been capable of complex behaviours, despite their small brains.

In a sense, we shouldn't be surprised that so many of these behaviours had their origins in older, extinct hominins. Evolution usually works by incremental steps and so does technology. The first birds weren't great at flying, and the first mobile phones weren't great at, well, anything really. The idea that there was a sudden explosion of intelligence and creativity at some point in our evolution isn't inherently ridiculous: sometimes a system hits a tipping point and undergoes runaway change. But there was never that much evidence that human evolution worked this way. Instead, it seems the Neanderthals and many others all walked so we could run.

One way or another, the *H. naledi* story is going to be an example of letting our preconceptions get in the way of the evidence. The same is true for our ideas about gender in prehistory. Archaeology was invented by individuals with now unfashionably patriarchal views about gender, and those notions fed into their research. Today's researchers are trying to unpick this stuff, and there have been some significant steps in recent years.

Perhaps the most dramatic was the demolition of 'Man the Hunter'. This was the idea, promoted for decades, that in most prehistoric societies the men went out to hunt and the women looked after the home. However, a meta-analysis published in June 2023 compiled data on several dozen foraging societies and found women hunted in 80 per cent of them. In line with this, it emerged that an ancient spear-throwing tool called an atlatl enables women to launch projectiles at the same speed as men. We have also seen growing evidence of women occupying positions of authority in ancient societies. The Viking queen Thyra may have helped unify Denmark in the 900s. Going further back, an Iberian leader from around 4000 years ago turned out to be female, not male as many had assumed, when proteins in her teeth were analysed.

It seems that the more we find out about past societies, the more our preconceptions about the ways society 'has to be' turn out to be wrong. Inequality, authoritarianism and patriarchy aren't inevitable. They're choices, and prehistory shows us that we can choose differently.

PART 3 — QUESTIONS

Questions 27-30

Choose the correct letter, A, B, C or D.

27 What is the writer doing in the second paragraph?

- **A** ○ pinpointing some key changes in our understanding of prehistory
- **B** ○ outlining some aspects of prehistory which are still poorly understood
- **C** ○ summarising some attitudes towards recent archaeological revelations
- **D** ○ giving an overview of some current disagreements among archaeologists

28 In the sixth paragraph, the writer mentions mobile phones to make the point that

- **A** ○ most developments happen in a gradual way.
- **B** ○ innovation can come from a variety of sources.
- **C** ○ not all technological advancements are positive.
- **D** ○ the path of evolution can often be unpredictable.

29 In the seventh paragraph, the phrase 'unpick this stuff' refers to the task of

- **A** ○ assessing the impact of certain recent research findings.
- **B** ○ questioning the authenticity of evidence used in earlier research.
- **C** ○ conducting research into how prehistoric societies were organised.
- **D** ○ reevaluating research influenced by outdated beliefs about society.

30 What does the writer suggest in the final paragraph?

- **A** ○ Studying past societies could help us create a fairer society today.
- **B** ○ We should not judge past societies by the standards of modern society.
- **C** ○ We still have much to learn about how societies have evolved over history.

D ○ There is more than one way to interpret evidence about societies in prehistoric times.

Questions 31-34

Complete each sentence with the correct ending, A-F, below.

• The findings at Kalambo Falls revealed that **31** _____

• Evidence from high-altitude regions suggests that **32** _____

• An academic publication from June 2023 shows that **33** _____

• Analysis of a 4000-year-old Iberian leader indicates that **34** _____

A. **Homo sapiens emerged at an earlier point in time than experts previously believed.**

B. **previous assumptions about who had power in the prehistoric world were inaccurate.**

C. **gender roles in extinct hominin species were different from those in Homo sapiens societies.**

D. **experts may have been mistaken about who looked for food in early human communities.**

E. **Homo sapiens was probably not the only species capable of sophisticated workmanship.**

F. **other species managed to survive in harsh environments before the arrival of Homo sapiens.**

Questions 35-40

Do the following statements agree with the views of the writer in Reading Passage 3?

YES if the statement agrees with the views of the writer

NO if the statement contradicts the views of the writer

NOT GIVEN if it is impossible to say what the writer thinks about this

35 It seems likely that the Neanderthals' cave paintings were the first examples of artwork ever created.

A ○ YES

B ○ NO

C ○ NOT GIVEN

36 It is very rare to find prehistoric artwork carved onto shells.

A ○ YES

B ○ NO

C ○ NOT GIVEN

37 The methods which the researchers used to examine the Rising Star cave system were rather unconventional.

A ○ YES

B ○ NO

C ○ NOT GIVEN

38 It is unclear how old the etchings in the Rising Star cave system are.

A ○ YES

B ○ NO

C ○ NOT GIVEN

39 The means used to publicise the findings from the Rising Star cave system added to the controversy that surrounds them.

A ○ YES

B ○ NO

C ○ NOT GIVEN

40 The size of H. naledi brains is a key factor in the question of whether these hominins were able to produce art.

A ○ YES

B ○ NO

C ○ NOT GIVEN

Answer Key

#	Answer	Explanation
1	**dust**	The swollen nostrils of the nose serve several purposes: they filter out dust and cool the blood during hot, dry summers, and they warm the cold air before it enters the saiga's lungs in winter
2	**blood**	The swollen nostrils of the nose serve several purposes: they filter out dust and cool the blood during hot, dry summers, and they warm the cold air before it enters the saiga's lungs in winter
3	**coat**	Other seasonal adaptations include a heavy winter coat that the saiga sheds when the weather warms up
4	**horns**	Male saiga are a particular target, because their horns are highly prized by traditional medicine practitioners
5	**habitat**	Another threat to the survival of the saiga is loss of habitat, as a result of agricultural expansion and human settlement
6	**routes**	Physical barriers such as railways, pipelines and fences can block the seasonal migration routes of this transboundary species
7	**streams**	The steppe region has also become increasingly arid in recent years, and many of the smaller streams that the species normally depended on have dried up and vanished
8	**FALSE**	This country is estimated to be home to well over 90% of the global saiga population, with Russia, Mongolia and Uzbekistan accounting for the rest
9	**FALSE**	Legal protection ensured its survival for a while, and numbers steadily recovered throughout most of the 20th century
10	**TRUE**	Poaching reached epidemic levels after misguided conservationists tried to relieve the pressure on threatened African rhinos by actively encouraging the use of saiga horns in traditional medicine as an alternative to those of rhinos. Male saiga were almost wiped out, leading to a population crash from which the species has been struggling to recover ever since
11	**NOT GIVEN**	Climate change poses a further threat. Although well adapted to cold winters and hot summers, saiga struggle to cope with temperature extremes and unpredictable fluctuations in climate
12	**TRUE**	Its purpose is to protect and restore Kazakhstan's steppe, semi-desert and desert ecosystems and the many species they support, including the critically endangered saiga

#	Answer	Explanation
13	**NOT GIVEN**	In 2022 the United Nations recognised the initiative as a World Restoration Flagship project, an accolade reserved for the ten best examples of large-scale ecosystem restoration around the globe
14	**NOT GIVEN**	United Nations projections anticipate it will become a megacity within seven years as its population passes 10 million, reaching 13.4 million by 2035. Daniel Hoornweg for the Global Cities Institute forecasts the city could be home to an incredible 73.7 million people by 2100
15	**FALSE**	Today, four out of five of its people live in single-storey informal settlements on the spreading edges of the city
16	**NOT GIVEN**	A single suburban rail line serves residents in a few areas to the south but is tiny in the context of the wider city
17	**TRUE**	Nearly all the expansion is happening on the periphery, and nearly all takes place informally without any agreed strategy
18	**FALSE**	Unlike many cities on the continent, Dar es Salaam isn't trying to build a metro. It has chosen a less exciting but cheaper and more achievable method: the bus
19	**lanes**	The DART bus rapid transit (BRT) system runs on bus lanes separated from other traffic, mostly in the middle of the road to reduce stoppages
20	**boarding**	Ticket purchase and control takes place at stations prior to boarding and the buses are step-free, which means the entire route is accessible to people using wheelchairs or who are travelling with baby buggies
21	**wheelchairs**	Ticket purchase and control takes place at stations prior to boarding and the buses are step-free, which means the entire route is accessible to people using wheelchairs or who are travelling with baby buggies
22	**fuel**	He says it is not perfect, though, complaining that drivers often refuse to turn on the air conditioning to save fuel
23	**flood**	A shortage of buses after a serious flood at the main depot during the rainy season means the system is carrying 200,000 people a day – half the expected capacity
24	**smartcards**	Smartcards can't be used as the mechanical readers aren't working either, forcing passengers to buy individual paper tickets for every journey
25	**gates**	Staff stand by the gates and tear tickets as people enter

#	Answer	Explanation
26	**queues**	As a result, queues are considerable at peak times
27	**A**	Two things stand out to me. One is the growing evidence that many supposedly ‘advanced’ behaviours, such as architecture and art, can be traced much further back in time than we thought, often to hominin species that existed before modern humans. And the other is that we have badly misunderstood gender roles in prehistoric societies, imposing patriarchal values onto cultures that had very different ideas about how women should behave
28	**A**	Evolution usually works by incremental steps and so does technology. The first birds weren’t great at flying, and the first mobile phones weren’t great at, well, anything really
29	**D**	Archaeology was invented by individuals with now unfashionably patriarchal views about gender, and those notions fed into their research. Today’s researchers are trying to unpick this stuff, and there have been some significant steps in recent years
30	**A**	Inequality, authoritarianism and patriarchy aren’t inevitable. They’re choices, and prehistory shows us that we can choose differently
31	**E**	At Kalambo Falls in Zambia, researchers found buried logs that had been shaped with stone tools so that they interlocked. They seem to have once been part of a larger structure, perhaps a building. This would be unsurprising if they weren’t 476,000 years old. That’s almost 200,000 years before our species, Homo sapiens, evolved
32	**F**	For instance, we now know that extinct hominins such as the Denisovans lived on the frozen heights of high-altitude regions 200,000 years ago – upending the old notion that such environments were only settled by modern humans around 3,600 years ago
33	**D**	This was the idea, promoted for decades, that in most prehistoric societies the men went out to hunt and the women looked after the home. However, a meta-analysis published in June 2023 compiled data on several dozen foraging societies and found women hunted in 80 per cent of them
34	**B**	Going further back, an Iberian leader from around 4000 years ago turned out to be female, not male as many had assumed, when proteins in her teeth were analysed
35	**NO**	Even earlier species, such as Homo erectus, may also have made art, for example by engraving patterns on shells

#	Answer	Explanation
36	**NOT GIVEN**	Even earlier species, such as Homo erectus, may also have made art, for example by engraving patterns on shells
37	**NOT GIVEN**	The dispute has only been heightened by the way the results were released, in a non-traditional journal that publishes peer reviews publicly alongside the paper
38	**YES**	Nevertheless, in the Rising Star cave system in South Africa where the H. naledi remains were found, researchers have found what seem to be etchings – resembling rudimentary artwork – on the cave walls, though these have yet to be firmly dated
39	**YES**	The dispute has only been heightened by the way the results were released, in a non-traditional journal that publishes peer reviews publicly alongside the paper
40	**NO**	At the same time, I think the species' small brains are a distraction

Test 34

PASSAGE 1

You should spend about 20 minutes on Questions 1-13, which are based on Reading Passage 1 below.

The problems and benefits created by the spread of the water hyacinth in Kenya

Water hyacinth (Eichhornia crassipes), an aquatic plant native to South America, first appeared in countries in Africa in the early 1900s. Scientists there called it the 'world's worst aquatic weed', after it spread from the southernmost tip of Africa in the early 1900s and started obstructing major dams and rivers.

In east Africa the plant arrived with Belgian colonists in Rwanda, who liked the look of its glossy leaves and delicate purple flowers floating in their ponds. But by the 1980s, it had 'escaped' out of the country via the Kagera river and made its way downstream to Lake Victoria. There, with no natural predators and perfect temperature conditions, the plant began spreading in the open water, blocking fishing routes and providing a new habitat for disease-carrying mosquitoes.

For the women who smoke fish from the lake to sell it has meant declining income, as the boats that once brought the fish to shore by the hundreds struggle to navigate through the mass of plants. But water hyacinth isn't their only headache. In order to smoke the fish that they buy, they must gather huge quantities of firewood, sometimes walking as far as 10km each way to collect enough to complete their work. And each day as they cook, they breathe in the thick, grey smoke. About three out of four families in Kenya depend on wood or charcoal to cook their daily meals, and the rate is even higher in rural areas, Kenya's latest demographic and health survey shows. Using solid fuels like these for cooking increases indoor pollution. The World Health Organization estimates that about 14,300 Kenyans die annually as a result of indoor air pollution - most of which is caused by cooking and heating sources.

Some years ago, on the shores of Lake Victoria, huge piles of water hyacinth that villagers had taken out of the water in an attempt to clear it were a common sight. But buried in those decaying waxy leaves was a renewable energy gold mine. It turns out the floating plant isn't just good at spreading - its foliage also contains a high ratio of carbon to nitrogen. It's a magic combination that has captivated researchers' imaginations since as early as the 1980s when, across the world, they began to explore its potential as a biofuel. Just about 4kg of the dried plant would be enough to cater for a large family's daily energy needs, early research predicted.

In 2014, Nigerian academics announced they had got better yields of biofuel gas when they mixed the plant with chicken manure. A few years later, Kenyan scientists confirmed what their Nigerian peers and others had already found: manure worked to improve the process of converting the weed into gas.

In 2018, the technology came to a village on the shore of Lake Victoria, called Dunga. The project promised a two-for-one solution to the dual menaces of the water hyacinth and dependence on firewood. The community received a pair of donated biogas digesters - machines that would transform a mix of water hyacinth and cow dung into biogas for cooking.

The digesters work a bit like a stomach. The mixture goes in one end - think of it as a mouth - and over the next 20 to 30 days, it goes through a fermentation process and breaks down, giving off gas that comes out the other end. From there, the clean-burning gas is passed through pipes to the point of use, just like traditional domestic gas. In Dunga, the machines produce enough gas to serve about 60% of the village's population. It is used in domestic stoves and for other household tasks such as purifying water and incubating chicks.

The project is testing whether biogas can provide an effective alternative to firewood and charcoal in rural Kenyan communities. Results indicate that the programme seems to be working. The women who smoke the lake fish are already getting sick less often. Besides, they don't have to devote a lot of time every day to gathering firewood, which is a great relief. As a result, they're able to make more money for their families from other enterprises.

Kanyiva Muindi is an epidemiologist and air pollution research fellow at the African Population and Health Research Centre in Nairobi. She says families who switch to the smokeless cooking method could expect fewer respiratory diseases. Women, young girls and children are particularly vulnerable because they are the ones who cook in the kitchen or outside over fires.

How much better the biogas stoves will be for the community's health still needs more research, says Dominic Kahumbu Wanjihia, Biogas International's chief executive. But unless the price of the machines drops, it's pretty clear that most communities will never be able to afford any, since they sell for about $750.

Kanyiva says affordability is a challenge worth addressing, given the huge health and environmental dangers posed by 'dirty' fuels such as wood, charcoal and kerosene. If biogas could become affordable on a large scale, she says it 'would be life-changing for millions on the African continent and beyond'.

PART 1 — QUESTIONS

Questions 1-7

Do the following statements agree with the information given in Reading Passage 1?

1 Water hyacinth was introduced as a decorative plant in east Africa.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

2 Fishermen took some water hyacinth plants to Lake Victoria.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

3 It is now difficult to force boats through the thick water hyacinth on Lake Victoria.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

4 Chemicals produced by the water hyacinth plants are affecting the numbers of fish in Lake Victoria.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

5 Cooking with charcoal has been proved to be even worse for people's health than cooking with wood.

- **A** ○ TRUE
- **B** ○ FALSE

C ○ NOT GIVEN

6 People found it impossible to remove much water hyacinth from Lake Victoria.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

7 Scientists started investigating the possibility of using water hyacinth to generate biogas in the last century.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

Questions 8-10

Complete the flow-chart below.

Choose NO MORE THAN TWO WORDS from the passage for each answer.

Generating biogas for domestic use in Dunga

First, place water hyacinth together with some **8** _____ into a digester

↓

Leave the mixture until the **9** _____ is completed

↓

Capture the gas emitted by the digester and use **10** _____ to transport it to individual homes

↓

Then use the gas for cooking as well as making water fit for human consumption

Questions 11-13

Complete the notes below.

Choose ONE WORD ONLY from the passage for each answer.

Cooking with biogas in Dunga

Benefits for the women in the village of cooking with biogas

- no need for them to spend so much **11** _____ collecting fuel
- they can focus on different tasks that bring in **12** _____
- they are less likely to experience certain diseases connected to burning wood

Drawbacks of changing to biogas

- the **13** _____ of the digesters is beyond the reach of most villages

PASSAGE 2

You should spend about 20 minutes on Questions 14-26, which are based on Reading Passage 2 below.

How could multilingualism benefit India's poorest schoolchildren?

The crowded and bustling streets of Delhi teem with life. Stop to listen and, above the din of rickshaws and buses, you'll hear a multitude of languages, as more than 20 million people go about their daily lives. Many were born and raised here, and many millions more have recently made India's capital their home, having moved from surrounding neighbourhoods, cities and states or across the country, often in the hope of gaining better jobs and a better life. Some arrive speaking fluent Hindi, the dominant language in Delhi (and the official language of government), but many arrive speaking any number of India's 22 officially recognised languages, let alone the hundreds of regional languages in a country of more than 1.3 billion people.

A team of researchers led by Professor Ianthi Tsimpli of Cambridge University is currently working on a project collecting data on 1,000 primary-age children in Delhi and the cities of Hyderabad and Bihar. The overriding aim of the four-year project, called 'Multilingualism and Multiliteracy', is to find out why in a country where multilingualism is so common (more than 255 million people in India speak at least two languages, and nearly 90 million speak three or more languages), the many benefits of speaking more than one language, observed in schools in Europe for instance, do not apply to many of India's schoolchildren.

'Each year across India, 600,000 children are tested, and year after year over 50% of children in Standard 5 [ten-year-olds] cannot read a Standard 2 [seven-year-olds] task fluently, and just under 50% of them cannot solve a Standard 2 subtraction task,' says Tsimpli. She explains that low educational achievement can lead to many of these students dropping out of school - a problem disproportionately affecting female students.

Tsimpli and her colleagues are investigating whether these low learning outcomes could be caused by an Indian school system where the language that children are taught in often differs from the language used at home. The research project, which focuses on 8 to 11-year-old schoolchildren in rural and urban areas, collects data on whether the schoolchildren live in slum* or non-slum areas. Many of the children have moved from remote, rural areas to urban areas. They are so poor they have to live in slums and, as a result of migration, they may speak languages that are different from the regional language.

Having already tested 1,000 children, the researchers will now embark on retesting them. They intend to look not only at test results, but also at variables such as the standard of schooling, the environment and the teaching practices themselves. It's possible that one of the causes of low performance is the lack of pupil-centred teaching methods; in many Indian primary schools the teacher dominates and there is little room for independent learning.

Although the findings are at a preliminary stage, Tsimpli and her team have found that the medium of instruction used in schools, especially English, may hold back those children who have little familiarity with, or exposure to, the language before starting school and outside of school life. According to Tsimpli, most of the evidence from this and other projects shows that English instruction for children from low socio-economic areas might not be the best way for them to learn, at least in the first three years of primary education.

'What we would recommend for everyone, not just low socio-economic status children, would be to start learning in the language they feel comfortable learning in ... English can still be used, but perhaps not as the medium of instruction in primary schools. It could, for example, be one of the subjects that are being taught alongside other subjects. We are not suggesting that English be withdrawn - that ship has sailed - but we perhaps have to think more about learner needs. There is perhaps too much uniformity in teaching and less tailoring to the children's language abilities and needs,' says Tsimpli.

While the preliminary results show there is no difference in general intelligence among boys and girls from slum areas versus those from urban poor backgrounds, an unanticipated finding has been that children from slum backgrounds do not seem to lag behind children from other urban poor backgrounds - and in some cases outperform them (e.g. in numeracy and literacy tasks). According to the researchers, this unexpected finding may be down to the life experiences of children growing up in slums. They are likely to mature faster and come into closer contact with the numeracy skills essential for day-to-day survival.

The project has already caught the attention of government ministers, who are keen to use the findings of the study to inform and adjust school policy in Delhi and the wider state. 'They are as keen as us to understand how the challenging context of deprivation can be attenuated when focusing on the languages children learn and use while at school. Our findings don't mean you're doomed if you're poor. It may be that these low learning outcomes are because of the way education is provided in India, with a huge focus on Hindi and English as the mediums of instruction, to the potential detriment of children unfamiliar with those languages,' explains Tsimpli.

'Language is central to the way knowledge is transferred - so the medium of instruction is obviously hugely influential. We hope to ... show that problem solving, numeracy and literacy can and do improve in children who are educated in a language of instruction they know. The trick may be to bridge school skills with life skills and make use of the richness of a child's life experience to help them learn in the most effective ways possible,' says Tsimpli.

** slum: a very densely populated area in which the infrastructure is incomplete and services inadequate or non-existent*

PART 2 — QUESTIONS

Questions 14-19

Complete the summary using the list of words, A-J, below.

Multilingualism in Delhi

The city of Delhi has a **14** _____ and as you walk through its streets you hear people speaking a variety of languages. Some of them have spent their entire life in Delhi, while others are **15** _____. Whether they have come from a **16** _____ or have travelled from the other side of India, they have all come in search of things such as improved **17** _____.

A team of researchers led by Professor Ianthi Tsimpli of Cambridge University is collecting data on primary-age schoolchildren in Delhi and other Indian cities. The **18** _____ of the research is to discover why multilingual Indian schoolchildren do not experience **19** _____ to those that multilingual schoolchildren in Europe experience.

A. **basic outlook** B. **employment opportunities** C. **wealthy visitors**

D. **distant country** E. **primary objective** F. **similar advantages**

G. **thriving economy** H. **nearby district** I. **dense population**

J. **new immigrants**

Questions 20-23

Do the following statements agree with the claims of the writer in Reading Passage 2?

20 Ten-year-old Indian schoolchildren tend to perform better in literacy tests than in numeracy tests.

A ○ YES

B ○ NO

C ○ NOT GIVEN

21 Tsimpli had problems convincing some female students to take part in the study.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

22 Tsimpli and her team wanted to know if there is a connection between poor academic performance and being taught in an unfamiliar language.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

23 The researchers have decided against investigating the impact teaching methodology may have on learning outcomes.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

Questions 24-26

Choose the correct letter, A, B, C or D.

24 What point does the writer make about primary schools in India in the sixth paragraph?

- **A** ○ Exposure to English outside of school is of limited benefit.
- **B** ○ Children learn English more easily when they are well motivated.
- **C** ○ Poor children may be disadvantaged further by being instructed in English.
- **D** ○ There is little consistency across schools with regard to instruction in English.

25 What is Tsimpli suggesting when she uses the phrase 'that ship has sailed'?

- **A** ○ The findings of the report may be of little help to some Indian schoolchildren.
- **B** ○ Instruction in English could be better adapted to the needs of schoolchildren.

C ○ Schools have had limited success in teaching English as a separate subject.

D ○ It is too late to remove English completely as a language of instruction in schools.

26 In the eighth paragraph, what do we learn has surprised researchers?

A ○ Boys and girls from low socio-economic groups have similar general intelligence levels.

B ○ The age at which children move into a slum does not affect their academic performance.

C ○ Slum children and children from other urban poor backgrounds have similar life experiences.

D ○ The literacy and numeracy skills of slum children are not lower than those of children from other urban poor backgrounds.

PASSAGE 3

You should spend 20 minutes on Questions 27-40, which are based on Reading Passage 3 below.

The Globemakers: The Curious Story of an Ancient Craft

A review of Peter Bellerby's book The Globemakers

In 2008, Peter Bellerby, who lived in London, wanted to give his father a model globe for his eightieth birthday. What seemed simple enough to start with triggered an almost obsessive, decade-long journey, marked by a series of obstacles that would have deterred anyone less determined. It ended with his establishing the world's only bespoke globemaking company.

The first surprise in The Globemakers, Bellerby's account of this impulsive enterprise, is that obtaining such a globe was not simply a matter of a quick online order and a repressed sigh at the shipping costs. After all, contrary to stubbornly held popular views of our ancestors' geographical ignorance, we have known that the world is spherical since at least the 6th century BCE. The ancient Greek philosopher Plato in his work Phaedo likened it to a leather ball, while the accolade of producing the first recorded globe goes to the ancient Greek philosopher Crates of Mallus, who is said to have made one in around 150 BCE. Surely, Bellerby reasoned, a good-quality globe wouldn't be difficult to find.

Nearly two millennia later, however, it seemed that the art of globemaking had been largely forgotten. Bellerby came across shoddy commercial versions designed for school classrooms and genuine antiques in auction houses that would have bust his budget. Even his trips to Morocco and India, where surely the knowledge of artisan cartographers* had been preserved, drew a blank.

Not one to be easily thwarted, Bellerby decided to make his own good-quality globe. In the process, almost everything that could possibly go wrong did so. Even the shape of the Earth posed a problem, as it is not quite a perfect sphere, but oblate (slightly flattened at the poles). Having decided to compromise and opt for two half-spherical pieces that could be fitted together, he was unable to discover anyone capable of casting moulds with sufficient accuracy to ensure that he would not be left with two half-spheres that were not quite the same circumference. Even after he eventually resolved this issue, extracting these from the moulds resulted in piles of cracked plaster of Paris** and clouds of choking dust in the workshop he had set up at the rear of his house.

This series of abortive experiments taught Bellerby a lot about the challenges of making globes, which he communicates here to the reader. Finding just the right way to prise the globes from the mould - a high-end air compressor finally did the trick - and locating the right paper and inks with which to make the gores (the sections of flat sheet mapping that are pasted onto the spherical globe) without the ink seeping out to create a mushy, unreadable mess took months and an alarming chunk out of his bank balance. Bellerby's frustration at the painstaking process of attaching the gores to the globe surface - after having found a glue with precisely the right

adhesive qualities - is palpable. Right at the end of the process, he learnt that the paper had stretched slightly and so the final one overlapped the first by a centimetre (which may not seem a great deal, but when that represents 2 per cent of the Earth's diameter, it's equivalent to obliterating the Himalayas or wiping out Chile).

Bellerby's account of the technical challenges of globe production is interspersed with a series of interludes on great globemakers of the past and cartographic history in general. Purists might wish for more map-making details, but Bellerby clearly found a kindred spirit in Martin Behaim. He was the Nuremberg entrepreneur who in 1492 created the Erdapfel, the world's oldest surviving globe, beautifully finished by a workshop of painters and other craftsmen, only to find that the explorer Christopher Columbus had stumbled upon the Americas the very same year, rendering his masterpiece instantly out of date. Something of Bellerby's unflinching ambition is reflected in the even more heroic efforts of the Italian cartographer Vincenzo Coronelli, who, in the seventeenth century, created two globes for Louis XIV of France. It took him twenty years to complete the monstrous pair, whose vast bulk - each with a diameter of around four metres - can still be admired in the National Library of France in Paris.

Although a celebration of the revival of an ancient craft, Bellerby's book is also a lament for the fading away of centuries-old traditions. When he embarked on his globemaking odyssey, he struggled to find artisans with the skills to make the right moulds for the globes or foundries that could shape the meridians (the metal frames which girdle globes) in just the right way. Although he finally located the right craftsmen, some simply dropping in, serendipitously, to his workshop (by now in more suitable premises than his back room), many of these have now retired or passed away.

Bellerby's father finally did receive his eightieth birthday present, albeit two years late. Bellerby went on to found a company which now turns out over six hundred globes a year for customers who can have their own tiny village marked or more unusual requests fulfilled. His book, beautifully illustrated with photographs of the various stages of his venture and a few illustrations of historic globes and maps, is hardly a blueprint for commercial success. But it is more than enough to stir up admiration for the craftsmanship of the great mapmakers of the past and the obsessive determination of a modern successor who revived their almost moribund art.

** cartographer: someone involved in the science or practice of drawing maps*

*** plaster of Paris: a quick-setting plaster consisting of a fine white powder that hardens when moistened and allowed to dry*

PART 3 — QUESTIONS

Questions 27-32

Complete the summary using the list of words, A-J, below.

A birthday gift

Peter Bellerby's plan to give his father a globe for his birthday was an unexpectedly **27** _____ for which he had to overcome **28** _____ .

He soon learnt that a straightforward **29** _____ would not be possible. Some **30** _____ that had been intended for **31** _____ were available, as were some expensive antique globes, but these were beyond his budget. He even travelled to places where people might still have the **32** _____ , but Bellerby could not find what he wanted.

A. **educational use** B. **rare materials** C. **inferior makes**

D. **product exchange markets** E. **necessary skills** F. **international**

G. **challenging task** H. **memorable object** I. **internet purchase**

J. **numerous problems**

Questions 33-36

Do the following statements agree with the claims of the writer in Reading Passage 3?

33 The assumption today that people in the past knew very little about geography is correct.

A ○ YES

B ○ NO

C ○ NOT GIVEN

34 Plato was criticised for saying the world was shaped like a leather ball.

A ○ YES

B ○ NO

C ○ NOT GIVEN

35 The globe made by Crates of Mallus was an accurate representation of the known world.

A ○ YES

B ○ NO

C ○ NOT GIVEN

36 Bellerby assumed he would have few problems locating a well-made globe.

A ○ YES

B ○ NO

C ○ NOT GIVEN

Questions 37-40

Choose the correct letter, A, B, C or D.

37 When Bellerby had to attach the gores to the globe surface,

A ○ he decided it was best to work quickly.

B ○ he became aware of an unexpected issue.

C ○ he was worried about the quality of his materials.

D ○ he nearly gave up the whole project.

38 The reviewer mentions other globe makers of the past because

A ○ Bellerby was particularly inspired by them.

B ○ their achievements are not widely known.

C ○ Bellerby had something in common with each of them.

D ○ their difficulties could have been avoided.

39 What point is made about Bellerby in the seventh paragraph?

A ○ He had long working relationships with numerous craftsmen.

B ○ He understands the lack of interest in traditional crafts.

C ○ He appreciates the importance of careful planning.

D ○ He regrets the loss of many globe-making skills.

40 What does the reviewer say about Bellerby's book in the final paragraph?

A ○ It does not tell you how to create a profitable business.

B ○ It overlooks some important mapmakers.

C ○ It fails to discuss the future of globe-making.

D ○ It does not give enough details about individual customers.

Answer Key

#	Answer	Explanation
1	**TRUE**	In east Africa the plant arrived with Belgian colonists in Rwanda, who liked the look of its glossy leaves and delicate purple flowers floating in their ponds
2	**FALSE**	it had ‘escaped’ out of the country via the Kagera river and made its way downstream to Lake Victoria
3	**TRUE**	as the boats that once brought the fish to shore by the hundreds struggle to navigate through the mass of plants
4	**NOT GIVEN**	There, with no natural predators and perfect temperature conditions, the plant began spreading in the open water, blocking fishing routes and providing a new habitat for disease-carrying mosquitoes
5	**NOT GIVEN**	About three out of four families in Kenya depend on wood or charcoal to cook their daily meals, and the rate is even higher in rural areas, Kenya’s latest demographic and health survey shows. Using solid fuels like these for cooking increases indoor pollution
6	**FALSE**	Some years ago, on the shores of Lake Victoria, huge piles of water hyacinth that villagers had taken out of the water in an attempt to clear it were a common sight
7	**TRUE**	It’s a magic combination that has captivated researchers’ imaginations since as early as the 1980s when, across the world, they began to explore its potential as a biofuel
8	**cow dung**	The community received a pair of donated biogas digesters – machines that would transform a mix of water hyacinth and cow dung into biogas for cooking
9	**fermentation (process)**	The mixture goes in one end – think of it as a mouth – and over the next 20 to 30 days, it goes through a fermentation process and breaks down, giving off gas that comes out the other end
10	**pipes**	From there, the clean-burning gas is passed through pipes to the point of use, just like traditional domestic gas
11	**time**	Besides, they don’t have to devote a lot of time every day to gathering firewood, which is a great relief
12	**money**	As a result, they’re able to make more money for their families from other enterprises

#	Answer	Explanation
13	**price**	But unless the price of the machines drops, it’s pretty clear that most communities will never be able to afford any, since they sell for about $750
14	**I**	The crowded and bustling streets of Delhi teem with life. Stop to listen and, above the din of rickshaws and buses, you’ll hear a multitude of languages, as more than 20 million people go about their daily lives
15	**J**	Many were born and raised here, and many millions more have recently made India’s capital their home, having moved from surrounding neighbourhoods, cities and states or across the country, often in the hope of gaining better jobs and a better life
16	**H**	Many were born and raised here, and many millions more have recently made India’s capital their home, having moved from surrounding neighbourhoods, cities and states or across the country, often in the hope of gaining better jobs and a better life
17	**B**	Many were born and raised here, and many millions more have recently made India’s capital their home, having moved from surrounding neighbourhoods, cities and states or across the country, often in the hope of gaining better jobs and a better life
18	**E**	The overriding aim of the four-year project, called ‘Multilingualism and Multiliteracy’, is to find out why in a country where multilingualism is so common (more than 255 million people in India speak at least two languages, and nearly 90 million speak three or more languages), the many benefits of speaking more than one language, observed in schools in Europe for instance, do not apply to many of India’s schoolchildren
19	**F**	The overriding aim of the four-year project, called 'Multilingualism and Multiliteracy', is to find out why in a country where multilingualism is so common (more than 255 million people in India speak at least two languages, and nearly 90 million speak three or more languages), the many benefits of speaking more than one language, observed in schools in Europe for instance, do not apply to many of India's schoolchildren
20	**NO**	‘Each year across India, 600,000 children are tested, and year after year over 50% of children in Standard 5 [ten-year-olds] cannot read a Standard 2 [seven-year-olds] task fluently, and just under 50% of them cannot solve a Standard 2 subtraction task,’ says Tsimpli
21	**NOT GIVEN**	She explains that low educational achievement can lead to many of these students dropping out of school – a problem disproportionately affecting female students

#	Answer	Explanation
22	**YES**	Tsimpli and her colleagues are investigating whether these low learning outcomes could be caused by an Indian school system where the language that children are taught in often differs from the language used at home
23	**NO**	They intend to look not only at test results, but also at variables such as the standard of schooling, the environment and the teaching practices themselves
24	**C**	According to Tsimpli, most of the evidence from this and other projects shows that English instruction for children from low socio-economic areas might not be the best way for them to learn, at least in the first three years of primary education
25	**D**	We are not suggesting that English be withdrawn – that ship has sailed – but we perhaps have to think more about learner needs
26	**D**	an unanticipated finding has been that children from slum backgrounds do not seem to lag behind children from other urban poor backgrounds – and in some cases outperform them (e.g. in numeracy and literacy tasks)
27	**G**	What seemed simple enough to start with triggered an almost obsessive, decade-long journey, marked by a series of obstacles that would have deterred anyone less determined
28	**J**	In the process, almost everything that could possibly go wrong did so
29	**I**	The first surprise in The Globemakers, Bellerby's account of this impulsive enterprise, is that obtaining such a globe was not simply a matter of a quick online order and a repressed sigh at the shipping costs
30	**C**	Bellerby came across shoddy commercial versions designed for school classrooms
31	**A**	Bellerby came across shoddy commercial versions designed for school classrooms
32	**E**	Even his trips to Morocco and India, where surely the knowledge of artisan cartographers* had been preserved, drew a blank
33	**NO**	After all, contrary to stubbornly held popular views of our ancestors' geographical ignorance, we have known that the world is spherical since at least the 6th century BCE
34	**NOT GIVEN**	The ancient Greek philosopher Plato in his work Phaedo likened it to a leather ball
35	**NOT GIVEN**	the accolade of producing the first recorded globe goes to the ancient Greek philosopher Crates of Mallus, who is said to have

#	Answer	Explanation
		made one in around 150 BCE
36	**YES**	Surely, Bellerby reasoned, a good-quality globe wouldn’t be difficult to find
37	**B**	Bellerby’s frustration at the painstaking process of attaching the gores to the globe surface – after having found a glue with precisely the right adhesive qualities – is palpable. Right at the end of the process, he learnt that the paper had stretched slightly and so the final one overlapped the first by a centimetre
38	**C**	Bellerby clearly found a kindred spirit in Martin Behaim Something of Bellerby’s unflinching ambition is reflected in the even more heroic efforts of the Italian cartographer Vincenzo Coronelli
39	**D**	Although a celebration of the revival of an ancient craft, Bellerby’s book is also a lament for the fading away of centuries-old traditions
40	**A**	His book, beautifully illustrated with photographs of the various stages of his venture and a few illustrations of historic globes and maps, is hardly a blueprint for commercial success

Test 35

PASSAGE 1

You should spend about 20 minutes on Questions 1-12, which are based on Reading Passage 1 below.

Invasive species

Britain's rivers and estuaries are being invaded at an alarming rate by a small furry-clawed crab all the way from China. So how did a crab travel so far and why are naturalists so concerned? The mitten crab first arrived in Europe on ships sailing from Asia. It then spread rapidly from Portugal to Sweden and was first reported to be in the River Thames in 1935. From the Thames, it spread across the United Kingdom at a very rapid rate: by 1999 mitten crabs had spread across 448 km of British coastline, sometimes walking miles overland to reach the next river. A team from the University of Newcastle found that UK rivers are being invaded three times faster today than in 1935. And there's little wonder - a single female crab can carry between 250,000 and 1,000,000 eggs so mitten crab colonies expand very rapidly. Furthermore, cleaning up pollution from Britain's rivers is simply helping the invaders.

The mitten crab is one example of many invasive species that have found their way from their original habitat into foreign lands. There are several ways invasive species move from country to country: they may expand their territory naturally as their colony grows; but far more frequently an invasion is associated with human activity. The main causes include shipping, deliberate introduction for hunting or work, and the escape of pets into the wild. The introduction of the mitten crab to Europe was probably accidental: ships taking on water to use as ballast to keep the vessel steady on its journey from Asia to Europe also took on the unwanted guests and carried them to new areas to colonise. Elsewhere, invasive species have been purposefully introduced by man. In 1859, 24 rabbits were introduced into Australia by Thomas Austin so that he could hunt them for recreation. Unfortunately, like the mitten crab, rabbits are prolific breeders: a single pair of rabbits are able to increase to 184 individual rabbits in just one and a half years and they spread at a rate of 130 km per year. Soon the population in Australia was out of control and had spread throughout the continent. Another domestic creature introduced from India into Australia in the 1800s was the dromedary camel. Camels were initially brought to work as pack animals to carry heavy loads across the hot desert interior of Australia. By 1920 it was estimated that around 20,000 camels were being used to transport goods. However, with the arrival of trains and cars, camels were released into the wild where their numbers had increased to around one million by 2008. Finally, the trade in animals as pets can enable a species to colonise areas far away from their native land.

Between 2000 and 2006 the U.S. Fish and Wildlife Service recorded 1.5 billion animal shipments made into America. 92% of these imported animals were then sold as pets, with the rest imported for research, education and zoos. While most of these animals were fish, the imports also included reptiles and mammals. When these pets escape and begin to breed, it can create serious problems. An example of this is in Florida, where in the 1990s a number of

pet Burmese pythons - a snake native to south east Asia - escaped their outdoor enclosures when a major hurricane hit the state. Today, it is estimated that up 30,000 snakes inhabit the wetlands of the Florida Everglades. Burmese pythons, which can grow up to 20 feet long, are thriving on their new diet of native species, including endangered creatures, and are more than capable of competing with the American alligator for food.

The impact of invasive species is not to be underestimated. Katherine Smith, a conservation biologist at Brown University in Providence, Rhode Island states that 'A huge amount of money goes into the myriad effects that invasive species have.' Smith continues, 'They destroy infrastructure. They cause public health threats. They harm livestock and native animals. They disrupt ecosystems. The dollar values really do increase quickly.'

When a non-native species finds its way into a new and vulnerable environment the damage can be more or less serious as the invader out-competes the local wildlife, brings in new disease or destroys the environment. The Australian dromedary camel, forming the largest herd of wild camels in the world, competes for food with native species and may have aided the local extinction of preferred species such as the quandong tree. The Australian government estimate that the camel is responsible for AUS$10 million in damage to infrastructure and competition for livestock food every year. Even more damaging is the effect rabbits are having in Australia. Apart from the economic loss to the wool industry, estimated at AUS$95 million annually, rabbits compete with sheep for food. The animals have a devastating environmental impact. Close grazing of grass leads to soil erosion and has significantly altered the composition of extensive areas of land. While the real impact of the mitten crab in the UK is not known at present, scientists have noted that the crab is causing riverbank erosion as it burrows into the mud, forming a network of tunnels that make the riverbanks unstable.

Invasive species are very difficult to manage once they have become established. Various methods have been tried to keep the populations under control. In Australia, 85,000 were culled and various methods have been tried to keep rabbit populations under control including poison and destruction of their warrens or homes. The latest idea in the UK to control the mitten crab is even simpler: catch them and give them to restaurants to sell as a tasty meal.

PART 1 — QUESTIONS

Questions 1-3

Do the following statements agree with the information given in Reading Passage 1? Write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

1 Mitten crabs originated in Vietnam.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

2 Crabs need water to spread.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

3 Making rivers less dirty has aided the invasion of the mitten crab.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

Questions 4-7

Look at the following items and the list of reasons.

Match each item with the reason for their introduction.

NB There are three more reasons than you will need.

A. was introduced as a predator species to protect plants from pests

B. escaped while being used as a pet

C. escaped from laboratories conducting experiments on animals

D. introduced by someone who enjoyed shooting

E. came with water used to balance ships at sea

F. were carried over by trains

G. used to carry large loads across inhospitable areas

	A	B	C	D	E	F	G
4 mitten crab	○	○	○	○	○	○	○
5 rabbit	○	○	○	○	○	○	○
6 dromedary camel	○	○	○	○	○	○	○
7 Burmese python	○	○	○	○	○	○	○

Questions 8-11

Complete the summary below.

Choose NO MORE THAN TWO WORDS from the passage for each answer.

The effects of the introduction of non-native species can bring them into **8** _____ with native animals. Dromedary camels may have helped the **9** _____ of a native plant. Rabbits have led to the degradation of **10** _____ across large areas of Australia. At the moment, the impact of the mitten crab is **11** _____.

Questions 12-12

Which of the following statements reflects the claims of the writer in the reading passage?

Choose the correct letter, A, B or C.

12 The writer of the article views invasive species as

A ○ a natural development.

B ○ a hard problem to manage.

C ○ a good business opportunity.

PASSAGE 2

You should spend about 20 minutes on Questions 13-29, which are based on Reading Passage 2 below.

Private space

A It's a remarkable achievement: the question is no longer 'How can we send humans into space?' but 'How can we keep them there?' Spaceflight is reaching a turning point where new technologies in engine development, better understanding of aerodynamics and materials for body construction are making spaceflight possible for private industry.

B The history of space exploration, until relatively recently, has been one of big government-backed projects like the Space Shuttle, Mars Landers and Long March rockets. But the most recent launches to the International Space Station (ISS) have been very special for at least three reasons. Firstly, along with 450 kg of scientific equipment, food and clothes, the rocket was carrying ice cream for the three space station astronauts. Secondly, the rocket was unmanned, being guided into docking position and back to earth again by remote control and automated systems. Finally, the rocket was commissioned from a private company by NASA.

C When the privately owned rocket delivered its goods to the ISS, it marked a milestone in the evolution of space flight and vindicated NASA's decision to delegate routine supply flights to the space station. The flight has been a long time in development. It started with President George W Bush announcing his Vision for Space Exploration, calling for the ISS to be completed. Under the next President, America's Space Shuttles were retired leaving NASA with no other choice but to look for alternative methods of supplying the ISS. The initiative was part of an effort to commercialise the space industry in order to decrease costs and spread the investment in the industry across a wider group than governments.

D The initiative had many attractions for NASA. By outsourcing to the private sector the routine business of taking food and equipment to and from low-earth orbit, NASA can theoretically free up money to do things that it really wants to prioritise: missions such as sending astronauts to Mars and landing on asteroids by the 2030s. Now that the Space Exploration Technologies Corporation (SpaceX) has proved that private enterprise can be players in space exploration, firms are pouring money into developing new spacecraft built to transport cargo, to mine asteroids and to carry passengers into space.

E In the last half of the twentieth century only government-backed agencies like NASA and Russia's ROSCOSMOS were capable of running space programmes due to the gigantic investment costs and uncertain payoffs. However, SpaceX and similar companies are proving that the former conditions are no longer relevant as new solutions are coming to light. Commercial companies like Boeing are able to raise large sums of money to run these projects. Furthermore, as the firms are running cargo and taxi services to lower orbits, the break-even point is lower, the technology is cheaper and they have the benefit of years of experience in commercial aviation and space flight. Opening space programmes to the commercial sector has the additional advantage of generating more solutions to old problems. An analogy is the

invention of the Internet: when the technology went into the commercial sector, no one could have envisioned the development of social network sites. Likewise, no one can predict where commercial enterprise will take the space industry.

F The uncertainty surrounding where the space industry will end up is a problem as well as an asset and it is unsettling private investors who like to invest in relatively certain prospects. At the moment the industry is dominated by big-spending billionaires like the owner of SpaceX. In addition, the relatively small number of companies in the area could pose a problem in the future. The commercial space industry is still very new and there is no guarantee that progress will be smoother. For one thing, no one is sure that the business model is sound: government is still the major, if not only, customer available to the private space companies. The other problem is that space travel is high risk: the loss of space shuttles Challenger in 1986 and Columbia in 2003 illustrates that even the most carefully planned launches have unavoidable risks associated with them. The question is what would happen to the industry if another accident occurred. Finally, many space experts are doubtful that, even if private industry takes over the 'taxi' role for low-orbit missions, NASA will be able to achieve its ambitions, given its squeezed budgets and history of being used for political purposes. Furthermore, NASA may have created another space race, this time between government and private industry. If NASA doesn't go to Mars or the asteroid belt, its private competitors certainly have plans to do so.

G In spite of all of these risks, many argue that it is critical for the private sector and federal government to work together to push further into space.

PART 2 — QUESTIONS

Questions 13-18

Reading Passage 2 has seven paragraphs, A-G.

Which paragraphs, A-F, contain the following information?

	A	B	C	D	E	F	G
13 NASA being able to spend money on important projects	○	○	○	○	○	○	○
14 events leading to the commercialisation of spaceflight	○	○	○	○	○	○	○
15 new developments that have made spaceflight more accessible	○	○	○	○	○	○	○
16 an automated rocket that successfully completed a mission	○	○	○	○	○	○	○
17 the great dangers of space travel	○	○	○	○	○	○	○
18 new answers being found to previous questions	○	○	○	○	○	○	○

Questions 19-23

Choose the correct letter, A, B, C or D.

19 Which is NOT mentioned as making private space flight possible?

- **A** ○ new methods of constructing the rockets
- **B** ○ modern substances from which to build the rockets
- **C** ○ understanding better how air moves round objects
- **D** ○ new methods of making space suits

20 Why are the recent launches special?

A ○ Their destination was the International Space Station.

B ○ They carried clothes.

C ○ They were not managed by a private company.

D ○ The rocket is not owned by a government.

21 In order to make NASA look for other spaceflight providers, the US government

A ○ invested in private space companies.

B ○ started to build the international space station.

C ○ stopped using the Space Shuttle.

D ○ allowed private companies to fly into space.

22 Private companies

A ○ need to reduce the cost of space projects.

B ○ have social network sites.

C ○ are able to fly rockets at high orbits.

D ○ act as ferries to and from the space station.

23 At present, the private space industry is characterised by

A ○ uncertainty about how to make profits.

B ○ companies controlled by individuals.

C ○ companies too small to raise the amount of money needed.

D ○ government interference.

Questions 24-29

Complete the summary below.

Choose NO MORE THAN TWO WORDS from the passage for each answer.

There are a number of problems with commercial space projects. To start with, the **24** _____ might not be sound. There is also great **25** _____ attached to space flight - what would happen if there was another **26** _____? Experts doubt whether NASA can fulfil its **27** _____ as it has often been under **28** _____ pressure. Moreover, the development may lead to a **29** _____ between NASA and the private space industry.

PASSAGE 3

You should spend about 20 minutes on Questions 30-40, which are based on Reading Passage 3 on the following pages.

Engineering a solution to climate change

A Looking at the rate of climate change and the disastrous effects it is having on the world, scientists are concerned that we are acting too slowly. Many are now looking to geoengineering - large-scale human interventions to change the world's climate - to counteract global warming. The schemes range from the mundane to science fiction but all come from the same impulse: if we don't do something now, it may be too late to do anything.

30

B Climate change is now so rapid that, in the very near future, the Arctic will be ice-free during winter as less ice forms during winters and more melts in summer. Scientists say that tackling climate change isn't a problem we need to deal with in 10 or 20 years' time; we need to look at radical solutions now. A study has shown that the technologies to produce these geoengineering projects already exists and could be in place for around $5 billion a year. This is a bargain when compared with the cost of reducing carbon dioxide emissions, a major greenhouse gas: that figure stands at somewhere between $200 and $2,000 billion.

31

C So what exactly are scientists planning to do to deal with global warming in the short term? Among the main schemes are shielding the earth from the sun's rays either at ground or atmospheric level, or capturing the carbon produced by industry and sinking it back into the ground or the sea. Shielding the world has produced ideas that range from simple science to science fiction. One suggestion has been to make the roofs of buildings and roads whiter to reflect the sun's rays back into space. While this has the advantage of simplicity, it simply won't make much difference, reflecting only 0.15 watts per square metre, averaged across the planet. To put this into perspective, to stop earth warming we need to increase heat loss by about 3.7 watts per square metre averaged over the world. Another idea is to protect the Greenland ice field by covering it in giant sheets of reflective material. If this works, it could help in the Antartic where the giant Filchner-Ronne ice shelf is melting rapidly. If this glacier disappears completely, it would raise sea levels, causing catastrophic flood damage around the planet.

32

D If reflecting heat back from the ground has little effect, there are two alternatives: seeding clouds and replicating volcanic activity. The first idea is to make clouds whiter by increasing the amount of rain in them. Sending salt particles into clouds should 'seed' the clouds with more raindrops. Clouds carrying more raindrops would be whiter and better reflectors of sunlight.

This could be good news for the earth and in addition could be stopped when necessary with the salt completely clear from the skies within ten years. Unfortunately, other research indicates that creating whiter clouds may have unwanted side effects, producing adverse weather conditions in the region and changing ocean currents. A much older idea is to replicate the effect volcanoes have had on the atmosphere. A volcanic eruption sends large amounts of ash and sulphur into the air, which block the sun and create cooler conditions. For example, when Mount Pinatubo erupted in 1991, it produced a sulphur dioxide cloud, which reduced average global temperatures by one degree centigrade. Geoengineers have long put forward the idea of circulating particles of sulphur in the atmosphere to counteract global warming. The particles would be delivered by aircraft or balloons spraying them into the atmosphere. However, this also has unpredictable effects on the amount and pattern of rainfall. Furthermore, this method would delay the recovery of the ozone layer over the Antartic by 30 to 70 years. More ambitious geoengineering projects have included placing billions of reflective balloons between the sun and the earth and putting giant mirrors into orbit. Scientists have criticised these approaches as 'science fiction' and say they are unlikely to happen due to the huge costs involved.

33

E Whatever actions we take to block or reflect the heat from the sun, we will still need to reduce the amount of carbon dioxide in the atmosphere. Various geoengineering projects have been proposed to do this. Carbon capture technologies range from planting trees, which naturally use carbon dioxide as they grow, to pumping carbon back into the earth and trapping it there. This is a good idea but would only account for about 0.5 watts per square metre. Carbon capture technologies are already in use at power stations where the greenhouse gas is taken at point of production and pumped underground into depleted gas and oil reserves. However, the technology to do this is not very efficient. Other ideas for taking carbon out of the atmosphere include seeding the oceans with iron. This would increase the growth of plankton which, like trees, use carbon naturally. Unfortunately, this would only account for 0.2 watts per square metre.

34

F Proponents of geoengineering have never regarded the earth-changing engineering projects as a complete solution. Nevertheless, the concept as a whole attracts many criticisms. One is that the problem of climate change is of such huge scale and complexity that there will not be one single solution. All proposals so far have advantages and disadvantages. The biggest problem of all is that many of the projects are untested and any of the proposals may have unforeseen consequences. For example, we could not suddenly stop a geoengineering scheme: keeping temperatures artificially low for a period then taking away the cause of this would cause the temperature to rise again rapidly. Furthermore, global engineering solutions to the problem of climate change would need the agreement of all the world's leaders: having an American solution, a Chinese solution, a Brazilian solution, and so on simply wouldn't be politically acceptable. But the biggest downfall is that geoengineering projects could reduce the political and popular pressure for reducing carbon emissions, as politicians point to

geoengineering for an answer rather than tackling the real cause of climate change: human activity.

PART 3 — QUESTIONS

Questions 30-34

Reading Passage 3 has six paragraphs, A-F.

Choose the correct heading for paragraphs B-F from the list below.

i. **Shielding the earth from the atmosphere**

ii. **Bouncing back the sun's rays from earth**

iii. **The effect of volcanoes on the atmosphere**

iv. **Criticisms of geoengineering**

v. **Trapping greenhouse gases**

vi. **The root of the problem**

vii. **Why attempt geoengineering?**

viii. **Protecting glaciers**

ix. **The need for action**

Questions 35-40

Classify the following as typical of

Write the correct letter, A, B or C

A. land-based reflection

B. atmospheric reflection

C. carbon capture

	A	B	C
35 removes carbon dioxide as soon as it is produced	○	○	○
36 increases the reflectivity of white clouds	○	○	○
37 cleans carbon dioxide from the air naturally	○	○	○
38 would increase the number of small plants and animals in the sea	○	○	○

	A	B	C
39 may help prevent rising water levels	○	○	○
40 is similar to the effect volcanoes have on the atmosphere	○	○	○

Answer Key

#	Answer	Explanation
1	**FALSE**	Britain's rivers and estuaries are being invaded at an alarming rate by a small furry-clawed crab all the way from China
2	**FALSE**	From the Thames, it spread across the United Kingdom at a very rapid rate: by 1999 mitten crabs had spread across 448 km of British coastline, sometimes walking miles overland to reach the next river
3	**TRUE**	Furthermore, cleaning up pollution from Britain's rivers is simply helping the invaders
4	**E**	The introduction of the mitten crab to Europe was probably accidental: ships taking on water to use as ballast to keep the vessel steady on its journey from Asia to Europe also took on the unwanted guests and carried them to new areas to colonise
5	**D**	In 1859, 24 rabbits were introduced into Australia by Thomas Austin so that he could hunt them for recreation
6	**G**	Camels were initially brought to work as pack animals to carry heavy loads across the hot desert interior of Australia
7	**B**	An example of this is in Florida, where in the 1990s a number of pet Burmese pythons – a snake native to south east Asia – escaped their outdoor enclosures when a major hurricane hit the state
8	**competition**	the invader out-competes the local wildlife
9	**extinction**	The Australian dromedary camel, forming the largest herd of wild camels in the world, competes for food with native species and may have aided the local extinction of preferred species such as the quandong tree
10	**land**	Close grazing of grass leads to soil erosion and has significantly altered the composition of extensive areas of land
11	**not known**	While the real impact of the mitten crab in the UK is not known at present, scientists have noted that the crab is causing riverbank erosion as it burrows into the mud, forming a network of tunnels that make the riverbanks unstable
12	**B**	Invasive species are very difficult to manage once they have become established

#	Answer	Explanation
13	**D**	By outsourcing to the private sector the routine business of taking food and equipment to and from low-earth orbit, NASA can theoretically free up money to do things that it really wants to prioritise: missions such as sending astronauts to Mars and landing on asteroids by the 2030s
14	**C**	It started with President George W Bush announcing his Vision for Space Exploration, calling for the ISS to be completed. Under the next President, America's Space Shuttles were retired leaving NASA with no other choice but to look for alternative methods of supplying the ISS
15	**A**	Spaceflight is reaching a turning point where new technologies in engine development, better understanding of aerodynamics and materials for body construction are making spaceflight possible for private industry
16	**B**	Secondly, the rocket was unmanned, being guided into docking position and back to earth again by remote control and automated systems
17	**F**	The other problem is that space travel is high risk: the loss of space shuttles Challenger in 1986 and Columbia in 2003 illustrates that even the most carefully planned launches have unavoidable risks associated with them
18	**E**	Opening space programmes to the commercial sector has the additional advantage of generating more solutions to old problems
19	**D**	Spaceflight is reaching a turning point where new technologies in engine development, better understanding of aerodynamics and materials for body construction are making spaceflight possible for private industry
20	**D**	Finally, the rocket was commissioned from a private company by NASA
21	**C**	Under the next President, America's Space Shuttles were retired leaving NASA with no other choice but to look for alternative methods of supplying the ISS
22	**D**	When the privately owned rocket delivered its goods to the ISS, it marked a milestone in the evolution of space flight and vindicated NASA's decision to delegate routine supply flights to the space station
23	**B**	At the moment the industry is dominated by big-spending billionaires like the owner of SpaceX

#	Answer	Explanation
24	**business model**	For one thing, no one is sure that the business model is sound: government is still the major, if not only, customer available to the private space companies
25	**risk**	The other problem is that space travel is high risk: the loss of space shuttles Challenger in 1986 and Columbia in 2003 illustrates that even the most carefully planned launches have unavoidable risks associated with them
26	**accident**	The question is what would happen to the industry if another accident occurred
27	**ambitions**	Finally, many space experts are doubtful that, even if private industry takes over the 'taxi' role for low-orbit missions, NASA will be able to achieve its ambitions, given its squeezed budgets and history of being used for political purposes
28	**political**	Finally, many space experts are doubtful that, even if private industry takes over the 'taxi' role for low-orbit missions, NASA will be able to achieve its ambitions, given its squeezed budgets and history of being used for political purposes
29	**(space) race**	Furthermore, NASA may have created another space race, this time between government and private industry
30	**vii**	Scientists say that tackling climate change isn't a problem we need to deal with in 10 or 20 years' time; we need to look at radical solutions now. A study has shown that the technologies to produce these geoengineering projects already exists and could be in place for around $5 billion a year. This is a bargain when compared with the cost of reducing carbon dioxide emissions, a major greenhouse gas: that figure stands at somewhere between $200 and $2,000 billion
31	**ii**	One suggestion has been to make the roofs of buildings and roads whiter to reflect the sun's rays back into space
32	**i**	If reflecting heat back from the ground has little effect, there are two alternatives: seeding clouds and replicating volcanic activity
33	**v**	Carbon capture technologies range from planting trees, which naturally use carbon dioxide as they grow, to pumping carbon back into the earth and trapping it there
34	**iv**	Nevertheless, the concept as a whole attracts many criticisms
35	**C**	Carbon capture technologies are already in use at power stations where the greenhouse gas is taken at point of production and pumped underground into depleted gas and oil reserves

#	Answer	Explanation
36	**B**	The first idea is to make clouds whiter by increasing the amount of rain in them. Sending salt particles into clouds should ‘seed’ the clouds with more raindrops. Clouds carrying more raindrops would be whiter and better reflectors of sunlight
37	**C**	Carbon capture technologies range from planting trees, which naturally use carbon dioxide as they grow, to pumping carbon back into the earth and trapping it there
38	**C**	Other ideas for taking carbon out of the atmosphere include seeding the oceans with iron. This would increase the growth of plankton which, like trees, use carbon naturally
39	**A**	Another idea is to protect the Greenland ice field by covering it in giant sheets of reflective material. If this works, it could help in the Antartic where the giant Filchner-Ronne ice shelf is melting rapidly. If this glacier disappears completely, it would raise sea levels, causing catastrophic flood damage around the planet
40	**B**	A much older idea is to replicate the effect volcanoes have had on the atmosphere. A volcanic eruption sends large amounts of ash and sulphur into the air, which block the sun and create cooler conditions. For example, when Mount Pinatubo erupted in 1991, it produced a sulphur dioxide cloud, which reduced average global temperatures by one degree centigrade. Geoengineers have long put forward the idea of circulating particles of sulphur in the atmosphere to counteract global warming

Test 36

PASSAGE 1

You should spend about 20 minutes on Questions 1-12, which are based on Reading Passage 1 on the following pages.

READING PASSAGE 1

1

A The health benefit of legumes has been widely known for centuries. Also known as pulses or, more commonly, beans, they belong to an extremely large category of vegetables containing over 13,000 species. Only grains supply more calories and protein to the world's population. Today, agricultural researchers and scientists are experimenting with varieties of legumes that are easier to harvest, more resistant to disease and yield better crops.

2

B Beans are often referred to as 'the poor person's meat' but this label is unfair - considering the health benefits of legumes, they should really be called 'the healthy alternative to meat'. Beans contain a rich and varied supply of nutritional substances, which are vital for keeping in good health. Diets rich in beans are used to help with a variety of health issues including lowering cholesterol levels, improving blood sugar control in diabetics, reducing the risk of many cancers, lowering the risk of heart disease and lowering blood pressure. Beans are a good source of protein but are often considered to be an 'incomplete' protein as they lack the essential amino acids that we need to complete our diet. Foods from animals (meat, fish, eggs, dairy products), on the other hand, contain protein and amino acids. However, many cultures combine beans with grains to form a complete protein that is a high-quality substitute for meat - rice and soy in Japan, corn and beans in Mexico, rice and lentils in the Middle East. Beans are also a good source of fibre, giving the consumer between 5 and 8.6 grams of fibre per 100 grams eaten. Fibre is an important ingredient in a healthy diet with great benefits to our digestive system and in reducing cholesterol levels, which in turn reduces our risk of heart disease. Fibre also helps us to feel full and control our appetite.

3

C Why is it important to substitute meat as much as possible? First of all because of the health implications - red meat in particular has a high fat content. Secondly, antibiotics and other chemicals are used in the raising of poultry and cattle. Thirdly, the cost to the environment is much greater in raising cattle than it is in growing crops. To produce a kilogram of beef, farmers need to feed the cow 15 kilograms of grain and a further 30 kilograms of forage.

4

D Little wonder then that legumes have been used from ancient times. According to Trevor Brice in *Life and Society in the Hittite World*, the Hittites, an ancient people living in Anatolia from the eighteenth century BC, ate a wide variety of legumes including peas, beans, faba beans, chickpeas and lentils. And in ancient Egypt, Ramses II is known to have offered 11,998 jars of beans to the god of the Nile. Archaeologists have found the remains of legumes on land beneath Lake Assad in Syria dating back to 8,000 BC and, astonishingly, a 4,000-year-old lentil seed found during an excavation in Turkey has been germinated, allowing scientists to compare the ancient variety with the organic and genetically engineered varieties of today. Professor Nejat Bilgen from Dumlupinar University, who led the archaeological team, said that the lentils were found in a container dating from the Bronze age. The plant grown from the ancient lentil was found to be 'pretty weak' in comparison with modern varieties.

E Modern agricultural research has tended to focus on grain production, breeding new varieties of wheat and other crops rather than improving the varieties of legumes, which can suffer from low yields and unstable harvests. For this reason, farmers started to abandon them in favour of more dependable crops, which had had the benefits of scientific improvement. Recently, scientists have returned to legumes to identify desirable characteristics such as height, good crop production and resistance to pests in order to cross different plants with each other and produce a new, improved variety. Using traditional breeding methods agricultural scientists are transforming the faba bean into a variety that is easier to grow. Traditional varieties are undependable as they rely on insects to pollinate them. But faba bean types that can self-fertilise naturally were discovered and this gene is being bred into new varieties. Other faba bean varieties have been found that produce higher yields or shorter crops. Faba bean plants tend to grow tall and fall over in the field making them difficult to harvest mechanically so breeding plants that are 50% shorter means they are more stable. Unlike the traditional plants, the new faba bean plants end in a flower - this means that more of the plant's energy is transformed into producing beans instead of unusable foliage.

5

F With the new varieties, farmers in some regions are achieving a marked rise in production - between 10 to 20% improvement. Scientists have also managed to develop a commercial faba bean able to resist the parasitic weed Orobanche, which has been known to destroy whole fields of the crop. The future of legumes and the farmers who grow them is becoming brighter. Legumes are an important source of nourishment for humans and also for the soil: the beans take nitrogen directly from the atmosphere and fix it into the soil to provide nutrients for other crops and save the farmer the cost of artificial fertiliser. Making legumes a profitable crop for the future may prove an essential factor in feeding growing populations.

PART 1 — QUESTIONS

Questions 1-5

Passage 1 has six paragraphs, A-F.

Choose the correct heading for paragraphs A-D and F from the list of headings below.

Write the correct number, i-ix, next to Questions 1-5.

i. **Improvements to faba bean farming**

ii. **Increasing productivity to secure the future of legume farming**

iii. **The importance of legumes**

iv. **The nutritional value of legumes**

v. **The effect of farming on the environment**

vi. **Legumes in the diet of ancient peoples**

vii. **The importance of reducing meat consumption**

viii. **Archaeological discoveries**

ix. **Legumes as a provider of protein**

Questions 6-11

Do the following statements agree with the information given in Reading Passage 1? Write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

6 Legumes are second to grain in providing people with calories and protein.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

7 Beans can help to cure heart disease.

- **A** ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

8 Antibiotics are used when farming animals for food.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

9 Scientists have the opportunity to see how similar modern and ancient lentil plants are.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

10 Agricultural scientists are making the faba bean easier to grow in dry areas.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

11 New varieties of faba bean can destroy parasitic weeds.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

Questions 12-12

Choose the correct letter A, B or C.

12 What is the best title for Reading Passage 1?

A ○ The health benefits of beans and pulses

B ○ Diet in ancient times

C ○ Agricultural scientists give legumes a new lease of life

PASSAGE 2

You should spend about 20 minutes on Questions 13-29, which are based on Reading Passage 2 below.

What is dyscalculia?

When you look at the morning newspaper or check a news webpage, numbers are everywhere: the date is 12th September; it's 16°C in London; England lose 2-1 at football; the time is 12.30. But for people with dyscalculia, dealing with numbers presents a particular everyday difficulty. Dyscalculia is a learning difficulty in mathematics. It was originally uncovered by Kosc - a Czech researcher - after research into damage to parts of the brain involved in mathematical cognition. Dyscalculia can have two causes: brain damage or 'acquired dyscalculia' and developmental dyscalculia - or dyscalculia from birth. Whichever the cause, dyscalculia has three features: problems with mathematics; problems with mathematics only, not other areas of learning; and the assumption that these problems are rooted in brain activity.

Unlike dyslexia - difficulties with words - dyscalculia has been relatively little studied until recently. Very little is known about its causes, prevalence or how to treat it. Estimates indicate that between 3% and 6% of the population could be affected. The figures refer to children who only have difficulties with maths but have good or excellent performance in other areas of learning. People with dyscalculia have difficulty with the most basic aspects of numbers and mathematics, but this does not mean that the person affected has difficulty with higher mathematical reasoning or arithmetic. In fact, the evidence from brain-damaged dyscalculic people shows that an individual might suffer dyscalculia but can even show great ability in abstract mathematical reasoning.

Dyscalculia appears to be related to an ability shared between humans and many other animals. This is called 'subitizing' and is the capacity to count the number of objects by briefly looking at them. Subitizing seems to be an innate skill present in humans from birth and is a useful survival skill for humans and animals: there is a big advantage in being able to count how many predators or prey there are. Experiments with babies show that we are able to count at a very early age: if a baby sees a doll put behind a screen then another doll is also put behind the screen, the baby expects to see two dolls when the screen is removed. Babies will look longer at things they didn't expect to see, so if the screen is removed and the baby sees only one doll or three dolls, they stare at this unexpected sight longer, proving our ability to count from infancy. Dyscalculia could be explained by the lack of this innate capability. Genetic causes could include known genetic disorders such as Fragile X syndrome. However, as well as genetic factors, there could also be environmental causes such as drinking alcohol during pregnancy, which can result in underdevelopment of the brain.

There are many signs of dyscalculia including some well established and some less well researched. There are a number of symptoms that we are relatively certain of. Firstly, counting: whilst discalculic children can learn the sequence of numbers - 1, 2, 3, 4, 5, etc - they have difficulty counting backwards or forwards, particularly in twos or threes. Secondly, they find learning and remembering number facts difficult and often lack confidence even when they

have the right answer. They can't use rules correctly either; for instance they may know that 4 + 2 = 6 but not be able to see that 2 + 4 = 6 or understand the concept of addition. Thirdly, they have problems with numbers with zeros and don't understand that the numerals 10, 100 and 1,000 are the same as the words ten, one hundred and one thousand. Fourthly, dyscalculic children may not be good at using money or telling the time. Concepts of speed or temperature may be difficult for them to fully understand. Finally, they may have problems in understanding directions or in following a map.

Diagnosing and treating dyscalculia is not straightforward as there are many reasons for being bad at maths including poor teaching, lack of motivation and inability to concentrate for long periods of time. An important result of present research will be to improve our methods for identifying children with dyscalculia. The treatment of the problem, however, is a different matter. Many people think that, because the cause of dyscalculia is in the brain, it can't be treated. But this is a misunderstanding. Every time we learn a new fact or skill, our brain changes. Furthermore, if we practise a new skill extensively the brain changes considerably. This is related to a property of the brain called 'plasticity', which simply means the ability of the brain to develop and change, particularly during childhood. Dyscalculia could be treated by experiences at home, providing an environment that encourages children to count. Schools could pay more attention to making sure children understand basic mathematical concepts before dealing with more advanced ideas; they should, for example, avoid teaching the division of fractions before ensuring children have understood the concept of division. Teaching maths through a multi-sensory approach using speech, sound, writing and reading simultaneously has been shown to be a good approach. Finally, maths should be taught in short blocks of time and lessons should build on what was taught previously.

PART 2 — QUESTIONS

Questions 13-16

Complete the sentences below.

Write NO MORE THAN TWO WORDS from the passage for each answer.

- A person with dyscalculia cannot solve basic **13** _____ problems.
- The condition was first discovered by a researcher investigating **14** _____ to the brain.
- Dyscalculia can be caused by injury to the brain or it can be present **15** _____.
- Other aspects of **16** _____ are not affected by dyscalculia.

Questions 17-22

Do the following statements agree with the information given in Reading Passage 2?

Write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

17 There is not much information on how many people have dyscalculia.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

18 People with dyscalculia are not able to do advanced maths.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

19 Subsitizing means knowing how many things there are by counting them.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

20 Experiments show that babies are able to count to four.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

21 One explanation is that people with dyscalculia have not inherited a common ability.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

22 Drinking alcohol may be linked to the development of dyscalculia.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

Questions 23-29

Classify the following as typical of

Write the correct letter, A, B, C or D, next to Questions 23-29.

A. reasons for being bad at maths

B. plasticity

C. dyscalculia

D. the treatment of dyscalculia

	A	B	C	D
23 limiting maths teaching to short periods	○	○	○	○
24 being unmotivated to learn	○	○	○	○
25 the brain developing, especially when young	○	○	○	○
26 not associating words about figures with numbers	○	○	○	○
27 needing practice at telling the time	○	○	○	○
28 using all the senses when doing maths	○	○	○	○
29 poor concentration for longer lengths of time	○	○	○	○

PASSAGE 3

You should spend about 20 minutes on Questions 30-40, which are based on Reading Passage 3 below.

Crowdmapping

One of the most exciting mass movements today is crowdmapping: sharing data collectively to produce a visualisation on a map giving almost-instant information on current events. Crowdmapping produces a picture of events on the ground as they happen by taking text messages and social media feeds together with geographic data to distribute real-time, interactive information on events such as revolutions, wars, humanitarian crises and natural disasters. This new application of social networking can bring fresh insights into events, which can be nearly impossible to cover through traditional methods of journalism where individuals report into a central newsroom. It has the additional advantage of mapping longer-term trends that fall in and out of the news.

Technologies like mobile phones and the world wide web have made it possible for those people caught up in a war or natural disaster to broadcast information from the affected area and for this information to be collected in a way that emergency aid services can use and act on. In a disaster situation the most current information is essential because the needs of, for example, flood victims change minute by minute. It enables response organisations to get an understanding of a crisis situation quickly (thus it is sometimes called *crisis mapping*), give targeted aid to people most in need and form a network of reliable reporters on the ground to check information going to the live updated map. When an emergency situation arises, a small army of volunteers comes together to collect incoming information and put it on the map. Some of the information comes from official sources such as the United Nations, but the most powerful aspect of data collection is the ability to pull information from Twitter posts, emails and text messages. Once this information is available, volunteers collaborate via the Internet to put data on to a map, which is updated every second to build a comprehensive picture of the scale and severity of the disaster. Volunteers from all over the world translate the messages coming in from the disaster zone into English and plot the information on the live interactive map.

One of the originators of crowdmapping is Ushahidi. The developers of crowdmapping software began the project in Kenya to map reports of violence after a controversial election result in 2008. Later, in 2010 in Haiti, a similar approach of collectively sharing information to help emergency services deal with the situation was adopted. A small team released a free phone number – 4636 – to allow victims of the 7.0-magnitude earthquake to text their requests for medical aid, water and shelter. Over 1,000 workers and volunteers around the globe, contacted via Facebook, translated the messages, mostly in Haitian Creole. They then prioritised and geolocated the requests for help via crowdmapping software. Through this service, emergency response teams were able to save the lives of hundreds of people and send food, water and medicine to tens of thousands. The success of Project 4636 led to the development of crowdmapping when dealing with critical and even non-critical situations.

Most recently, crowdmapping has been used to track violent activity in warzones and areas with uprisings. In one country, when the people rose up against their leader, the United Nations monitored the escalating violence via a crowdmap to provide them with information on what was happening in the country. In another country, rebel fighters reported people who were missing, killed or arrested according to eyewitnesses. Other uses for the software have included the Danish people's attempt to map the extent of CCTV surveillance in their country. Since the project began, 2,220 CCTV cameras have been photographed and verified by journalists. However, not all attempts at crowdmapping have been successful. The attempt to map an uprising in one country was cut short when the authorities took the country offline and, when the Internet was brought back, the crowdmap had been forgotten.

There are other downsides to crowdmapping. According to George Chamales, there are security challenges: it must be ensured that the system stays operational and that the information collated is not misused. Firstly, the lead crowdmap tends to be the one that is set up first and has the most users. Unfortunately, the organisation behind the first crowdmap may not be the best one to manage the complex process of collecting and managing the data. Secondly, there are several platforms for producing crowdmaps including commercial products and open-source projects like Ushahidi. Some have even been developed for a particular crisis such as the nuclear meltdown in Fukushima - all of these have their own disadvantages: commercial software may need to patch bugs in the programme; open source software may overlook security in favour of functionality. The information collected needs to come from trustworthy sources, which are then relied on for more reports; this may make the person sending the report a potential target in war situations. Finally, there is the human element in processing the information, relying on thousands of volunteers to translate, categorise and prioritise the information. There is an obvious risk in giving strangers access to messages generated in dangerous circumstances: messages may be deleted and the sender's identity may be compromised.

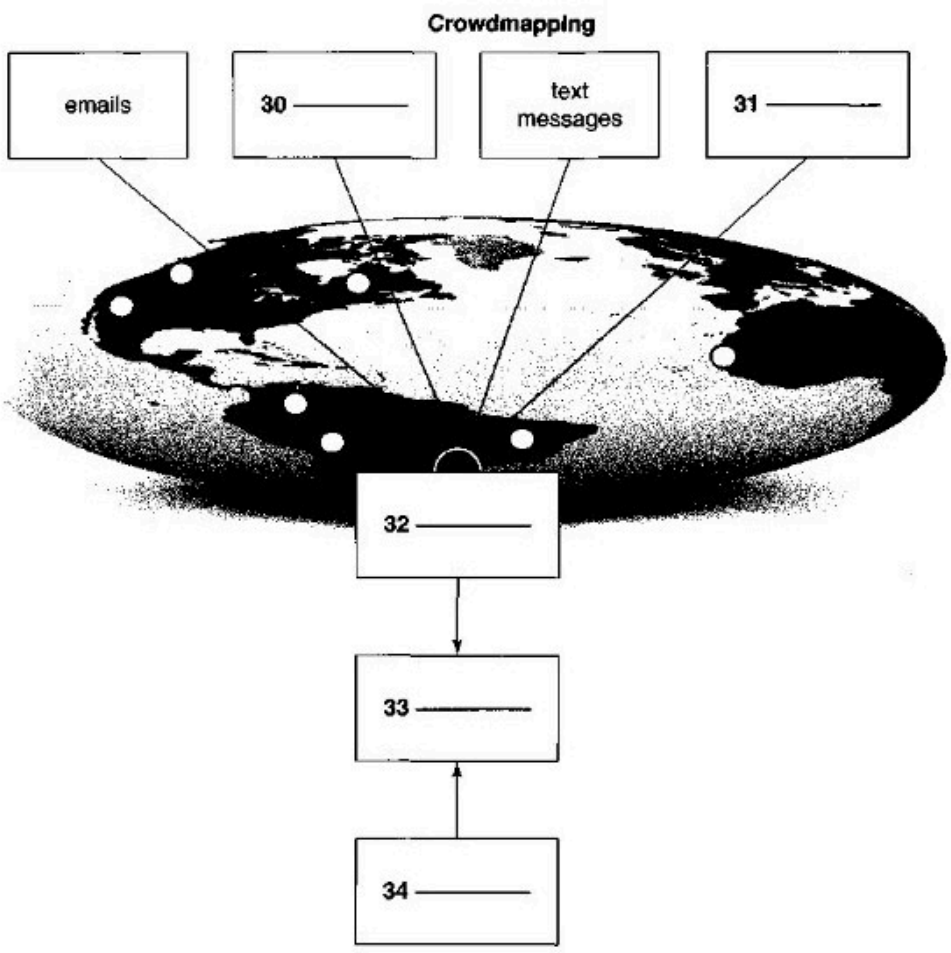
While the introduction of any new technology has flaws, George Chamales believes that crowdmapping cannot afford to go through the same maturation as other technologies: the risks to people using it in hostile political situations are too great and could lead to them being arrested or killed. Furthermore, over time the technology may be labelled as dangerous, leading organisations to shun an extremely useful instrument. The answer, Chamales believes, can be found in developing standards through collaboration between IT security experts and the crowdmapping movement. New challenges and issues will arise with each crisis mapped by the people affected, but George Chamales thinks that establishing security standards would be a good starting point to allow this valuable new form of networking to evolve.

PART 3 — QUESTIONS

Questions 30-34

Label the diagram below using words from the box.

Write the correct letter, A-E, in spaces 30-34.



- **30** _____
- **31** _____
- **32** _____
- **33** _____
- **34** _____

A. **interactive map**

B. **social media feeds**

C. **emergency services**

D. **volunteers collect and translate**

E. **official sources**

Questions 35-40

Choose the correct letter, A, B, C or D.

35 Crowdmapping aims to produce data on

- **A** ○ historical and future patterns of behaviour.
- **B** ○ political events.
- **C** ○ interactive maps.
- **D** ○ events after earthquakes only.

36 Crowdmapping allows emergency services to

- **A** ○ contact journalists.
- **B** ○ help everyone who needs it.
- **C** ○ check information online.
- **D** ○ act quickly in specific areas.

37 The operation relies heavily on

- **A** ○ a project in Kenya.
- **B** ○ a small team.
- **C** ○ people translating messages.
- **D** ○ emergency response teams.

38 The fourth paragraph contains examples of crowdmapping in

- **A** ○ countries with no internet access.
- **B** ○ natural disasters.

C ○ areas of conflict.

D ○ a country with a lot of traffic cameras.

39 Which is NOT a disadvantage of crowdmapping?

A ○ the inability of some organisations to handle the data effectively

B ○ unreliable information

C ○ security being compromised

D ○ computer crashes

40 What is the best way to deal with the problems associated with this new technology?

A ○ wait for problems to be resolved

B ○ arrest people using it incorrectly

C ○ agree common practices to make crowdmapping secure

D ○ change the process when new problems arise

Answer Key

#	Answer	Explanation
1	iii	Only grains supply more calories and protein to the world's population
2	iv	Beans contain a rich and varied supply of nutritional substances, which are vital for keeping in good health
3	vii	Why is it important to substitute meat as much as possible? First of all because of the health implications — red meat in particular has a high fat content. Secondly, antibiotics and other chemicals are used in the raising of poultry and cattle. Thirdly, the cost to the environment is much greater in raising cattle than it is in growing crops
4	viii	Archaeologists have found the remains of legumes on land beneath Lake Assad in Syria dating back to 8,000 BC and, astonishingly, a 4,000-year-old lentil seed found during an excavation in Turkey has been germinated, allowing scientists to compare the ancient variety with the organic and genetically engineered varieties of today
5	ii	With the new varieties, farmers in some regions are achieving a marked rise in production – between 10 to 20% improvement Making legumes a profitable crop for the future may prove an essential factor in feeding growing populations
6	TRUE	Only grains supply more calories and protein to the world's population
7	FALSE	Diets rich in beans are used to help with a variety of health issues including lowering cholesterol levels, improving blood sugar control in diabetics, reducing the risk of many cancers, lowering the risk of heart disease and lowering blood pressure
8	TRUE	Secondly, antibiotics and other chemicals are used in the raising of poultry and cattle
9	TRUE	a 4,000-year-old lentil seed found during an excavation in Turkey has been germinated, allowing scientists to compare the ancient variety with the organic and genetically engineered varieties of today
10	NOT GIVEN	Using traditional breeding methods agricultural scientists are transforming the faba bean into a variety that is easier to grow. Traditional varieties are undependable as they rely on insects to pollinate them. But faba bean types that can self-fertilise naturally

#	Answer	Explanation
		were discovered and this gene is being bred into new varieties. Other faba bean varieties have been found that produce higher yields or shorter crops
11	**FALSE**	Scientists have also managed to develop a commercial faba bean able to resist the parasitic weed Orobanche, which has been known to destroy whole fields of the crop
12	**C**	farmers started to abandon them in favour of more dependable crops, which had had the benefits of scientific improvement Recently, scientists have returned to legumes to identify desirable characteristics such as height, good crop production and resistance to pests in order to cross different plants with each other and produce a new, improved variety
13	**mathematical**	Schools could pay more attention to making sure children understand basic mathematical concepts before dealing with more advanced ideas
14	**damage**	It was originally uncovered by Kosc – a Czech researcher – after research into damage to parts of the brain involved in mathematical cognition
15	**from birth**	Dyscalculia can have two causes: brain damage or 'acquired dyscalculia' and developmental dyscalculia – or dyscalculia from birth
16	**learning**	Whichever the cause, dyscalculia has three features: problems with mathematics; problems with mathematics only, not other areas of learning; and the assumption that these problems are rooted in brain activity
17	**TRUE**	Very little is known about its causes, prevalence or how to treat it
18	**FALSE**	In fact, the evidence from brain-damaged dyscalculic people shows that an individual might suffer dyscalculia but can even show great ability in abstract mathematical reasoning
19	**FALSE**	This is called 'subitizing' and is the capacity to count the number of objects by briefly looking at them
20	**NOT GIVEN**	Experiments with babies show that we are able to count at a very early age: if a baby sees a doll put behind a screen then another doll is also put behind the screen, the baby expects to see two dolls when the screen is removed. Babies will look longer at things they didn't expect to see, so if the screen is removed and the baby sees only one doll or three dolls, they stare at this unexpected sight longer, proving our ability to count from infancy
21	**TRUE**	Dyscalculia appears to be related to an ability shared between humans and many other animals. This is called 'subitizing' and is

#	Answer	Explanation
		the capacity to count the number of objects by briefly looking at them. Subitizing seems to be an innate skill present in humans from birth and is a useful survival skill for humans and animals: there is a big advantage in being able to count how many predators or prey there are Dyscalculia could be explained by the lack of this innate capability
22	**TRUE**	However, as well as genetic factors, there could also be environmental causes such as drinking alcohol during pregnancy, which can result in underdevelopment of the brain
23	**D**	Finally, maths should be taught in short blocks of time and lessons should build on what was taught previously
24	**A**	Diagnosing and treating dyscalculia is not straightforward as there are many reasons for being bad at maths including poor teaching, lack of motivation and inability to concentrate for long periods of time
25	**B**	This is related to a property of the brain called ‘plasticity’, which simply means the ability of the brain to develop and change, particularly during childhood
26	**C**	Thirdly, they have problems with numbers with zeros and don’t understand that the numerals 10, 100 and 1,000 are the same as the words ten, one hundred and one thousand
27	**C**	Fourthly, dyscalculic children may not be good at using money or telling the time
28	**D**	Teaching maths through a multi-sensory approach using speech, sound, writing and reading simultaneously has been shown to be a good approach
29	**A**	Diagnosing and treating dyscalculia is not straightforward as there are many reasons for being bad at maths including poor teaching, lack of motivation and inability to concentrate for long periods of time
30	**B**	Crowdmapping produces a picture of events on the ground as they happen by taking text messages and social media feeds together with geographic data to distribute real-time, interactive information on events such as revolutions, wars, humanitarian crises and natural disasters
31	**E**	Some of the information comes from official sources such as the United Nations, but the most powerful aspect of data collection is the ability to pull information from Twitter posts, emails and text messages

#	Answer	Explanation
32	**D**	When an emergency situation arises, a small army of volunteers comes together to collect incoming information and put it on the map Volunteers from all over the world translate the messages coming in from the disaster zone into English and plot the information on the live interactive map
33	**A**	Volunteers from all over the world translate the messages coming in from the disaster zone into English and plot the information on the live interactive map
34	**C**	Technologies like mobile phones and the world wide web have made it possible for those people caught up in a war or natural disaster to broadcast information from the affected area and for this information to be collected in a way that emergency aid services can use and act on
35	**A**	It has the additional advantage of mapping longer-term trends that fall in and out of the news
36	**D**	It enables response organisations to get an understanding of a crisis situation quickly (thus it is sometimes called crisis mapping), give targeted aid to people most in need and form a network of reliable reporters on the ground to check information going to the live updated map
37	**C**	Finally, there is the human element in processing the information, relying on thousands of volunteers to translate, categorise and prioritise the information
38	**C**	Most recently, crowdmapping has been used to track violent activity in warzones and areas with uprisings
39	**D**	Unfortunately, the organisation behind the first crowdmap may not be the best one to manage the complex process of collecting and managing the data The information collected needs to come from trustworthy sources, which are then relied on for more reports There is an obvious risk in giving strangers access to messages generated in dangerous circumstances: messages may be deleted and the sender’s identity may be compromised
40	**C**	The answer, Chamales believes, can be found in developing standards through collaboration between IT security experts and the crowdmapping movement

Test 37

PASSAGE 1

You should spend about 20 minutes on Questions 1–12, which are based on Reading Passage 1 below.

Seas beneath the sands

A Look at a map of North Africa from Egypt to Algeria. Almost everything outside the Nile Valley and south of the coastal plain appears to be lifeless sand and gravel deserts. But peer deeper, under the sand, and you will find water. Under the Sahara lie three major aquifers, strata of saturated sandstones and limestones that hold water in their pores like a wet sponge. The easternmost of these, extending over two million square kilometres, contains 375,000 cubic kilometres of water—the equivalent of 3,750 years of Nile river flow. It is called the Nubian Sandstone Aquifer System, and lately it has come to the attention of practitioners of a subspeciality of nuclear science known as isotope hydrology.

B Isotope hydrology, which studies the atoms of the two elements making up groundwater—oxygen and hydrogen—and the trace elements in it, like carbon and nitrogen, is able to determine when, give or take a couple of thousand years, today's groundwater fell to earth as rain. In the case of the Nubian Aquifer, some water in the system is thought to be one million years old, but most of it fell between 50,000 and 20,000 years ago. Since then, as the region has slowly turned to desert, there has been little addition of water to the aquifer. What lies beneath the ground is called fossil water, and it will likely never be recharged.

C Because the Nubian Aquifer is shared among four nations, and because Libya and Egypt are now going forward with big water-pumping projects that tap the Nubian Aquifer, the International Atomic Energy Agency (IAEA), co-recipient of the 2005 Nobel Peace Prize, is trying to bring the countries together in a joint effort to plan for a rational shared use of the water.

D The stakes are certainly high. Egypt eventually hopes to use almost half a billion cubic metres of groundwater annually—more than the volume of Lake Erie. Libya is already pumping water from the Kufra Oasis, in its southeast corner, through a four-metre-diameter pipeline to its thirsty coastal cities. When fully operational, that project will pump some 3.6 million cubic metres per day. Still, at current extraction rates, the aquifer is not likely to be depleted for a thousand years.

E Dr Taher Muhammad Hassan of the EAEA (Egyptian Atomic Energy Authority) says "One thing that isotope studies have shown us is that there is surprisingly little aquifer recharge from the Nile. Nile water has a younger isotopic profile, and samples from wells dug as close as five kilometres from the river show no sign of the Nile fingerprint. In fact, some of that well water is dated at 26,000 years old." Hassan is confident there is little likelihood of international conflict over aquifer sharing. "We know that the velocity of underground flow in most places is just two

metres a day," he says. "It's like sucking a thick milkshake through a straw—it doesn't happen fast, and eventually it stops completely." Even Libya's big extraction plans for Kufra will probably have only a minor effect on Egypt's East Uweinat farming area, given the distance between the two. If Kufra's water table drops 200 metres, the Egyptian side might see a drop of only 10 centimetres.

F At al-Agouza West in Egypt, a 10-story drilling rig, the same kind used to drill oil wells, has reached 800 metres and is now evacuating the drilling mud and widening the bore. It has taken 20 days to penetrate layers of shale and clay to reach the saturated sandstone—the basement of the Nubian formation is some 1,800 metres deep here—at a cost of about $400,000. Once the well is ready for testing, the ministry engineers check its static and dynamic levels with a sounder, a kind of fisherman's bob at the end of a tape measure that rises and falls with the water table.

G Dr Khaled Abu Zeid, of the Egyptian non-profit Center for Environment and Development of the Arab Region and Europe (CEDARE), stresses the social context of water-resource development, and the need to keep in mind traditional water users as well as new users. Small farmers and Bedouin who rely on shallow wells should not be ignored in favour of the big development schemes. "They need water today," he says, "and will still need it tomorrow. We must not let it run dry because deeper wells are more cost-effective. But neither should we have an absolutist conservationist approach, in which we try to keep fossil water in some kind of 'museum' for their benefit."

H The director of the Groundwater Research Institute at the Nile Barrage, Dr Ahmed Khater, finds it ironic that in a desert region like the Middle East, petroleum geology is much better understood than subsurface hydrology. "But water is what makes our life possible here, and we must use it wisely," he says. He cites the experience of President Nasser's "New Valley" project in the 1960s, which proposed a massive resettlement of Nile Valley farmers to the western oases. It was a failure. "These isotope studies hold the promise of learning more about what is really our most precious asset—water, not oil," he says. Nasser, he notes, got the New Valley project's motto wrong. "He said, 'When settlers come, then we will find water.' He should have said, 'When we find water, then settlers can come.'"

PART 1 — QUESTIONS

Questions 1-4

Complete the table below.

Choose NO MORE THAN THREE WORDS from the passage for each answer.

Nubian Sandstone Aquifer system	
Extent	**1** _____ 375,000 km³ of water
Formation	The majority of the **2** _____ fell between 50,000 and 20,000 years ago.
Flow	water moves only **3** _____ a day in most places
Depth	The **4** _____ of the formation is 1,800 metres deep.

Questions 5-12

Reading Passage 1 has eight paragraphs, A-H.

Which paragraph contains the following information?

Write the correct letter, A-H.

	A	B	C	D	E	F	G	H
5 dating the age of the water	○	○	○	○	○	○	○	○
6 understanding underground water through studying isotopes	○	○	○	○	○	○	○	○
7 the process of water collection	○	○	○	○	○	○	○	○
8 review of the likelihood of conflict	○	○	○	○	○	○	○	○
9 the importance of water for North-Saharan countries	○	○	○	○	○	○	○	○

	A	B	C	D	E	F	G	H
10 layers of porous rock holding water under the desert	○	○	○	○	○	○	○	○
11 attention to the needs of local people	○	○	○	○	○	○	○	○
12 cross-country project for the use of water	○	○	○	○	○	○	○	○

PASSAGE 2

You should spend about 20 minutes on Questions 13–27, which are based on Reading Passage 2 below.

High intensity training

Endurance vs intensity

The traditional view of exercise is that more is better. But now a new form of exercise is challenging the old view and causing debate between traditionalists and proponents of a new form of exercise, High Intensity Training (HIT). Current recommendations from the US Department of Health and Human Services say adults aged between 16 and 64 should take two kinds of exercise every week: aerobic and muscle-strengthening. Aerobic exercise covers activities that make you breathe harder and your heart beat faster – activities such as walking quickly, swimming or playing a relaxed game of tennis. Muscle-strengthening exercises work all the major muscle groups in a person's body – legs, hips, back, chest, abdomen, shoulders and arms. The US Department of Health and Human Services recommends that adults do two hours and thirty minutes of moderate-intensity aerobic activity per week and muscle-strengthening activities on at least two days per week. A lot of people, perhaps understandably, never meet these targets, usually citing lack of time as the main reason.

However, a recent study has removed the old excuse. Professor Martin Gibala, from Canada's McMaster University, has published research in the Journal of Physiology that shows doing less exercise can be more effective than time-consuming periods of aerobic and muscle-strengthening activities. High Intensity Training is very simple: it involves a warm-up period followed by a short burst of intense activity, usually 30 seconds to one minute, then a recovery period where you exercise at a gentler pace for a couple of minutes, then another short period of high-energy activity. After a second recovery phase, there is more energy-intensive exercise before slowing down for a while, then stopping. That's all your exercise for the day. This cycle of warm up / intense activity / recovery / intense activity, etc can be applied to a variety of sports such as cycling, jogging and swimming.

How does it work?

There are a number of different explanations as to why HIT seems to be more effective than endurance exercise. Firstly, exercising at low intensity only burns calories while you are active so that the minute you stop, you also stop burning calories. In contrast, high-intensity exercise continues to work on your metabolism a long time after you have finished – and this can be up to 24 hours later – so that you continue burning calories for longer. Secondly, HIT builds your muscles, replacing fat with muscle mass. The third theory is that the sprint-and-recover cycle doesn't give the body the chance to store energy in the same way as training over a long period: the body needs to use all the energy in one go rather than maintain the same energy level over a longer period and still being able to reserve some as fat. The final theory is HIT combines both aerobic and muscle-strengthening activities and uses many more muscles than

regular exercise – up to 80% of the muscles in the body, compared with up to 40% for moderate jogging or cycling.

There have been numerous experiments into HIT. In one conducted by a team from the University of Colorado led by Kyle Sevits, five male volunteers were tested to measure the number of calories a typical HIT workout burns. The volunteers, aged between 25 and 31, were tested to make sure their hearts were healthy, and their body composition and resting metabolic rates were measured. The participants ate a specific diet, then taken to a hospital room where researchers were able to control the air intake and determine the oxygen, carbon dioxide and water content of the air. Through these indices researchers were able to measure how many calories the volunteers burned. While each person lived in the room, they were kept on their strict diet and could only watch TV or use a computer. However, on one day they were asked to participate in HIT on a gym bike, pedalling as fast as they could for five 30-second periods with four-minute recovery periods between. The results were startling: the volunteers burned an average of an extra 200 calories on the workout day in spite of doing high-intensity activity for just 2.5 minutes. Other experiments have revealed similar results. In Japan, a team from the National Institute of Fitness and Sport separated individuals into two groups. The first group trained five days a week over six weeks, taking an hour of moderate-intensity exercise per day, totally five hours per week. The oxygen intake of this group improved by an average of 9%. The second group's training sessions were eight 20-second intense workouts followed by ten seconds of rest. Their oxygen intake improved by 15%.

Benefits to health

Good oxygen intake is a sign of a healthy adult but the workout routine has shown other health benefits in diabetes. Scientists at Herriot Watt University in Edinburgh found that short bursts of high-intensity activity every few days reduced the risk of contracting diabetes due to the beneficial effects on blood sugar. Similarly, a study in 2011 by Professor Gibala found that insulin sensitivity improved by 35% after just two weeks, which is important in enabling glucose digested from food to get to our cells and provide energy. Endurance is also increased: one study in 2006 found that eight weeks of doing high-intensity workouts meant subjects could exercise twice as long as they could before the study, while maintaining the same pace. Additionally, HIT increases the fat burnt and sustains more muscle. Finally, HIT stimulates production of human growth hormone (HGH) by up to 450% during the 24 hours after the workout has finished. HGH is not only responsible for increased calorie burning but also slows down the ageing process. It seems that HIT could keep us fitter and younger for longer.

PART 2 — QUESTIONS

Questions 13-17

Do the following statements agree with the information given in Reading Passage 2?

Write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

13 The traditional view of exercise questions the effectiveness of long periods of activity.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

14 Aerobic exercise includes tennis, walking and football.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

15 Many people fail to do the recommended amount of exercise.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

16 Some now believe that being active for shorter periods is better for our health.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

17 HIT involves a 10-minute cool-down period.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

Questions 18-22

Choose the correct letter, A, B, C or D.

18 Low-intensity activity

- **A** ○ burns calories after you stop.
- **B** ○ lets the body store fat.
- **C** ○ doesn't take much time.
- **D** ○ uses all the body's energy reserves.

19 High-intensity training

- **A** ○ retains both muscle and fat tissue.
- **B** ○ is only good for muscle-building.
- **C** ○ makes use of under half of our muscles.
- **D** ○ is done in cycles of rest and activity.

20 In one experiment, participants

- **A** ○ were all middle aged.
- **B** ○ were slightly unhealthy.
- **C** ○ ate a high-fibre diet.
- **D** ○ were kept in a controlled environment.

21 Researchers measured

- **A** ○ the air intake.

B ○ how much TV they watched.

C ○ how fast they pedalled.

D ○ how much energy they used.

22 In the Japanese experiment

A ○ there were two groups of men.

B ○ the groups trained simultaneously.

C ○ scientists measured the amount of oxygen used in training.

D ○ both groups had intensive training sessions.

Questions 23-27

Complete the text below.

Choose NO MORE THAN TWO WORDS from the passage for each answer.

A study has found that HIT **23** _____ the chance of getting diabetes. Another study found that HIT improves **24** _____, enabling individuals to exercise for longer periods while **25** _____ a similar pace. More fat is **26** _____ and the **27** _____ of human growth hormone increases enormously.

PASSAGE 3

You should spend about 20 minutes on Questions 28–40, which are based on Reading Passage 3 on the following pages.

Reading Passage 3

A Among prehistoric archeologists, Ksar Aqil has an almost mythical status, but the site is little known outside professional circles. The migration of modern humans out of Africa and the Near East's position as a bridge between continents and cultures, as well as nearly a century of scientific research, are all woven into the story of Ksar Aqil. Current perspectives on human evolution and mankind's colonization of the globe are based upon fossil evidence, as well as excavated artifacts and biogenetic data. These lines of inquiry indicate a relatively recent evolution of modern humans, *Homo sapiens sapiens*, in Africa about 200,000 years ago.

28

B The latest, and arguably most powerful, analytical tool available to those investigating human origins comes from molecular biology. Geneticists have found that examination of the DNA from tiny structures inside the cell, called mitochondria, provided a means to measure human biogenetic relationships on a time scale spanning hundreds of thousands of years. Mitochondria, also known as the powerhouse of the cell because they generate chemical energy, possess their own genome, and mitochondrial DNA (mtDNA) is inherited exclusively from the mother. Dramatic results released in 1987 by researchers at the University of California at Berkley indicated that all mtDNA present in people today stems from a single female who lived about 200,000 years ago in Africa. This woman was called "Mitochondrial Eve," the genetic mother of all of earth's present-day population.

29

C Tens of thousands of years before Beirut became a meeting place of East and West, the Levantine coastal strip and the Arabian Peninsula to the south were corridors through which our common ancestors moved out of Africa and into Asia, Europe, Australia and, lastly, the Americas. The region also has the distinction of being a place where Neanderthals (*Homo sapiens neanderthalensis*) and our immediate ancestors co-existed and indeed interbred. Although the evolutionary split between Neanderthals and the ancestors of modern humans occurred sometime between 440,000 and 270,000 years ago, according to research, a little Neanderthal DNA, between one and four per cent, exists in all peoples alive today, except for those in Africa. It is probable that our Neanderthal heritage resulted from interbreeding that happened in the Near East sometime between 80,000 and 45,000 years ago.

30

D According to proponents of the "out of Africa" theory, the exodus of anatomically modern humans probably occurred in waves. One early migration into the Near East occurred prior to 130,000 years ago, and an examination of a modern map of the Horn of Africa and adjacent parts of Arabia shows there are two obvious routes this migration could have taken. One involves crossing from northern Egypt into the Sinai Peninsula, the other crosses the Bab el-Mandab strait to reach modern-day Yemen, perhaps by watercraft. It is likely that both these routes were taken at different times, as they were navigable, presented no significant hazards and were frequented by the animals our early ancestors tracked and hunted. Given the geographic position of the Near East as a bridge between Europe and Asia, this region formed the trunk through which our family tree branched out from its African roots, both geographically and genetically. When modern humans entered the area over 130,000 years ago, the Neanderthals were in residence, and it seems they curtailed the extent of the newcomers' settlement for a while. When another wave of modern humans began migrating from Africa about 50,000 years ago, perhaps due to population pressure on resources and territory, our ancestors ultimately became the sole inhabitants of places like Ksar Aqil.

31

E If this contest had been based on physical strength alone, the Neanderthals would have won hands down. Modern humans, however, had developed cognitive, physical and cultural abilities that provided an advantage, ultimately leading to the Neanderthals being relegated to geographically marginalized refugees. Neanderthals differed from modern humans in a number of ways, perhaps most noticeably in their skull anatomy, which featured a sloped forehead, a large projection at the back of the skull called an occipital bun, pronounced eyebrow ridges, and no chin. Physically robust and more powerfully built than our ancestors, their massive but relatively short stature was more efficient in cold climates like Europe's. In common with modern humans, they possessed a gene essential for language development, and some paleoanthropologists believe they were capable of complex speech patterns. The Neanderthals apparently were not suited to activities like long-distance running. The energy cost of locomotion was apparently 32 per cent higher in Neanderthals, resulting in a daily dietary requirement between 100 and 350 calories greater than that of modern humans living in similar environmental settings. Our ancestors may, therefore, have had a competitive edge simply by being more fuel-efficient.

32

F What exactly happened to the Neanderthals no one knows. Modern peoples migrating into Southwest Asia and on to Europe may have displaced them. Undoubtedly, contact led to a variety of interactions, some clearly resulting in opportunities for interbreeding, others involving physical conflict and competition for resources. The Neanderthals' demise may also have been linked to rapid climatic swings between 50,000 and 30,000 years ago, which created further pressure on their already divided and isolated populations.

PART 3 — QUESTIONS

Questions 28-32

Passage 3 has six paragraphs, A-F.

Choose the correct heading for paragraphs B-F from the list below.

Write the correct number, i-ix.

i. **The collapse of the Neanderthal population**

ii. **The origin of modern humans**

iii. **Humanity's prehistoric mother**

iv. **Routes out of Africa**

v. **Attributes of humans and Neanderthals**

vi. **The human migration**

vii. **What did Neanderthals look like?**

viii. **The diversity of African populations**

ix. **Tracing back our DNA**

Questions 33-39

Classify the following as typical of

Write the correct letter, A, B or C.

A. Neanderthals

B. humans

C. both

	A	B	C
33 the ability to develop language	○	○	○
34 the absence of one particular facial feature	○	○	○
35 the ability to run long distances	○	○	○
36 needing to consume lots of calories	○	○	○

	A	B	C
37 greater physical strength	○	○	○
38 being small in height	○	○	○
39 making up at least 96% of our genes	○	○	○

Questions 40-40

What is the best title for Reading Passage 3?

Choose the correct letter, A, B or C.

40 What is the best title for Reading Passage 3?

- **A** ○ The decline of Neanderthal man
- **B** ○ The site where humans and Neanderthals met and mixed
- **C** ○ The migration of humans into Europe

Answer Key

#	Answer	Explanation
1	**contains**	The easternmost of these, extending over two million square kilometres, contains 375,000 cubic kilometres of water—the equivalent of 3,750 years of Nile river flow
2	**water**	In the case of the Nubian Aquifer, some water in the system is thought to be one million years old, but most of it fell between 50,000 and 20,000 years ago
3	**two metres**	We know that the velocity of underground flow in most places is just two metres a day
4	**basement**	the basement of the Nubian formation is some 1,800 metres deep here
5	**B**	In the case of the Nubian Aquifer, some water in the system is thought to be one million years old, but most of it fell between 50,000 and 20,000 years ago
6	**H**	These isotope studies hold the promise of learning more about what is really our most precious asset—water, not oil
7	**F**	At al-Agouza West in Egypt, a 10-story drilling rig, the same kind used to drill oil wells, has reached 800 metres and is now evacuating the drilling mud and widening the bore. It has taken 20 days to penetrate layers of shale and clay to reach the saturated sandstone—the basement of the Nubian formation is some 1,800 metres deep here—at a cost of about $400,000
8	**E**	Hassan is confident there is little likelihood of international conflict over aquifer sharing
9	**D**	The stakes are certainly high. Egypt eventually hopes to use almost half a billion cubic metres of groundwater annually—more than the volume of Lake Erie. Libya is already pumping water from the Kufra Oasis, in its southeast corner, through a four-metre-diameter pipeline to its thirsty coastal cities
10	**A**	Under the Sahara lie three major aquifers, strata of saturated sandstones and limestones that hold water in their pores like a wet sponge
11	**G**	Dr Khaled Abu Zeid, of the Egyptian non-profit Center for Environment and Development of the Arab Region and Europe (CEDARE), stresses the social context of water-resource development, and the need to keep in mind traditional water users as well as new users. Small farmers and Bedouin who rely

#	Answer	Explanation
		on shallow wells should not be ignored in favour of the big development schemes
12	C	Because the Nubian Aquifer is shared among four nations, and because Libya and Egypt are now going forward with big water-pumping projects that tap the Nubian Aquifer, the International Atomic Energy Agency (IAEA), co-recipient of the 2005 Nobel Peace Prize, is trying to bring the countries together in a joint effort to plan for a rational shared use of the water
13	FALSE	The traditional view of exercise is that more is better
14	NOT GIVEN	Aerobic exercise covers activities that make you breathe harder and your heart beat faster – activities such as walking quickly, swimming or playing a relaxed game of tennis
15	TRUE	A lot of people, perhaps understandably, never meet these targets, usually citing lack of time as the main reason
16	TRUE	Professor Martin Gibala, from Canada's McMaster University, has published research in the Journal of Physiology that shows doing less exercise can be more effective than time-consuming periods of aerobic and muscle-strengthening activities
17	NOT GIVEN	High Intensity Training is very simple: it involves a warm-up period followed by a short burst of intense activity, usually 30 seconds to one minute, then a recovery period where you exercise at a gentler pace for a couple of minutes, then another short period of high-energy activity. After a second recovery phase, there is more energy-intensive exercise before slowing down for a while, then stopping
18	B	The third theory is that the sprint-and-recover cycle doesn't give the body the chance to store energy in the same way as training over a long period: the body needs to use all the energy in one go rather than maintain the same energy level over a longer period and still being able to reserve some as fat
19	D	High Intensity Training is very simple: it involves a warm-up period followed by a short burst of intense activity, usually 30 seconds to one minute, then a recovery period where you exercise at a gentler pace for a couple of minutes, then another short period of high-energy activity
20	D	The participants ate a specific diet, then taken to a hospital room where researchers were able to control the air intake and determine the oxygen, carbon dioxide and water content of the air
21	D	Through these indices researchers were able to measure how many calories the volunteers burned

#	Answer	Explanation
22	**C**	The oxygen intake of this group improved by an average of 9%. The second group's training sessions were eight 20-second intense workouts followed by ten seconds of rest. Their oxygen intake improved by 15%
23	**reduced**	Scientists at Herriot Watt University in Edinburgh found that short bursts of high-intensity activity every few days reduced the risk of contracting diabetes due to the beneficial effects on blood sugar
24	**endurance**	Endurance is also increased: one study in 2006 found that eight weeks of doing high-intensity workouts meant subjects could exercise twice as long as they could before the study, while maintaining the same pace
25	**maintaining**	Endurance is also increased: one study in 2006 found that eight weeks of doing high-intensity workouts meant subjects could exercise twice as long as they could before the study, while maintaining the same pace
26	**burnt**	Additionally, HIT increases the fat burnt and sustains more muscle
27	**production**	Finally, HIT stimulates production of human growth hormone (HGH) by up to 450% during the 24 hours after the workout has finished
28	**ix**	Geneticists have found that examination of the DNA from tiny structures inside the cell, called mitochondria, provided a means to measure human biogenetic relationships on a time scale spanning hundreds of thousands of years
29	**iv**	the Levantine coastal strip and the Arabian Peninsula to the south were corridors through which our common ancestors moved out of Africa and into Asia, Europe, Australia and, lastly, the Americas
30	**vi**	According to proponents of the "out of Africa" theory, the exodus of anatomically modern humans probably occurred in waves. One early migration into the Near East occurred prior to 130,000 years ago, and an examination of a modern map of the Horn of Africa and adjacent parts of Arabia shows there are two obvious routes this migration could have taken When another wave of modern humans began migrating from Africa about 50,000 years ago, perhaps due to population pressure on resources and territory, our ancestors ultimately became the sole inhabitants of places like Ksar Aqil
31	**v**	Modern humans, however, had developed cognitive, physical and cultural abilities that provided an advantage, ultimately leading to the Neanderthals being relegated to geographically marginalized refugees. Neanderthals differed from modern humans in a

#	Answer	Explanation
		number of ways, perhaps most noticeably in their skull anatomy, which featured a sloped forehead, a large projection at the back of the skull called an occipital bun, pronounced eyebrow ridges, and no chin
32	**i**	The Neanderthals' demise may also have been linked to rapid climatic swings between 50,000 and 30,000 years ago, which created further pressure on their already divided and isolated populations
33	**C**	In common with modern humans, they possessed a gene essential for language development, and some paleoanthropologists believe they were capable of complex speech patterns
34	**A**	Neanderthals differed from modern humans in a number of ways, perhaps most noticeably in their skull anatomy, which featured a sloped forehead, a large projection at the back of the skull called an occipital bun, pronounced eyebrow ridges, and no chin
35	**B**	The Neanderthals apparently were not suited to activities like long-distance running Our ancestors may, therefore, have had a competitive edge simply by being more fuel-efficient
36	**A**	The energy cost of locomotion was apparently 32 per cent higher in Neanderthals, resulting in a daily dietary requirement between 100 and 350 calories greater than that of modern humans living in similar environmental settings
37	**A**	If this contest had been based on physical strength alone, the Neanderthals would have won hands down
38	**A**	Physically robust and more powerfully built than our ancestors, their massive but relatively short stature was more efficient in cold climates like Europe's
39	**B**	a little Neanderthal DNA, between one and four per cent, exists in all peoples alive today, except for those in Africa
40	**B**	Among prehistoric archeologists, Ksar Aqil has an almost mythical status, but the site is little known outside professional circles The region also has the distinction of being a place where Neanderthals (Homo sapiens neanderthalensis) and our immediate ancestors co-existed and indeed interbred

Test 38

PASSAGE 1

You should spend about 20 minutes on Questions 1-16, which are based on Reading Passage 1 below.

Raining Ice

In May 2012, disaster struck a mountainous region of China's Gansu province. 40 people were killed and 29,300 people evacuated when a brief but extremely violent hailstone storm swept across Min County. Houses collapsed, roads were blocked and crops were destroyed. The extreme weather also affected the power supply and communications in the region. When you consider that hailstones can reach sizeable proportions, the damage they can cause is understandable. The world's largest hailstone was found after a storm in South Dakota and measured 20.5 cm in diameter with a 47 cm circumference - this was after melting caused it to lose 5 cm from its original size. Apart from China and the US, other parts of the world that frequently suffer from hailstorm damage include Russia, India and northern Italy.

Hail is a form of solid precipitation created within cumulonimbus clouds. Cumulonimbus clouds are caused by heating from below and cooling from above. As the earth is heated during the day by the sun, air close to the ground becomes warmer. Hot air is less dense than cold air and therefore lighter so it rises and, as it does so, it becomes cooler. The warm air reaches a cold point called the condensation level where the water vapor condenses and turns back to a liquid form. As the warm air rises to the condensation level, it becomes less able to keep its moisture and condenses into large clouds, which are often called thunderheads. The process of condensation releases heat into the surrounding air making the air rise even faster and release more moisture. These huge clouds are complex systems in their own right, containing large amounts of energy resulting in updrafts and downdrafts - vertical winds that can reach speeds over 176 km per hour and help in the formation of hail.

Hail grows in the thunderhead's main updraft where most of the cloud is 'supercooled' water: water that is still liquid even though its temperature is below 0°C. This water will stay in liquid form until it encounters something on which to freeze. There are other particles within the cloud - small frozen raindrops or soft ice particles - called graupel. When the supercooled water hits the graupel, it freezes around it, creating a hailstone. However, this is just the start of the hailstone's journey. A hailstone's eventual size depends upon the intensity of the storm in which it is born. To form a golf ball-sized hailstone requires over ten billion supercooled drops of water and a time span of between five and 10 minutes. This accumulation of additional ice is a process called accretion and takes place in areas of the cloud rich in supercooled water. Accretion takes place in two ways, resulting in two distinguishable kinds of hailstone. In the first process, strong updrafts, which lift the top of the cloud into part of the atmosphere known as the troposphere, take the hailstone through the supercooled layer where it accretes ice, making it heavy enough to fall back through the cloud. On falling, it encounters other strong updrafts, which take it back though the supercooled layer where it grows and falls again. An updraft of

35-55 km per hour will form small hailstones; hailstones that are 5 cm in diameter require updrafts of 88 kph and hailstones that are 12 cm in diameter need updrafts of 160 kph to grow. The other process involves the hailstone falling slowly through a layer of the cloud rich in supercooled water.

The first process results in hailstones with concentric layers usually alternating between clear and cloudy ice, indicating how it was produced. The opaque layer forms when supercooled water drops freeze quickly onto the growing hailstone and trap tiny air bubbles inside the ice giving it a milky appearance. The next layer - the transparent layer - forms when larger drops of supercooled liquid water hit the hailstone. Here the freezing process is slower, allowing air bubbles to escape and clear ice to form. Hailstones showing little of this layering may have been subject to the second process of formation. Instead of being pushed up through the cumulonimbus by updrafts and pulled back through by gravity several times, these hailstones simply fall slowly through the cloud gathering mass as they drop.

The interior of a cumulonimbus cloud is a place of extreme violence. As the hailstones rise and fall, they collide with each other. The result of this can be their breaking up or the formation of large irregular shaped hailstones. Hailstones are categorised according to their size. The Tornado and Storm Research Organisation classifies hailstones according to their destructive power, ranging from H0 - hard hail composed of hailstones of 5 mm in diameter, which do not cause damage - through H5 storms, destructive enough to damage glass, roofs and injure people, to the most severe - H10 or 'super hailstorms', which cause extensive structural damage and can fatally injure people caught out in the open.

The rate at which they fall varies but can be faster than 160 kph for larger hailstones as they become too heavy for the updraft to support or if a downdraft catches them and blows them violently back to earth. It is estimated that between 40 and 70% of hailstones never reach the earth, melting instead inside the cloud, colliding with and smashing into smaller pieces on their way through the air, or melting in the atmosphere to fall as rain.

PART 1 — QUESTIONS

Questions 1-8

Do the following statements agree with the information given in Reading Passage 1?

Write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

1 Hailstone storms last a long time and cause considerable damage.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

2 The world's largest hailstone had lost volume before it was found.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

3 Cumulonimbus clouds hold significant quantities of energy.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

4 Cumulonimbus clouds are called 'thunderheads' because they are the cause of thunder and lightening storms.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

5 Water always turns to ice when it is under 0°C.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

6 A slow freezing rate creates clear ice.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

7 Hailstones are classified according to their destructive power.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

8 Many hailstones stay within the cloud and do not reach the ground.

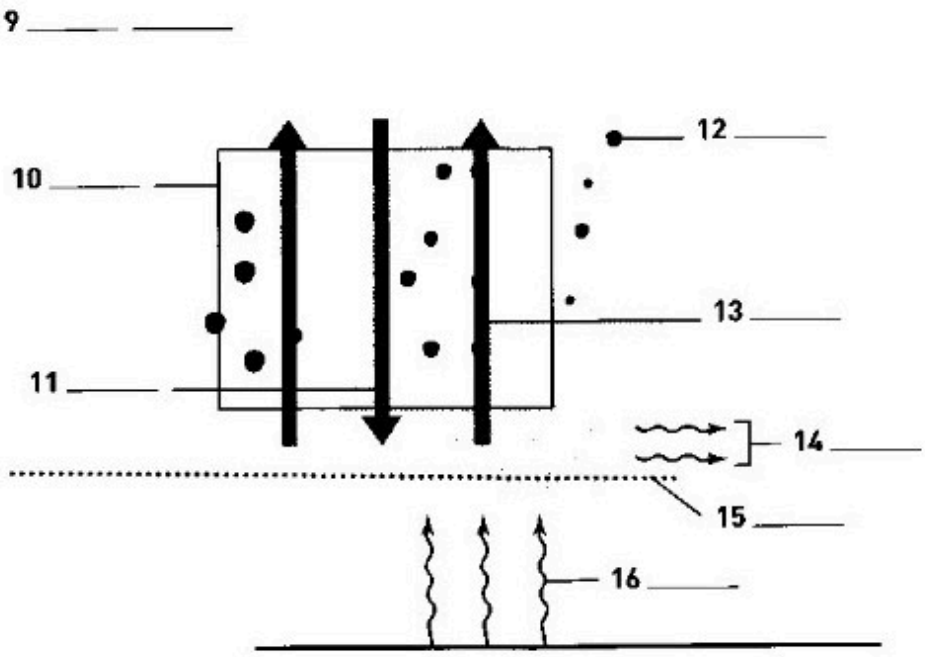
- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

Questions 9-16

Label the diagram below using words from the box.

Write the correct letter, A-H, in spaces 9-16.

The formation of hailstones in a cloud



- 9 _____
- 10 _____
- 11 _____
- 12 _____
- 13 _____
- 14 _____
- 15 _____
- 16 _____

A. graupel

B. updraft

C. condensation level

D. accretion

E. heat released into atmosphere

F. downdraft

G. warm air

H. supercooled area

PASSAGE 2

You should spend about 20 minutes on Questions 17-27, which are based on Reading Passage 2 below.

Twisted Light

A Why is your mobile phone or wireless signal so slow? If you ask your service provider, they'll tell you that it's the bandwidth. We're running out of signal space on the wireless spectrum. All wireless communications travel through radio or optical frequencies: your TV or radio programmes, your GPS device that helps you find your way, your mobile and smartphone, laptop and wirelessly connected PC. The demands from users and industry on a limited resource, the wireless spectrum, are growing daily and are closely regulated. The reason is that two users cannot use the same signal: think about radio stations, which have to operate on different frequencies otherwise they cause interference with each other. Likewise mobile phone operators cannot transit over the same frequency in the same market at the same time. Government-controlled agencies grant licences to use the wireless spectrum but if a wireless company wants to add more spectrum to its service to boost its capacity, it's likely to be disappointed as there isn't much more available. What is needed is a way of pushing more data through the same amount of bandwidth.

B Now scientists may have found a way of manipulating light waves to carry more information: potentially enough for users to be able to download a film onto a smartphone in a single second. By twisting light waves, scientists could possibly transmit data at speeds of 2.56 terrabits per second: that's 85,000 times faster than the 30 megabits per second currently possible. To put it another way, this is the same as transmitting 70 DVDs through the air in about a second. Researchers based in America, China, Israel and Pakistan have built on previous research from Sweden, which negates the need for more bandwidth by making better use of the spectrum. The basis of the research is to manipulate the properties of light.

C One property of light is wavelength: lasers, radio waves, microwaves are simply different wavelengths of light. Light is made up of photons and photons have two other properties that define a beam of light: spin angular momentum and orbital angular momentum. A good way of thinking about how photons travel is to think of the orbit of a planet: it spins around on its axis (spin angular momentum), and at the same time the planet is also revolving around the sun (orbital angular momentum). The latter force means that light can be twisted around its axis of travel to take the shape of a spiral or a corkscrew. At the centre of the spiral the light waves cancel each other out, leaving darkness in the middle, called an optical vortex. When light travels, it is formed into a spiral shape and it can be manipulated. There are infinite possibilities for ways in which the photon can be made to spiral: clockwise, counterclockwise, tight spirals or loose ones. Each of these spiral states can be uniquely identified but, more importantly for wireless communication, the spirals can be wrapped up within each other - or multiplexed - into a single beam. The beam can be transmitted and unwound at the receiving end to get the data streams back out again, essentially doubling or trebling or even quadrupling the bandwidth.

D Scientists have been twisting light since the 1970s, and the spin angular momentum of waves is already manipulated in standard wireless communication. For years, Bo Thide of the Swedish Institute of Space Physics theorised that the orbital angular momentum could be used to create the spiral signal or as Thide calls it a 'radio vortex'. Then in an experiment in Venice, his team transmitted two signals simultaneously on the same frequency over a distance of 442 metres. Following on from this, researchers in America, China, Israel and Pakistan, led by Alan Wilner, twisted together eight light data streams, each stream with its own level of orbital angular momentum twist. One of the streams was transmitted as a thin stream while the others were transmitted around the outside. The data beam was then sent to a receiver and untwisted to recover the data.

E The achievement is very exciting for developers of wireless network technology as the useful spectrum of frequencies is largely used up. The orbital angular momentum model would allow for an infinite number of data transmissons without taking up any more of the spectrum. There is a problem, however: researchers can only transmit the data stream one metre, which is an insignificant distance for communication purposes. The short transmission range is due to turbulence in the atmosphere, which disrupts the signal as the light hits air molecules. But the scientists are planning to be able to send the beam considerably further. One idea is to create links every kilometre to extend the network. Another is to build high-speed satellite communication links where the atmospheric problems would not affect the signal. Another possibility is to adapt the technology for fibre-optic use, the way data is currently transmitted over the Internet. Unfortunately, at this point standard fibre-optic cables are not capable of carrying multichannel signals and fibre-optic cables that can carry the signal experience problems of interference between channels as they carry data with high bit-rates.

F Nevertheless, exploiting the orbital angular momentum gives scientists options that could lead to significant increases in data transfer; even a modest increase in the existing data transfer rate is worthwhile. Furthermore, very often technology is pulled along by innovative research so a novel solution to carrying the data-rich signal may not be far behind.

PART 2 — QUESTIONS

Questions 17-22

Reading Passage 2 has six paragraphs, A-F.

Which paragraphs contain the following information?

Write the correct letter, A-F, next to Questions 17-22.

	A	B	C	D	E	F
17 changing light waves to increase capacity	○	○	○	○	○	○
18 a practical demonstration of the new technology	○	○	○	○	○	○
19 use of the wireless spectrum needing to be monitored closely	○	○	○	○	○	○
20 overcoming the problem of the short range of the new signal	○	○	○	○	○	○
21 improvements in data transmission possibly leading to technological breakthroughs	○	○	○	○	○	○
22 the prospect of saving people a lot of time	○	○	○	○	○	○

Questions 23-27

Complete the summary using the list of words, A-I, below.

Write the correct letter, A-I, in spaces 23-27.

Researchers are looking for a way of using the **23** _____ more efficiently. One option is to transmit signals that are twisted into **24** _____, and wrapping them together, or **25** _____ them. This is still problematic on earth due to **26** _____ but scientists hope that **27** _____ cable technology will catch up with the research breakthrough.

A. **bandwidth** B. **atmospheric interference** C. **fibre-optic**

D. **light waves** E. **multiplexing** F. **wireless spectrum** G. **spirals**

H. **data streams** I. **novel**

PASSAGE 3

You should spend about 20 minutes on Questions 28-40, which are based on Reading Passage 3 below.

Sinking Cities

Looking across the Bund towards Pudong across the Huangpu River in Shanghai, you will see an array of modern world-beating skyscrapers. In contrast, behind you are the magnificent buildings from the nineteenth century. Standing on the high tourist promenade that runs the length of the waterfront, you may also notice that the level of the river is quite a bit higher than that of the buildings on the Bund. It isn't because the river has risen higher than usual due to rainfall; no - Shanghai is sinking. It is an unfortunate problem that Shanghai shares with several other major financial and industrial centres and it is caused by factors most of the cities have in common. Included in the list are New York, Bangkok, Houston and Mexico City, all either built on shaky foundations or low-lying land that is now threatened by rising sea levels.

New York and Bangkok are victims of bad luck. The effect of global warming on the sea levels means that these cities may drown in the oceans that brought them such importance and prosperity. Scientists believe that sea levels in the New York area are expected to rise about twice as quickly as in the rest of the world. The position of the city - situated where the Hudson River flows into the Atlantic Ocean - already puts America's most densely populated city at a higher risk of flooding. But the impact of tropical storms and rising tides poses more dangers than just flooding. Beaches in the area will be swept away followed by the surrounding wetlands eventually becoming part of the sea; surrounding river estuaries will see an increase in the salt levels in the fresh water. All of this will affect the ecosystems in New York's immediate area and damage developments along the coast. Bangkok too will fall victim to rising sea levels. Also situated on swamplands next to a river, the Chao Phraya, the city is about 50 kilometres north of the Gulf of Thailand. The city is likely to face increasingly severe tropical storms crossing from the Bay as well as threats from coastal erosion and shifting clay soil. It seems unlikely that Bangkok will save itself from drowning under the waters of the Pacific, which are predicted to rise by between 19 and 29 cm by 2050.

Other cities are sinking due to bad planning rather than bad luck. The fourth largest city in America is Houston but it has been built on shaky foundations - and these are now giving way. Houston was literally built on a foundation of sand up to several kilometres deep and loosely packed clay from river deposits formed from the erosion of the Rocky Mountains. In addition to poor foundation materials, Houston has an estimated 300 fault lines running through it. Using GPS data from 24 measuring points throughout the country between 1995 to 2005 a research team were able to monitor the area of subsidence and found an area of Houston measuring 30 kilometres squared was sinking very fast - up to 5 centimetres per year. The reason for the subsidence is quite straightforward: the withdrawal of water from deep beneath the surface. Areas of Houston where water extraction has been stopped have stopped sinking. Similarly, parts of Mexico City are subsiding rapidly due to poor foundations - some areas of the city are sinking up to 20 centimetres a year. The city is built on a dry lake bed in the valley of Mexico,

and the council has condemned fifty structures since 2006 because of leaning, and approximately 5,000 homes and buildings are unstable. Some of the heaviest buildings, like the Palace of Fine Arts, have sunk more than three metres over the past one hundred years and its original ground floor is now the basement. Again the reason is the depletion of the water reserve lying under the city. But in this case there is a complicating factor: a vast complex of drains was built under the city to protect it from flooding by water running from the surrounding mountains. As the city sinks, so do the drains and the wastewater they were supposed to carry away is finding its way back to the city. And it's not only water mains and drains that have been affected; as the city sinks the subway network is subsiding with it.

Back in Shanghai, the same problem is causing the city of 13 million people and ultra-modern skyline to sink beneath the waterline of the Huang Pu River. Originally a small fishing village built on swamplands surrounding the mouth of the Yangtze River, Shanghai's population has swollen to around 13 million people. The expansion has been sustained by taking water from wells drilled into the aquifer under the city and by constructing massive skyscrapers. According to China Central Television, Shanghai has sunk up to three metres since the early 1990s mainly due to depletion of underground water but also because of the weight of high-rise buildings situated on areas with soft soil. As a partial solution to the problem, Shanghai is trying to reverse the sinking by pumping 5.2 billion gallons of water a year into the water table with some success - so far the city has risen by almost 11.5 cm.

PART 3 — QUESTIONS

Questions 28-35

Complete the table below.

Choose NO MORE THAN THREE WORDS from the passage for each answer.

City	Situated	Cause of sinking	Effect
New York	where the Hudson meets the Atlantic	the effect of **28** _____ and rising tides	increased chance of **29** _____
Bangkok	on swamps near the Gulf of Thailand	increasingly damaging storms, **30** _____ and moving soil	a rise in the level of the Pacific of up to **31** _____ by 2050
Mexico City	on a **32** _____ that has dried out	using up the **33** _____ beneath the city	wastewater drains and subway affected
Shanghai	on wetlands around the **34** _____ of the Yangtze River	wells drilled into aquifer and building **35** _____	sunk up to 3 metres

Questions 36-40

Choose the correct letter, A, B, C or D.

36 The thing that may strike you when you are standing on Shanghai's tourist promenade is

- **A** ○ the contrasting styles of the buildings.
- **B** ○ its height.
- **C** ○ that the river is higher than the buildings behind the promenade.
- **D** ○ that it runs the length of the waterfront.

37 Which of the following is NOT a predicted effect on New York?

- **A** ○ wetlands becoming part of the ocean

B ○ beaches being lost

C ○ developments along the coastline

D ○ the increasing saltiness of river mouths

38 Houston has been built on

A ○ shallow sand.

B ○ material from the Rocky Mountains.

C ○ volcanic fault lines.

D ○ accurate GPS measurements.

39 The sinking in Houston

A ○ affects the whole city equally.

B ○ is due to water use and the weight of the buildings.

C ○ has completely stopped.

D ○ was measured using historical data.

40 Which of the following is NOT true of Mexico City's drains?

A ○ They were built to defend the city from flooding.

B ○ They run back to the surrounding mountains.

C ○ They are sinking with the city.

D ○ They are carrying wastewater back to the city instead of away from it.

Answer Key

#	Answer	Explanation
1	**FALSE**	40 people were killed and 29,300 people evacuated when a brief but extremely violent hailstone storm swept across Min County
2	**TRUE**	The world's largest hailstone was found after a storm in South Dakota and measured 20.5 cm in diameter with a 47 cm circumference – this was after melting caused it to lose 5 cm from its original size
3	**TRUE**	These huge clouds are complex systems in their own right, containing large amounts of energy resulting in updrafts and downdrafts — vertical winds that can reach speeds over 176 km per hour and help in the formation of hail
4	**NOT GIVEN**	As the warm air rises to the condensation level, it becomes less able to keep its moisture and condenses into large clouds, which are often called thunderheads
5	**FALSE**	Hail grows in the thunderhead's main updraft where most of the cloud is 'supercooled' water: water that is still liquid even though its temperature is below 0°C
6	**TRUE**	The next layer – the transparent layer – forms when larger drops of supercooled liquid water hit the hailstone. Here the freezing process is slower, allowing air bubbles to escape and clear ice to form
7	**FALSE**	Hailstones are categorised according to their size
8	**TRUE**	It is estimated that between 40 and 70% of hailstones never reach the earth, melting instead inside the cloud, colliding with and smashing into smaller pieces on their way through the air, or melting in the atmosphere to fall as rain
9	**H**	Hail grows in the thunderhead's main updraft where most of the cloud is 'supercooled' water: water that is still liquid even though its temperature is below 0°C
10	**D**	This accumulation of additional ice is a process called accretion and takes place in areas of the cloud rich in supercooled water
11	**F**	These huge clouds are complex systems in their own right, containing large amounts of energy resulting in updrafts and downdrafts – vertical winds that can reach speeds over 176 km per hour and help in the formation of hail

#	Answer	Explanation
12	**A**	There are other particles within the cloud – small frozen raindrops or soft ice particles – called graupel. When the supercooled water hits the graupel, it freezes around it, creating a hailstone
13	**B**	These huge clouds are complex systems in their own right, containing large amounts of energy resulting in updrafts and downdrafts – vertical winds that can reach speeds over 176 km per hour and help in the formation of hail
14	**E**	The process of condensation releases heat into the surrounding air making the air rise even faster and release more moisture
15	**C**	The warm air reaches a cold point called the condensation level where the water vapor condenses and turns back to a liquid form
16	**G**	As the earth is heated during the day by the sun, air close to the ground becomes warmer. Hot air is less dense than cold air and therefore lighter so it rises and, as it does so, it becomes cooler
17	**C**	Each of these spiral states can be uniquely identified but, more importantly for wireless communication, the spirals can be wrapped up within each other – or multiplexed – into a single beam. The beam can be transmitted and unwound at the receiving end to get the data streams back out again, essentially doubling or trebling or even quadrupling the bandwidth
18	**D**	Then in an experiment in Venice, his team transmitted two signals simultaneously on the same frequency over a distance of 442 metres. Following on from this, researchers in America, China, Israel and Pakistan, led by Alan Wilner, twisted together eight light data streams, each stream with its own level of orbital angular momentum twist
19	**A**	The demands from users and industry on a limited resource, the wireless spectrum, are growing daily and are closely regulated
20	**E**	There is a problem, however: researchers can only transmit the data stream one metre, which is an insignificant distance for communication purposes. The short transmission range is due to turbulence in the atmosphere, which disrupts the signal as the light hits air molecules. But the scientists are planning to be able to send the beam considerably further. One idea is to create links every kilometre to extend the network. Another is to build high-speed satellite communication links where the atmospheric problems would not affect the signal
21	**F**	Furthermore, very often technology is pulled along by innovative research so a novel solution to carrying the data-rich signal may not be far behind

#	Answer	Explanation
22	**B**	Now scientists may have found a way of manipulating light waves to carry more information: potentially enough for users to be able to download a film onto a smartphone in a single second
23	**F**	Researchers based in America, China, Israel and Pakistan have built on previous research from Sweden, which negates the need for more bandwidth by making better use of the spectrum
24	**G**	The latter force means that light can be twisted around its axis of travel to take the shape of a spiral or a corkscrew
25	**E**	Each of these spiral states can be uniquely identified but, more importantly for wireless communication, the spirals can be wrapped up within each other – or multiplexed – into a single beam
26	**B**	The short transmission range is due to turbulence in the atmosphere, which disrupts the signal as the light hits air molecules
27	**C**	Another possibility is to adapt the technology for fibre-optic use, the way data is currently transmitted over the Internet. Unfortunately, at this point standard fibre-optic cables are not capable of carrying multichannel signals and fibre-optic cables that can carry the signal experience problems of interference between channels as they carry data with high bit-rates
28	**(tropical) storms**	But the impact of tropical storms and rising tides poses more dangers than just flooding
29	**flooding**	The position of the city – situated where the Hudson River flows into the Atlantic Ocean – already puts America's most densely populated city at a higher risk of flooding
30	**coastal erosion**	The city is likely to face increasingly severe tropical storms crossing from the Bay as well as threats from coastal erosion and shifting clay soil
31	**29 cm**	It seems unlikely that Bangkok will save itself from drowning under the waters of the Pacific, which are predicted to rise by between 19 and 29 cm by 2050
32	**lake bed**	The city is built on a dry lake bed in the valley of Mexico, and the council has condemned fifty structures since 2006 because of leaning, and approximately 5,000 homes and buildings are unstable
33	**water (reserve)**	Again the reason is the depletion of the water reserve lying under the city

#	Answer	Explanation
34	**mouth**	Originally a small fishing village built on swamplands surrounding the mouth of the Yangtze River, Shanghai's population has swollen to around 13 million people
35	**(massive) skyscrapers**	The expansion has been sustained by taking water from wells drilled into the aquifer under the city and by constructing massive skyscrapers
36	**C**	Standing on the high tourist promenade that runs the length of the waterfront, you may also notice that the level of the river is quite a bit higher than that of the buildings on the Bund
37	**C**	Beaches in the area will be swept away followed by the surrounding wetlands eventually becoming part of the sea; surrounding river estuaries will see an increase in the salt levels in the fresh water. All of this will affect the ecosystems in New York's immediate area and damage developments along the coast
38	**B**	Houston was literally built on a foundation of sand up to several kilometres deep and loosely packed clay from river deposits formed from the erosion of the Rocky Mountains
39	**D**	Using GPS data from 24 measuring points throughout the country between 1995 to 2005 a research team were able to monitor the area of subsidence
40	**B**	a vast complex of drains was built under the city to protect it from flooding by water running from the surrounding mountains

Test 39

PASSAGE 1

You should spend about 20 minutes on Questions 1-14, which are based on Reading Passage 1 below.

Mutual harm

A In forests and fields all over the world, plants are engaged in a deadly chemical war to suppress other plants and create conditions for their own success. But what if we could learn the secrets of these plants and use them for our own purposes? Would it be possible to use their strategies and weapons to help us improve agriculture by preventing weeds from germinating and encouraging growth in crops? This possibility is leading agricultural researchers to explore the effects plants have on other plants with the aim of applying their findings to farming.

1

B The phenomenon by which an organism produces one or more chemicals that influence the growth, survival and reproduction of other organisms is called allelopathy. These chemicals are a subset of chemicals produced by organisms called secondary metabolites. A plant's primary metabolites are associated with growth and development. Allelochemicals, however, are part of a plant's defence system and have a secondary function in the life of the organism. The term allelopathy comes from the Greek: allelo and pathy meaning 'mutual harm'. The term was first used by the Austrian scientist Hans Molisch in 1937, but people have been noting the negative effects that one plant can have on another for a long time. In 300 BC, the Greek philosopher Theophrastus noticed that pigweed had a negative effect on alfalfa plants. In China, around the first century AD, the author of Shennong Ben Cao Jing described 267 plants that have the ability to kill pests.

2

C Allelopathy can be observed in many aspects of plant ecology. It can affect where certain species of plants grow, the fertility of competitor plants, the natural change of plant communities over time, which plant species are able to dominate a particular area, and the diversity of plants in an area. Plants can release allelopathic chemicals in several ways: their roots can release chemicals directly into the soil, and their bark and leaves can release chemicals into the soil as they rot. Initially, scientists were interested in the negative effects of allelopathic chemicals. Observations of the phenomenon included poor growth of some forest trees, damage to crops, changes in vegetation patterns and, interestingly, the occurrence of weed-free areas. It was also realised that some species could have beneficial effects on

agricultural crop plants and the possible application of allelopathy became the subject of research.

3

D Today research is focused on the effects of weeds on crops, the effects of crops on weeds, and how certain crops affect other crops. Agricultural scientists are exploring the use of allelochemicals to regulate growth and to act as natural herbicides, thereby promoting sustainable agriculture by using these natural chemicals as an alternative to man-made chemicals. For example, a small fast-growing tree found in Central America, sometimes called the 'miracle tree', contains a poison that slows the growth of other trees but does not affect its own seeds. Chemicals produced by this tree have been shown to improve the production of rice. Similarly, box elder – another tree – stimulates the growth of bluestem grass, which is a tall prairie grass found in the mid-western United States. Many weeds may use allelopathy to become ecologically successful; a study in China found that 25 out of 33 highly poisonous weeds had significant allelopathic properties.

4

E There may be at least three applications of allelopathy to agriculture. Firstly, the allelopathic properties of wild or cultivated plants may be bred into crop plants through genetic modification or traditional breeding methods to improve the release of desired allelochemicals and thus improve crop yield. Secondly, a plant with strong allelopathic properties could be used to control weeds by planting it in rotation with an agricultural crop and then leaving it to rot and become part of the soil in order to inhibit the growth of weeds. Finally, naturally occurring allelopathic chemicals could be used in combination with man-made chemicals. Boosting the efficiency of man-made herbicides could lead to a reduction in the amount of herbicides used in agriculture, which is better for the environment.

5

F Despite the promising uses of allelopathic chemicals, agricultural scientists are still cautious. Firstly, allelopathic chemicals may break down and disappear in the soil more easily than artificial chemicals. Secondly, allelopathic chemicals may be harmful to plants other than weeds. Thirdly, allelopathic chemicals could persist in the soil for a long time and may affect crops grown in the same field as the allelopathic plants at a later date. Because the effects of allelopathic chemicals are not yet fully known, agricultural scientists will need to continue to study the biological war between plants.

PART 1 — QUESTIONS

Questions 1-5

Choose the correct heading for paragraphs B-F from the list of headings below.

Write the correct number, i-ix.

i. **What are metabolites?**

ii. **The negative effects of allelopathy**

iii. **Biological warfare in the plant world**

iv. **Why we cannot use allelopathic chemicals at present**

v. **What is allelopathy?**

vi. **The reasons why plants compete with other plants**

vii. **The effects of allelopathy and realisation of its possible uses**

viii. **How could we use allelopathic chemicals in farming?**

ix. **Specific examples of allelopathic plants**

Questions 6-9

Choose the correct letter, A, B, C or D.

6 What does the term 'allelopathy' refer to?

A ○ the growth and development of a plant

B ○ the relationship between plants that grown in the same area

C ○ the effects of chemicals produced by a plant on another plant

D ○ a plant's primary metabolic processes

7 Which of the following does allelopathy NOT affect?

A ○ how certain species of plants change the nature of the soil where they grow

B ○ the diversity of plants in an area

C ○ the nutrients present in the soil

D ○ the location in which plants can grow

8 Scientists are mainly interested in

- **A** ○ being able to exploit allelopathy in sustainable farming.
- **B** ○ the beneficial effects of weeds on crops.
- **C** ○ the effect of allelopathy on forests.
- **D** ○ the negative effects of weeds.

9 Which of the following is NOT mentioned in the text?

- **A** ○ a tree which is highly poisonous to weeds
- **B** ○ a tree which makes a type of grass grow better
- **C** ○ a tree which makes rice more productive
- **D** ○ a tree which produces a chemical that affects the growth of other trees

Questions 10-14

Complete the summary of paragraphs E and F below.

Choose NO MORE THAN TWO WORDS from the passage for each answer.

Scientists can see three potential uses of allelopathic chemicals in farming. Firstly, the ability to produce allelopathic chemicals could be **10** _____ into agricultural crops; secondly, allelopathic plants could be planted in rotation with the **11** _____; finally, naturally produced chemicals could be combined with **12** _____ herbicides. However, agriculturalists are still **13** _____ as allelopathic plants may have negative effects on plants which are not the intended target and the chemicals could remain in the ground for a(n) **14** _____, even after the plants themselves have died.

PASSAGE 2

You should spend about 20 minutes on Questions 15-26, which are based on Reading Passage 2 below.

Ordinary treasures

When Andy Warhol, one of the twentieth century's most influential artists, died his four-floor house was so full of items that the only rooms you could walk through were the kitchen and the bedroom. It turned out that Warhol had compulsive hoarding disorder, which is defined as the excessive accumulation of objects and a refusal to throw them away. But Warhol's case is not uncommon; around five per cent of Americans – nearly 15 million people – suffer from compulsive hoarding disorder. This disorder interferes with daily activities such as sleeping and cooking, and in an extreme form it can harm one's health, be a fire risk and even lead to death. Although researchers suspect that the disorder is more widespread in the West, cases of hoarding have been recorded in almost every country.

Twenty years ago, compulsive hoarding disorder was a relatively unexplored psychological phenomenon, often treated as an aspect of obsessive compulsive disorder – the compulsion to repeat a certain action over and over. However, it is now recognised as a separate disorder. Scientists from many disciplines, including psychologists, neurologists and behavioural researchers are looking at gene sequences within hoarders' DNA and scanning their brains to try to understand their behaviour in the hope that they can be helped.

There are several theories for the behaviour. First of all, hoarding appears to run in families and may have genetic causes, with family members often having similar issues. In a study of 219 families, researchers at Johns Hopkins University found that families with two or more hoarding members showed a linkage between hoarding behaviour and chromosome 14 – one of the 23 pairs of chromosomes that make up human DNA. A second theory states that the instinct to hoard may be an evolutionary survival strategy: there are plenty of examples of hoarding in the animal kingdom. The Arctic gray jay hoards around 100,000 berries and insects so that it has enough food for the long winter months. Humans, however, are the only species that take the strategy to extremes, sometimes filling their homes with so many objects that they eventually become uninhabitable.

Recent psychological research, however, emphasises that hoarders do not just collect junk; nor are they lazy or disorganised, even if their homes are chaotic. Many hoarders have normal lives, with regular jobs and normal relationships with friends and family. Cognitively, hoarders tend to be emotional, attaching sentimental value to belongings that other people would discard. They also tend to be intelligent, well educated and more creative than average. However, they can be indecisive and may start several different projects at the same time.

Carol Mathews, a leading researcher into the condition, used magnetic resonance imaging (MRI) to show brain activity in the process of decision making. People with compulsive hoarding disorder display increased activity in an area of the brain related to decision making when asked to organise objects. This increased activity is due to their greater emotional attachment to

possessions. In other tests, Mathews found that people with hoarding behaviour had difficulty grouping similar objects and remembering the sequence of things. In effect, people with compulsive hoarding disorder do not categorise objects in the same way as other people, and when they are asked to do so, show an increase in brain activity associated with the decision-making process. It seems that people with hoarding behaviour see and treat objects differently and might have a different appreciation of the physical world. For example, a pile of objects in the middle of a room may be seen as a work of art by a hoarder rather than just a heap of junk.

Treating hoarding effectively may depend upon whether we can identify specific character traits. Dr Monika Eckfield of the University of California, San Francisco, believes there are two different kinds of people with hoarding behaviour. She calls one kind impulsive-acquirers, who buy objects out of excitement and keep them because they are interested in them. The other type are the worried-keepers – the hoarders who acquire items passively and keep them in case they need them in future. Worried-keepers spend more time sorting and organising belongings. While both kinds of hoarders of either gender find it nearly impossible to throw anything away, more men than women belong to the former category whilst more women fall into the worried-keeper group.

PART 2 — QUESTIONS

Questions 15-19

Do the following statements agree with the information given in Reading Passage 2?

Write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

15 People have died as a result of extreme hoarding behavior.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

16 Compulsive hoarding disorder is a type of obsessive compulsive disorder.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

17 People with compulsive hoarding disorder usually have parents with the same condition.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

18 People who take collecting to extremes eventually cannot live in their homes.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

19 Hoarders show more activity in parts of the brain associated with the emotions.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

Questions 20-25

Classify the following as typical of

Write the correct letter, A, B or C.

A. impulsive-acquirer hoarders

B. worried-keeper hoarders

C. both

	A	B	C
20 This type of hoarder finds it almost impossible to discard anything.	○	○	○
21 This type of hoarder keeps possessions because he/she finds them interesting.	○	○	○
22 This type of hoarder keeps objects for future use.	○	○	○
23 This type of hoarder buys things because he/she is excited by them.	○	○	○
24 This type of hoarder has a greater tendency to sort objects.	○	○	○
25 This type of hoarder includes more men than women.	○	○	○

Questions 26-26

Choose the correct letter, A, B or C.

26 The writer of the article views people with compulsive hoarding disorder as

- **A** ○ lazy and disorganised.
- **B** ○ abnormal because they cannot lead a normal life.

C ○ having a different perception of physical objects from the majority of people.

PASSAGE 3

You should spend about 20 minutes on Questions 27-40, which are based on Reading Passage 3 below.

Reading Passage 3

A A major cause of blindness in the industrialised world is age-related macular degeneration (AMD). It affects approximately three million people globally and accounts for around nine per cent of all blindness. These statistics are expected to double by the year 2020 as the world population increases. Scientists have been working on a new treatment for one type of the disease by using stem cells to repair damage to the retina, with positive results. Two women in America, both registered as blind, were given the new treatment and say their vision improved just weeks after they were injected with the stems cells. With such promising results for a condition which previously had no treatment, researchers are positive about the direction of the stem cell treatment.

B AMD usually affects the elderly although younger people can also develop a version of the condition. People with AMD typically have dark patches at the centre of their vision – the deterioration takes place over months and years. Although people with AMD do not lose their sight completely, they do lose central vision, which is vital for detailed work and activities like reading and driving, so that leading a normal life can become impossible over time. In the cases of the two American women, one was a graphic artist who began to lose her vision in her twenties. As she lost most of her central vision, she became unable to work, and then eventually it became impossible for her to recognise people or watch TV. The second woman became unable to recognise faces, had to stop driving and in the end could not leave her home.

C To understand AMD, we need to understand how our eyes work. Essentially a hollow ball, the eye has a number of layers. The outer layer consists of the white of the eye and the cornea. The cornea is the transparent area in front of the coloured iris and the black pupil at the centre of the iris. The middle layer of the eye includes blood vessels and the iris, which regulates the amount of light entering the eye. Just behind the iris is the lens, which focuses images on the retina, which covers the inside of the eyeball. The retina is the part of the eye that contains photoreceptors – cells that sense light. Nerve fibres from the photoreceptors in the retina join together to form the optic nerve, which then exits the eyeball and transmits visual information to the brain. The photoreceptors are of two types, rods and cones: the rods are sensitive to light intensity and the cones are sensitive to colour. They are mostly concentrated in the part of the retina called the macula. This is only the size of a grain of rice, but it is responsible for our central vision, most of our colour vision and our visual acuity, or sharpness of vision. The photoreceptor cells lie on a thin layer of cells that provide them with nutrients and carry away waste. When these underlying cells die or are damaged, the photoreceptor cells cannot function properly, and this leads to a loss of vision.

D Damage to the macula can result from a variety of factors. Age is the main risk factor but smoking also damages blood vessels and the structure of the eye. Smokers are three times more likely to develop AMD, as are people with poor diets. A diet lacking in fruit and vegetables

cannot help the body defend itself against free radical molecules which damage cells. Fruit and vegetables contain antioxidants, which protect the body against these free radicals. Finally, people with high blood pressure are one and a half times more likely to contract AMD, as are those people with a family history of the disease.

E The new treatment for AMD, developed by Dr Robert Lanza at Advanced Cell Technology, involves changing embryonic stem cells into more specialised eye stem cells and injecting 50,000 of them into the layer of the eye that supports the photoreceptors. A stem cell is a primary cell that has the ability to divide and form specialised cells that perform various functions within the body. First, a single stem cell was taken from a human embryo and grown into a colony of millions of cells. The cells were checked to make sure they were healthy. Then another procedure encouraged the stem cells to develop into the type of cell that forms the layer under the photoreceptor cells. The eye stem cells were injected below the retina through a cut into the eyeball, where they filled in the gaps left by dead and damaged cells and began functioning again.

F For the two patients, the results have been stunning. Tests have indicated that healthy cells have grown where the stem cells were injected. The first woman has regained enough vision to be able to cycle. Meanwhile, the second woman can read, cook and go shopping by herself again. The hope is that the treatment could be a way forward for other currently incurable conditions so that other people can lead normal lives again.

PART 3 — QUESTIONS

Questions 27-32

Reading Passage 3 has six paragraphs, A-F.

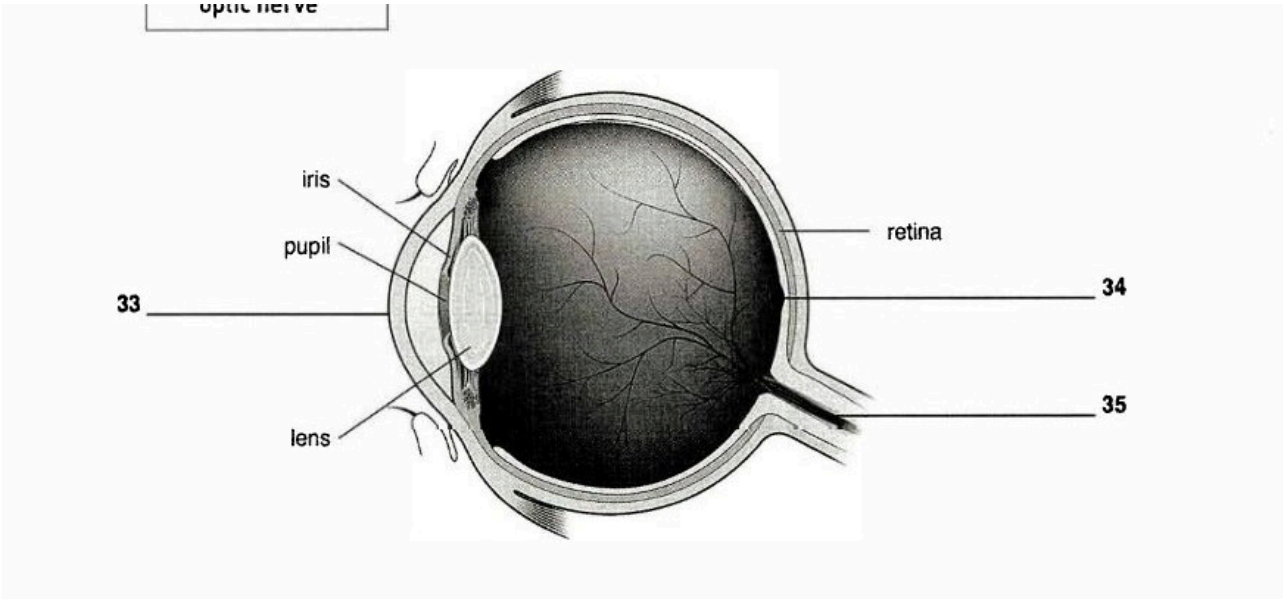
Which paragraphs, A-F, contain the following information?

Write the correct letter, A-F.

	A	B	C	D	E	F
27 the symptoms of AMD	○	○	○	○	○	○
28 details about the treatment process	○	○	○	○	○	○
29 factors that may contribute to AMD	○	○	○	○	○	○
30 the physical causes of AMD	○	○	○	○	○	○
31 potential future uses of stem cell treatment	○	○	○	○	○	○
32 the frequency of occurrence of AMD	○	○	○	○	○	○

Questions 33-35

Label the diagram below using words from the box.



macula | cornea | optic nerve

33 _____

34 _____

35 _____

Questions 36-40

Complete the summary below.

Choose NO MORE THAN TWO WORDS from the passage for each answer.

Age-related macular degeneration (AMD) is one of the main causes of loss of sight in the 36 _____. Although AMD can affect 37 _____, the majority of sufferers are older. Despite being very small, the macula is essential to our 38 _____ as well as detailed vision and some colour vision. AMD happens when the cells beneath the 39 _____ cells are damaged or die. A new treatment to repair the damaged cells involves 40 _____ 50,000 stem cells under the retina, after which they regenerate the damaged area.

Answer Key

#	Answer	Explanation
1	v	The phenomenon by which an organism produces one or more chemicals that influence the growth, survival and reproduction of other organisms is called allelopathy
2	vii	It can affect where certain species of plants grow, the fertility of competitor plants, the natural change of plant communities over time, which plant species are able to dominate a particular area, and the diversity of plants in an area It was also realised that some species could have beneficial effects on agricultural crop plants and the possible application of allelopathy became the subject of research
3	ix	For example, a small fast-growing tree found in Central America, sometimes called the ‘miracle tree’, contains a poison that slows the growth of other trees but does not affect its own seeds. Chemicals produced by this tree have been shown to improve the production of rice. Similarly, box elder – another tree – stimulates the growth of bluestem grass, which is a tall prairie grass found in the mid-western United States. Many weeds may use allelopathy to become ecologically successful; a study in China found that 25 out of 33 highly poisonous weeds had significant allelopathic properties
4	viii	There may be at least three applications of allelopathy to agriculture
5	iv	Despite the promising uses of allelopathic chemicals, agricultural scientists are still cautious Because the effects of allelopathic chemicals are not yet fully known, agricultural scientists will need to continue to study the biological war between plants
6	C	The phenomenon by which an organism produces one or more chemicals that influence the growth, survival and reproduction of other organisms is called allelopathy
7	C	It can affect where certain species of plants grow, the fertility of competitor plants, the natural change of plant communities over time, which plant species are able to dominate a particular area, and the diversity of plants in an area
8	A	Agricultural scientists are exploring the use of allelochemicals to regulate growth and to act as natural herbicides, thereby promoting sustainable agriculture by using these natural chemicals as an alternative to man-made chemicals

#	Answer	Explanation
9	**A**	For example, a small fast-growing tree found in Central America, sometimes called the ‘miracle tree’, contains a poison that slows the growth of other trees but does not affect its own seeds. Chemicals produced by this tree have been shown to improve the production of rice. Similarly, box elder – another tree – stimulates the growth of bluestem grass, which is a tall prairie grass found in the mid-western United States
10	**bred**	Firstly, the allelopathic properties of wild or cultivated plants may be bred into crop plants through genetic modification or traditional breeding methods to improve the release of desired allelochemicals and thus improve crop yield
11	**agricultural crop**	Secondly, a plant with strong allelopathic properties could be used to control weeds by planting it in rotation with an agricultural crop and then leaving it to rot and become part of the soil in order to inhibit the growth of weeds
12	**man-made**	Finally, naturally occurring allelopathic chemicals could be used in combination with man-made chemicals
13	**cautious**	Despite the promising uses of allelopathic chemicals, agricultural scientists are still cautious
14	**long time**	Thirdly, allelopathic chemicals could persist in the soil for a long time and may affect crops grown in the same field as the allelopathic plants at a later date
15	**TRUE**	This disorder interferes with daily activities such as sleeping and cooking, and in an extreme form it can harm one’s health, be a fire risk and even lead to death
16	**FALSE**	Twenty years ago, compulsive hoarding disorder was a relatively unexplored psychological phenomenon, often treated as an aspect of obsessive compulsive disorder – the compulsion to repeat a certain action over and over. However, it is now recognised as a separate disorder
17	**NOT GIVEN**	First of all, hoarding appears to run in families and may have genetic causes, with family members often having similar issues
18	**TRUE**	Humans, however, are the only species that take the strategy to extremes, sometimes filling their homes with so many objects that they eventually become uninhabitable
19	**NOT GIVEN**	People with compulsive hoarding disorder display increased activity in an area of the brain related to decision making when asked to organise objects. This increased activity is due to their greater emotional attachment to possessions

#	Answer	Explanation
20	**C**	While both kinds of hoarders of either gender find it nearly impossible to throw anything away, more men than women belong to the former category whilst more women fall into the worried-keeper group
21	**A**	She calls one kind impulsive-acquirers, who buy objects out of excitement and keep them because they are interested in them
22	**B**	The other type are the worried-keepers – the hoarders who acquire items passively and keep them in case they need them in future
23	**A**	She calls one kind impulsive-acquirers, who buy objects out of excitement and keep them because they are interested in them
24	**B**	Worried-keepers spend more time sorting and organising belongings
25	**A**	She calls one kind impulsive-acquirers, who buy objects out of excitement and keep them because they are interested in them. The other type are the worried-keepers – the hoarders who acquire items passively and keep them in case they need them in future While both kinds of hoarders of either gender find it nearly impossible to throw anything away, more men than women belong to the former category whilst more women fall into the worried-keeper group
26	**C**	It seems that people with hoarding behaviour see and treat objects differently and might have a different appreciation of the physical world
27	**B**	People with AMD typically have dark patches at the centre of their vision – the deterioration takes place over months and years. Although people with AMD do not lose their sight completely, they do lose central vision, which is vital for detailed work and activities like reading and driving, so that leading a normal life can become impossible over time
28	**E**	The new treatment for AMD, developed by Dr Robert Lanza at Advanced Cell Technology, involves changing embryonic stem cells into more specialised eye stem cells and injecting 50,000 of them into the layer of the eye that supports the photoreceptors. A stem cell is a primary cell that has the ability to divide and form specialised cells that perform various functions within the body. First, a single stem cell was taken from a human embryo and grown into a colony of millions of cells. The cells were checked to make sure they were healthy. Then another procedure encouraged the stem cells to develop into the type of cell that forms the layer under the photoreceptor cells. The eye stem cells were injected below the retina through a cut into the eyeball,

#	Answer	Explanation
		where they filled in the gaps left by dead and damaged cells and began functioning again
29	**D**	Damage to the macula can result from a variety of factors. Age is the main risk factor but smoking also damages blood vessels and the structure of the eye. Smokers are three times more likely to develop AMD, as are people with poor diets. A diet lacking in fruit and vegetables cannot help the body defend itself against free radical molecules which damage cells. Fruit and vegetables contain antioxidants, which protect the body against these free radicals. Finally, people with high blood pressure are one and a half times more likely to contract AMD, as are those people with a family history of the disease
30	**C**	When these underlying cells die or are damaged, the photoreceptor cells cannot function properly, and this leads to a loss of vision
31	**F**	The hope is that the treatment could be a way forward for other currently incurable conditions so that other people can lead normal lives again
32	**A**	It affects approximately three million people globally and accounts for around nine per cent of all blindness. These statistics are expected to double by the year 2020 as the world population increases
33	**cornea**	The outer layer consists of the white of the eye and the cornea. The cornea is the transparent area in front of the coloured iris and the black pupil at the centre of the iris
34	**macula**	They are mostly concentrated in the part of the retina called the macula. This is only the size of a grain of rice, but it is responsible for our central vision, most of our colour vision and our visual acuity, or sharpness of vision
35	**optic nerve**	Nerve fibres from the photoreceptors in the retina join together to form the optic nerve, which then exits the eyeball and transmits visual information to the brain
36	**(industrialised) world**	A major cause of blindness in the industrialised world is age-related macular degeneration (AMD)
37	**younger people**	AMD usually affects the elderly although younger people can also develop a version of the condition
38	**central vision**	This is only the size of a grain of rice, but it is responsible for our central vision, most of our colour vision and our visual acuity, or sharpness of vision

#	Answer	Explanation
39	**photoreceptor**	The photoreceptor cells lie on a thin layer of cells that provide them with nutrients and carry away waste. When these underlying cells die or are damaged, the photoreceptor cells cannot function properly, and this leads to a loss of vision
40	**injecting**	The new treatment for AMD, developed by Dr Robert Lanza at Advanced Cell Technology, involves changing embryonic stem cells into more specialised eye stem cells and injecting 50,000 of them into the layer of the eye that supports the photoreceptors

Test 40

PASSAGE 1

You should spend about 20 minutes on Questions 1-13, which are based on Reading Passage 1 below.

The Humungous Fungus

If you were asked what is the largest organism in the world, what would your answer be? A blue whale or a redwood tree? Or perhaps a giant squid? You would be wrong. But this is understandable because the world's largest organism is largely hidden from sight and was discovered only relatively recently in 1998 in the soil of Oregon's Blue Mountains. It is a fungus nearly ten square kilometres in area and one metre deep. It may be not only the largest single organism in the world but also one of the oldest. Based on its current rate of growth, the fungus is thought to be around 2,400 years old; however, it is also possible that it has been growing for the past 8,650 years. Commonly known as the honey mushroom, the only visible evidence for the organism on the surface is groups of golden mushrooms that grow in forests during the autumn.

The discovery of the organism came about when Catherine Parks, a scientist at the Pacific Northwest Research Station in Oregon, heard about trees dying from root rot in a forest east of Prairie City. Using aerial photographs, she identified an area of dying trees stretching over a 5.6 kilometre area. She then collected samples from the roots of these trees. When she looked at the samples, Parks was able to confirm that many of the samples were infected by the same organism; the fungus had grown bigger than any other creature known to science. A combination of good genes and stable conditions has enabled it to spread. In addition, the dry climate of the region makes it difficult for new fungi to establish themselves and compete with established fungi.

The technique for identifying the fungus was developed in 1992, when the first gigantic fungus was discovered in Michigan. A PhD biology student, Myron Smith, discovered it in a hardwood forest, when he and his team were trying to find the boundaries of individual fungi. After a year of testing, they still had not found the boundary of a particular fungus. The next thing they did was develop new genetic tests to see if the DNA from the samples was from a single individual fungus and not closely related individuals. Eventually, they realised that they had found a 1,500-year-old fungus that weighed over 90 metric tonnes.

The honey mushroom fungus is the cause of a root disease that kills many trees in the US and Canada. It has fine filaments or tubes that grow along tree roots and connect together to form a mat. The mat then slowly consumes the food source: it produces chemicals that digest carbohydrates from the tree and interfere with the tree's ability to absorb water and nutrients, eventually leading to the death of the host organism. As well as producing feeding filaments, the honey fungus is able to spread by producing string-like growths that reach out to find new potential food sources. The fungus spreads very slowly over hundreds of years, seeking out

food and killing its victims. Not surprisingly, forest service scientists are interested in learning to control the fungus but they also realise that it has an important role to play in the forest's ecology.

Fungi have both beneficial and harmful effects. They are essential because they decompose or break down waste matter on the forest floor and recycle nutrients. They are also central to many processes that are important to humans: they are vital to the process of making many kinds of food, including cheese, bread and wine. They have been used in the production of medicines, and particularly antibiotics. Even the golden mushrooms produced by the honey mushroom fungus are edible, though apparently not very tasty. On the other hand, fungi also form a major group of organisms harmful to plants and animals. Some mushrooms produced by fungi, such as the death cap mushroom and the fool's mushroom, are extremely poisonous to humans. Fungi can spoil food which has been stored, and of course they can kill trees and other plants.

Although to humans the idea of an enormous organism silently growing underground seems very strange, Tom Volk, a biology professor at the University of Wisconsin-La Crosse, explains that this may be in the nature of things for a fungus. 'We think that these things are not very rare,' he says. 'We think that they're in fact normal.'

PART 1 — QUESTIONS

Questions 1-7

Do the following statements agree with the information given in Reading Passage 1?

Write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

1 The fungus is perhaps the world's oldest living organism.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

2 Catherine Parks wanted to work in Oregon.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

3 Photos taken from the air helped her to locate the fungus.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

4 Myron Smith developed a test to see which organisms are related to fungi.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

5 The fungus damages trees by digesting carbohydrates that are part of the tree.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

6 The mushrooms from the honey mushroom fungus are poisonous to humans.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

7 The fungi are the largest group of organisms harmful to humans.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

Questions 8-13

Complete the summary below.

Choose NO MORE THAN TWO WORDS from the passage for each answer.

The largest known organism is a fungus, the only **8** _____ signs of which are mushrooms which appear in autumn. The fungus was discovered when a scientist was studying **9** _____ across a large area of forest in Oregon. The fungus is responsible for a(n) **10** _____ that kills the trees. Scientists determined that the fungus was a single organism by using **11** _____ to see if DNA samples were from the same individual. Although the concept of an enormous organism living **12** _____ is strange to humans, scientists think it may be **13** _____.

PASSAGE 2

You should spend about 20 minutes on Questions 14-26, which are based on Reading Passage 2 below.

Style Shifting

A How do we recognise an individual's personal style? We may initially think of the way people dress, their hairstyle, or even the vehicle they drive. But a crucial part of a person's style is the way they speak. How we talk can tell other people a lot about our self or who we would like to be. It can be a strong indication of where we are from, our level of education and our age, and it can also reveal a lot about how we view the situation in which we are speaking. Because we are largely unaware of our language production and language behaviour, we are often not conscious of features in our language that give away which social groups we belong to or even which values we hold. On the other hand, we may be very aware of the linguistic features that are characteristic of another social group, and we may consciously choose to adopt those language features to indicate that we are part of that group – or would like to be, at least. One thing is clear: an individual can change their linguistic style just as easily as they can change their fashion style or hairstyle, if not more easily. This ability to change language style is called style shifting and it happens all the time.

B Style shifting is not an addition to how we normally speak; in fact, you could say that it is impossible to speak without any style. When we speak, we are making several choices within fractions of a second; choices regarding vocabulary, pronunciation, intonation, grammar, sentence length and dialect. Mostly these choices are unconscious and have been learnt in childhood. The most noticeable of the language features that we learn unconsciously are determined by the place where we grow up and may include the vocabulary and grammar patterns of the dialect spoken in that area.

C Other choices are conscious and may be tied to our work; newsreaders or teachers, for example, may speak in a certain way due to their jobs. Personal language style is therefore an individual version of the typical behaviour of a social group and is acquired along with the culture of the group. Moreover, as we grow up and come into contact with other social groups, we continually adjust our speech to the audience, situation and topic.

D So, style shifting is the change we make, consciously or unconsciously, to our personal language depending on the circumstances. And how do we shift our linguistic style? The most common moves are from casual to formal or vice versa. Casual to formal shifts happen in specific contexts and in certain social groups. They are marked by a reduction in certain features of casual speech, such as the use of double negatives or slang words. They are also marked by hypercorrection. Hypercorrection is the over-use of a perceived rule from a more 'prestigious' variety of the language. An example from English is as follows: instead of saying 'There's no difference between you and me', a style shift to more formal speech would be 'There's no difference between you and I'. Conversely, a shift from formal to informal will be marked by greater use of informal speech features. Another type of style shift occurs when we change our style in response to our audience. An example is when an adult speaks to a baby in

'baby language', or again, when a newsreader stops using their personal speech style and begins to use their 'newsreader' style.

E There are a number of theories for why people change their personal speech style. The first was put forward by William Labov in the 1960s. Labov studied the speech patterns of people in New York, and in particular the pronunciation of /r/ – the inclusion of this sound being seen as high status. Labov found that because people were aware of the higher status of this sound, when they were asked to do a task that needed their attention such as reading aloud, they were more likely to produce the sound. On the other hand, when asked to do something which involved their emotions, like telling a story, they paid less attention to the sound. This is called the Attention to Speech model. Another theory, the Communication Accommodation Theory, developed by Howard Giles in the 1970s, says that style shift may be convergent, i.e. it moves closer to the speech style of the person or people with whom we are talking, or it may be divergent, i.e. it moves away from the other person's speech style. The shift is most commonly convergent when people find similarities in their background, social class or even shared interests and likes. In a later theory, the role of the other speaker or audience is emphasised further. In 1984 Allan Bell proposed the Audience Design Model. In this theory, individuals shift their style to win the approval of the people they are speaking to.

F Whatever reason is closest to the truth, whether we pay more attention to how we say something, express social solidarity or seek the approval of our audience, it is clear that everyone possesses the ability to change their language identity according to who they are speaking to and how they would like to project themselves.

PART 2 — QUESTIONS

Questions 14-19

Do the following statements agree with the information given in Reading Passage 2?

Write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

14 We are usually aware of the way we use language in our speech.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

15 If we wanted to, we could speak in a neutral style.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

16 Our language choices happen virtually instantaneously.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

17 Some people use certain styles of speech as part of their job.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

18 Informal to formal style shifting features a greater use of personal pronouns.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

19 Labov's experiments included asking people to read a text out loud.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

Questions 20-25

Classify the following as part of

Write the correct letter, A, B or C, next to Questions 20-25.

A. Attention Theory

B. Communication Accommodation Theory

C. Audience Design Model

	A	B	C
20 reading aloud	○	○	○
21 showing you are similar to someone by shifting your speech style to theirs	○	○	○
22 narrating	○	○	○
23 trying to gain your listener's acceptance	○	○	○
24 including a particular sound	○	○	○
25 moving your speech style away from the other person's	○	○	○

Questions 26-26

Which of the following is NOT an example of style shift?

26 Which of the following is NOT an example of style shift?

- **A** ○ being unaware of your speech style
- **B** ○ changing pronunciation features
- **C** ○ using unusual sentence patterns
- **D** ○ using dialect words in your speech

PASSAGE 3

You should spend about 20 minutes on Questions 27-40, which are based on Reading Passage 3 below.

Coronal Mass Ejections

Quebec, 13th March 1989: At 2.45 a.m. the province's entire power grid crashed. The blackout affected six million people in north-eastern Canada for up to nine hours, shutting schools and businesses, and closing down the Montreal Metro and Dorval Airport. Meanwhile, a red glow appeared in the night sky over most of the world, and as far south as Texas and Cuba people were able to see multi-coloured shifting lights in the sky. At the same time, in space, some satellites spun out of control for several hours. The blackout in Quebec was caused when the safety systems in the electricity network sensed a power surge caused by electric energy flowing through the ground. In fact, most of North America was experiencing increased electrical activity and around 200 power grid problems were reported within minutes of each other.

All the events had one source: days earlier a massive wave of energy had erupted from the sun and crashed into earth's magnetic field. These events are called coronal mass ejections (CMEs). CMEs are similar to solar flares in so far as they both produce high-energy particles that are dangerous to living organisms. They are both explosions on the surface of the sun that continue for minutes and even hours, and they can release enough energy to power the USA for a million years. They happen when areas of intense solar activity called sunspots appear and magnetic fields associated with sunspots connect, sending huge amounts of energy away from the sun. The most dangerous emissions from these ejections are protons (subatomic particles with a positive electrical charge) and X-rays.

The sun has an eleven-year cycle of activity in which the intensity of activity on its surface changes, the most intense period (called a solar maximum) being characterised by the appearance of sun spots and solar flares. Like solar flares, CMEs are more likely to be produced during the period of maximum solar activity. However, unlike solar flares, which produce high-energy particles near the surface of the sun, CMEs carry a large volume of material much further into interplanetary space. Fortunately, the iron core spinning at the centre of the Earth generates a magnetic force field around the planet called the magnetosphere. This magnetic field reaches out thousands of miles into space and protects us from all but the most violent CMEs. When the solar material collides with the earth's magnetosphere, it triggers geomagnetic storms of the kind that affected Quebec so dramatically.

CMEs and flares are classified as B, C, M or X according to how strong they are. Each letter of the scale is ten times more powerful than the previous one; so an X flare is ten times more powerful than an M and a hundred times more powerful than a C flare. Within each letter scale there is a finer gradation from 1 to 9. In reality, C class flares are too weak to affect the Earth; M class flares can cause radio blackouts in areas near the poles and cause weak radiation storms that can be dangerous for astronauts. However, the X class flares can cause considerable

damage at ground level. Although the flare that affected Quebec was strong, the most powerful flare ever recorded was in 2003 – a flare so powerful that it overloaded satellite sensors.

It will typically take a CME three to five days to affect the Earth after leaving the sun. Observing the ejection of CMEs from the sun provides early warning of geomagnetic storms. The Solar and Heliospheric Observatory, a European-built spacecraft that orbits the Earth, continuously observes the CMEs to determine if they are travelling in the direction of the Earth as damage to satellites and communications can be very serious. Communications satellites are generally the most exposed to damage from CMEs – these satellites are often in high orbits. When the solar material hits a satellite, it becomes charged with electricity and a component can become damaged by the current or by high-energy particles penetrating the satellite. As we have become more and more dependent upon high technology and other systems that can be affected by electrical currents and energy particles, the danger from flares and CMEs has intensified. But could a solar flare or CME be large enough to cause a global disaster? It is impossible to give an answer.

PART 3 — QUESTIONS

Questions 27-30

Choose the correct letter, A, B or C.

27 What did the CME of 13th March 1989 NOT do?

- **A** ○ disrupt daily life for some Canadians
- **B** ○ cause an unusual phenomenon in Texas
- **C** ○ stop all flights across Canada
- **D** ○ increase ground electricity in North America

28 What produces the magnetosphere?

- **A** ○ high-energy particles
- **B** ○ geomagnetic storms
- **C** ○ metal at the centre of the Earth
- **D** ○ sunspots

29 What does the Solar and Heliospheric Observatory do?

- **A** ○ It tells scientists when a CME is approaching the Earth.
- **B** ○ It communicates with other satellites orbiting the Earth.
- **C** ○ It tells scientists if a CME will cause a global disaster.
- **D** ○ It circles the sun in a high orbit.

30 How can CMEs damage satellites?

- **A** ○ by sending them out of high orbit
- **B** ○ by bombarding them with high-energy particles
- **C** ○ by stopping communication between them and the sun
- **D** ○ by melting components inside them

Questions 31-35

Which characterises the following?

Write the correct letter, A, B or C, next to Questions 31-35.

A. solar flare

B. CME

C. both

	A	B	C
31 It is produced during the solar maximum.	○	○	○
32 It carries material far into interplanetary space.	○	○	○
33 It produces high-energy particles.	○	○	○
34 It may affect the Earth.	○	○	○
35 It happens near the sun's surface.	○	○	○

Questions 36-40

Which flares are mentioned in the text as having the effects below?

Write the correct letter, A, B, or C, next to Questions 36-40.

A. C flares

B. M flares

C. X flares

	A	B	C
36 There would be damage to electrical equipment on the Earth's surface.	○	○	○
37 You couldn't listen to the radio in certain places.	○	○	○
38 You wouldn't notice the effect.	○	○	○

	A	B	C
39 You would be harmed if you were working in space.	○	○	○
40 It would seriously damage satellite equipment.	○	○	○

Answer Key

#	Answer	Explanation
1	**TRUE**	It may be not only the largest single organism in the world but also one of the oldest. Based on its current rate of growth, the fungus is thought to be around 2,400 years old; however, it is also possible that it has been growing for the past 8,650 years
2	**NOT GIVEN**	The discovery of the organism came about when Catherine Parks, a scientist at the Pacific Northwest Research Station in Oregon, heard about trees dying from root rot in a forest east of Prairie City
3	**TRUE**	Using aerial photographs, she identified an area of dying trees stretching over a 5.6 kilometre area
4	**FALSE**	The next thing they did was develop new genetic tests to see if the DNA from the samples was from a single individual fungus and not closely related individuals
5	**TRUE**	The mat then slowly consumes the food source: it produces chemicals that digest carbohydrates from the tree and interfere with the tree's ability to absorb water and nutrients, eventually leading to the death of the host organism
6	**FALSE**	Even the golden mushrooms produced by the honey mushroom fungus are edible, though apparently not very tasty
7	**NOT GIVEN**	On the other hand, fungi also form a major group of organisms harmful to plants and animals. Some mushrooms produced by fungi, such as the death cap mushroom and the fool's mushroom, are extremely poisonous to humans
8	**visible**	Commonly known as the honey mushroom, the only visible evidence for the organism on the surface is groups of golden mushrooms that grow in forests during the autumn
9	**trees dying/dying trees**	Using aerial photographs, she identified an area of dying trees stretching over a 5.6 kilometre area
10	**root disease**	The honey mushroom fungus is the cause of a root disease that kills many trees in the US and Canada
11	**genetic tests**	The next thing they did was develop new genetic tests to see if the DNA from the samples was from a single individual fungus and not closely related individuals
12	**underground**	Although to humans the idea of an enormous organism silently growing underground seems very strange, Tom Volk, a biology

#	Answer	Explanation
		professor at the University of Wisconsin-La Crosse, explains that this may be in the nature of things for a fungus
13	**normal**	'We think that these things are not very rare,' he says. 'We think that they're in fact normal.'
14	**FALSE**	Because we are largely unaware of our language production and language behaviour, we are often not conscious of features in our language that give away which social groups we belong to or even which values we hold
15	**FALSE**	Style shifting is not an addition to how we normally speak; in fact, you could say that it is impossible to speak without any style
16	**TRUE**	When we speak, we are making several choices within fractions of a second; choices regarding vocabulary, pronunciation, intonation, grammar, sentence length and dialect
17	**TRUE**	Other choices are conscious and may be tied to our work; newsreaders or teachers, for example, may speak in a certain way due to their jobs
18	**NOT GIVEN**	They are marked by a reduction in certain features of casual speech, such as the use of double negatives or slang words. They are also marked by hypercorrection
19	**TRUE**	Labov found that because people were aware of the higher status of this sound, when they were asked to do a task that needed their attention such as reading aloud, they were more likely to produce the sound
20	**A**	Labov found that because people were aware of the higher status of this sound, when they were asked to do a task that needed their attention such as reading aloud, they were more likely to produce the sound. On the other hand, when asked to do something which involved their emotions, like telling a story, they paid less attention to the sound. This is called the Attention to Speech model
21	**B**	Another theory, the Communication Accommodation Theory, developed by Howard Giles in the 1970s, says that style shift may be convergent, i.e. it moves closer to the speech style of the person or people with whom we are talking, or it may be divergent, i.e. it moves away from the other person's speech style. The shift is most commonly convergent when people find similarities in their background, social class or even shared interests and likes
22	**A**	Labov found that because people were aware of the higher status of this sound, when they were asked to do a task that needed their attention such as reading aloud, they were more likely to

#	Answer	Explanation
		produce the sound. On the other hand, when asked to do something which involved their emotions, like telling a story, they paid less attention to the sound. This is called the Attention to Speech model
23	**C**	In 1984 Allan Bell proposed the Audience Design Model. In this theory, individuals shift their style to win the approval of the people they are speaking to
24	**A**	Labov studied the speech patterns of people in New York, and in particular the pronunciation of /r/ – the inclusion of this sound being seen as high status. Labov found that because people were aware of the higher status of this sound, when they were asked to do a task that needed their attention such as reading aloud, they were more likely to produce the sound. On the other hand, when asked to do something which involved their emotions, like telling a story, they paid less attention to the sound. This is called the Attention to Speech model
25	**B**	Another theory, the Communication Accommodation Theory, developed by Howard Giles in the 1970s, says that style shift may be convergent, i.e. it moves closer to the speech style of the person or people with whom we are talking, or it may be divergent, i.e. it moves away from the other person's speech style
26	**A**	So, style shifting is the change we make, consciously or unconsciously, to our personal language depending on the circumstances
27	**C**	The blackout affected six million people in north-eastern Canada for up to nine hours, shutting schools and businesses, and closing down the Montreal Metro and Dorval Airport
28	**C**	Fortunately, the iron core spinning at the centre of the Earth generates a magnetic force field around the planet called the magnetosphere
29	**A**	The Solar and Heliospheric Observatory, a European-built spacecraft that orbits the Earth, continuously observes the CMEs to determine if they are travelling in the direction of the Earth as damage to satellites and communications can be very serious
30	**B**	When the solar material hits a satellite, it becomes charged with electricity and a component can become damaged by the current or by high-energy particles penetrating the satellite
31	**C**	the most intense period (called a solar maximum) being characterised by the appearance of sun spots and solar flares. Like solar flares, CMEs are more likely to be produced during the period of maximum solar activity

#	Answer	Explanation
32	**B**	However, unlike solar flares, which produce high-energy particles near the surface of the sun, CMEs carry a large volume of material much further into interplanetary space
33	**C**	CMEs are similar to solar flares in so far as they both produce high-energy particles that are dangerous to living organisms
34	**C**	As we have become more and more dependent upon high technology and other systems that can be affected by electrical currents and energy particles, the danger from flares and CMEs has intensified
35	**A**	However, unlike solar flares, which produce high-energy particles near the surface of the sun, CMEs carry a large volume of material much further into interplanetary space
36	**C**	However, the X class flares can cause considerable damage at ground level
37	**B**	M class flares can cause radio blackouts in areas near the poles
38	**A**	In reality, C class flares are too weak to affect the Earth
39	**B**	M class flares can cause radio blackouts in areas near the poles and cause weak radiation storms that can be dangerous for astronauts
40	**C**	Although the flare that affected Quebec was strong, the most powerful flare ever recorded was in 2003 – a flare so powerful that it overloaded satellite sensors

Test 41

PASSAGE 1

You should spend about 20 minutes on Questions 1-12, which are based on Reading Passage 1 below.

READING PASSAGE 1

1

A A condition that causes children to dislike being hugged and sometimes reject all physical affection is closer to being understood following research into the part of the brain responsible for our senses. Scientists at Northwestern University, Illinois, and the University of Edinburgh explored fragile X syndrome, a condition associated with hypersensitivity to sounds, touch, smells and visual stimuli that can result in social withdrawal or anxiety. Hypersensitivity is a condition in which the person affected responds in an excessive way to contact with the world around them. Some sufferers are even hypersensitive to material on their skin.

2

B The scientists found that critical phases in the brain's development may be wrongly timed in people with the condition. This may result in delayed communication between certain neurons in the brain. By recording electrical signals in the brains of mice, bred to exactly copy the effects of the condition, the researchers found that connections in the brain's sensory cortex were late to develop fully. The study, published in the journal *Neuron*, found that normal neural connections in the sensory cortex occur much earlier than previously thought: in the first week of pregnancy in mice, which is equivalent to the middle of the second trimester (or fifth month) of pregnancy in humans. In fragile X syndrome, the mistiming also has a domino effect, causing further problems with the correct wiring of the brain. The hope is that by understanding how and when the functions of the brain are affected in fragile X syndrome, a therapy may become possible.

3

C 'There is a "critical period" during development, when the brain is very plastic and is changing rapidly,' said Anis Contractor, from the Feinberg School of Medicine at Northwestern University. 'All the elements of this rapid development have to be coordinated so that the brain becomes wired correctly and therefore functions properly.' People with the syndrome have cognitive problems as well as sensory problems that make them physically weaker. 'They have tactile defensiveness,' Dr Contractor said. 'They don't look in people's eyes, they won't hug their parents, and they are hypersensitive to touch and sound. All of this causes anxiety for family and friends as well as for the fragile X patients themselves.' Peter Kind, who led the study

at the University of Edinburgh, said: 'We know there are key windows during which the brain develops, both in the womb and afterwards. The general principle is that if these time windows have shifted, then that could explain the cognitive problems.'

4

D Professor Kind said that this could be demonstrated by the fact that a child with a cataract (a medical condition in which the lens of the eye becomes less and less transparent) that was not corrected would become permanently blind in the affected eye, whereas an adult would be able to regain their sight after an operation. 'We've learnt that these changes happen much earlier than previously thought, which gives valuable insight into when we should begin therapeutic intervention for people with these conditions,' he said. 'It also has implications for the treatment of autism since the changes in the brains of people with fragile X syndrome and autistic people are thought to significantly overlap.' Autism, as many people know, is a disability that affects how a person communicates with and relates to other people, and how they make sense of the world.

E Fragile X syndrome is as common as cystic fibrosis, a genetic disorder that commonly affects the lungs and causes breathing difficulties, and that affects about 1 in 4,000 males and 1 in 8,000 females worldwide. The Fragile X Society believes that there are many people who have the fragile X syndrome but have never been diagnosed. It shows up in early infancy and progressively worsens throughout childhood, causing intellectual disability as well as social, language and behavioural problems.

5

F Fragile X syndrome is caused by a gene mutation on the X chromosome - one of the two chromosomes that determine the gender or sex of a person. The mutation interferes in the production of a protein called fragile X mental retardation protein. Fragile X is so-named because the X chromosome appears broken or kinked. Tim Potter, of the Fragile X Society, said: 'We welcome any research that helps us understand fragile X and which may open the way to reversing the effects or preventing them ever happening.'

PART 1 — QUESTIONS

Questions 1-5

Reading Passage 1 has six paragraphs, A-F.

Choose the correct heading for paragraphs A, B, C, D and F from the list of headings below.

Write the correct number, i-ix, next to Questions 1-5.

i. **How fragile X syndrome was discovered**

ii. **The genetic basis of fragile X syndrome**

iii. **Fragile X syndrome and developmental delays in the brain**

iv. **New treatments for fragile X syndrome**

v. **The comparative frequency of fragile X syndrome**

vi. **Research into understanding fragile X syndrome**

vii. **Reasons for the increase of fragile X syndrome**

viii. **Other conditions related to cognitive development**

ix. **Examples of the symptoms of Fragile X syndrome**

Questions 6-11

Complete the summary of paragraphs A and B below.

Choose NO MORE THAN TWO WORDS from the passage for each answer.

People with fragile X syndrome are extremely sensitive to sensory **6** _____ . Some sufferers are even **7** _____ to clothing. The condition is the result of connections within the **8** _____ of the brain not being made at the right time. Instead, the **9** _____ of people with the condition establish connections later than should happen, which is normally in the second **10** _____ of pregnancy in humans. By understanding how the brain's **11** _____ are affected, scientists hope to develop a treatment.

Questions 12-12

Complete the title of Reading Passage 3.

Choose the correct letter, A, B, C or D.

12 Study reveals common bond of children who

A ○ are autistic.

B ○ hate to be hugged.

C ○ have incomplete X chromosomes.

PASSAGE 2

You should spend about 20 minutes on Questions 13-26, which are based on Reading Passage 2 below.

Mutualism

Mutualism is an association between individuals belonging to two different species that benefit each other. There are numerous examples of this: the way flowers rely on insects to pollinate them or even how we humans rely on bacteria within our digestive system to break down our food.

One of the most visible forms of mutualism can be found in the pampas grasslands of Argentina, where organisms belonging to two different species work together not only to benefit each other but also to change the ecosystem around them. Grasscutter ants have been instrumental in shaping the landscape of the pampas grasslands - in fact, the landscape has been created almost entirely by the ants. Although they are only 1.5 cm long, they are one of the few creatures capable of shaping their own environment and one of the few living creatures apart from humans that cultivate their own food. The ants harvest the grasslands to supply their colony with grass. Each year over 0.5 tonnes of grass are harvested by a single colony. However, grass consists largely of cellulose, which the ants cannot digest, so the ants have developed a mutualistic relationship with an organism that can digest it. Deep inside the ant nests is a fungus that is able to grow on the compost produced by the grass. The fungus is unique to the habitat inside the ants' nest and it produces edible gardens for the ants. The relationship is so successful that a single colony can consist of up to eight million ants.

One of the reasons for the ants' success is the sophistication of their social organisation: they are all members of a single society but there is a division of labour within it. There are three main castes: the queen, the soldiers (or majors) and the worker ants. The worker ants are further divided into categories: the minims (the smallest ants), the minors and the mediae, each with different duties. The soldier ants defend the colony against physical threats. They also clear the paths for the other workers. The mediae are the foraging ants that look for grass to cut up and take back to the nest. Once the grass has been harvested, the forager ants carry it to the nest by following a chemical trail. But often they are not alone: minims ride on them or on the grass in order to protect them from a particular species of fly that parasitises the foragers. As soon as the grass leaves arrive at the nest, the forager ants pass them to smaller gardener ants, which cut up the leaves into smaller and smaller pieces until they are small enough to feed to the fungus. They then pass the tiny pieces on to the smallest ants, which feed the grass to the fungus and tend the fungal gardens.

A very important function of the smallest ants is to keep the fungus healthy. They do this by carefully inspecting each piece of grass leaf and making sure that it is free from other fungi or pests. In fact, the mutualistic relationship is supplemented by bacteria that live on the ants and give out chemicals that kill microbes harmful to the fungus. The relationship between the fungus and the ants is so developed that the grasscutter ants are sensitive to the fungus's reaction to different plants; if a particular plant is poisonous to the fungus, the ants no longer

collect it. Waste disposal is another serious concern. Waste is collected by waste-disposer ants, which tend to be the older ants, thus ensuring that the younger ones can tend to other work. The waste-disposer ants remove waste (including dead ants) from the nest and take it underground into the deepest tunnels, where they aid its decomposition by moving it around.

Because the fungus at the heart of the colony nest is a living and breathing organism, it produces carbon dioxide - a very toxic gas. The ant nest is a masterpiece of construction, carefully made to keep air circulating in order to prevent suffocation through the build-up of carbon dioxide. The nest has two methods of air circulation. Firstly, the hot air produced by the fungal gardens at the centre of the nest flows up through a central tunnel and draws in cooler, cleaner air from the outside passages. The second method involves a series of towers at the top of the nest. When the wind blows over the towers, it draws out old air and fresh air rushes into the nest from nest holes that extend outwards from the main nest. A nest can measure up to 30 metres across, and other mounds extend away from the central nest for up to 80 metres. As the nest also dominates the underground world, often extending seven metres down, the rapid flow of air through the nest is essential to the health of the inhabitants and their garden.

PART 2 — QUESTIONS

Questions 13-19

Do the following statements agree with the information given in Reading Passage 2?

Write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

13 Grasscutter ants are one of a small group of creatures that use other organisms to produce food.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

14 The fungus that grows in the nests of grasscutter ants is not found in any other kind of environment.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

15 Grasscutter ants cut the grass into very small pieces so they can eat it.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

16 Forager ants are the smallest ants.

- **A** ○ TRUE
- **B** ○ FALSE

C ○ NOT GIVEN

17 Grasscutter ants can carry loads much heavier than their body weight.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

18 The ants never collect plants that might harm the fungus.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

19 The older ants are responsible for getting rid of waste.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

Questions 20-23

Classify the following as typical of

Write the correct letter, A, B or C, next to Questions 20-23.

A. majors

B. mediae

C. minims

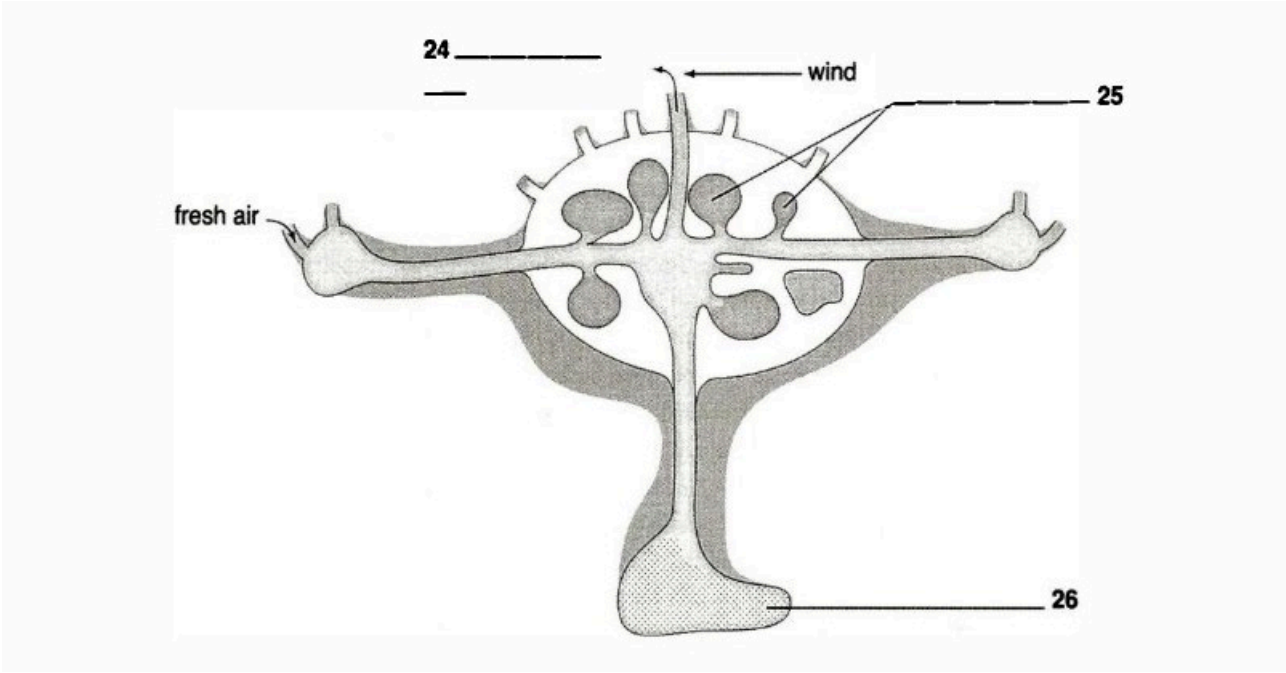
	A	B	C
20 take grass back to the colony	○	○	○
21 protect the colony from invaders	○	○	○
22 make sure the way to the food is clear	○	○	○

	A	B	C
23 farm the fungus	○	○	○

Questions 24-26

Label the diagram below using words from the box.

Write the correct letter, A-C, in spaces 24-26.



- 24 _____
- 25 _____
- 26 _____

A. **fungal gardens**

B. **waste tunnel**

C. **carbon dioxide**

PASSAGE 3

You should spend about 20 minutes on Questions 27-40, which are based on Reading Passage 3 below.

READING PASSAGE 3

Is it really true that human adults are less able to learn as they grow older? Traditionally, the brain was thought to be 'completed' at the latest by the start of adulthood. During adulthood the brain was viewed as relatively stable until at last the aging brain started to decline. We have around 86 billion neurons at birth, and that's it. Or is it? Until two decades ago, it was thought that new neurons - the cells that carry messages between the brain and other parts of the body - did not grow in adults. Moreover, it was believed that functions in the brain were fixed or localised in distinct areas, one common assumption being that language functions resided solely in the left hemisphere of the brain. The functions were fixed in childhood and did not change.

But this is not strictly true. Research has shown that adult brains are not fixed, and nor are they degenerating or dying as we grow older. In fact, the opposite seems to be the case: neurons are dying and being regenerated all the time and new experiences create new connections between neurons. Furthermore, when the brain suffers damage, it has the ability to shift brain functions to other parts of the brain.

The first evidence that refuted the idea that the brain was a stable organ was produced over 30 years ago. Fernando Nottebohm's study of male songbirds at The Rockefeller University showed that new neurons would grow when a bird learnt a new song. And more recently, evidence from studies done at Wayne State University has shown that physical exercise or lack of it is a factor in remodelling the brain. Two regions of the brain are capable of producing new neurons: the hippocampus and the olfactory cortex. In particular, the hippocampus is extremely important in turning short-term memories into long-term memories. It appears that new neurons regularly grow and move into the hippocampus. Conversely, the loss of brain tissue, most often associated with brain damage or illness can also have a positive function. We know that most of the neurons that die off in children and adults are the ones that are not effective or are not needed. In short, the brain needs to operate at maximum efficiency and neurons which become unused are discarded. So, far from being a stable organ, the brain is constantly changing, losing what is not needed and developing what is needed.

A landmark study by neuroscientist Dr Eleanor Maguire and her colleagues at University College, London confirmed findings from other studies which reveal that when humans spend time repeating a particular skill, the area of the brain associated with that skill becomes better developed. For four years, Dr Maguire and her team followed a group of 79 London taxi drivers who shared certain characteristics including age, gender and education. They used magnetic resonance imaging (MRI) to map changes to their posterior hippocampi. The hippocampus plays a major role in short-term memory and spatial navigation, both of which are very important to the work of taxi drivers, and London taxi drivers in particular. To become a taxi driver in London, you need to learn 'the Knowledge' - a detailed understanding of the streets in

central London as well as tourist spots and other places of interest. Gaining 'the Knowledge' takes on average three to four years, at the end of which taxi drivers have to take a test that only fifty per cent of candidates pass.

At the start of the study, the taxi drivers had similar sized hippocampi but after four years of intensive spatial and memory training, Dr Maguire found that the taxi drivers who successfully passed their tests had more developed hippocampi than those who failed. This was confirmed by a series of memory tests and MRI images which showed that certain parts of their brains had developed over time. Furthermore, other experimental studies over the last few decades have shown that the adult brain can change its structure and function massively. In a 1982 study carried out by Jon Kaas at Vanderbilt University, changes in brain patterns were noted in people whose limbs had been amputated or who suffered nerve damage. Since then, it has become clear that the living brain is constantly changing depending on external experiences. As Boston University neurobiologist Howard Eichenbaum (commenting on Dr Maguire's research) stated: '... you can produce profound changes in the brain with training. That's a big deal.'

PART 3 — QUESTIONS

Questions 27-32

Complete the sentences below.

Choose NO MORE THAN THREE WORDS or a NUMBER from the passage for each answer.

- Humans are born with about **27** _____ neurons.
- It used to be believed that neurons **28** _____ in humans after a certain age.
- If the brain is damaged, it can **29** _____ to other areas within the brain.
- The hippocampus, which plays a role in creating **30** _____ from short-term memories, has been identified as being one of the parts of the brain that can grow neurons.
- The hippocampus also plays an important part in **31** _____ - a key skill for taxi drivers in London.
- Taxi drivers who successfully passed 'the Knowledge' had **32** _____ hippocampi than those who did not pass.

Questions 33-36

Look at the people and institutions (Questions 33-36) and the list of findings below.

Match each person or institution with their findings.

Write the correct letter, A-G, next to Questions 33-36. Note: There are three more findings than you will need.

A. The hippocampus stores memories.

B. Song birds grew neurons when they learnt a new song.

C. The olfactory cortex is capable of growing new cells.

D. Being active changes the brain.

E. The brain is constantly changing its function and structure.

F. Training for a test enlarged a part of the brain in some people.

G. Brain patterns changed when a person's arms or legs were cut off.

	A	B	C	D	E	F	G
33 Fernando Nottebohm, The Rockefeller University	○	○	○	○	○	○	○
34 Jon Kaas, Vanderbilt University	○	○	○	○	○	○	○
35 Eleanor Maguire, University College, London	○	○	○	○	○	○	○
36 Wayne State University	○	○	○	○	○	○	○

Questions 37-40

Do the following statements agree with the information given in Reading Passage 3?

Write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

37 When you do something over and over again, the part of the brain controlling the skill grows.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

38 'The Knowledge' helps taxi drivers to take people to places in the shortest time.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

39 Dr Maguire's study was conducted on people with similar characteristics.

- **A** ○ TRUE
- **B** ○ FALSE

C ○ NOT GIVEN

40 Dr Maguire relied mainly on intelligence tests in her research.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

Answer Key

#	Answer	Explanation
1	**vi**	A condition that causes children to dislike being hugged and sometimes reject all physical affection is closer to being understood following research into the part of the brain responsible for our senses
2	**iii**	The scientists found that critical phases in the brain's development may be wrongly timed in people with the condition. This may result in delayed communication between certain neurons in the brain. By recording electrical signals in the brains of mice, bred to exactly copy the effects of the condition, the researchers found that connections in the brain's sensory cortex were late to develop fully
3	**ix**	'They have tactile defensiveness,' Dr Contractor said. 'They don't look in people's eyes, they won't hug their parents, and they are hypersensitive to touch and sound.'
4	**viii**	Professor Kind said that this could be demonstrated by the fact that a child with a cataract (a medical condition in which the lens of the eye becomes less and less transparent) that was not corrected would become permanently blind in the affected eye, whereas an adult would be able to regain their sight after an operation It also has implications for the treatment of autism since the changes in the brains of people with fragile X syndrome and autistic people are thought to significantly overlap
5	**ii**	Fragile X syndrome is caused by a gene mutation on the X chromosome – one of the two chromosomes that determine the gender or sex of a person
6	**stimuli**	Scientists at Northwestern University, Illinois, and the University of Edinburgh explored fragile X syndrome, a condition associated with hypersensitivity to sounds, touch, smells and visual stimuli that can result in social withdrawal or anxiety
7	**hypersensitive**	Some sufferers are even hypersensitive to material on their skin
8	**sensory cortex**	the researchers found that connections in the brain's sensory cortex were late to develop fully
9	**neurons**	This may result in delayed communication between certain neurons in the brain
10	**trimester**	The study, published in the journal Neuron, found that normal neural connections in the sensory cortex occur much earlier than

#	Answer	Explanation
		previously thought: in the first week of pregnancy in mice, which is equivalent to the middle of the second trimester (or fifth month) of pregnancy in humans
11	**functions**	The hope is that by understanding how and when the functions of the brain are affected in fragile X syndrome, a therapy may become possible
12	**B**	A condition that causes children to dislike being hugged and sometimes reject all physical affection is closer to being understood following research into the part of the brain responsible for our senses
13	**TRUE**	Although they are only 1.5 cm long, they are one of the few creatures capable of shaping their own environment and one of the few living creatures apart from humans that cultivate their own food the ants have developed a mutualistic relationship with an organism that can digest it. Deep inside the ant nests is a fungus that is able to grow on the compost produced by the grass
14	**TRUE**	The fungus is unique to the habitat inside the ants' nest and it produces edible gardens for the ants
15	**FALSE**	As soon as the grass leaves arrive at the nest, the forager ants pass them to smaller gardener ants, which cut up the leaves into smaller and smaller pieces until they are small enough to feed to the fungus
16	**FALSE**	The worker ants are further divided into categories: the minims (the smallest ants), the minors and the mediae, each with different duties The mediae are the foraging ants that look for grass to cut up and take back to the nest
17	**NOT GIVEN**	Once the grass has been harvested, the forager ants carry it to the nest by following a chemical trail. But often they are not alone: minims ride on them or on the grass in order to protect them from a particular species of fly that parasitises the foragers
18	**FALSE**	the grasscutter ants are sensitive to the fungus's reaction to different plants; if a particular plant is poisonous to the fungus, the ants no longer collect it
19	**TRUE**	Waste is collected by waste-disposer ants, which tend to be the older ants, thus ensuring that the younger ones can tend to other work
20	**B**	The mediae are the foraging ants that look for grass to cut up and take back to the nest
21	**A**	The soldier ants defend the colony against physical threats

#	Answer	Explanation
22	**A**	There are three main castes: the queen, the soldiers (or majors) and the worker ants The soldier ants defend the colony against physical threats. They also clear the paths for the other workers
23	**C**	The worker ants are further divided into categories: the minims (the smallest ants), the minors and the mediae, each with different duties They then pass the tiny pieces on to the smallest ants, which feed the grass to the fungus and tend the fungal gardens
24	**C**	Because the fungus at the heart of the colony nest is a living and breathing organism, it produces carbon dioxide – a very toxic gas the hot air produced by the fungal gardens at the centre of the nest flows up through a central tunnel
25	**A**	Firstly, the hot air produced by the fungal gardens at the centre of the nest flows up through a central tunnel and draws in cooler, cleaner air from the outside passages
26	**B**	The waste-disposer ants remove waste (including dead ants) from the nest and take it underground into the deepest tunnels, where they aid its decomposition by moving it around
27	**86 / eighty-six billion**	We have around 86 billion neurons at birth, and that's it
28	**did not grow**	Until two decades ago, it was thought that new neurons – the cells that carry messages between the brain and other parts of the body – did not grow in adults
29	**shift (brain) functions**	Furthermore, when the brain suffers damage, it has the ability to shift brain functions to other parts of the brain
30	**long-term (memories)**	Two regions of the brain are capable of producing new neurons: the hippocampus and the olfactory cortex. In particular, the hippocampus is extremely important in turning short-term memories into long-term memories
31	**spatial navigation**	The hippocampus plays a major role in short-term memory and spatial navigation, both of which are very important to the work of taxi drivers, and London taxi drivers in particular
32	**more developed / better developed**	At the start of the study, the taxi drivers had similar sized hippocampi but after four years of intensive spatial and memory training, Dr Maguire found that the taxi drivers who successfully passed their tests had more developed hippocampi than those who failed
33	**B**	Fernando Nottebohm's study of male songbirds at The Rockefeller University showed that new neurons would grow when a bird learnt a new song

#	Answer	Explanation
34	**G**	In a 1982 study carried out by Jon Kaas at Vanderbilt University, changes in brain patterns were noted in people whose limbs had been amputated or who suffered nerve damage
35	**F**	At the start of the study, the taxi drivers had similar sized hippocampi but after four years of intensive spatial and memory training, Dr Maguire found that the taxi drivers who successfully passed their tests had more developed hippocampi than those who failed
36	**D**	And more recently, evidence from studies done at Wayne State University has shown that physical exercise or lack of it is a factor in remodelling the brain
37	**TRUE**	A landmark study by neuroscientist Dr Eleanor Maguire and her colleagues at University College, London confirmed findings from other studies which reveal that when humans spend time repeating a particular skill, the area of the brain associated with that skill becomes better developed
38	**NOT GIVEN**	To become a taxi driver in London, you need to learn ‘the Knowledge’ – a detailed understanding of the streets in central London as well as tourist spots and other places of interest
39	**TRUE**	For four years, Dr Maguire and her team followed a group of 79 London taxi drivers who shared certain characteristics including age, gender and education
40	**FALSE**	They used magnetic resonance imaging (MRI) to map changes to their posterior hippocampi This was confirmed by a series of memory tests and MRI images which showed that certain parts of their brains had developed over time

Test 42

PASSAGE 1

You should spend about 20 minutes on Questions 1–13, which are based on Reading Passage 1 below.

Meteor Strikes

On 15 February 2013, just after dawn, the sleepy Russian city of Chelyabinsk was woken by the biggest meteor strike on Earth in over 100 years. Several people videoed the meteor as it crashed through Earth's atmosphere, passing close above the city and giving scientists vital clues as to where it had come from and how it had travelled to Earth. To the people of Chelyabinsk, the meteor shone 30 times brighter than the sun and had 20–30 times more energy than the atomic bomb dropped on Hiroshima. The meteor did not hit the ground, but due to its enormous speed exploded 29.7 kilometres above the ground, producing a bright flash, a cloud of hot dust and gas, many smaller fragments of meteor and a powerful shockwave. The latter was so strong that it knocked people off their feet and blew out the windows of homes, shops and factories. 1,500 people went to hospital with injuries indirectly caused by the strike, but matters could have been far worse if the meteor had made contact with the Earth.

The meteor was not an uncommon rock. From studying videos of the meteor's flight, scientists have concluded that it originated in the asteroid belt located between the orbits of Mars and Jupiter. At the time it entered Earth's atmosphere, it weighed between 12,000 and 13,000 metric tonnes and was 10 metres in diameter. It crashed through the upper atmosphere at around 19 kilometres a second – above 50 times the speed of sound, fracturing at an altitude of between 45 and 50 kilometres. Such events happen on average every 10 or so years, mainly over oceans or unpopulated areas. This time the strike was over a city and observed by many people, reminding us how common these occurrences are.

A meteor strike has several phases. Moving through space, a meteor's temperature can be around –100°C. It travels around 5 kilometres per second until Earth's gravity accelerates it to 17 kilometres a second. It begins to encounter the atmosphere 140 kilometres above the Earth but there is little air resistance until about three seconds later, when it reaches 100 kilometres above the ground. At this point the air becomes dense, causing the meteor to glow as the material on its surface melts. The mix of burning gas and dust creates a fireball as the meteor loses 3 to 6 millimetres of surface mass per second as it is heated to over 1,800°C. The rate of loss of material through heat is so rapid that the core temperature of the meteor is still very low while at the same time a tail of vaporised dust and gas becomes visible. These tails can often be seen for up to 45 minutes and may be followed by a sonic boom as the meteor crashes through the sound barrier. During its flight to the Earth, the meteor slows down by 70 per cent and it is during this period that it may fracture and split. At this point some meteors explode in a violent airburst while others enter dark flight – the period when the meteor slows down so much that it stops burning and it falls to the ground as a cold rock.

The Chelyabinsk airburst left only a few large pieces of the meteor: one rock was recovered near the town of Timiryazevskiy, another fell on a house in Deputatskiy, and the largest piece was found by divers at the bottom of Lake Chebarkul. The meteor was the largest to crash to Earth since 1908, when a meteor exploded over an area near the Tunguska River in Siberia. Although information about the event is scarce, the theory most scientists share is that an asteroid around 36.5 metres in diameter and travelling at 54,000 kilometres per hour entered the atmosphere above Russia. It exploded in an airburst at 28,000 feet, releasing energy equal to about 185 Hiroshima atomic bombs and flattening trees across an area of 800 square miles. Airbursts the size of Tunguska are estimated to occur every 1,200 years on average. But following the Chelyabinsk meteor, scientists now think the risk of similar objects hitting our planet may be ten times greater than thought previously.

PART 1 — QUESTIONS

Questions 1-6

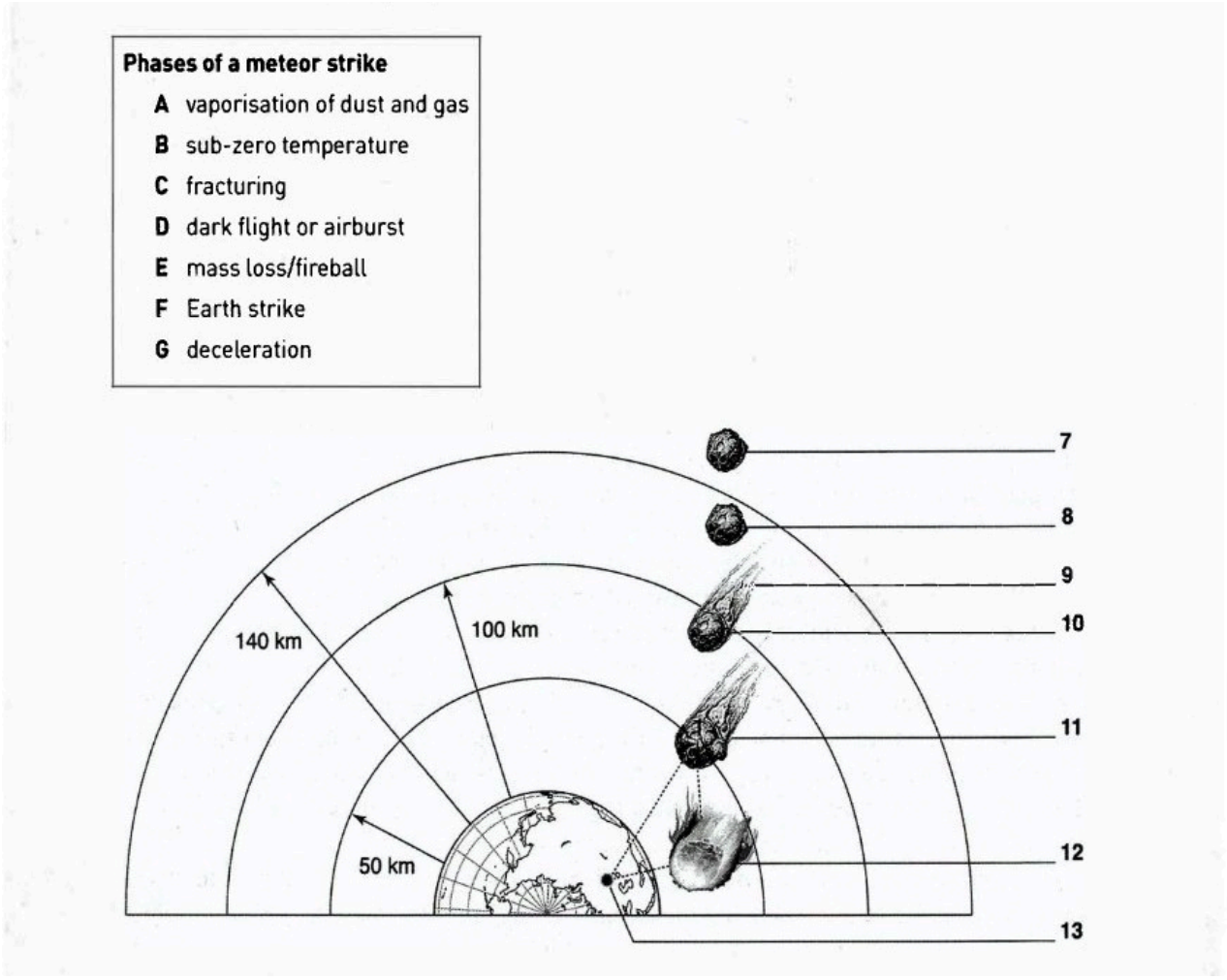
Complete the table below.

Choose NO MORE THAN TWO NUMBERS AND ONE WORD from the passage for each answer.

The Chelyabinsk meteor strike	• The meteor was 10 metres in diameter. • It travelled **1** _____ times faster than the speed of sound. • It exploded **2** _____ above the Earth's surface. • It released **3** _____ times more energy than the Hiroshima atomic bomb. • Meteor strikes of this kind occur on average every 10 years.
The Tunguska meteor strike	• The meteor was **4** _____ metres in diameter. • It entered the atmosphere above Russia at about **5** _____ per hour. • It exploded 28,000 feet above the Earth's surface. • It released 185 times more energy than the Hiroshima atomic bomb. • Meteor strikes of this kind occur on average every **6** _____ years.

Questions 7-13

Label the diagram below using words from the box.



- 7 _____
- 8 _____
- 9 _____
- 10 _____
- 11 _____
- 12 _____
- 13 _____

A. **vaporisation of dust and gas**

B. **sub-zero temperature**

C. **fracturing**

D. **dark flight or airburst**

E. **mass loss/fireball**

F. **Earth strike**

G. **deceleration**

PASSAGE 2

You should spend about 20 minutes on Questions 14–26, which are based on Reading Passage 2 below.

Reading Passage 2

Some years ago, in 2009, the Mayor of London's advisor on waste questioned the efficiency of recycling, making environmentalists very angry. The chief executive of the independent not-for-profit company Waste and Resources Action Programme (WRAP), Dr Liz Goodwin, responded, saying that the advisor's comments were unhelpful to recycling initiatives and that 'WRAP's independent research, carried out by internationally recognised experts, has shown that across the board recycling is the best environmental option'. Dr Goodwin went on to say: 'Around two thirds of households now recycle as a way of life. The message to householders is that recycling is delivering great environmental benefits and there is absolutely no reason for them to stop.'

However, others can see several reasons to stop recycling, calling the UK's recycling schemes a disorganised waste of time. At the moment recycling means ordinary people sorting out their own waste when it could be dealt with more economically, more efficiently and in a more environmentally friendly way. In the past 20 years in the UK, people have accepted their work as unpaid labourers for councils and waste recycling companies. Every week millions of households diligently sort out their plastic bottles from their glass bottles, their cardboard from their paper, and put it into the correct container. The type and colour of container varies significantly throughout the country; in parts of Scotland you can't recycle aluminium foil but in the south of England the council positively want it. This may seem like a small matter, but it does point to the lack of a coherent strategy for waste disposal. The Chartered Institution of Wastes Management certainly thinks that Britain doesn't have a national strategy. More importantly, if we could count the number of hours spent sorting out recyclable waste – 45 minutes each week by one estimate – and then multiply it by the number of households – 24 million – we get a massive 18 million hours spent each week on recycling.

Other places, however, do things differently. In Maryland, USA, a high-tech system for sorting out waste in a plant and recycling it afterwards increased recycling use by 30 per cent, probably because people did not need to spend three quarters of an hour every week sorting out the waste. There are other issues caused by asking people to give their free time to sort out waste. Because most people generally do not want to do this, local authorities have introduced a range of punishments to deal with them. One is to decrease the regularity of waste collection; another is to check people's rubbish bins and fine them if they put the wrong waste in the wrong bin. Putting paper in the wrong recycling bin cost a journalist from Wales £200.

One reason why questioning the efficiency of recycling makes environmentalists uneasy is that recycling may actually have the opposite effect on the environment. When Britain's waste has been collected, it is sent abroad – to Europe or even longer distances to China – for processing. The cost to the environment of transporting the waste around the world is considerable. But there are alternatives. Firstly, simply using less would help. Secondly, the waste could be buried

again in landfill sites around the UK. According to Tim Worstall, in Britain we 'dig up some 110 million cubic metres (mcm) of sand, gravel and clay every year; and each year we produce some 100 mcm of waste'. Unfortunately, the European Union is discouraging landfill by fining countries in the EU who landfill too much. The next alternative is incineration – burning the waste to produce energy. Naturally, incineration is controversial, but burning plastic bottles in power stations to generate electricity saves using fossil fuels like gas, oil and coal. Waste heat produced by the process can be distributed to local public buildings and nearby homes. The question is, which is better environmentally: transporting the waste across the world, or using it locally to produce energy?

Recycling is not a new concept: we have done it for years. We have recycled old cars, scrap metal and paper for a long time now. However, the difference between then and now is that we used to recycle when it made economic sense. Today, it is part of our law and it has somehow become a belief that recycling is the only right thing to do whereas there may be better and more environmentally friendly alternatives. Recycling is not the only answer and the discussion should continue.

PART 2 — QUESTIONS

Questions 14-17

Choose the correct letter, A, B or C.

14 Current recycling policies mean that

- **A** ○ taxpayers are working voluntarily to sort waste.
- **B** ○ recycling takes a lot of time.
- **C** ○ we make a profit on recycled products.
- **D** ○ we have to pay too much for recycling.

15 The lack of consistent recycling policies indicates that

- **A** ○ there are many different recycling processes.
- **B** ○ there is no overall plan for dealing with waste.
- **C** ○ recycling is not economical.
- **D** ○ people are not sorting their waste properly.

16 Which of the following is NOT an alternative to recycling?

- **A** ○ burying the waste in the ground
- **B** ○ burning the waste
- **C** ○ conserving what we use
- **D** ○ transporting the waste overseas

17 What is one benefit of incineration?

- **A** ○ The European Union cannot fine the country.
- **B** ○ Fossil fuels are needed to start the process.
- **C** ○ The energy produced can be transported across the country.
- **D** ○ The heat produced can be used to keep some homes warm.

Questions 18-25

Complete the summary below.

Choose NO MORE THAN THREE WORDS from the passage for each answer.

Recycling is widely regarded as the **18** _____ for dealing with waste. However, seeing it as the only option ignores the amount of effort it requires and other, possibly better alternatives. It seems that there is no **19** _____ for waste disposal. Furthermore, sorting our recyclable waste has a hidden cost. In one US state, waste is sorted in **20** _____ waste plants, but in the UK a(n) **21** _____ is used to force people to recycle. One method is to make **22** _____ less frequent; another is to **23** _____ people who place the wrong waste in bins. Alternative ways of dealing with waste could include burying it in **24** _____ to replace materials taken out. Another would be **25** _____ it for energy.

Questions 26-26

Choose the correct letter, A, B or C.

26 What is the best title for the article?

- **A** ○ Why people hate recycling
- **B** ○ Economical alternatives to recycling
- **C** ○ Recycling and the law
- **D** ○ The real cost of recycling

PASSAGE 3

You should spend about 20 minutes on Questions 27–40, which are based on Reading Passage 3 below.

Hello 3D printing, goodbye China

A A spectre is haunting the great container ship ports of China, with their highways jammed by lorries and the vast factory estates stretching from the coast of the South China Sea to the mountainous inland provinces. It is the spectre of a revolution led by a quiet, software-driven 3D printer, a machine that can laser up layers of liquid or granular resin or even cell tissue into a finished product. Some 3D printers are huge devices that make complete components such as aircraft parts. Others are small units that could stand next to a desk and create a small plastic prototype. Maplin, the British electronics retailer, said last week it would start selling one for just £700. The Velleman K8200 will allow those who are so inclined to make simple objects — mobile phone covers, perhaps, or toys. 'The only restriction is your imagination. You can make whatever you want,' said Pieter Nartus, export manager at Velleman.

B To visionaries in the West, the digital 3D printer promises to disrupt conventional manufacturing and supply chains so radically that advocates compare its impact to the advent of the production line or the internet. In China, whose big factories are thinking of using giant 3D printers for manufacturing, the technology does not seem to pose an immediate threat. 'It is on their horizon but it is not a factor right now,' says a British buying agent who sources plastics in China. However, as Chinese leaders ought to know from their compulsory classes in Karl Marx, control of the means of production is everything. And if 3D printing takes off, production will come back to a place near you.

C The implications, economists say, are limitless. No huge factories. No fleets of trucks. No ships. No supply chain. No tariffs. Few middlemen. Orders tailored exactly to demand, so no need for stock and warehouses. Just a printer, raw materials, software and a design. The advantages do not end there. Because the item is 'sintered' – created from a powdered material – to precise settings using a laser, there is no waste such as metal shavings. To customise a product, the user simply changes the software. An operator presses a button and the printer spits out the item.

D 'The first implication is that more goods will be manufactured at or closer to their point of purchase or consumption,' said Richard D'Aveni, a professor at Dartmouth College in the USA. Writing in the *Harvard Business Review*, D'Aveni predicted the elimination of the long supply chain linked to a huge factory staffed by cheap workers and sited on the other side of the world. It may be the most significant, if underplayed, article in that distinguished publication in decades. 'China has grabbed outsourced manufacturing contracts from every mature economy by pushing the mass-manufacturing model to its limit,' he wrote. 'It not only aggregates enough demand to create unprecedented efficiencies of scale but also minimises a key cost: labour. ... Under a model of widely distributed, highly flexible small-scale manufacturing, these daunting advantages become liabilities. No workforce can be paid little enough to make up for the costs of shipping across oceans.'

E In the brutal war for margin amid volatile commodities and currencies at the bottom end of the market, where China has carved its niche, the numbers tell their own ominous story. In a world of 3D manufacturing, the classic supply chain makes no commercial sense. 'China won't be a loser in the new era,' D'Aveni argued in the *Harvard Business Review*. 'It will have a domestic market to serve . . . and its domestic market is huge. But China will have to give up on being the mass-manufacturing powerhouse of the world.'

F China, of course, is not sitting still. It is eagerly buying Western 3D printing technology and making its own lightweight machines to sell to consumers. The Ministry of Industry and Information Technology has already allocated £20 million to fund 10 research centres and set up a group of 40 participating companies. So there is no doubt about China's scientific, engineering and intellectual commitment to 3D manufacturing. However, it is a fundamentally different concept in China. To the Chinese, it is an industrial tool to be used in making more things to sell. To Western economies that are hooked on cheap imports with a huge carbon footprint, it could be a means of transformation – perhaps even an agent of de-industrialisation.

PART 3 — QUESTIONS

Questions 27-32

Reading Passage 3 has six paragraphs, A-F.

Which paragraph, A-F, contains the following information?

	A	B	C	D	E	F
27 a change in China's markets	○	○	○	○	○	○
28 the advent of a new technology	○	○	○	○	○	○
29 a description of the new business model	○	○	○	○	○	○
30 a comparison of 3D printing with past innovations	○	○	○	○	○	○
31 China's investments in 3D printing	○	○	○	○	○	○
32 possible future consequences of 3D printing	○	○	○	○	○	○

Questions 33-37

Classify the following as said by

A. Pieter Nartus

B. Karl Marx

C. Richard D'Aveni

	A	B	C
33 China will not manufacture products for the world in the future.	○	○	○
34 There will be no advantages in efficiencies of scale.	○	○	○
35 Control over how we produce things counts for everything.	○	○	○
36 What we make will be limited only by our imagination.	○	○	○

	A	B	C
37 Goods will be made closer to the consumer.	○	○	○

Questions 38-40

Choose the correct letter A, B, C or D.

38 Which is NOT an advantage of 3D printing?

- **A** ○ You do not need to buy stock.
- **B** ○ You do not need to store materials in large buildings.
- **C** ○ Goods are made from powder.
- **D** ○ There is no waste.

39 How did China achieve industrial growth?

- **A** ○ It had manufacturing contracts.
- **B** ○ It had low labour costs.
- **C** ○ There was high demand for its products from one area.
- **D** ○ The cost of shipping goods across the oceans was not significant.

40 What does the writer think about China's reaction to 3D printing?

- **A** ○ Chinese business leaders do not fully realise the implications.
- **B** ○ China should be investing more in it.
- **C** ○ China should concentrate more on its domestic market.
- **D** ○ The changes will leave China behind.

Answer Key

#	Answer	Explanation
1	**50**	It crashed through the upper atmosphere at around 19 kilometres a second – above 50 times the speed of sound, fracturing at an altitude of between 45 and 50 kilometres
2	**29.7 kilometres**	The meteor did not hit the ground, but due to its enormous speed exploded 29.7 kilometres above the ground, producing a bright flash, a cloud of hot dust and gas, many smaller fragments of meteor and a powerful shockwave
3	**20 to 30 / 20–30**	To the people of Chelyabinsk, the meteor shone 30 times brighter than the sun and had 20–30 times more energy than the atomic bomb dropped on Hiroshima
4	**36.5**	the theory most scientists share is that an asteroid around 36.5 metres in diameter and travelling at 54,000 kilometres per hour entered the atmosphere above Russia
5	**54,000 kilometres / 54000 kilometres**	travelling at 54,000 kilometres per hour
6	**1,200 / 1200**	Airbursts the size of Tunguska are estimated to occur every 1,200 years on average
7	**B**	Moving through space, a meteor's temperature can be around –100°C
8	**G**	During its flight to the Earth, the meteor slows down by 70 per cent and it is during this period that it may fracture and split
9	**A**	The rate of loss of material through heat is so rapid that the core temperature of the meteor is still very low while at the same time a tail of vaporised dust and gas becomes visible
10	**E**	The mix of burning gas and dust creates a fireball as the meteor loses 3 to 6 millimetres of surface mass per second as it is heated to over 1,800°C
11	**C**	During its flight to the Earth, the meteor slows down by 70 per cent and it is during this period that it may fracture and split
12	**D**	At this point some meteors explode in a violent airburst while others enter dark flight – the period when the meteor slows down so much that it stops burning and it falls to the ground as a cold rock

#	Answer	Explanation
13	**F**	At this point some meteors explode in a violent airburst while others enter dark flight – the period when the meteor slows down so much that it stops burning and it falls to the ground as a cold rock
14	**A**	At the moment recycling means ordinary people sorting out their own waste when it could be dealt with more economically, more efficiently and in a more environmentally friendly way. In the past 20 years in the UK, people have accepted their work as unpaid labourers for councils and waste recycling companies
15	**B**	This may seem like a small matter, but it does point to the lack of a coherent strategy for waste disposal. The Chartered Institution of Wastes Management certainly thinks that Britain doesn't have a national strategy
16	**D**	When Britain's waste has been collected, it is sent abroad – to Europe or even longer distances to China – for processing But there are alternatives. Firstly, simply using less would help. Secondly, the waste could be buried again in landfill sites around the UK The next alternative is incineration – burning the waste to produce energy
17	**D**	Waste heat produced by the process can be distributed to local public buildings and nearby homes
18	**best (environmental) option**	WRAP's independent research, carried out by internationally recognised experts, has shown that across the board recycling is the best environmental option
19	**coherent strategy**	This may seem like a small matter, but it does point to the lack of a coherent strategy for waste disposal
20	**high-tech**	In Maryland, USA, a high-tech system for sorting out waste in a plant and recycling it afterwards increased recycling use by 30 per cent, probably because people did not need to spend three quarters of an hour every week sorting out the waste
21	**range of punishments**	Because most people generally do not want to do this, local authorities have introduced a range of punishments to deal with them
22	**waste collection**	One is to decrease the regularity of waste collection
23	**fine**	One is to decrease the regularity of waste collection; another is to check people's rubbish bins and fine them if they put the wrong waste in the wrong bin
24	**landfill sites**	Secondly, the waste could be buried again in landfill sites around the UK. According to Tim Worstall, in Britain we 'dig up some 110

#	Answer	Explanation
		million cubic metres (mcm) of sand, gravel and clay every year; and each year we produce some 100 mcm of waste’
25	**burning**	The next alternative is incineration – burning the waste to produce energy
26	**D**	More importantly, if we could count the number of hours spent sorting out recyclable waste – 45 minutes each week by one estimate – and then multiply it by the number of households – 24 million – we get a massive 18 million hours spent each week on recycling The cost to the environment of transporting the waste around the world is considerable
27	**E**	‘China won’t be a loser in the new era,’ D’Aveni argued in the Harvard Business Review. ‘It will have a domestic market to serve . . . and its domestic market is huge. But China will have to give up on being the mass-manufacturing powerhouse of the world.’
28	**A**	Maplin, the British electronics retailer, said last week it would start selling one for just £700
29	**D**	Under a model of widely distributed, highly flexible small-scale manufacturing, these daunting advantages become liabilities
30	**B**	To visionaries in the West, the digital 3D printer promises to disrupt conventional manufacturing and supply chains so radically that advocates compare its impact to the advent of the production line or the internet
31	**F**	The Ministry of Industry and Information Technology has already allocated £20 million to fund 10 research centres and set up a group of 40 participating companies
32	**C**	The implications, economists say, are limitless. No huge factories. No fleets of trucks. No ships. No supply chain. No tariffs. Few middlemen. Orders tailored exactly to demand, so no need for stock and warehouses
33	**C**	‘China won’t be a loser in the new era,’ D’Aveni argued in the Harvard Business Review. ‘It will have a domestic market to serve . . . and its domestic market is huge. But China will have to give up on being the mass-manufacturing powerhouse of the world.’
34	**C**	It not only aggregates enough demand to create unprecedented efficiencies of scale but also minimises a key cost: labour Under a model of widely distributed, highly flexible small-scale manufacturing, these daunting advantages become liabilities
35	**B**	However, as Chinese leaders ought to know from their compulsory classes in Karl Marx, control of the means of production is everything

#	Answer	Explanation
36	**A**	‘The only restriction is your imagination. You can make whatever you want,’ said Pieter Nartus, export manager at Velleman
37	**C**	‘The first implication is that more goods will be manufactured at or closer to their point of purchase or consumption,’ said Richard D’Aveni, a professor at Dartmouth College in the USA
38	**C**	Orders tailored exactly to demand, so no need for stock and warehouses. Just a printer, raw materials, software and a design. The advantages do not end there. Because the item is ‘sintered’ – created from a powdered material – to precise settings using a laser, there is no waste such as metal shavings
39	**B**	It not only aggregates enough demand to create unprecedented efficiencies of scale but also minimises a key cost: labour
40	**A**	In China, whose big factories are thinking of using giant 3D printers for manufacturing, the technology does not seem to pose an immediate threat. ‘It is on their horizon but it is not a factor right now,’ says a British buying agent who sources plastics in China. However, as Chinese leaders ought to know from their compulsory classes in Karl Marx, control of the means of production is everything

Test 43

PASSAGE 1

You should spend about 20 minutes on Questions 1-14, which are based on Reading Passage 1 below.

Grey water

In Abu Dhabi, where fresh water sources are very limited, sustainable water management is a high priority. The region receives on average just 120 millimetres of rainfall every year but the country is seeing demand for water increase by almost 40% annually. In this situation, it is clear that Abu Dhabi needs to boost the efficiency of water use by increasing water recycling and using treated water safely. An example of how this can be done can be seen at one of Abu Dhabi's airport hotels, which is saving a quarter of its water by recycling grey water. The hotel's new grey water recycling system is reported to save 735,000 litres of water per month, or 60 litres for every one of its guests.

Every building where people live or work, such as homes, hotels, schools and offices uses two types of water, potable and non-potable. Put simply, potable water is drinking water and non-potable water is used for washing and cleaning. Non-potable water is further divided into grey and black water. Black water is waste water that has been contaminated because it has been used to carry away human waste from toilets, for example, and cannot be reused without extensive biological or chemical treatment. Grey water, however, requires less treatment prior to reuse, and although it cannot be used for drinking, as in the case of the hotel, it can help make significant savings to water usage by being used again for different purposes.

Grey water usually comes from showers, washing machines, sinks, dishwashers, and so on, and because of this it contains fats and oils from products such as soap and washing powder as well as flakes of skin and food waste. It typically makes up approximately 6% of a household's waste water but contains fewer harmful bacteria and less nitrogen than black or waste water. However, if it is recycled properly, around 70 litres of drinking water per person per day can be saved by domestic households. To separate grey water from black water, a separate water system is needed in the building because different pipes are required to keep grey water away from the contaminated water and flow it into the recycling process.

When the grey water undergoes biological cleaning, the water is collected from various sources around the house and fed into a course filter and surge tank. This serves two purposes: first of all, a valve regulates air and water flow into the surge tank so that an even flow and pressure is maintained. This is important for the filtering process to work properly and ensure an even flow of grey water through the filter. The water is then pumped into a second filtration tank, which contains natural materials. In this second tank, the water passes through different layers. The first filtration layer is made up of sand, which traps larger waste particles between the grains. Below this layer there are other layers made up of soil, finer sand and then coarse sand. Each layer traps more and more waste, thus purifying the water as it passes through. A lot of the

purifying takes place in the soil layer, where microorganisms feed on the organic waste in the grey water and reproduce. Finally, the water flows through gravel or small stones to allow it to drain out of the system.

It is then pumped into a UV tank for a final mechanical treatment. In the UV tanks, ultraviolet light sterilises the water by killing any remaining microorganisms. Further filtration may also be applied after this. At this point, the water can be reused, not for drinking but for flushing toilets, or outdoor uses like washing the car or watering plants.

In contrast, the mechanical process for treating grey water is much simpler. It usually involves collecting the water from sinks, showers, etc. and passing it through a series of filters, each with a membrane that is finer than that of the previous filter. Chemicals, usually chlorine, can then be used to disinfect the water and it can also be treated with UV light.

In hot dry countries such as Abu Dhabi and in other environmentally sensitive areas, the benefits of recycling grey water are obvious. The main one is that it reduces the pressures on public water supplies. Moreover, the amount of polluted water entering rivers is reduced and the problem of poisonous blue-green algae in water reservoirs is also significantly reduced. Furthermore, grey water recycling can save on water bills in the long term.

However, grey water recycling can be expensive if it involves putting new or extra pipes into a building to move the grey water into the purification system. Furthermore, even after filtration and cleaning, the water still contains chemicals and microorganisms which limit its uses. There are few risks to human health when recycled grey water is used properly; one possible risk comes from eating fruit and vegetables that have been grown with it but the danger seems to be minimal. It is clear that commercial and domestic water use needs to be taken more seriously, and single-use water systems are hard to justify in a world of ever greater water scarcity.

PART 1 — QUESTIONS

Questions 1-5

Look at the descriptions and the list of quantities below.

Match each description with the correct quantity.

Write the correct letter, A-E.

A. 60 litres

B. 25%

C. approximately 70 litres

D. 120 millimetres

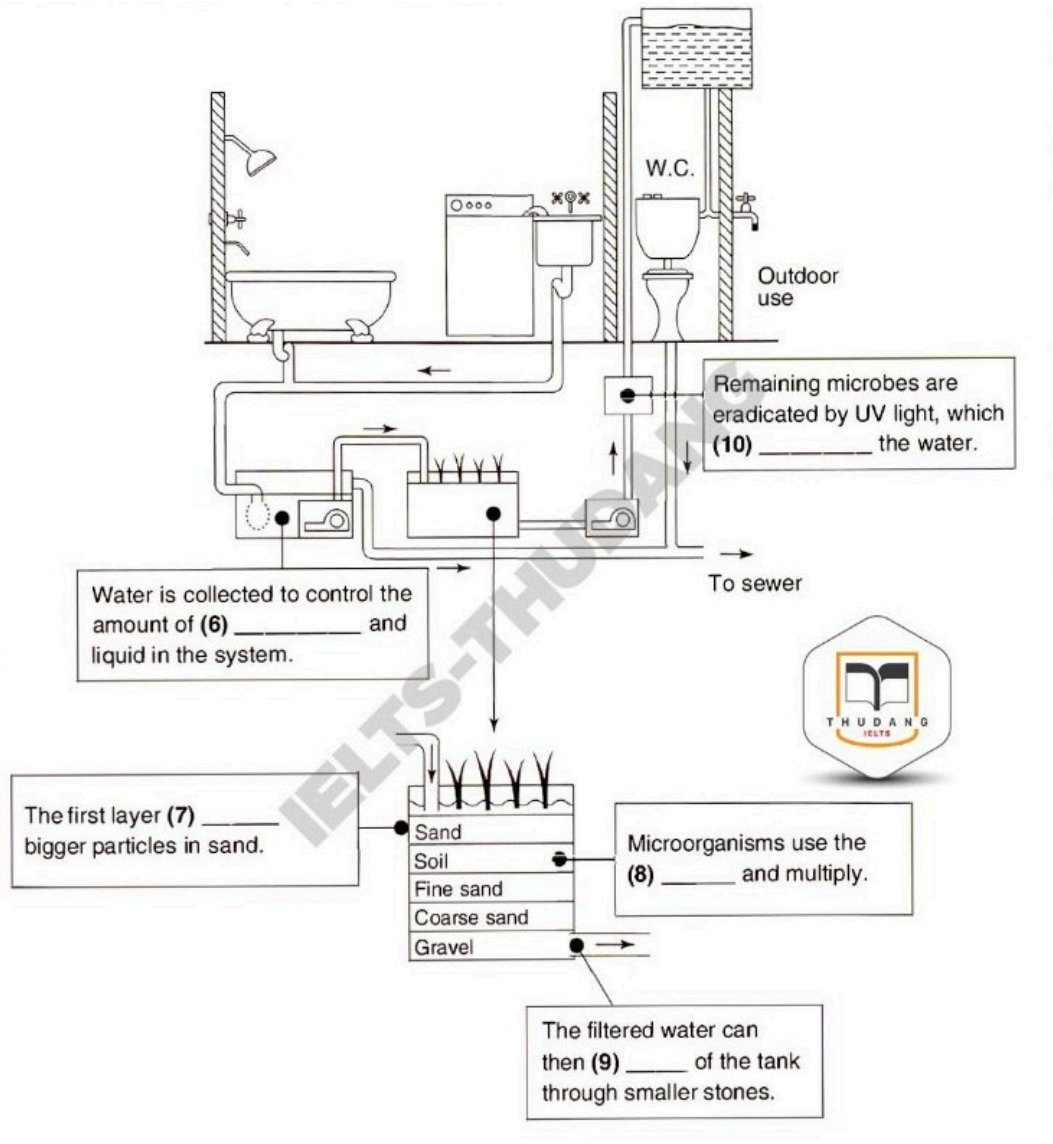
E. 6%

	A	B	C	D	E
1 how much rainwater falls annually in Abu Dhabi	○	○	○	○	○
2 how much water an airport hotel is saving by reusing waste water	○	○	○	○	○
3 how much domestic waste water is grey water	○	○	○	○	○
4 how much water is recycled per person staying at an airport hotel	○	○	○	○	○
5 how much potable water can be saved daily per person by recycling grey water	○	○	○	○	○

Questions 6-10

Look at the diagram below and complete the sentences.

Choose NO MORE THAN TWO WORDS from the passage for each answer.



IELTS-THUDANG

6 _____

7 _____

8 _____

9 _____

10 _____

Questions 11-14

Do the following statements agree with the information given in Reading Passage 1?

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

11 Grey water recycling reduces the amount of pollution entering water reserves.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

12 Grey water recycling can be expensive if it involves plumbing work.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

13 Filtering grey water leaves the water completely free from chemicals and microorganisms.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

14 Vegetables and fruit grown with grey water may be more likely to get crop diseases.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

PASSAGE 2

You should spend about 20 minutes on Questions 15-28, which are based on Reading Passage 2 below.

Born to run

People run for many different reasons: for fun, for exercise, to raise money for charities, and so on. Over the past decades, running has become an essential part of many health routines because of the publicity about its beneficial effects. It is claimed that it is good for our heart, it reduces stress and it helps to prevent diseases like diabetes. But what if running is more than just a way of keeping fit? Perhaps we need to run because it is part of what makes us human.

Evolutionary biologists point to the physical characteristics that have made our species one of the greatest runners on Earth. Scientists like Professor Daniel Lieberman of Harvard University maintain that our ancestors' need to run long distances in hot conditions led to evolutionary adaptations, such as the ability to lose heat through our sweat; skin with relatively little hair so we cool down as we run; large powerful muscles like the gluteus maximus, which controls hip and thigh movements; the Achilles tendon, which stores and releases energy for each step or jump we make; and a short vertical neck that keeps our head stable as we run, in contrast to animals whose heads bob up and down for balance.

Professor Lieberman explains that the features of the human neck that evolved to keep the head stable when we run were vital because they gave us an evolutionary advantage. This ability enabled us to scan what is in front of us while we are running and it helped us avoid falling and tripping. It meant that apart from being foragers, who look for plants, roots and berries for food, we could also become hunters. We could now get food from animals, which is richer in protein, and Lieberman contends that this enabled the evolution of the large human brain.

All of these adaptations give humans the ability to run much further than many animals. This means they can persistence hunt. Persistence or endurance hunting gives the hunter, who may be slower than their prey over short distances, the ability to track and follow an animal over very long distances until it is exhausted, then killed. It is a strategy still used by humans today. The hunter-gatherer tribes of the Kalahari Desert will track an antelope for hours over distances of more than 30 kilometres until it is too exhausted to go further.

Our ability to run long distances also means we can run half-marathons, marathons and even ultramarathons, where people run huge distances every day for days. However, many researchers suggest that running, particularly extensive running, can have adverse effects. The list of possible injuries is long and they have been well documented, especially injuries around joints in the hips and knees. Studies of runners dating back to 1973 as well as more recent studies have found a correlation between running and osteoporosis (or weakening of the bones). Research by Melonie Burrows at the University of East London found that long distance female runners have lower bone density, a sign of osteoporosis, than women who did little exercise. Studies by James O'Keefe and others at the Mayo Foundation for Medical Education

found abnormalities in the structure of the hearts of athletes who did extreme running such as ultramarathons.

Despite these findings, other studies have found that running long distances actually strengthens the parts of the knee that are impacted by running. Furthermore, where damage occurs in the knee, this is reversed six months later. It also seems that our hip joints are able to withstand or tolerate the impacts from running. It has therefore been suggested that because our bodies have evolved to run, they have also evolved to self-repair damage to joints caused by the activity, and that in fact, running makes these joints stronger in the long term.

Other studies show that running improves the condition of our hearts and lungs, and reduces blood pressure, weight and the risk of many other diseases such as diabetes and cancer. A study led by Duck-chul Lee at Iowa State University followed 55,000 adults for over 15 years and concluded that running for just 50 minutes a week increases average life expectancy by three years. The study also found that people who ran consistently had up to 50% lower risk of heart disease.

PART 2 — QUESTIONS

Questions 15-20

Look at the statements and the list of researchers below.

Match each statement with the researcher who made the claim.

Write the correct letter, A-D.

NB You may use any letter more than once.

A. Duck-chul Lee

B. Daniel Lieberman

C. James O'Keefe

D. Melonie Burrows

	A	B	C	D
15 The bones of women who run long distances are weaker than those of other women.	○	○	○	○
16 Ultramarathon runners can develop hearts that are not the same as those of other people.	○	○	○	○
17 Humans evolved to run great distances in high temperatures.	○	○	○	○
18 Muscles in our body have adapted to help us run.	○	○	○	○
19 Running just under an hour a week helps us live longer.	○	○	○	○
20 Having a neck that keeps the head still when we move gives humans an evolutionary advantage.	○	○	○	○

Questions 21-24

Complete the notes below.

Choose ONE WORD ONLY from the passage for each answer.

Physical developments

Neck: to keep our head **21** _____ when we move

Skin: not much hair so we can keep **22** _____ as we run

ability to sweat when it is **23** _____

Gluteus maximus: at the top of our legs to move hips and thighs

Achilles tendon: keeps and **24** _____ the energy we need so that we can run

Questions 25-28

Complete the summary of the last three paragraphs using the list of words, A-G, below.

Write the correct letter, A-G.

Research dating from 1973 has found a correlation between running and **25** _____ bones. More recent research has discovered that some athletes who run extreme distances have **26** _____ abnormalities in their hearts. However, both hip and knee joints are **27** _____ of withstanding the physical strains from running and can self-repair. It seems that running even a little every week can enable us to live **28** _____ by three years.

A. **stronger** B. **weakened** C. **structural** D. **muscular** E. **Capable**

F. **longer** G. **fit**

PASSAGE 3

You should spend about 20 minutes on Questions 29-40, which are based on Reading Passage 3 below.

Life at the limit

What are the physical limits to life in extreme environments? Although microbes are the Earth's simplest organisms, they live in places where it is impossible for more complex life forms to survive. Some microbes are able to thrive in the water surrounding deep sea hydrothermal vents, which emit water heated up to 400°C. At the other extreme, some microbes can survive in sub-zero temperatures. In fact, marine microbes living in all regions of the ocean make up over 98% of the total organisms living in the ocean. But what exactly are the limits to survival? Can organisms live in places that lack nutrients, and how long can they survive?

The middle of the Pacific Ocean, in an area known as the South Pacific Gyre, is the place furthest from any land, and it lacks nutrients or signs of life. According to Steven D'Hondt, an oceanographer at the University of Rhode Island, it is the deadest spot in the ocean. It seemed to be the obvious place to look for limits of life on Earth, and microbes have, in fact, been found far beneath this oceanic desert. Researchers think that they have been there for at least 100 million years. The previous record for longevity was held by microbes that had survived for 15 million years but this most recent discovery exceeds that tenfold and raises some intriguing questions.

The microbes from the South Pacific Gyre were discovered by geomicrobiologist Yuki Morono of the Japan Agency for Marine-Earth Science and Technology. Morono wanted to know whether organisms are able to survive where there is very little to sustain them. He drilled 5,700 metres below the seabed and extracted clay samples. The samples were found to contain oxygen, enough to allow the microbes to live, although the clay was extremely poor in nutrients. When Morono and his team then introduced nutrients into the samples, they were absorbed by the microbes that were living in the clay. Within a few days, the microbes started to multiply and 557 days later they were still forming thriving communities.

How the organisms survived for so long is a remarkable puzzle that scientists are trying to understand. The microbes are under intense pressure from miles of mud and water above them and do not have food or sunlight. Under inhospitable conditions, some microbes can form spores, or endospores. In this inactive state, they can stay dormant in order to survive extended periods of starvation. But the Pacific microbes had not formed these spores, suggesting two different possibilities.

A microbe can either reproduce by dividing or it can conserve its energy and maintain only its most basic functions. One possibility is that in the unfavourable conditions under the South Pacific floor, the microbes could have been dividing very slowly over centuries. In this case, the microbes in Morono's study may be the descendants of microbes from an even more distant past. However, at the depth where the microbes were found, there is so little nutrition that it seems unlikely that they would have the energy to divide and multiply. In fact, it seems that the

most they could do is to self-repair. But if that is the case, and the microbes are not reproducing, they must have been living at the very edge of life for millions of years. This would mean that their metabolism can slow down so much that they can survive with only the tiniest amounts of nutrients. To the researchers, it seemed almost impossible that the microbes would be able to wake up and grow but they did just that.

The study is globally important and, as Yuki Morono stated, it shows that some of the simplest living creatures in the world 'do not actually have the concept of lifespan'. Unfortunately, the research is very difficult to replicate because different areas of the seabed have different compositions and therefore different environments, so is this a unique find? Scientists have collected samples of material from the sub-seabed that are 200 million years old; could they hold even older organisms? This points to another question: at which point under the seafloor does life end and what are the conditions that limit life? These are important questions, not only for life on Earth but also for potential life on other planets. According to Bo Barker Jorgensen from Aarhus University, 'low food and energy seem not to set the ultimate limit for life on Earth'. So, could life exist on places such as Mars or Jupiter's moons? If a planet seems to be uninhabitable, perhaps life may still exist in some form beneath the extra-terrestrial surface.

PART 3 — QUESTIONS

Questions 29-31

Choose the correct letter, A, B, C or D.

29 In the first paragraph, the writer states that microbes

- **A** ○ compete with each other for nutrients in extreme environments.
- **B** ○ can flourish where other forms of life cannot live.
- **C** ○ prefer to live in areas rich in nutrients.
- **D** ○ can survive temperatures lower than -98°C

30 Which statement is NOT true about the South Pacific Gyre, according to the second paragraph?

- **A** ○ It is the part of the ocean furthest away from land.
- **B** ○ There are no means of supporting life there.
- **C** ○ It is a good place to investigate the limits of life on Earth.
- **D** ○ It is impossible for living creatures to survive there.

31 The team led by Yuki Morono

- **A** ○ discovered a complex mixture of chemicals under the ocean.
- **B** ○ extracted oxygen from the clay in samples taken from the ocean.
- **C** ○ provided the microbes with nutrients that increased their activity.
- **D** ○ waited for 557 days for the microbes to start forming colonies

Questions 32-37

Do the following statements agree with the information given in Reading Passage 3?

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

32 Scientists believe the microbes they discovered in the South Pacific Gyre could have lived for 100 million years.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

33 In situations of physical stress, microbes form endospores.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

34 The microbes in the South Pacific Gyre can survive greater pressure from mud and water than microbes in other parts of the ocean.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

35 Scientists discovered that microbes from the South Pacific Gyre reproduce very slowly.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

36 If the microbes under the sea floor in the South Pacific Gyre were not dividing, they were surviving for millions of years.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

37 The microbes from the South Pacific Gyre had survived without oxygen or nutrients.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

Questions 38-40

Complete the summary below.

Choose ONE WORD ONLY from the passage for each answer.

It seems microorganisms do not have limits to their **38** _____ However, this is hard to confirm because different conditions exist in the seabed and therefore it is hard to **39** _____ the study. According to some scientists, having very little **40** _____ or food is not a barrier to life.

Answer Key

#	Answer	Explanation
1	**D**	The region receives on average just 120 millimetres of rainfall every year
2	**B**	An example of how this can be done can be seen at one of Abu Dhabi's airport hotels, which is saving a quarter of its water by recycling grey water
3	**E**	It typically makes up approximately 6% of a household's waste water
4	**A**	The hotel's new grey water recycling system is reported to save 735,000 litres of water per month, or 60 litres for every one of its guests
5	**C**	However, if it is recycled properly, around 70 litres of drinking water per person per day can be saved by domestic households
6	**pressure**	This serves two purposes: first of all, a valve regulates air and water flow into the surge tank so that an even flow and pressure is maintained
7	**traps**	The first filtration layer is made up of sand, which traps larger waste particles between the grains
8	**organic waste**	A lot of the purifying takes place in the soil layer, where microorganisms feed on the organic waste in the grey water and reproduce
9	**drain out**	Finally, the water flows through gravel or small stones to allow it to drain out of the system
10	**sterilises**	In the UV tanks, ultraviolet light sterilises the water by killing any remaining microorganisms
11	**TRUE**	Moreover, the amount of polluted water entering rivers is reduced and the problem of poisonous blue-green algae in water reservoirs is also significantly reduced
12	**TRUE**	However, grey water recycling can be expensive if it involves putting new or extra pipes into a building to move the grey water into the purification system
13	**FALSE**	Furthermore, even after filtration and cleaning, the water still contains chemicals and microorganisms which limit its uses
14	**NOT GIVEN**	There are few risks to human health when recycled grey water is used properly; one possible risk comes from eating fruit and

#	Answer	Explanation
		vegetables that have been grown with it but the danger seems to be minimal
15	**D**	Research by Melonie Burrows at the University of East London found that long distance female runners have lower bone density, a sign of osteoporosis, than women who did little exercise
16	**C**	Studies by James O'Keefe and others at the Mayo Foundation for Medical Education found abnormalities in the structure of the hearts of athletes who did extreme running such as ultramarathons
17	**B**	Scientists like Professor Daniel Lieberman of Harvard University maintain that our ancestors' need to run long distances in hot conditions led to evolutionary adaptations
18	**B**	Scientists like Professor Daniel Lieberman of Harvard University maintain that our ancestors' need to run long distances in hot conditions led to evolutionary adaptations, such as the ability to lose heat through our sweat; skin with relatively little hair so we cool down as we run; large powerful muscles like the gluteus maximus, which controls hip and thigh movements
19	**A**	A study led by Duck-chul Lee at Iowa State University followed 55,000 adults for over 15 years and concluded that running for just 50 minutes a week increases average life expectancy by three years
20	**B**	Professor Lieberman explains that the features of the human neck that evolved to keep the head stable when we run were vital because they gave us an evolutionary advantage
21	**stable**	a short vertical neck that keeps our head stable as we run
22	**cool**	skin with relatively little hair so we cool down as we run
23	**hot**	Scientists like Professor Daniel Lieberman of Harvard University maintain that our ancestors' need to run long distances in hot conditions led to evolutionary adaptations, such as the ability to lose heat through our sweat
24	**releases**	the Achilles tendon, which stores and releases energy for each step or jump we make
25	**B**	Studies of runners dating back to 1973 as well as more recent studies have found a correlation between running and osteoporosis (or weakening of the bones)

#	Answer	Explanation
26	**C**	Studies by James O'Keefe and others at the Mayo Foundation for Medical Education found abnormalities in the structure of the hearts of athletes who did extreme running such as ultramarathons
27	**E**	It also seems that our hip joints are able to withstand or tolerate the impacts from running. It has therefore been suggested that because our bodies have evolved to run, they have also evolved to self-repair damage to joints caused by the activity
28	**F**	A study led by Duck-chul Lee at Iowa State University followed 55,000 adults for over 15 years and concluded that running for just 50 minutes a week increases average life expectancy by three years
29	**B**	Although microbes are the Earth's simplest organisms, they live in places where it is impossible for more complex life forms to survive
30	**D**	It seemed to be the obvious place to look for limits of life on Earth, and microbes have, in fact, been found far beneath this oceanic desert
31	**C**	When Morono and his team then introduced nutrients into the samples, they were absorbed by the microbes that were living in the clay. Within a few days, the microbes started to multiply
32	**TRUE**	Researchers think that they have been there for at least 100 million years
33	**TRUE**	Under inhospitable conditions, some microbes can form spores, or endospores
34	**NOT GIVEN**	The microbes are under intense pressure from miles of mud and water above them and do not have food or sunlight
35	**FALSE**	However, at the depth where the microbes were found, there is so little nutrition that it seems unlikely that they would have the energy to divide and multiply. In fact, it seems that the most they could do is to self-repair
36	**TRUE**	But if that is the case, and the microbes are not reproducing, they must have been living at the very edge of life for millions of years
37	**FALSE**	The samples were found to contain oxygen, enough to allow the microbes to live, although the clay was extremely poor in nutrients
38	**lifespan**	The study is globally important and, as Yuki Morono stated, it shows that some of the simplest living creatures in the world 'do not actually have the concept of lifespan'

#	Answer	Explanation
39	**replicate**	Unfortunately, the research is very difficult to replicate because different areas of the seabed have different compositions and therefore different environments, so is this a unique find
40	**energy**	According to Bo Barker Jorgensen from Aarhus University, ‘low food and energy seem not to set the ultimate limit for life on Earth’

Test 44

PASSAGE 1

You should spend about 20 minutes on Questions 1–14, which are based on Reading Passage 1 below.

Moon base

On 16 July 1969, two American astronauts, Neil Armstrong and Buzz Aldrin, made the first landing on the Moon when the Eagle lunar module touched down in the Sea of Tranquility and Armstrong stepped onto the lunar surface. At that time, it seemed almost impossible that humans would not colonise the Moon in the near future but the cost of sending people to live there was just too great. Instead, individual national space agencies have been sending robots called orbiters and rovers in place of humans. These are able to bring back and transmit a huge amount of data to help us understand the Moon better and then colonise it.

Although it is difficult to take people back to the Moon, it is not impossible. We can transport people but the logistical challenge of keeping them there is a very different thing. However, we have two of the components necessary to make this work: power from the Sun and minerals on the Moon itself. Scientists and researchers are already busy in laboratories and simulation facilities on Earth, testing their ideas for a lunar base.

The most fundamental requirement for keeping people on the Moon is oxygen, a component of the air we breathe. Fortunately, the surface of the Moon is covered with rocks and lunar soil known as regolith, which is 42-45% oxygen. Harvesting the oxygen from the regolith will be very energy intensive, but the American space agency NASA has developed and tested robots capable of doing this. Oxygen is, of course, one of the components needed to produce water, the next vital requirement for sustaining life. The other component of water is hydrogen, but because hydrogen is not present on the Moon as a free chemical, there are two options. Either we take it to the Moon in liquid form or we extract it from water. In 2018 NASA confirmed that water is indeed present on the Moon in the form of ice at the lunar poles. It is estimated that there could be 10 billion tons of water there. Some of the water would be used to sustain life, but most of it would be converted into fuel by electrolysing it into its constituent parts: oxygen and hydrogen. Electrolysis, however, requires a great deal of energy and this will need to be sourced from the Sun.

A town in Norway, Rjukan, has given scientists a lead on how to do this. Rjukan used to lack sunlight for long periods of time until giant solar mirrors were positioned on high points above the town in order to reflect sunlight down into it. On the Moon, water could be obtained by reflecting sunlight onto ice within the craters from giant reflectors positioned at high points or mountains near the craters. The melted water could then be moved to a processing plant, where it would be split into hydrogen and oxygen using solar electricity. The hydrogen could then be used to fuel vehicles or fed to fuel cells to supply energy to the lunar base, and the oxygen could be used in the air supply. As well as being used to obtain water, the Sun's energy

could also be used to provide power to the base. Lunar soil contains almost all the minerals necessary to build solar panels and in theory, the potential to harvest solar electricity is unlimited. However, because the lunar night lasts for 354 hours, it is important to place solar panels in regions of the Moon that receive the most sunlight. Fortunately, the Moon's poles get sunlight 75-80% of the time and this is also where ice is located, making the poles ideal places to establish the base station.

What will the Moon base be constructed from? The Moon's surface is constantly bombarded by cosmic radiation and small asteroids because it has no protecting atmosphere or magnetic field. This makes it a dangerous place to live so shelter is vital. There are three options. One would be to build a Moon base on Earth and transport it to the Moon via a spaceship in lunar orbit, but the costs of doing this would be prohibitive. A better solution would be to make bricks from the lunar soil. Architects in Vienna have already shown that such bricks can be used to form walls and domes, and it is thought that they would be strong enough to stand up to moonquakes. A third option would be to use caves and geographical features such as crater walls as shelters. Researchers in the Canary Islands are currently practising how to explore lunar caves by driving rovers into caves and tubes formed by volcanic lava.

Humans have not been on the Moon for decades, but preparations to establish a base there are now well under way, and lessons learned from a future Moon base will help us to explore even further: Mars, Europa and beyond.

PART 1 — QUESTIONS

Questions 1-5

Do the following statements agree with the information given in Reading Passage 1?

Write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

1 In the late 1960s it seemed likely that humans would build a city on the Moon.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

2 Machines are able to send large amounts of information about the Moon back to Earth.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

3 It is difficult to take people to the Moon and bring them back safely.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

4 Solar power and lunar minerals make it possible to establish a base on the Moon.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

5 Tests to see if a lunar base is possible are taking place on the Moon.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

Questions 6-9

Complete each sentence with the correct ending, A-G, below.

Write the correct letter, A-G.

• It will not be necessary to transport supplies from Earth to build and sustain a Moon base because **6** _____

• We know that we can extract oxygen from lunar rocks because **7** _____

• Hydrogen will have to be extracted from ice on the Moon because **8** _____

• We know that some of the techniques needed to establish a Moon base will work because **9** _____

A. **they would be cheaper to manufacture on the Moon.**

B. **this has already been done successfully with robots.**

C. **it is quite easy to duplicate on the Moon.**

D. **resources found on the Moon could be used instead.**

E. **they have already been tested on Earth.**

F. **it is composed of oxygen and hydrogen.**

G. **it will be needed to fuel vehicles and power a Moon base.**

Questions 10-13

Complete the summary below.

Choose NO MORE THAN TWO WORDS from paragraph 4 for each answer.

New techniques, for example, the use of mirrors to light the town of Rjukan in Norway, can be applied on the Moon. Sunlight could be **10** _____ onto the Moon's ice to

melt it. The water could then be split into hydrogen and oxygen, and the hydrogen could be used as **11** _____. Lunar soil contains the minerals needed to make **12** _____ to generate electricity. In order to collect sunlight during the lunar night, these would be located at the **13** _____.

Questions 14-14

Choose the correct letter, A, B, C or D.

14 Which option for shelter is NOT mentioned in paragraph 5?

- **A** ○ taking radiation proof shelters to the Moon
- **B** ○ staying on a spaceship in orbit around the Moon
- **C** ○ using materials found on the Moon's surface to make bricks
- **D** ○ finding shelter in natural features such as crater walls and lunar caves

PASSAGE 2

You should spend about 20 minutes on Questions 15-26, which are based on Reading Passage 2 below.

Peer to peer banking

In 1994 Microsoft's founder, Bill Gates, said that although banking is necessary, banks are not. At a time when many traditional institutions and ways of doing things are changing, banking is changing too. There are now new ways of accessing loans and lending money. Thanks to the rise of alternative finance, people can raise and invest money outside the traditional banking system and the regulations and rules that banks have to follow. This has taken many forms, such as crowdfunding, revenue-based finance and peer to peer finance. Crowdfunding is when specific projects raise money by asking a large number of people to invest a small amount of money in return for shares. In revenue-based finance, investors provide money to a company in return for a fixed percentage of the earnings. Peer to peer (P2P) banking also bypasses traditional banks by helping individuals give direct loans to other individuals. Prior to these financial vehicles, it was difficult to invest in new companies without having a considerable amount of money.

In traditional banking, an institution usually works as a financial middleman, regulating the transactions between lenders and borrowers. The banks check the financial status and credit rating of the lender and offer security to the borrower. A credit rating is a score given to an individual that measures how risky it is to lend to that person, based on a prediction of their ability to pay back their loan. P2P banking, on the other hand, works without the traditional checks offered by the banking system. The process is relatively simple. If someone is interested in borrowing money, they complete an online application form on a P2P lending company platform. The online P2P organisation assesses _the application and the credit rating of the person making the application. At this point, an interest rate at which the applicant can borrow money is assigned to them. When the application is approved, the applicant is given various options for borrowing and paying back the money and can choose among them. The interesting development here is that, depending on the platform, the investor and the lender are able to select their preferred client depending on the conditions that are on offer. The borrower then makes monthly repayments that include the added interest on the loan. The company that owns the online platform charges a fee to both borrowers and lenders for the services it provides and this is how it generates its profit - almost like a dating agency matching the suitability of the people involved.

Because P2P banks are online, they do not have to pay for a physical high street presence, which can be expensive. Nor do they need to have large teams of staff because lenders and borrowers are matched using a computer algorithm that assesses the credit status of each party. Consequently, the savings made can then be passed to their customers through better interest rates or reduced fees for their services.

Two indicators of the success of P2P banks are their wide customer base and the accuracy of their credit rating processes. P2P companies assess credit worthiness through their own

artificial intelligence software, which takes hundreds or thousands of factors into account when someone applies for a loan. This process is done though analysing big data - the process of examining huge amounts of information to make decisions. The good news for P2P lenders is that so far, the number of bad debts has been relatively low. This is a key point in a process that relies on trust or the knowledge that if you lend money, you will get it back, plus more, after a period of time. This is significant because P2P banks do not have the same financial guarantees that governments require traditional banks to offer. They also do not have the same capital reserves that allow savers or investors to get their money back if the P2P bank fails.

The loan/investment model developed by P2P banks enables them to reach people who would not normally qualify for a loan from a traditional bank or who would not normally consider themselves to be an investor. For example, if a small business does not meet the narrow rules for borrowing from a traditional bank, they may be able to get a loan through P2P; and potential investors are finding the higher rates of interest attractive. Because of this, consumers now have more choice about where they invest and borrow, and traditional banks face a threat to their business.

So, what is the future for banking and P2P financial platforms? Possibly a lot will depend on the question of trust mentioned before. Big banks still have the advantages of large cash reserves, legal backing and government guarantees - all the safeguards not available to people putting their money into P2P banks. But for people with limited access to money and small businesses struggling to find financing, P2P lending is already changing the way people bank. Traditional banks will have to think about their response to competition from P2P banking, but for P2P companies the future looks full of opportunities in financial sectors such as insurance, house purchasing, loans for students, and so on.

PART 2 — QUESTIONS

Questions 15-17

Complete each sentence with the correct ending, A-F, below.

Write the correct Letter, A-F.

• The availability of alternative finance means that people can now raise money even if they do not meet **15** _____

• Alternative finance allows individuals with limited finances to invest in **16** _____

• One of the roles of traditional banks is to manage and check **17** _____

A. **new companies.**

B. **the process of making loans and investments.**

C. **a lot of money to buy shares in safe companies.**

D. **the traditional structures of banks.**

E. **the requirements traditional banks ask for.**

F. **a fixed percentage.**

G. **companies that are too risky to invest in.**

Questions 18-22

Complete the flow-chart below.

Choose NO MORE THAN TWO WORDS from the passage for each answer.

The potential borrower **18** _____ to the P2P bank.

↓

The P2P bank assesses the risk and **19** _____ of the borrower and assigns an interest rate to the amount they want to borrow.

↓

Depending on the P2P bank, the borrower and lender are able to choose a **20** _____ according to the options available to them.

↓

The borrower decides on an option for **21** _____ the amount.

↓

The P2P bank charges both the borrower and the lender a **22** _____.

Questions 23-24

Choose TWO letters, A-D.

23 **24** Which TWO advantages of P2P banks are mentioned by the writer of the text?

- **A** ☐ P2P banks save money by not having buildings on the high street.
- **B** ☐ The number of bad debts for P2P banks has been lower than traditional banks.
- **C** ☐ P2P banks are not in competition with traditional banks.
- **D** ☐ P2P banks do not need a lot of staff because they use other means to assess credit risk.

Questions 25-26

Choose TWO letters, A-D.

25 **26** Which TWO advantages of traditional banks are mentioned by the writer of the text?

- **A** ☐ Traditional banks have a wider customer base.
- **B** ☐ Governments make traditional banks guarantee savings, so customers can be sure most of their money is safe.
- **C** ☐ Traditional banks have large reserves of cash.
- **D** ☐ Traditional banks have attractive rates of interest for borrowers and lenders.

PASSAGE 3

You should spend about 20 minutes on Questions 27-40, which are based on Reading Passage 3 below

The long-distance navigators

A Every year between late July and October, the Arctic tern leaves its breeding grounds in the Arctic and flies over 19,000 kilometres to the Antarctic. The bird therefore sees two summers a year, once in the northern hemisphere and then again in the southern hemisphere. The Arctic tern is by no means the only bird to undertake long journeys. It is estimated that one in five bird species migrates, a feat that requires great endurance, stamina and strength. The migration patterns of birds are not random. They are very precise and follow flight routes called flyways, which connect a bird's breeding grounds with its wintering grounds, and they include stopovers for food and rest. The Americas Flyway, for example, is the route that birds take from their North American breeding grounds to wintering places in the Caribbean and South America, and the African-Eurasian Flyway connects breeding grounds in Europe and northern Asia with wintering grounds in Africa. Migration is largely driven by the weather and the availability of food. Birds in the southern hemisphere fly north, and birds in the northern hemisphere go south, seeking food and places to mate and rear their young.

27

B Birds have a variety of methods by which they are able to find their way across these flyways year in, year out. It seems that birds employ different geopositioning strategies according to the conditions encountered during migration. They seem able to use the position of the sun and stars, the Earth's magnetic field, smells and even landmarks to find their way, depending on which is available to them during the journey.

28

C When the chicks of migrating birds are born, they imprint, or intuitively learn, the map of the sky and stars as they grow in order to orientate themselves. In one famous experiment, Stephen Emlen placed Indigo buntings in a planetarium, where patterns of stars and planets are projected onto the ceiling. When the stars were projected in different positions, the birds changed position according to the new sky map, thus showing their awareness of the position of the stars.

29

D Obviously, birds cannot use a sky map when the weather is overcast so they must have other means to guide them on their journey. One possibility is that they use the Earth's magnetic field. How they do this is a mystery because the field is so weak. However, experiments have pointed to evidence that birds use the magnetic field in two ways. Researchers have discovered

receptors, or chemicals, in their retinas and it is thought that these enable birds to sense the direction of the magnetic north. When these chemicals are exposed to light, they generate electrons that are sensitive to magnetism. If this is the case, north and south could look different to migratory birds, in effect allowing them to 'see' the magnetic field. Other researchers suggest that that birds can also sense magnetism using a molecule called magnetite. Magnetite contains iron and orientates to the north like the needle on a compass. Scientists have found magnetite on the beak of some birds and nerves that carry information about the magnetic field to their brain so that the birds can in effect 'feel' the magnetism. It seems that birds are able to sense the strength of the magnetic field, which is stronger at the poles and weaker at the equator. Traces of magnetite have also been found in humans but our ability to sense magnetic currents is far less developed than in other animals.

30

E There is also some evidence that birds use their sense of smell to find their way across long distances. Researchers in the UK, Spain and Italy experimented on seabirds by temporarily blocking their sense of smell using chemicals and then tracking their paths home. The birds could find their way normally when they approached land where aromas and odours are present but were less efficient at finding their direction over the sea, suggesting that smell is very important for them in piloting their routes.

31

F Visual clues have long been thought to be a navigational tool for birds. 'Previewing' experiments, where birds were allowed or denied visual access to a familiar site before releasing them, indicated that they use a 'familiar area map'. It seems that birds may build up a visual memory of landmarks that allows them to successfully navigate around places they have already visited. Birds that migrate in daylight often follow natural features like mountains, rivers and lakes. It has even been suggested that they follow man-made features such as roads.

PART 3 — QUESTIONS

Questions 27-31

Reading Passage 3 has six sections, A-F.

Choose the correct heading for each section from the list of headings below.

Write the correct number, i-ix.

i. **Bird migration and their routes**

ii. **Memorising the sky for migration purposes**

iii. **Using the Earth's magnetic field to navigate**

iv. **Humans sense Earth's magnetism like birds**

v. **Studies show that birds get lost over the ocean**

vi. **Evidence shows birds use scents to guide them**

vii. **Ways used to navigate migration routes**

viii. **Familiar places guide birds across the land**

ix. **The navigation strategy most used by birds**

Questions 32-40

Complete the notes below.

Choose NO MORE THAN TWO WORDS from the passage for each answer.

Research and experiments

Imprinting: Experiment took place in a **32** _____. Birds aligned themselves to the **33** _____ when it was changed.

Magnetic field: Chemicals in birds' **34** _____ become sensitive to magnetism when exposed to **35** _____. As a result, north and south appear **36** _____ to birds. Magnetite found on the **37** _____ of birds. Magnetite allows birds to sense strength of magnetic field.

Sense of smell: Blocking birds' sense of smell with **38** _____ made them less **39** _____ at navigating over the sea.

Previewing: Preventing **40** _____ to familiar places showed birds use natural features to navigate.

Answer Key

#	Answer	Explanation
1	**NOT GIVEN**	On 16 July 1969, two American astronauts, Neil Armstrong and Buzz Aldrin, made the first landing on the Moon when the Eagle lunar module touched down in the Sea of Tranquility and Armstrong stepped onto the lunar surface. At that time, it seemed almost impossible that humans would not colonise the Moon in the near future but the cost of sending people to live there was just too great
2	**TRUE**	Instead, individual national space agencies have been sending robots called orbiters and rovers in place of humans. These are able to bring back and transmit a huge amount of data to help us understand the Moon better and then colonise it
3	**NOT GIVEN**	Although it is difficult to take people back to the Moon, it is not impossible. We can transport people but the logistical challenge of keeping them there is a very different thing
4	**TRUE**	However, we have two of the components necessary to make this work: power from the Sun and minerals on the Moon itself
5	**FALSE**	Scientists and researchers are already busy in laboratories and simulation facilities on Earth, testing their ideas for a lunar base
6	**D**	However, we have two of the components necessary to make this work: power from the Sun and minerals on the Moon itself
7	**B**	Harvesting the oxygen from the regolith will be very energy intensive, but the American space agency NASA has developed and tested robots capable of doing this
8	**G**	The hydrogen could then be used to fuel vehicles or fed to fuel cells to supply energy to the lunar base, and the oxygen could be used in the air supply
9	**E**	Scientists and researchers are already busy in laboratories and simulation facilities on Earth, testing their ideas for a lunar base
10	**reflected**	On the Moon, water could be obtained by reflecting sunlight onto ice within the craters from giant reflectors positioned at high points or mountains near the craters
11	**fuel**	The hydrogen could then be used to fuel vehicles or fed to fuel cells to supply energy to the lunar base, and the oxygen could be used in the air supply

#	Answer	Explanation
12	**solar panels**	Lunar soil contains almost all the minerals necessary to build solar panels
13	**(lunar / Moon's) poles**	Fortunately, the Moon's poles get sunlight 75-80% of the time and this is also where ice is located, making the poles ideal places to establish the base station
14	**B**	One would be to build a Moon base on Earth and transport it to the Moon via a spaceship in lunar orbit, but the costs of doing this would be prohibitive
15	**E**	For example, if a small business does not meet the narrow rules for borrowing from a traditional bank, they may be able to get a loan through P2P
16	**A**	Prior to these financial vehicles, it was difficult to invest in new companies without having a considerable amount of money
17	**B**	In traditional banking, an institution usually works as a financial middleman, regulating the transactions between lenders and borrowers
18	**applies**	P2P companies assess credit worthiness through their own artificial intelligence software, which takes hundreds or thousands of factors into account when someone applies for a loan
19	**credit rating**	The online P2P organisation assesses _the application and the credit rating of the person making the application
20	**client**	The interesting development here is that, depending on the platform, the investor and the lender are able to select their preferred client depending on the conditions that are on offer
21	**paying back**	When the application is approved, the applicant is given various options for borrowing and paying back the money and can choose among them
22	**fee**	The company that owns the online platform charges a fee to both borrowers and lenders for the services it provides and this is how it generates its profit – almost like a dating agency matching the suitability of the people involved
23	**A / D**	Because P2P banks are online, they do not have to pay for a physical high street presence, which can be expensive. Nor do they need to have large teams of staff because lenders and borrowers are matched using a computer algorithm that assesses the credit status of each party
24	**A / D**	Because P2P banks are online, they do not have to pay for a physical high street presence, which can be expensive. Nor do

#	Answer	Explanation
		they need to have large teams of staff because lenders and borrowers are matched using a computer algorithm that assesses the credit status of each party
25	**B / C**	Big banks still have the advantages of large cash reserves, legal backing and government guarantees – all the safeguards not available to people putting their money into P2P banks
26	**B / C**	Big banks still have the advantages of large cash reserves, legal backing and government guarantees – all the safeguards not available to people putting their money into P2P banks
27	**vii**	They seem able to use the position of the sun and stars, the Earth's magnetic field, smells and even landmarks to find their way, depending on which is available to them during the journey
28	**ii**	When the chicks of migrating birds are born, they imprint, or intuitively learn, the map of the sky and stars as they grow in order to orientate themselves
29	**iii**	One possibility is that they use the Earth's magnetic field. How they do this is a mystery because the field is so weak. However, experiments have pointed to evidence that birds use the magnetic field in two ways
30	**vi**	There is also some evidence that birds use their sense of smell to find their way across long distances The birds could find their way normally when they approached land where aromas and odours are present but were less efficient at finding their direction over the sea, suggesting that smell is very important for them in piloting their routes
31	**viii**	It seems that birds may build up a visual memory of landmarks that allows them to successfully navigate around places they have already visited. Birds that migrate in daylight often follow natural features like mountains, rivers and lakes. It has even been suggested that they follow man-made features such as roads
32	**planetarium**	In one famous experiment, Stephen Emlen placed Indigo buntings in a planetarium, where patterns of stars and planets are projected onto the ceiling
33	**sky map**	When the stars were projected in different positions, the birds changed position according to the new sky map, thus showing their awareness of the position of the stars
34	**retinas**	Researchers have discovered receptors, or chemicals, in their retinas and it is thought that these enable birds to sense the direction of the magnetic north

#	Answer	Explanation
35	**light**	When these chemicals are exposed to light, they generate electrons that are sensitive to magnetism
36	**different**	If this is the case, north and south could look different to migratory birds, in effect allowing them to ‘see’ the magnetic field
37	**beak(s)**	Scientists have found magnetite on the beak of some birds
38	**chemicals**	Researchers in the UK, Spain and Italy experimented on seabirds by temporarily blocking their sense of smell using chemicals and then tracking their paths home
39	**efficient**	The birds could find their way normally when they approached land where aromas and odours are present but were less efficient at finding their direction over the sea, suggesting that smell is very important for them in piloting their routes
40	**visual access**	‘Previewing’ experiments, where birds were allowed or denied visual access to a familiar site before releasing them, indicated that they use a ‘familiar area map’

Test 45

PASSAGE 1

You should spend about 20 minutes on Questions 1-14, which are based on Reading Passage 1 below.

The Change Curve

Change is inevitable in any sphere of life. Although the results of change can bring great benefits, the process of change can be intensely traumatic, involve loss of choice, power and status, and when change happens in the workplace, it can even lead to loss of jobs. Many businesses and organisations use a model called the Change Curve to understand and manage how people react to change and the stages they go through before they accept it.

The concept of the Change Curve is based on work by psychiatrist Elisabeth Kubler-Ross. Her book On Death & Dying, published in 1969, dealt with the trauma and shock that people who are facing the end of life experience and how their families are also affected. Kubler-Ross proposed several stages of grief as a way of helping patients face death and their relatives deal with its effects. Kiibler-Ross °S ideas were groundbreaking but have since become one of the bases of grief support and counselling. Moreover, because the ideas give a framework for dealing with personal trauma and change and for helping people adjust emotionally to significant life events, the model has been adopted by organisational theory and business management.

It is worth noting that Kiibler-Ross's original work described 10-13 stages of grief rather than the simpler four-stage version used by organisations, and that she did not intend them to be regarded as individual stages to be passed through in a fixed order but rather as phases of dealing with grief, which people may experience more than once at different times.

When change is introduced, in stage 1, people's first reactions may be shock or denial as their normality is threatened. Their refusal to accept the facts is a natural defensive reaction and it is important to understand this in order to help them move beyond this stage. Even when people know about a change in advance and understand the need for it, they still need to be informed of what is happening to them and their workplace. At this stage, it is important to communicate with people and to give them the sense that they are being included in the process.

If stage 1 is handled well, stage 2, a critical stage, will be smoother than if stage 1 is badly handled. In stage 2, people start to react to the change and this may generate feelings of anger, resentment or fear. They may feel angry with themselves, their workmates and even their friends. For an organisation, this is the point at which a team can fall apart and the working environment can become chaotic. Good management is crucial now and it must consider the impact the change is having on people and their emotions and address any objections they may have. Furthermore, change may affect people differently. For example, some may find that their skills are no longer useful and that their position is being threatened or undermined. Reactions

to change are highly personal so it is important to listen to people and monitor the situation and, if necessary, show that you are listening by taking action in response.

Stage 3 is when the organisation begins to assimilate the changes and come out of the crisis At this point, the changes have become real to people and they have begun to accept them. They will begin to learn in practical terms what the changes mean for them and wì11 do this more easiiy if they are helped and supported to do so. Therefore, training will be important, and time for this will need to be scheduled. The organisation's productivity may slip as people begin to work with the changes instead of against them. People will stop focusing on the past and start to learn what is good about the changes and what they need to do to adapt. When they have the right skills and training to cope, the organisation can move forward again.

The final stage, stage 4, is when people embrace the new reality and begin to see the benefits. They then start seeing opportunities and build new plans and hopes. Some may actually acknowledge that the change has been for the best, while others may accept the new status quo because they have no other option. During this stage, the organisation will become more productive. At this point, it is a good idea to acknowledge the difficulties and turmoil people have been through and celebrate the success of the change.

PART 1 — QUESTIONS

Questions 1-8

Look at the following descriptions and the stages below.

Match each description with the stage in which it occurs.

Write the correct letter, A-D.

NB

You may use any letter more than once.

A. stage 1

B. stage 2

C. stage 3

D. stage 4

	A	B	C	D
1 Common feelings are hate, bitterness and alarm about the changes.	○	○	○	○
2 Programmes to help and train people are important.	○	○	○	○
3 People reject the reality of what is happening.	○	○	○	○
4 People start to acknowledge and work with the new situation.	○	○	○	○
5 Relationships between colleagues become problematic and the working environment no longer functions properly.	○	○	○	○
6 It is important to explain forthcoming changes so that people feel involved.	○	○	○	○
7 It is important to acknowledge the positive aspects of the change and show appreciation for the way people have dealt with difficulties.	○	○	○	○
8 People start planning for their future in the new circumstances.	○	○	○	○

Questions 9-12

Do the following statements agree with the information given in Reading Passage 1?

Write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

9 The Change Curve is a model of human behaviour that helps us understand why organisations change.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

10 The ideas for the Change Curve were based on ideas used in counselling people who were dying.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

11 Kübler-Ross's ideas give us a way of understanding how people adapt to significant national events.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

12 A more complex version of Kübler-Ross's stages is used by organisations to understand change.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

Questions 13-14

Choose TWO letters, A-E.

Write the correct letters.

13 **14** Which TWO pieces of information are mentioned by the writer of the text in paragraphs 5-7?

- **A** ☐ During stage 3, the productivity of a company increases as people get used to changes.
- **B** ☐ It is not worth spending money on training staff because they are not focused on their jobs.
- **C** ☐ Some people only accept changes because there is no other choice.
- **D** ☐ Changes are harder to process when people receive no support.
- **E** ☐ Managers can prevent people from feeling any stress by communicating with staff.

PASSAGE 2

You should spend about 20 minutes on Questions 15-29, which are based on Reading Passage 2 below

Space Junk

Since the Soviet Union successfully launched the first man-made satellite, Sputnik 1, in 1957, about 5,000 more satellites have been put into orbit around the Earth. About 2,000 of these are active and although the rest are now dead, they remain in orbit, together with parts from all the rockets that carried them there. These remnants are often referred to as space junk, space trash or orbital debris. The debris ranges in size from 1-10 centimetres and there are estimated to be around half a million pieces with an additional 23,000 fragments bigger than 10 centimetres. These larger pieces can be observed and tracked from the ground. The waste is found in all zones of the Earth's orbit: low Earth orbit, which is within 2,000 kilometres of the Earth's surface; medium orbit, which is between 2,000 and 36,000 kilometres from the Earth's surface; and high orbit, which is beyond that. Most satellites are in low Earth orbit, as is the International Space Station (ISS). The problem is that most of the space debris is found there too and this is becoming a huge problem.

Some of the debris in low Earth orbit is eventually captured by the Earth's gravity and burns up when it enters the Earth's atmosphere or reaches its surface. However, most of the space junk stays in low Earth orbit and this can have several unwanted consequences. In 2009, almost 500 miles above Siberia, there was a collision between the obsolete Russian satellite Cosmos 2251 and the working US communication satellite Iridium 33. The satellites collided with each other at a speed of 11.7 kilometres per second and produced more than 2,000 pieces of debris. This was the first time two satellites were actually observed hitting each other in space, and the fragments from that collision could be seen spreading out over a very wide area over the following months.

Even though the area within low Earth orbit is vast, the speed at which pieces of junk travel means that they are deadly at the infrequent times they encounter another object. In 2006 a small piece of space junk hit the ISS and damaged one of its windows. Later, in 2014, the ISS had to make an emergency manoeuvre to avoid a piece of junk from the Russian Cosmos 2251 satellite smashing into it. The potential disaster was only averted because a supply vehicle that was docked with the space station fired its thrusters and raised the ISS by one kilometre out of the path of the space junk. This example illustrates the first problem with the debris: satellites need to carry out important work but are in constant danger of being damaged or destroyed. The ISS was designed to withstand impacts from debris up to one centimetre in size but in order to prevent it being hit by larger objects, scientists have to watch for space junk and try to move the station out of harm's way if necessary; the lives of the people on board could be at risk so it is extremely important to monitor the paths of the pieces of debris. However, it is very difficult to accurately plot the course of a debris fragment and so the ISS is only moved when there is probability of a strike. The junk from Cosmos 2251 was spotted only six hours before it

passed within three kilometres of the ISS's position. As debris is broken into smaller and smaller pieces, tracking it becomes increasingly difficult.

The second problem is what happens when we launch satellites and rockets in the future. Some scientists describe space junk as an umbrella or ring around the Earth, which any future launch will need to punch through to go into space. No one really knows how bad the problem has to get before it prevents us putting objects into space or makes it very expensive to do so. The astrophysicist Donald Kessler, who used to work for NASA, calculated that if there is enough junk in orbit, collisions between pieces would create high-velocity smaller pieces of debris that would then hit even more objects, resulting in a chain reaction, producing more and more destructive pieces of debris. The problem is made worse when satellites remain in space after their working lives or when they are destroyed deliberately. An anti-satellite test in 2007 destroyed an obsolete weather satellite, creating 3,000 pieces of space debris, and a missile strike in 2019 scattered thousands more pieces into orbit. The gradual accumulation of space junk caused by debris colliding and creating more junk is called the Kessler syndrome and it will build up over the next 100 years. Eventually, the time between collisions will become shorter and shorter, and it is predicted that a cloud of deadly space junk will circle the planet.

Kessler believes that we need legislation that requires countries to build satellites that re-enter the atmosphere after their mission has ended and impose penalties on countries that do not do this. The problem is that the damage is already done and even if everyone keeps to the rules, collisions are still happening and the amount of debris is growing. This points to a second aspect of the potential solution: clean up the biggest pieces. The larger debris could be tracked and removed; Kessler believes that if we could take just five objects per year out of orbit, the problem would stabilise. Although this sounds simple, satellites travel at great speeds and some are very large. Ideas for dealing with inactive satellites include removing them using harpoons or nets based on the ISS. A satellite service station that would repair satellites and extend their working lives has also been proposed. Whichever solution is brought forward, however, it will need international cooperation and this could be more difficult to achieve than catching the wayward satellites.

PART 2 — QUESTIONS

Questions 15-19

Complete each sentence with the correct ending, A-H, below.

Write the correct letter, A-H.

- A large number of the satellites that orbit the Earth **15** _____
- Pieces of space junk that are larger than 10 centimetres **16** _____
- Pieces of debris that have resulted from collisions **17** _____
- Some objects that are in low Earth orbit **18** _____
- Collisions that happen at high speed **19** _____

A. **can be found mostly in the same orbit area as the International Space Station.**

B. **produce even more debris that travels large distances.**

C. **are above Siberia.**

D. **are no longer active.**

E. **can be seen and followed from Earth.**

F. **are among the 5,000 satellites that are circling the Earth.**

G. **burn up and are destroyed as they fall back to ground.**

H. **circle the planet in the medium Earth orbit.**

Questions 20-23

Choose the correct letter, A, B, C or D.

Write the correct letter.

20 The International Space Station managed to avoid a piece of space junk because

A ○ one of its windows was damaged.

B ○ a supply vehicle moved it out of its path.

C ○ scientists did not want to smash a Russian satellite.

D ○ space junk travels at incredible speeds.

21 Because both satellites and space debris are in low Earth orbit,

A ○ satellites are built to withstand impact.

B ○ there is a high probability of collisions happening.

C ○ scientists try to accurately predict the orbit of the debris.

D ○ the International Space Station is frequently moved to avoid them.

22 The amount of junk in space will NOT lead to

A ○ more expensive space flights.

B ○ a huge ball of space junk around the Earth.

C ○ easier tracking of orbiting fragments.

D ○ a chain reaction of pieces of debris hitting each other and creating more junk.

23 The problem of space junk is being made worse due to

A ○ the intentional destruction of old satellites.

B ○ the high concentration of pieces of debris.

C ○ inactive satellites not returning to Earth.

D ○ a lack of understanding of the extent of the problem

Questions 24-29

Complete the summary below.

Choose NO MORE THAN THREE WORDS from the passage for each answer.

Solutions to the Kessler syndrome include introducing laws that force countries to launch satellites that can **24** _____ the Earth's atmosphere at the end of their life and make them pay **25** _____ if they do not do this. At the same time, we need to **26** _____ the situation by removing larger objects from low Earth orbit. This is

difficult because of the **27** _____ of such objects, but ideas include catching them with **28** _____ or building a **29** _____ to extend their active lives.

PASSAGE 3

You should spend about 20 minutes on Questions30-40, which are based on Reading Passage 3 below.

The Tree of Life

A. The baobab tree has a very distinctive appearance, with a large, round trunk and branches that look like roots reaching into the air. The latter gained it the name of the 'upside-down tree' but it is also known by other names. The origin of the word 'baobab' is not clear; it may come from the Arabic bu hibab, referring to a fruit with many seeds, or from the medieval Latin bahobab, apparently from a central African language. It grows in arid regions of the southern hemisphere and has evolved unique ways of surviving in water-scarce environments. The tree is common throughout sub-Saharan Africa, Madagascar and north-western Australia. It is impressive, not just because of its appearance and ability to survive in harsh climates, but also because of its size. In Zimbabwe, one baobab grew so big that 40 adults could fit inside it. A baobab can grow 25 metres high and as it gets older, the middle of the trunk becomes hollowed out. The hollow trunk is used as shelter by animals, and humans too have used it for a variety of purposes; one tree was even used as a prison cell. Indeed, the baobab is one of the biggest flowering plants in the world and produces fruits that are prized by people and animals alike for food.

B. Baobabs are long lived but unlike other trees, it is very difficult, if not impossible, to discover their age by counting annual growth rings in the trunk because their growth rings are very faint. Instead, researchers use radiocarbon dating to analyse samples from trees. The oldest specimen found so far was 2,500 years old. The trees have a staged growth pattern that was observed by the naturalist Von Breitenbach, who described four phases. The first is the young or sapling phase, which lasts until the tree is 15 years old. During this phase, it reaches a height of about six metres. The second phase is the cone phase, which lasts until the tree is 60-70 years old. This is the period when growth is the fastest and the tree reaches about 15 metres in height. In the third phase, the bottle phase, the trunk broadens out to produce the tree's iconic shape, and at 200-300 years old, it gains a height of about 20 metres. During the old age phase, the trunk expands further and becomes hollow. The tree eventually dies aged 500-800 years, although some individuals survive much longer.

C. A master of water management, the baobab can hold up to 120,000 litres of water in its trunk, which is incredibly useful for animals and humans in times of drought. Both are able to pierce the tree to access the water, and this is probably why many trees can be found along trade routes in Africa. The trunk is not a single structure but is composed of many stems fused together. This creates gaps in the trunk to capture precious water, which can be absorbed later by the tree - unless people or animals find it first.

D. The tree first flowers after 20 years of age and the flowering period can be up to 6 weeks. The flowers appear in early summer (October to December in the southern hemisphere) and they are extraordinary. White in colour, heavy and large, they open during the evening simultaneously and survive for just 24 hours. When they open, they have a sweet smell but the

scent becomes unpleasant later on as they turn brown and then fall. The flowers are pollinated mainly by fruit bats, which are attracted by the strong smell, and to a lesser extent by bushbabies as well as various insects. After flowering, the baobab produces large fruit pods about 20 centimetres long, which hang down from the tree. The pods take six months to ripen before falling to the ground, from where they can be harvested. Inside are small black seeds that are covered with a white powdery substance that tastes lemony and delicious and is a valuable food source. The fruit has many uses: it can be made into a drink that is high in vitamins C and B2, and it has been used to treat fevers; the seeds are pressed into oil or roasted as snacks; and the shell can be made into a musical percussion instrument.

E. Like many giant trees, an old baobab creates its own ecosystem. It supports the life of thousands of creatures, from the largest mammals to insects and other small animals that shelter in its crevices. Birds nest in its branches; baboons eat its fruit; bushbabies and fruit bats drink the nectar. Little wonder the baobab is sometimes called the 'tree of life'. However, like all living things, the baobab does eventually die and when this happens, it collapses quickly and disintegrates into fibres. Perhaps this has given rise to another of its names, the 'magic tree'; its disintegration is so fast that the tree simply seems to disappear.

PART 3 — QUESTIONS

Questions 30-32

Complete the sentences below.

Choose ONE WORD ONLY from the passage for each answer.

- The baobab is called the 'upside-down tree' because its **30** _____ stick into the air like tree roots.
- It is also called the 'tree of life' because many creatures depend on it for water, food, **31** _____ and as a place to live.
- Because the baobab **32** _____ so quickly at the end of its life, people also call it the 'magic tree'.

Questions 33-35

Complete the table below.

Choose NO MORE THAN TWO WORDS from the passage for each answer.

Age (years)	Phase	Height	Feature
10-15	sapling	3-6 metres	
60-70	**33** _____	5-15 metres	the tree's **34** _____ is the quickest
70-300	bottle	10-20 metres	the trunk **35** _____ and takes on the familiar baobab shape
300-800	old age		the tree trunk becomes hollow and expands

Questions 36-40

Reading Passage 3 has five paragraphs labelled A-E.

Which paragraph contains the following information?

Write the correct letter, A-E.

	A	B	C	D	E
36 how the baobab reproduces	○	○	○	○	○
37 the end of the baobab's life	○	○	○	○	○
38 how the baobab survives in dry conditions	○	○	○	○	○
39 the climate and regions in which the tree grows	○	○	○	○	○
40 how scientists date the trees	○	○	○	○	○

Answer Key

#	Answer	Explanation
1	**B**	In stage 2, people start to react to the change and this may generate feelings of anger, resentment or fear
2	**C**	Therefore, training will be important, and time for this will need to be scheduled
3	**A**	When change is introduced, in stage 1, people's first reactions may be shock or denial as their normality is threatened. Their refusal to accept the facts is a natural defensive reaction and it is important to understand this in order to help them move beyond this stage
4	**C**	At this point, the changes have become real to people and they have begun to accept them The organisation's productivity may slip as people begin to work with the changes instead of against them
5	**B**	In stage 2, people start to react to the change and this may generate feelings of anger, resentment or fear. They may feel angry with themselves, their workmates and even their friends. For an organisation, this is the point at which a team can fall apart and the working environment can become chaotic
6	**A**	Even when people know about a change in advance and understand the need for it, they still need to be informed of what is happening to them and their workplace. At this stage, it is important to communicate with people and to give them the sense that they are being included in the process
7	**D**	At this point, it is a good idea to acknowledge the difficulties and turmoil people have been through and celebrate the success of the change
8	**D**	The final stage, stage 4, is when people embrace the new reality and begin to see the benefits. They then start seeing opportunities and build new plans and hopes
9	**FALSE**	Many businesses and organisations use a model called the Change Curve to understand and manage how people react to change and the stages they go through before they accept it
10	**TRUE**	The concept of the Change Curve is based on work by psychiatrist Elisabeth Kubler-Ross. Her book On Death & Dying, published in 1969, dealt with the trauma and shock that people who are facing the end of life experience and how their families

#	Answer	Explanation
		are also affected. Kubler-Ross proposed several stages of grief as a way of helping patients face death and their relatives deal with its effects. Kiibler-Ross °S ideas were groundbreaking but have since become one of the bases of grief support and counselling
11	**NOT GIVEN**	Moreover, because the ideas give a framework for dealing with personal trauma and change and for helping people adjust emotionally to significant life events, the model has been adopted by organisational theory and business management
12	**FALSE**	It is worth noting that Kiibler-Ross's original work described 10-13 stages of grief rather than the simpler four-stage version used by organisations
13	**C / D**	They will begin to learn in practical terms what the changes mean for them and wì11 do this more easiiy if they are helped and supported to do so Some may actually acknowledge that the change has been for the best, while others may accept the new status quo because they have no other option
14	**C / D**	They will begin to learn in practical terms what the changes mean for them and wì11 do this more easiiy if they are helped and supported to do so Some may actually acknowledge that the change has been for the best, while others may accept the new status quo because they have no other option
15	**D**	About 2,000 of these are active and although the rest are now dead, they remain in orbit, together with parts from all the rockets that carried them there
16	**E**	The debris ranges in size from 1-10 centimetres and there are estimated to be around half a million pieces with an additional 23,000 fragments bigger than 10 centimetres. These larger pieces can be observed and tracked from the ground
17	**A**	Most satellites are in low Earth orbit, as is the International Space Station (ISS). The problem is that most of the space debris is found there too and this is becoming a huge problem Later, in 2014, the ISS had to make an emergency manoeuvre to avoid a piece of junk from the Russian Cosmos 2251 satellite smashing into it
18	**G**	Some of the debris in low Earth orbit is eventually captured by the Earth's gravity and burns up when it enters the Earth's atmosphere or reaches its surface
19	**B**	The satellites collided with each other at a speed of 11.7 kilometres per second and produced more than 2,000 pieces of debris. This was the first time two satellites were actually observed hitting each other in space, and the fragments from that

#	Answer	Explanation
		collision could be seen spreading out over a very wide area over the following months
20	**B**	The potential disaster was only averted because a supply vehicle that was docked with the space station fired its thrusters and raised the ISS by one kilometre out of the path of the space junk
21	**C**	the lives of the people on board could be at risk so it is extremely important to monitor the paths of the pieces of debris. However, it is very difficult to accurately plot the course of a debris fragment
22	**C**	As debris is broken into smaller and smaller pieces, tracking it becomes increasingly difficult
23	**A**	The problem is made worse when satellites remain in space after their working lives or when they are destroyed deliberately
24	**re-enter**	Kessler believes that we need legislation that requires countries to build satellites that re-enter the atmosphere after their mission has ended and impose penalties on countries that do not do this
25	**penalties**	Kessler believes that we need legislation that requires countries to build satellites that re-enter the atmosphere after their mission has ended and impose penalties on countries that do not do this
26	**stabilise**	Kessler believes that if we could take just five objects per year out of orbit, the problem would stabilise
27	**size**	Although this sounds simple, satellites travel at great speeds and some are very large
28	**harpoons or nets**	Ideas for dealing with inactive satellites include removing them using harpoons or nets based on the ISS
29	**satellite service station**	A satellite service station that would repair satellites and extend their working lives has also been proposed
30	**branches**	The baobab tree has a very distinctive appearance, with a large, round trunk and branches that look like roots reaching into the air
31	**shelter**	It supports the life of thousands of creatures, from the largest mammals to insects and other small animals that shelter in its crevices
32	**disintegrates**	the baobab does eventually die and when this happens, it collapses quickly and disintegrates into fibres
33	**cone**	The second phase is the cone phase, which lasts until the tree is 60-70 years old
34	**growth**	This is the period when growth is the fastest and the tree reaches about 15 metres in height

#	Answer	Explanation
35	**broadens out**	In the third phase, the bottle phase, the trunk broadens out to produce the tree’s iconic shape, and at 200-300 years old, it gains a height of about 20 metres
36	**D**	The flowers are pollinated mainly by fruit bats, which are attracted by the strong smell, and to a lesser extent by bushbabies as well as various insects. After flowering, the baobab produces large fruit pods about 20 centimetres long, which hang down from the tree
37	**E**	However, like all living things, the baobab does eventually die and when this happens, it collapses quickly and disintegrates into fibres
38	**C**	A master of water management, the baobab can hold up to 120,000 litres of water in its trunk, which is incredibly useful for animals and humans in times of drought The trunk is not a single structure but is composed of many stems fused together. This creates gaps in the trunk to capture precious water, which can be absorbed later by the tree – unless people or animals find it first
39	**A**	It grows in arid regions of the southern hemisphere and has evolved unique ways of surviving in water-scarce environments. The tree is common throughout sub-Saharan Africa, Madagascar and north-western Australia
40	**B**	Instead, researchers use radiocarbon dating to analyse samples from trees

Test 46

PASSAGE 1

You should spend about 20 minutes on Questions 1-14, which are based on Reading Passage 1 below.

Coastal defences

The world's coastlines are constantly being reshaped and reworked by the sea. Coastal erosion is one of the natural phenomena that contribute to the creation and destruction of our shores and one of the main processes that form beaches, dunes, mud flats, reefs and marshes along the coast. These different shoreline features have a wide range of functions: they provide habitats for wildlife, prevent flooding and protect fresh water resources inland, and, of course, they provide opportunities for leisure activities like sunbathing. As human activity along the coast continues to increase with the development of towns and industries, managing erosion is becoming a problem of growing importance. The risk of flooding due to rising sea levels, attributed to the effects of global warming, makes finding a solution to erosion a priority. As well as protecting natural habitats, coastal management involves saving homes and businesses from damage or destruction, and failing to do this can have severe consequences for society and the economy.

Coastlines are changed by the sea in two ways: erosion and longshore drift. Erosion happens through different processes, but essentially the action of the sea wears down features of the coastal landscape such as cliffs, beaches and sand dunes before washing them away. Longshore drift happens when waves approach a beach at an angle and move sediment along the coast until eventually the beach changes its shape. The beach may even disappear from its original location and re-form (as sediment is deposited) further down the coast.

There are three basic approaches to coastline management. The first one is to maintain the existing coastal defences but not to build new ones. The second is to build new defences further out at sea in order to reduce pressure on existing defences and even extend the coastline. The third is to retreat, in other words, to move people, homes and businesses away from disappearing coastlines. When the preferred option is to attempt to stop coastline erosion, either hard or soft engineering options can be used.

Hard engineering options are expensive and, in all probability, short term. They tend to have a significant effect on the landscape and environment because of their size 'and visual impact. Furthermore, they are expensive to build and maintain. Common coastal hard engineering methods are to build a sea wall or groynes; each type of barrier is designed to combat an aspect of coastal change, and in some places more than one type of sea defence can be seen. Sea walls are built at the edge of a coastline and are usually made from reinforced concrete to make them stronger. The walls prevent the sea from washing away the bottom of cliffs, causing the cliffs to fall into the sea. The walls can be vertical, curved or mound walls. Vertical walls were mainly used in the past and are the simplest type of wall. Unfortunately, they are also the

most easily damaged by waves as their foundations can be undermined by the sea. Curved seawalls serve to push the waves back out to sea, and the curve prevents water from crashing over the top of the wall. However, deflecting the energy of the waves simply means that erosion takes place further down the coast. Mound sea walls use a mixture of loose material, such as rock and concrete, which has the advantage of absorbing the energy of the waves rather than deflecting it, and cost much less to build. However, they are less effective in storms and have shorter lives than solid sea walls.

Groynes are low walls built at a right angle to the coastline and are used to minimise the effect of longshore drift. They can be built from wood, stones and/or concrete, and are used in groups to break the beach into sections. As a wave hits the side of a groyne, its power is reduced and the material being carried by it is deposited at the side of the groyne. Groynes are less expensive than sea walls to put in place but like mound sea walls, they have a short lifespan.

The alternatives to hard engineering schemes are soft engineering techniques. They are low-cost solutions that have little immediate effectiveness against coastal erosion but are much more sustainable. There are two main kinds of soft engineering options. The first is beach nourishment, which replaces the sand and pebbles washed away by the sea. This avoids the need for expensive sea walls but sand needs to be moved constantly to maintain the beach. Unfortunately, because this option does not stop natural erosion by the sea, a larger quantity of material is deposited further down the coast. The second option, managed retreat, avoids coastal management and construction projects and allows areas of the coast to erode and flood naturally. Managed retreat usually takes place in areas of low economic value. The advantage of this method is that it encourages the development of beaches and salt marshes, two kinds of environments that are natural defences against the sea. The second advantage is, of course, that it is cheap.

Coastal management is difficult as local people, farmers and the agricultural industry, environmentalists, tourist authorities and other economic interests will have different opinions about what should be done. The importance of the issue is obvious from just one statistic: 45% of the world's population live within 100 kilometres of the coast. As sea levels rise and storm energy increases, the problems of coastal management are going to become ever more intense and pressing.

PART 1 — QUESTIONS

Questions 1-5

Complete the summary using the list of words, A-I, below.

Write the correct letter, A-I.

Coastal erosion can create several different types of **1** _____ which have many different **2** _____ in the changing coastal environment. These include providing environments for wildlife to live, stopping floods and protecting water supplies. The increasing **3** _____ of homes and businesses on or near the coast means that managing our coastline is a[n] **4** _____ for many countries around the world. If this cannot be done effectively, there could be severe effects on **5** _____

A. **crisis** B. **priority** C. **landscape** D. **management** E. **economy**

F. **roles** G. **society** H. **resources** I. **development**

Questions 6-8

Complete the sentences below.

Choose ONE WORD ONLY from the passage for each answer.

- Erosion occurs when features of the coast are worn down by the sea's **6** _____
- Shorelines are reshaped when materials are washed down the coast because waves hit beaches at an **7** _____
- Beaches can move and **8** _____ some distance away from their original position.

Questions 9-12

Complete the flow-chart below.

Choose ONE WORD from the passage for each answer.

Engineered Coastal Defences

Sea walls	**Groynes**
vertical ✓ simple to build X the foundations are often **9** _____ by the sea **curved** ✓ stop waves **10** _____ over the wall X reflect wave energy back to the sea **mound** ✓ capable of **11** _____ wave energy X need replacing often	**vertical** ✓ less expensive than walls X do not have a long **12** _____

Questions 13-14

Choose the correct letter, A, B, C or D.

13 Which statement is NOT TRUE about beach nourishment?

- **A** ○ A. Sea walls are not needed.
- **B** ○ B. Coastal materials have to be replaced often.
- **C** ○ C. More coastal material is carried further down the coast.
- **D** ○ D. It involves building roads to bring materials to the coast.

14 Which statement is TRUE about managed retreat?

- **A** ○ A. Salt marshes and cliffs are usually created as a result.
- **B** ○ B. It is used in areas of little commercial interest.
- **C** ○ C. Not a lot of land is lost to the sea.
- **D** ○ D. The costs of managed retreat are high.

PASSAGE 2

You should spend about 20 minutes on Questions 15-29, which are based on Reading Passage 2 below.

Team working

The ability to work in a team is one that is prized by employers and educationalists alike. It is often requested in job advertisements and displayed on CVs. When employers list their most important skills for promotion, 86% list team working skills. The willingness and ability to work with a group of people towards a single target has become increasingly important in an era when soft skills like communication, creativity, critical thinking and collaboration are essential in work and study. Today's teams are different from those of the past because a team is likely to change membership more often, will be more socially diverse and its members could be located over a wider area - even globally.

In 1965 psychologist Bruce Tuckman recognised that team building goes through different stages, from a collection of individuals to a fully functioning unit. Tuckman did not study groups himself; he reviewed articles about group development. He found that the articles described two features that all the groups had in common: individual interactions and the task activity. Tuckman recognised that groups evolve and he suggested that they do so via four stages that he called forming, storming, norming and performing. Briefly, in the first stage, 'forming', people are getting to know each other and finding their roles in the new hierarchy. In the second stage, 'storming', there are conflicts between members as differences emerge about issues such as what the team is being asked to do and how to do it. In the third phase, 'norming', team members start to work together. They establish processes about who will do what, when and how, and there is a growing sense of cooperation in the team. In the fourth stage, 'performing', the team now has a shared set of norms and has learned how to work well together. The individual members focus less on their position in the team and how to work together and more on their tasks. Tuckman later added a further, final stage, 'adjourning', to his model. In this final stage, the team stops working together, celebrates its success and reflects on its performance and achievements.

The value of Tuckman's model is that it enables us to see team working as a process dependent on interpersonal relationships and the team's interaction with the task. It gives managers and educators a simple, staged model to help them form teams and support the team members as they try to understand where they are in the process. According to the model, all teams are likely to go through these stages in this order, and although it is also possible to go backwards, for example from storming to forming, when a team does this, it must go through the other stages in the same order again. However, the model has been criticised and alternatives have been proposed. Firstly, Tuckman's model was not based on first-hand observations and evidence, and it seems that where the model has been tested, the reality was different from that predicted by the model. A study by the Monterey Naval Postgraduate School showed that only 2% of the teams observed went through all four stages. Furthermore, storming, or conflict, continues throughout the duration of the team's life and conflict happens frequently. Secondly,

Tuckman's model excluded external factors such as the nature of the task the group has been given and how this affects progress. Thirdly, the model predicts stability and specialisation: the longer the team stays together, the better it becomes at its task or tasks.

The problem is that when teams become too specialised, this leads to silo working, where teams focus on one task and become territorial about sharing ideas, knowledge and expertise with others in the organisation. In fact, some researchers, like Klaus Schauser at the University of California, have suggested that there is a sixth stage to Tuckman's model: stagnation. Newer companies, especially in the technology sector, require agile - or flexible - teams, and have built their company culture around a process called reteaming, or breaking up teams to build new ones. This enables team members to move between groups so that teams learn from each other. Some online gaming and music streaming companies are noted for their reteaming techniques, believing that this gives them the flexibility to move with their markets and to change and adapt swiftly. One way to re-organise teams is to create situations where a team has to make an effort to recruit new members and there is an ongoing effort to bring in new people. Another way is to let a team grow until it is big enough to divide into two teams; the advantage is that both teams are used to working with each other and so are now two effective working groups. When there is a single temporary problem to solve, volunteers can come together to form a temporary task team. After the work on the problem is completed, the team breaks up and the members re-join their old group. Finally, team members can swap places between teams in order to share learning across the organization.

PART 2 — QUESTIONS

Questions 15-19

Complete the table below.

Choose ONE WORD ONLY from the passage for each answer.

Stage	Behaviours
Forming	People become acquainted with each other and learn where they fit into the group's **15** _____
Storming	Differences **16** _____ in the team about the task members are being asked to do and the way to do it.
Norming	Team **17** _____ improves as people learn how to work with each other.
Performing	The team understands how to work together according to agreed **18** _____
Adjourning	The team breaks up and can think about its **19** _____ and successes.

Questions 20-21

Choose TWO letters, A-E.

20 **21** The list below describes some of the features of Tuckman s model. Which TWO points are mentioned by the writer of the text?

- **A** ☐ It regards team working as a process dependent on good managers.
- **B** ☐ It helps managers support their staff as they try to form working teams.
- **C** ☐ It helps managers monitor the performance of their teams.
- **D** ☐ It is based on research carried out by Tuckman in the workplace.
- **E** ☐ It proposes that teams can return to a previous stage before moving to the next one.

Questions 22-23

Choose TWO letters, A-E.

22 **23** The list below describes some of the shortcomings of Tuckman s model. Which TWO points are mentioned by the writer of the text?

- **A** ☐ It only applies to schools of postgraduate studies.
- **B** ☐ It incorrectly forecasts that teams become unstable and unable to perform well.
- **C** ☐ It does not predict how long a team can stay together.
- **D** ☐ It does not consider outside influences that affect people's work.
- **E** ☐ It does not predict what actually happens at work.

Questions 24-29

Do the following statements agree with the information given in Reading Passage 2?

write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

24 Modern tech companies do not like people working in a team for more than six months.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

25 Technology companies routinely dissolve teams to form new ones.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

26 Reteaming means that technology companies cannot respond quickly to changes in the market.

- **A** ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

27 Technology companies routinely recruit new team members from outside the company.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

28 Some teams are left to grow until they are big enough to make two smaller teams.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

29 Sometimes, people from one team will join another to make a new temporary team focused on a single task.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

PASSAGE 3

You should spend about 20 minutes on Questions 30-40, which are based on Reading Passage 3 below.

Artificial curation

We all know that too much information can be a bad thing - this is as true in daily life as it is in business. Filtering useful from useless information has become a growing problem, bringing confusion with it, but this is where data curation can help. Curating data involves finding and displaying patterns in large volumes of disconnected and messy data to create meaningful information and suggestions for the end user. The process of data collection to inform business and consumer choice has developed from collecting information via questionnaires and interviews to digitalising information and using technology to gather and interpret data. The latter requires huge databases for computer algorithms (sets of computer instructions) to search and find patterns in order to predict what choices we might make. The use of algorithms is called AI curation, and from shopping to social media, it is part of our lives.

AI curation involves designing computer algorithms that work with large amounts of data. The data is gathered from people's past internet use, for example, searches, purchases, likes and bookmarks. The algorithm looks for patterns in this historical data and uses these patterns to predict the user's choices. The patterns and predictions help the algorithm search and sort through the huge volume of information on the internet and present items that the user has previously looked for or liked or bought. For example, if a person has searched for a particular product online, the algorithm may make suggestions for other products or websites the person might be interested in. If the consumer goes on to click through to the website or to buy something that has been recommended, then the algorithm has found a winning pattern for that individual.

Algorithms make it possible to collect data about a target audience and consequently, they determine which adverts we see as we browse the internet as well as which news stories are shown to us. The purpose of this is to increase our engagement with a particular company or website and thus generate revenue. AI curation has other benefits too. In the recent past, when we wanted information about the news, we went to a news site and if we were interested in sports news, for example, we searched for sports news within that news site. With AI curation, based on our searches and our likes, we have the sports news brought directly to us. Users see what they are mostly interested in and, conversely, see less of what they don't want to. They can therefore build a relationship with websites they frequently visit as content and products are personalised for them, building loyalty and trust. Finally, they are able to focus on certain information and build up specialist knowledge about the things they are interested in. They can even connect with other users who are interested in the same subject and form communities based on that particular topic.

Although algorithms are good to some extent at curating virtual information for us and putting forward suggestions, some companies are moving away from AI and back to human recommendations. Humans have always played a role in some areas of internet curation,

particularly news or stories where people have to moderate or make a choice about what is suitable or not for an audience. There have been several cases where algorithms have spread stories that were partially or wholly untrue or presented content that was not suitable for younger people. Some social media companies are bringing back human editors because algorithms cannot distinguish between stories that have on-the- record sources and stories that are simply made up. The other thing a recommendation algorithm can't do is to tell you why it is desirable to use a product – what makes it great or different or better than a rival product. Neither can it give its recommendation the human touch, and people usually prefer recommendations from other people. The problem with human curation, however, is that there just isn't enough of it to deal with all the information, particularly when algorithms are cheaper and much more efficient.

It seems that the best way forward is a solution that uses both Al and human curation. One news company that works in this way starts by asking its users to pick articles for others to read. These stories form the basis for algorithms to work with. The algorithms then gather similar stories for the next stage. When the algorithm has compiled stories from various internet sources, a human editor fine-tunes the selection for the audience. For example, if the Al curator is asked for stories about famous people, it may deliver sensational or even misleading stories because these are the ones that have received the most clicks. At this point, the human curator intervenes and deletes inappropriate content in favour of better stories. It seems that putting a human curator alongside Al can give a better quality of curation and create trust in the recommendations as well as a personal connection that isn't offered by an algorithm alone.

PART 3 — QUESTIONS

Questions 30-32

Complete the sentences below.

Choose ONE WORD ONLY from the passage for each answer.

- The amount of data that is available to companies is too great to be useful and results in **30** _____
- AI curation means that a computer program looks for and shows **31** _____ in large amounts of data.
- Technology is applied to digital information to collect and **32** _____ the data

Questions 33-34

Choose TWO letters, A-E.

33 **34** Which TWO things does an algorithm do?

- **A** ☐ It reviews past interactions by the user on the internet to gather data.
- **B** ☐ It helps to build relationships between the user and their preferred websites.
- **C** ☐ It uses people's responses to create advertisements.
- **D** ☐ It collects information from other algorithms.
- **E** ☐ It presents information that we do not want to see.

Questions 35-36

Choose TWO letters, A-E.

35 **36** Which TWO things can't an AI algorithm do?

- **A** ☐ provide certain kinds of information more directly
- **B** ☐ distinguish between stories that have valid sources and those that don't
- **C** ☐ recommend items that are appropriate for the user

D ☐ find sources quickly and efficiently

E ☐ find stories about famous people

Questions 37-40

Complete the flow-chart below.

Choose ONE WORD ONLY from the passage for each answer.

The news company's readers select articles to recommend to other users.

↓

The news items become the **37** _____ algorithms use to collect comparable items.

↓

A human editor **38** _____ the stories collected by the algorithm.

↓

The human editor **39** _____ content that is not suitable and replaces it.

↓

Selection by AI and humans can give a better standard of **40** _____

Answer Key

#	Answer	Explanation
1	**C**	Coastal erosion is one of the natural phenomena that contribute to the creation and destruction of our shores and one of the main processes that form beaches, dunes, mud flats, reefs and marshes along the coast
2	**F**	These different shoreline features have a wide range of functions: they provide habitats for wildlife, prevent flooding and protect fresh water resources inland, and, of course, they provide opportunities for leisure activities like sunbathing
3	**I**	As human activity along the coast continues to increase with the development of towns and industries, managing erosion is becoming a problem of growing importance
4	**B**	The risk of flooding due to rising sea levels, attributed to the effects of global warming, makes finding a solution to erosion a priority
5	**G**	As well as protecting natural habitats, coastal management involves saving homes and businesses from damage or destruction, and failing to do this can have severe consequences for society and the economy
6	**action**	Erosion happens through different processes, but essentially the action of the sea wears down features of the coastal landscape such as cliffs, beaches and sand dunes before washing them away
7	**angle**	Longshore drift happens when waves approach a beach at an angle and move sediment along the coast until eventually the beach changes its shape
8	**re-form**	The beach may even disappear from its original location and re-form (as sediment is deposited) further down the coast
9	**undermined**	Vertical walls were mainly used in the past and are the simplest type of wall. Unfortunately, they are also the most easily damaged by waves as their foundations can be undermined by the sea
10	**crashing**	Curved seawalls serve to push the waves back out to sea, and the curve prevents water from crashing over the top of the wall
11	**absorbing**	Mound sea walls use a mixture of loose material, such as rock and concrete, which has the advantage of absorbing the energy of the waves rather than deflecting it, and cost much less to build

#	Answer	Explanation
12	**lifespan**	Groynes are less expensive than sea walls to put in place but like mound sea walls, they have a short lifespan
13	**D**	The first is beach nourishment, which replaces the sand and pebbles washed away by the sea. This avoids the need for expensive sea walls but sand needs to be moved constantly to maintain the beach. Unfortunately, because this option does not stop natural erosion by the sea, a larger quantity of material is deposited further down the coast
14	**B**	Managed retreat usually takes place in areas of low economic value
15	**hierarchy**	Briefly, in the first stage, 'forming', people are getting to know each other and finding their roles in the new hierarchy
16	**emerge**	In the second stage, 'storming', there are conflicts between members as differences emerge about issues such as what the team is being asked to do and how to do it
17	**cooperation**	In the third phase, 'norming', team members start to work together. They establish processes about who will do what, when and how, and there is a growing sense of cooperation in the team
18	**norms**	In the fourth stage, 'performing', the team now has a shared set of norms and has learned how to work well together
19	**performance**	In this final stage, the team stops working together, celebrates its success and reflects on its performance and achievements
20	**B / E**	It gives managers and educators a simple, staged model to help them form teams and support the team members as they try to understand where they are in the process. According to the model, all teams are likely to go through these stages in this order, and although it is also possible to go backwards, for example from storming to forming, when a team does this, it must go through the other stages in the same order again
21	**B / E**	It gives managers and educators a simple, staged model to help them form teams and support the team members as they try to understand where they are in the process. According to the model, all teams are likely to go through these stages in this order, and although it is also possible to go backwards, for example from storming to forming, when a team does this, it must go through the other stages in the same order again
22	**D / E**	Firstly, Tuckman's model was not based on first-hand observations and evidence, and it seems that where the model has been tested, the reality was different from that predicted by the model Secondly, Tuckman's model excluded external factors

#	Answer	Explanation
		such as the nature of the task the group has been given and how this affects progress
23	**D / E**	Firstly, Tuckman's model was not based on first-hand observations and evidence, and it seems that where the model has been tested, the reality was different from that predicted by the model Secondly, Tuckman's model excluded external factors such as the nature of the task the group has been given and how this affects progress
24	**NOT GIVEN**	Newer companies, especially in the technology sector, require agile — or flexible — teams, and have built their company culture around a process called reteaming, or breaking up teams to build new ones
25	**TRUE**	Newer companies, especially in the technology sector, require agile – or flexible – teams, and have built their company culture around a process called reteaming, or breaking up teams to build new ones
26	**FALSE**	Some online gaming and music streaming companies are noted for their reteaming techniques, believing that this gives them the flexibility to move with their markets and to change and adapt swiftly
27	**NOT GIVEN**	One way to re-organise teams is to create situations where a team has to make an effort to recruit new members and there is an ongoing effort to bring in new people
28	**TRUE**	Another way is to let a team grow until it is big enough to divide into two teams; the advantage is that both teams are used to working with each other and so are now two effective working groups
29	**TRUE**	When there is a single temporary problem to solve, volunteers can come together to form a temporary task team. After the work on the problem is completed, the team breaks up and the members re-join their old group. Finally, team members can swap places between teams in order to share learning across the organization
30	**confusion**	Filtering useful from useless information has become a growing problem, bringing confusion with it
31	**patterns**	Curating data involves finding and displaying patterns in large volumes of disconnected and messy data to create meaningful information and suggestions for the end user
32	**interpret**	The process of data collection to inform business and consumer choice has developed from collecting information via

#	Answer	Explanation
		questionnaires and interviews to digitalising information and using technology to gather and interpret data
33	**A / B**	The data is gathered from people's past internet use, for example, searches, purchases, likes and bookmarks. The algorithm looks for patterns in this historical data and uses these patterns to predict the user's choices Users see what they are mostly interested in and, conversely, see less of what they don't want to. They can therefore build a relationship with websites they frequently visit as content and products are personalised for them, building loyalty and trust
34	**A / B**	The data is gathered from people's past internet use, for example, searches, purchases, likes and bookmarks. The algorithm looks for patterns in this historical data and uses these patterns to predict the user's choices Users see what they are mostly interested in and, conversely, see less of what they don't want to. They can therefore build a relationship with websites they frequently visit as content and products are personalised for them, building loyalty and trust
35	**B / C**	There have been several cases where algorithms have spread stories that were partially or wholly untrue or presented content that was not suitable for younger people. Some social media companies are bringing back human editors because algorithms cannot distinguish between stories that have on-the-record sources and stories that are simply made up
36	**B / C**	There have been several cases where algorithms have spread stories that were partially or wholly untrue or presented content that was not suitable for younger people. Some social media companies are bringing back human editors because algorithms cannot distinguish between stories that have on-the-record sources and stories that are simply made up
37	**basis**	These stories form the basis for algorithms to work with
38	**fine-tunes**	When the algorithm has compiled stories from various internet sources, a human editor fine-tunes the selection for the audience
39	**deletes**	At this point, the human curator intervenes and deletes inappropriate content in favour of better stories
40	**curation**	It seems that putting a human curator alongside AI can give a better quality of curation and create trust in the recommendations as well as a personal connection that isn't offered by an algorithm alone

Test 47

PASSAGE 1

Read the text below and answer questions 1-13.

Andrea Palladio: Italian architect

A new exhibition celebrates Palladio's architecture 500years on

A Vicenza is a pleasant, prosperous city in the Veneto, 60km west of Venice. Its grand families settled and farmed the area from the 16th century. But its principal claim to fame is Andrea Palladio, who is such an influential architect that a neoclassical style is known as Palladian. The city is a permanent exhibition of some of his finest buildings, and as he was born—in Padua, to be precise—500 years ago, the International Centre for the Study of Palladio's Architecture has an excellent excuse for mounting *la grande mostra*, the big show.

B The exhibition has the special advantage of being held in one of Palladio's buildings, Palazzo Barbaran da Porto. Its bold facade is a mixture of rustication and decoration set between two rows of elegant columns. On the second floor the pediments are alternately curved or pointed, a Palladian trademark. The harmonious proportions of the atrium at the entrance lead through to a dramatic interior of fine fireplaces and painted ceilings. Palladio's design is simple, clear and not over-crowded. The show has been organised on the same principles, according to Howard Burns, the architectural historian who co-curated it.

C Palladio's father was a miller who settled in Vicenza, where the young Andrea was apprenticed to a skilled stonemason. How did a humble miller's son become a world renowned architect? The answer in the exhibition is that, as a young man, Palladio excelled at carving decorative stonework on columns, doorways and fireplaces. He was plainly intelligent, and lucky enough to come across a rich patron, Gian Giorgio Trissino, a landowner and scholar, who organised his education, taking him to Rome in the 1540s, where he studied the masterpieces of classical Roman and Greek architecture and the work of other influential architects of the time, such as Donato Bramante and Raphael.

D Burns argues that social mobility was also important. Entrepreneurs, prosperous from agriculture in the Veneto, commissioned the promising local architect to design their country villas and their urban mansions. In Venice the aristocracy were anxious to co-opt talented artists, and Palladio was given the chance to design the buildings that have made him famous—the churches of San Giorgio Maggiore and the Redentore, both easy to admire because they can be seen from the city's historical centre across a stretch of water.

E He tried his hand at bridges—his unbuilt version of the Rialto Bridge was decorated with the large pediment and columns of a temple —and, after a fire at the Ducal Palace, he offered an alternative design which bears an uncanny resemblance to the Banqueting House in Whitehall in London. Since it was designed by Inigo Jones, Palladio's first foreign disciple, this is not as surprising as it sounds.

F Jones, who visited Italy in 1614, bought a trunk full of the master's architectural drawings; they passed through the hands of the Dukes of Burlington and Devonshire before settling at the Royal Institute of British Architects in 1894. Many are now on display at Palazzo Barbaran. What they show is how Palladio drew on the buildings of ancient Rome as models. The major theme of both his rural and urban building was temple architecture, with a strong pointed pediment supported by columns and approached by wide steps.

G Palladio's work for rich landowners alienates unreconstructed critics on the Italian left, but among the papers in the show are designs for cheap housing in Venice. In the wider world, Palladio's reputation has been nurtured by a text he wrote and illustrated, "Quattro Libri dell' Architettura". His influence spread to St Petersburg and to Charlottesville in Virginia, where Thomas Jefferson commissioned a Palladian villa he called Monticello.

H Vicenza's show contains detailed models of the major buildings and is leavened by portraits of Palladio's teachers and clients by Titian, Veronese and Tintoretto; the paintings of his Venetian buildings are all by Canaletto, no less. This is an uncompromising exhibition; many of the drawings are small and faint, and there are no sideshows for children, but the impact of harmonious lines and satisfying proportions is to impart in a viewer a feeling of benevolent calm. Palladio is history's most therapeutic architect.

I "Palladio, 500 Anni: La Grande Mostra" is at Palazzo Barbaran da Porto, Vicenza, until January 6th 2009. The exhibition continues at the Royal Academy of Arts, London, from January 31st to April 13th, and travels afterwards to Barcelona and Madrid.

PART 1 — QUESTIONS

Questions 1-7

Do the following statements agree with the information given in Reading Passage 1?

True if the statement agree with the information

False if the statement contradicts the information

NOT GIVEN If there is no information on this

1 The building where the exhibition is staged has been newly renovated

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

2 Palazzo Barbaran da Porto typically represent the Palladio's design

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

3 Palladio's father worked as an architect.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

4 Palladio's family refused to pay for his architectural studies

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

5 Palladio's alternative design for the Ducal Palace in Venice was based on an English building.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

6 Palladio designed both wealthy and poor people

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

7 The exhibition includes paintings of people by famous artists

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

Questions 8-13

Answer the questions below

Choose NO MORE THAN THREE WORDS from the passage for each answer.

8 What job was Palladio training for before he became an architect? _____

9 Who arranged Palladio's architectural studies? _____

10 Who was the first non-Italian architect influenced by Palladio? _____

11 What type of Ancient Roman buildings most heavily influenced Palladio's work?

_____

12 What did Palladio write that strengthened his reputation? _____

13 In the writer's opinion, what feeling will visitors to the exhibition experience?

_____

PASSAGE 2

You should spend about 20 minutes on Questions 14 -26 which are based on Reading Passage 2 below.

The future never dies?

The prospects for humanity and for the world as a whole are somewhere between glorious and dire. It is hard to be much more precise.

A By 'glorious' I mean that our descendants - all who are born on to this Earth - could live very comfortably and securely, and could continue to do so for as long as the Earth can support life, which should be for a very long time indeed. We should at least be thinking in terms of the next million years. Furthermore, our descendants could continue to enjoy the company of other species - establishing a much better relationship with them than we have now. Other animals need not live in constant fear of us. Many of those fellow species now seem bound to become extinct, but a significant proportion could and should continue to live alongside US. Such a future may seem ideal, and so it is. Yet I do not believe it is fanciful. There is nothing in the physical fabric of the Earth or in our own biology to suggest that this is not possible.

B 'Dire' means that we human beings could be in deep trouble within the next few centuries, living but also dying in large numbers in political terror and from starvation, while huge numbers of our fellow creatures would simply disappear, leaving only the ones that we find convenient - chickens, cattle - or that we can't shake off, like flies and mice. I'm taking it to be self-evident that glory is preferable.

C Our future is not entirely in our own hands because the Earth has its own rules, is part of the solar system and is neither stable nor innately safe. Other planets in the solar system are quite beyond habitation, because their temperature is far too high or too low to be endured, and ours, too, in principle could tip either way. Even relatively unspectacular changes in the atmosphere could do the trick. The core of the Earth is hot, which in many ways is good for living creatures, but every now and again, the molten rock bursts through volcanoes on the surface. Among the biggest volcanic eruptions in recent memory was Mount St Helens, in the USA, which threw out a cubic kilometre of ash - fortunately in an area where very few people live. In 1815, Tambora (in present-day Indonesia) expelled so much ash into the upper atmosphere that climatic effects seriously harmed food production around the world for season after season. Entire civilisations have been destroyed by volcanoes.

D Yet nothing we have so far experienced shows what volcanoes can really do. Yellowstone National Park in the USA occupies the caldera (the crater formed when a volcano collapses) of an exceedingly ancient volcano of extraordinary magnitude. Modem surveys show that its centre is now rising. Sometime in the next 200 million years, Yellowstone could erupt again, and when it does, the whole world will be transformed. Yellowstone could erupt tomorrow. But there's a very good chance that it will give US another million years, and that surely is enough to be going on with. It seems sensible to assume that this will be the case.

E The universe at large is dangerous, too: in particular, we share the sky with vast numbers of asteroids, and every now and again, they come into our planet's atmosphere. An asteroid the size of a small island, hitting the Earth at 15,000 kilometres an hour (a relatively modest speed by the standards of heavenly bodies), would strike the ocean bed like a rock in a puddle, send a tidal wave around the world as high as a small mountain and as fast as a jumbo jet, and propel us into an ice age that could last for centuries. There are plans to head off such disasters (including rockets to push approaching asteroids into new trajectories), but in truth it's down to luck.

F On the other hand, the archaeological and the fossil evidence shows that no truly devastating asteroid has struck since the one that seems to have accounted for the extinction of the dinosaurs 65 million years ago. So again, there seems no immediate reason for despair. The Earth is indeed an uncertain place, in an uncertain universe, but with average luck, it should do us well enough. If the world does become inhospitable in the next few thousand or million years, then it will probably be our own fault. In short, despite the underlying uncertainty, our own future and that of our fellow creatures is very much in our own hands.

G Given average luck on the geological and the cosmic scale, the difference between glory and disaster will be made, and is being made, by politics. Certain kinds of political systems and strategies would predispose US to long-term survival (and indeed to comfort and security and the pleasure of being alive), while others would take us more and more frenetically towards collapse. The broad point is, though, that we need to look at ourselves - humanity - and at the world in general in a quite new light. Our material problems are fundamentally those of biology. We need to think, and we need our politicians to think, biologically. Do that, and take the ideas seriously, and we are in with a chance. Ignore biology and we and our fellow creatures haven't a hope.

PART 2 — QUESTIONS

Questions 14-19

Do the following statements reflect the claims of the writer in Reading Passage 2?

YES if the statement is true

NO if the statement is false

NOT GIVEN if the formation is not given to the passage

14 It seems predictable that some species will disappear.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

15 The nature of the Earth and human biology make it impossible for human beings to survive another million years,

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

16 An eruption by Yellowstone is likely to be more destructive than previous volcanic eruptions.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

17 There is a greater chance of the Earth being hit by small asteroids than by large ones.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

18 If the world becomes uninhabitable, It is most likely to be as a result of a natural disaster.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

19 Politicians currently in power seem unlikely to change their way of thinking.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

Questions 20-25

Complete the summary below.

Choose NO MORE THAN TWO WORDS from the passage for each answer.

The Earth could become uninhabitable, like other planets, through a major change in the **20** _____. Volcanic eruptions of **21** _____ can lead to shortages of **22** _____ in a wide area.

An asteroid hitting the Earth could create a **23** _____ that would result in a new **24** _____. Plans are being made to use **25** _____ to deflect asteroids heading for the Earth.

Questions 26-26

Choose the correct letter. A, B, C or D.

26 What is the writer's purpose in Reading Passage 2?

- **A** ○ to propose a new theory about the causes of natural disasters
- **B** ○ to prove that generally held beliefs about the future are all mistaken
- **C** ○ to present a range of opinions currently held by scientists

D ◯ to argue the need for a general change in behavior

PASSAGE 3

Read the text below and answer questions 27-40.

Pottery production in ancient Akrotiri

A Excavations at the site of prehistoric Akrotiri, on the coast of the Aegean Sea, have revealed much about the technical aspects of pottery manufacture, indisputably one of the basic industries of this Greek city. However, considerably less is known about the socio-economic context and the way production was organised.

B The bulk of pottery found at Akrotiri is locally made, and dates from the late fifteenth century BC. It clearly fulfilled a vast range of the settlement's requirements: more than fifty different types of pots can be distinguished. The pottery found includes a wide variety of functional types like storage jars, smaller containers, pouring vessels, cooking pots, drinking vessels and so on, which all relate to specific activities and which would have been made and distributed with those activities in mind. Given the large number of shapes produced and the relatively high degree of standardisation, it has generally been assumed that most, if not all, of Akrotiri pottery was produced by specialised craftsmen in a non-domestic context. Unfortunately neither the potters' workshops nor kilns have been found within the excavated area. The reason may be that the ceramic workshops were located on the periphery of the site, which has not yet been excavated. In any event, the ubiquity of the pottery, and the consistent repetition of the same types in different sizes, suggest production on an industrial scale.

C The Akrotirian potters seem to have responded to pressures beyond their households, namely to the increasing complexity of regional distribution and exchange systems. We can imagine them as full-time craftsmen working permanently in a high production-rate craft such as pottery manufacture, and supporting themselves entirely from the proceeds of then craft. In view of the above, one can begin to speak in terms of mass-produced pottery and the existence of organised workshops of craftsmen during the period 1550—1500 BC. Yet, how pottery production was organised at Akrotiri remains an open question, as there is no real documentary evidence. Our entire knowledge comes from the ceramic material itself, and the tentative conclusions which can be drawn from it.

D The invention of units of quantity and of a numerical system to count them was of capital importance for an exchange-geared society such as that of Akrotiri. In spite of the absence of any written records, the archaeological evidence reveals that concepts of measurements, both of weight and number, had been formulated. Standard measures may already have been in operation, such as those evidenced by a graduated series of lead weights— made in disc form— found at the site. The existence of units of capacity in Late Bronze Age times is also evidenced, by the notation of units of a liquid measure for wine on excavated containers.

E It must be recognised that the function of pottery vessels plays a very important role in determining then characteristics. The intended function affects the choice of clay, the production technique, and the shape and the size of the pots. For example, large storage jars (pithoi) would be needed to store commodities, whereas smaller containers would be used for

transport. In fact, the length of a man's arm limits the size of a smaller pot to a capacity of about twenty lines; that is also the maximum a man can comfortably carry.

F The various sizes of container would thus represent standard quantities of a commodity, which is a fundamental element in the function of exchange. Akrotirian merchants handling a commodity such as wine would have been able to determine easily the amount of wine they were transporting fiom the number of containers they carried in then ships, since the capacity of each container was known to be 14-18 litres. (We could draw a parallel here with the current practice in Greece of selling oil in 17 kilogram tins.)

G We may therefore assume that the shape, capacity, and, sometimes decoration of vessels are indicative of the commodity contained by them. Since individual transactions would normally involve different quantities of a given commodity, a range of 'standardised' types of vessel would be needed to meet traders' requirements.

H In trying to reconstruct systems of capacity by measuring the volume of excavated pottery, a rather generous range of tolerances must be allowed. It seems possible that the potters of that time had specific sizes of vessel in mind, and tried to reproduce them using a specific type and amount of clay. However, it would be quite difficult for them to achieve the exact size required every time, without any mechanical means of regulating symmetry and wall thickness, and some potters would be more skilled than others. In addition, variations in the repetition of types and size may also occur because of unforeseen circumstances during the throwing process. For instance, instead of destroying the entire pot if the clay in the rim contained a piece of grit, a potter might produce a smaller pot by simply cutting off the rim. Even where there is no noticeable external difference between pots meant to contain the same quantity of a commodity, differences in their capacity can actually reach one or two litres. In one case the deviation from the required size appears to be as much as 10-20 percent.

I The establishment of regular trade routes within the Aegean led to increased movement of goods; consequently a regular exchange of local, luxury and surplus goods, including metals, would have become feasible as a result of the advances in transport technology. The increased demand for standardised exchanges, inextricably linked to commercial transactions, might have been one of the main factors which led to the standardisation of pottery production. Thus, the whole network of ceramic production and exchange would have depended on specific regional economic conditions, and would reflect the socio-economic structure of prehistoric Akrotiri.

PART 3 — QUESTIONS

Questions 27-28

Choose the correct letter, A, B. c or D.

27 What does die writer say about items of pottery excavated at Akrotiri?

- **A** ○ There was very little duplication.
- **B** ○ They would have met a big variety of needs.
- **C** ○ Most of them had been imported from other places.
- **D** ○ The intended purpose of each piece was unclear.

28 The assumption that pottery from Akrotiri was produced by specialists is partly ' based on

- **A** ○ The discovery of kilns.
- **B** ○ The central location of workshops.
- **C** ○ The sophistication of decorative patterns.
- **D** ○ The wide range of shapes represented.

Questions 29-32

Complete each sentence with the correct ending, A-F, below.

Write the correct letter, A-F.

• The assumption that standard units of weight were in use could be based on **29** _____

• Evidence of the use of standard units of volume is provided by **30** _____

• The size of certain types of containers would have been restricted by **31** _____

• Attempts to identify the intended capacity of containers are complicated by **32** _____

A. **The discovery of a collection of metal discs.**

B. **The size and type of the sailing ships in use.**

C. **Variations in the exact shape and thickness of similar containers.**

D. **The physical characteristics of workmen.**

E. **Marks found on wine containers.**

F. **The variety of commodities for which they would have been used.**

Questions 33-38

Do the following statements agree with the views of the writer in Reading Passage 3? Write

YES if the statement agrees with the claims of the writer

NO if the statement contradicts the claims of the writer

NOT GIVEN if it is impossible to say what the writer thinks about this

33 There are plans to excavate new areas of the archaeological site in the near future.

A ○ YES

B ○ NO

C ○ NOT GIVEN

34 Some of the evidence concerning pottery production in ancient Akrotiri comes from written records.

A ○ YES

B ○ NO

C ○ NOT GIVEN

35 Pots for transporting liquids would have held no more than about 20 litres.

A ○ YES

B ○ NO

C ○ NOT GIVEN

36 It would have been hard for merchants to calculate how much wine was on their ships.

A ○ YES

B ○ NO

C ○ NOT GIVEN

37 The capacity of containers intended to hold the same amounts differed by up to 20 percent.

A ○ YES

B ○ NO

C ○ NOT GIVEN

38 Regular trading of goods around the Aegean would have led to the general standardisation of quantities.

A ○ YES

B ○ NO

C ○ NOT GIVEN

Questions 39-40

Choose the correct letter, A. B, C or D

39 What does the writer say about the standardisation of container sizes?

A ○ Containers which looked the same from the outside often varied in capacity.

B ○ The instruments used to control container size were unreliable.

C ○ The unsystematic use of different types of clay resulted in size variations.

D ○ Potters usually discarded containers which were of a non-standard size.

40 What is probably the main purpose of Reading Passage 3?

A ○ To evaluate the quality of pottery containers found in prehistoric Akrotiri.

B ○ To suggest how features of pottery production at Akrotiri reflected other developments in the region.

C ○ To outline the development of pottery-making skills in ancient Greece.

D ○ To describe methods for storing and transporting household goods in prehistoric societies.

Answer Key

#	Answer	Explanation
1	**NOT GIVEN**	The exhibition has the special advantage of being held in one of Palladio’s buildings, Palazzo Barbaran da Porto
2	**TRUE**	On the second floor the pediments are alternately curved or pointed, a Palladian trademark
3	**FALSE**	Palladio’s father was a miller who settled in Vicenza, where the young Andrea was apprenticed to a skilled stonemason
4	**NOT GIVEN**	He was plainly intelligent, and lucky enough to come across a rich patron, Gian Giorgio Trissino, a landowner and scholar, who organised his education, taking him to Rome in the 1540s, where he studied the masterpieces of classical Roman and Greek architecture and the work of other influential architects of the time, such as Donato Bramante and Raphael
5	**FALSE**	and, after a fire at the Ducal Palace, he offered an alternative design which bears an uncanny resemblance to the Banqueting House in Whitehall in London. Since it was designed by Inigo Jones, Palladio’s first foreign disciple, this is not as surprising as it sounds
6	**TRUE**	Palladio’s work for rich landowners alienates unreconstructed critics on the Italian left, but among the papers in the show are designs for cheap housing in Venice
7	**TRUE**	Vicenza’s show contains detailed models of the major buildings and is leavened by portraits of Palladio’s teachers and clients by Titian, Veronese and Tintoretto; the paintings of his Venetian buildings are all by Canaletto, no less
8	**Stonemason**	where the young Andrea was apprenticed to a skilled stonemason
9	**Gian Giorgio Trissino**	He was plainly intelligent, and lucky enough to come across a rich patron, Gian Giorgio Trissino, a landowner and scholar, who organised his education, taking him to Rome in the 1540s, where he studied the masterpieces of classical Roman and Greek architecture and the work of other influential architects of the time, such as Donato Bramante and Raphael
10	**Inigo Jones**	Since it was designed by Inigo Jones, Palladio’s first foreign disciple, this is not as surprising as it sounds

#	Answer	Explanation
11	**Temple**	The major theme of both his rural and urban building was temple architecture, with a strong pointed pediment supported by columns and approached by wide steps
12	**Quattro Libri dell' Architettura**	In the wider world, Palladio's reputation has been nurtured by a text he wrote and illustrated, "Quattro Libri dell' Architettura"
13	**Benevolent calm**	the impact of harmonious lines and satisfying proportions is to impart in a viewer a feeling of benevolent calm
14	**YES**	Many of those fellow species now seem bound to become extinct, but a significant proportion could and should continue to live alongside US
15	**NO**	There is nothing in the physical fabric of the Earth or in our own biology to suggest that this is not possible
16	**YES**	Yet nothing we have so far experienced shows what volcanoes can really do. Yellowstone National Park in the USA occupies the caldera (the crater formed when a volcano collapses) of an exceedingly ancient volcano of extraordinary magnitude
17	**NOT GIVEN**	The universe at large is dangerous, too: in particular, we share the sky with vast numbers of asteroids, and every now and again, they come into our planet's atmosphere
18	**NO**	If the world does become inhospitable in the next few thousand or million years, then it will probably be our own fault
19	**NOT GIVEN**	We need to think, and we need our politicians to think, biologically
20	**Temperature**	Other planets in the solar system are quite beyond habitation, because their temperature is far too high or too low to be endured, and ours, too, in principle could tip either way
21	**(molten) rock/ash**	every now and again, the molten rock bursts through volcanoes on the surface. Among the biggest volcanic eruptions in recent memory was Mount St Helens, in the USA, which threw out a cubic kilometre of ash
22	**food/food production**	In 1815, Tambora (in present-day Indonesia) expelled so much ash into the upper atmosphere that climatic effects seriously harmed food production around the world for season after season
23	**Tidal wave**	An asteroid the size of a small island, hitting the Earth at 15,000 kilometres an hour (a relatively modest speed by the standards of heavenly bodies), would strike the ocean bed like a rock in a puddle, send a tidal wave around the world as high as a small mountain and as fast as a jumbo jet, and propel us into an ice age that could last for centuries

#	Answer	Explanation
24	**Ice age**	An asteroid the size of a small island, hitting the Earth at 15,000 kilometres an hour (a relatively modest speed by the standards of heavenly bodies), would strike the ocean bed like a rock in a puddle, send a tidal wave around the world as high as a small mountain and as fast as a jumbo jet, and propel us into an ice age that could last for centuries
25	**Rockets**	There are plans to head off such disasters (including rockets to push approaching asteroids into new trajectories), but in truth it's down to luck
26	**D**	The broad point is, though, that we need to look at ourselves – humanity – and at the world in general in a quite new light. Our material problems are fundamentally those of biology. We need to think, and we need our politicians to think, biologically
27	**B**	It clearly fulfilled a vast range of the settlement's requirements: more than fifty different types of pots can be distinguished
28	**D**	Given the large number of shapes produced and the relatively high degree of standardisation, it has generally been assumed that most, if not all, of Akrotiri pottery was produced by specialised craftsmen in a non-domestic context
29	**A**	Standard measures may already have been in operation, such as those evidenced by a graduated series of lead weights— made in disc form— found at the site
30	**E**	The existence of units of capacity in Late Bronze Age times is also evidenced, by the notation of units of a liquid measure for wine on excavated containers
31	**D**	In fact, the length of a man's arm limits the size of a smaller pot to a capacity of about twenty lines; that is also the maximum a man can comfortably carry
32	**C**	However, it would be quite difficult for them to achieve the exact size required every time, without any mechanical means of regulating symmetry and wall thickness, and some potters would be more skilled than others
33	**NOT GIVEN**	The reason may be that the ceramic workshops were located on the periphery of the site, which has not yet been excavated
34	**NO**	Yet, how pottery production was organised at Akrotiri remains an open question, as there is no real documentary evidence. Our entire knowledge comes from the ceramic material itself, and the tentative conclusions which can be drawn from it
35	**YES**	whereas smaller containers would be used for transport. In fact, the length of a man's arm limits the size of a smaller pot to a

#	Answer	Explanation
		capacity of about twenty lines; that is also the maximum a man can comfortably carry
36	**NO**	Akrotirian merchants handling a commodity such as wine would have been able to determine easily the amount of wine they were transporting fiom the number of containers they carried in then ships, since the capacity of each container was known to be 14-18 litres
37	**YES**	Even where there is no noticeable external difference between pots meant to contain the same quantity of a commodity, differences in their capacity can actually reach one or two litres. In one case the deviation from the required size appears to be as much as 10-20 percent
38	**YES**	The establishment of regular trade routes within the Aegean led to increased movement of goods; consequently a regular exchange of local, luxury and surplus goods, including metals, would have become feasible as a result of the advances in transport technology. The increased demand for standardised exchanges, inextricably linked to commercial transactions, might have been one of the main factors which led to the standardisation of pottery production
39	**A**	Even where there is no noticeable external difference between pots meant to contain the same quantity of a commodity, differences in their capacity can actually reach one or two litres
40	**B**	Thus, the whole network of ceramic production and exchange would have depended on specific regional economic conditions, and would reflect the socio-economic structure of prehistoric Akrotiri

Test 48

PASSAGE 1

Read the text below and answer questions 1-13.

Save the Turtles

A Leatherback turtles follow the general sea turtle body plan of having a large, flattened, round body with two pairs of very large flippers and a short tail. Like other sea turtles, the leatherback's flattened forelimbs are adapted for swimming in the open ocean. Claws are absent from both pairs of flippers. The Leatherback's flippers arc the largest in proportion to its body among extant sea turtles. Leatherback's front flippers can grow up to 2.7 meters (9 ft) in large specimens, the largest flippers (even in comparison to its body) of any sea turtle. As the last surviving member of its family, the leatherback turtle has several distinguishing characteristics that differentiate it from other sea turtles. Its most notable feature is that it lacks the bony carapace of the other extant sea turtles.

1

B During the past month, four turtles have washed up along Irish coasts from Wexford to Kerry. These turtles arc more typical of warmer waters and only occur in Irish waters when they stray off course. It is likely that they may have originated from Florida, America. Two specimens have been taken to Coastal and Marine Resources Centre (stored at the National Maritime College), University College Cork, where a necropsy (post mortem for animals) will be conducted to establish their age, sex and their exact origin. During this same period, two leatherback turtles were found in Scotland, and a rare Kemp's Ridley turtle was found in Wales, thus making it an exceptional month for stranded turtles in Ireland and the UK.

2

C Actually, There has been extensive research conducted regarding the sea turtles' abilities to return to their nesting regions and sometimes exact locations from hundreds of miles away. In the water, their path is greatly affected by powerful currents. Despite their limited vision, and lack of landmarks in the open water, turtles are able to retrace their migratory paths. Some explanations of this phenomenon have found that sea turtles can detect the angle and intensity of the earth's magnetic fields.

3

D However, Loggerhead turtles are not normally found in Irish waters, because water temperatures here are far too cold for their survival. Instead, adult loggerheads prefer the warmers waters of the Mediterranean, the Caribbean and North America's east coast. The four

turtles that were found have probably originated from the North American population of loggerheads. However it will require genetic analysis to confirm this assumption. It is thought that after leaving their nesting beach as hatchlings (when they measure 4.5 cm in length), these tiny turtles enter the North Atlantic Gyre (a giant circular ocean current) that takes them from America, across to Europe (Azores area), down towards North Africa, before being transported back again to America via a different current. This remarkable round trip may take many years during which these tiny turtles grow by several centimetres a year. Loggerheads may circulate around the North Atlantic several times before they settle in the coastal waters of Florida or the Caribbean.

4

E These four turtles were probably on their way around the Atlantic when they strayed a bit too far north from the Gulf Stream. Once they did, their fate was sealed, as the cooler waters of the North East Atlantic are too cold for loggerheads (unlike leatherback turtles which have many anatomical and physiological adaptations to enable them to swim in our seas). Once in cool waters, the body of a loggerhead begins to shut down as they get 'cold stunned', then get hypothermia and die.

5

F Leatherbacks are in immanent danger of extinction. A critical factor (among others) is the harvesting of eggs from nests. Valued as a food delicacy, Leatherback eggs are falsely touted to have aphrodisiacal properties in some cultures. The leatherback, unlike the Green Sea turtle, is not often killed for its meat; however, the increase in human populations coupled with the growing black market trade has escalated their egg depletion. Other critical factors causing the leatherbacks' decline are pollution such as plastics (leatherbacks eat this debris thinking it is jellyfish; fishing practices such as longline fishing and gill nets, and development on habitat areas. Scientists have estimated that there are only about 35,000 Leatherback turtles in the world.

6

G We are often unable to understand the critical impact a species has on the environment—that is, until that species becomes extinct. Even if we do not know the role a creature plays in the health of the environment, past lessons have taught US enough to know that every animal and plant is one important link in the integral chain of nature. Some scientists now speculate that the Leatherback may play an important role in the recovery of diminishing fish populations. Since the Leatherback consumes its weight in jellyfish per day, it helps to keep Jellyfish populations in check. Jellyfish consume large quantities of fish larvae. The rapid decline in Leatherback populations over the last 50 years has been accompanied by a significant increase in jellyfish and a marked decrease in fish in our oceans. Saving sea turtles is an International endeavor.

PART 1 — QUESTIONS

Questions 1-6

Choose the most suitable headings for paragraphs B-G from the list of headings below.

NB There are more headings than paragraphs, so you will not use them all.

i. **Sea turtles are found in unusual locations**

ii. **Unique features of the Leatherbacks**

iii. **The Leatherback's contribution**

iv. **Methods used for routes tracking**

v. **Predict the migration routes**

vi. **Remains multiplicity within the species**

vii. **The progress of hatching**

viii. **The fate of the lost turles**

ix. **How trips suppose to look like?**

x. **Factors leading to population decline**

Questions 7-13

Choose words from the passage to answer the questions. Write NO MORE THAN THREE WORDS AND/OR A NUMBER for each answer.

7 How many Leatherback turtles are there in the world? _____

8 What is the most noticeable difference between other sea turtles and leatherbacks?

_____

9 What causes the Loggerhead turtles to die in Irish waters? _____

10 Where did the four turtles probably come from? _____

11 By which means can sea turtles retrace their migratory paths? _____

12 For what purpose are Green Sea turtles killed by people? _____

13 What kind of species will benefits from a decline in Leatherback populations?

_____

PASSAGE 2

Read the text below and answer questions 14-26.

Corporate Social Responsibility

Broadly speaking, proponents of CSR have used four arguments to make their case: moral obligation, sustainability, license to operate, and reputation. The moral appeal—arguing that companies have a duty to be good citizens and to *do the right thing" —is prominent in the goal of Business for Social Responsibility, the leading nonprofit CSR business association in the United States. It asks that its members "achieve commercial success in ways that honor ethical values and respect people, communities, and the natural environment." Sustainability emphasizes environmental and community stewardship.

14

A An excellent definition was developed in the 1980s by Norwegian Prime Minister Gro Harlem Brundtland and used by the World Business Council for Sustainable Devebpment "Meeting the needs of the present without compromising the ability of future generations to meet their own needs." The notion of license to operate derives from the fact that every company needs tacit or explicit permission from governments, communities, and numerous other stakeholders to do business. Finally, reputation is used by many companies to justify CSR initiatives on the grounds that they will improve a company's image, strengthen its brand, enliven morale, and even raise the value of its stock.

15

B To advance CSR, we must root it in a broad understanding of the interrelationship between a corporation and society while at the same time anchoring it in the strategies and activities of specific companies. To say broadly that business and society need each other might seem like a cliché, but it is also the basic truth that will pull companies out of the muddle that their current corporate-responsibility thinking has created Successful corporations need a healthy society. Education, health care, and equal opportunity are essential to a productive workforce. Safe products and working conditions not only attract customers but lower the internal costs of accidents. Efficient utilization of land, water, energy, and other natural resources makes business more productive. Good government, the rub of law, and property rights are essential for efficiency and innovation. Strong regulatory standards protect both consumers and competitive companies from exploitation. Ultimately, a healthy society creates expanding demand for business, as more human needs are met and aspirations grow. Any business that pursues its ends at the expense of the society in which it operates will find its success to be illusory and ultimately temporary. At the same time, a healthy society needs successful companies. No social program can rival the business sector when it comes to creating the jobs, wealth, and innovation that improve standards of living and social conditions over time.

16

C A company's impact on society also changes over time, as social standards evolve and science progresses. Asbestos, now understood as a serious health risk, was thought to be safe in the early 1900s, given the scientific knowledge then available. Evidence of its risks gradually mounted for more than 50 years before any company was held liable for the harms it can cause. Many firms that failed to anticipate the consequences of this evolving body of research have been bankrupted by the results. No longer can companies be content to monitor only the obvious social impacts of today. Without a careful process for identifying evolving social effects of tomorrow, firms may risk their very survival.

17

D No business can solve all of society's problems or bear the cost of doing so. Instead, each company must select issues that intersect with its particular business. Other social agendas are best left to those companies in other industries, NGOs, or government institutions that are better positioned to address them. The essential test that should guide CSR is not whether a cause is worthy but whether it presents an opportunity to create shared value— that is, a meaningful benefit for society that is also valuable to the business. However, Corporations are not responsible for all the world's problems, nor do they have the resources to solve them all Each company can identify the particular set of societal problems that it is best equipped to help resolve and from which it can gain the greatest competitive benefit. Addressing social issues by creating shared value will lead to self-sustaining solutions that do not depend on private or government subsidies. When a well-run business applies its vast resources, expertise, and management talent to problems that it understands and in which it has a stake, it can have a greater impact on social good than any other institution or philanthropic organization.

18

E The best corporate citizenship initiatives involve far more than writing a check: They specify clear, measurable goals and track results over time. A good example is GE's program to adopt underperforming public high schools near several of its major u.s. facilities. The company contributes between $250,000 and $1 million over a five-year period to each school and makes in-kind donations as well GE managers and employees take an active role by working with school administrators to assess needs and mentor or tutor students. In an independent study of ten schools in the program between 1989 and 1999, nearly all showed significant improvement, while the graduation rate in four of the five worst performing schools doubled from an average of 30% to 60%. Effective corporate citizenship initiatives such as this one create goodwill and improve relations with local governments and other important constituencies. What's more, GE's employees feel great pride in their participation. Their effect is inherently limited, however. No matter how beneficial the program is, it remains incidental to the company's business, and the direct effect on GE's recruiting and retention is modest.

19

F Microsoft's Working Connections partnership with the American Association of Community Colleges (AACC) is a good example of a shared-value opportunity arising from investments in context. The shortage of information technology workers is a significant constraint on Microsoft’s growth; currently, there are more than 450,000 unfilled IT positions in the United States alone. Community colleges, with an enrollment of 11.6 million students, representing 45% of all U.S. undergraduates, could be a major solution. Microsoft recognizes, however, that community colleges face special challenges: IT curricula are not standardized, technology used in classrooms is often outdated, and there are no systematic professional development programs to keep faculty up to date. Microsoft's $50 million five-year initiative was aimed at all three problems. In addition to contributing money and products, Microsoft sent employee volunteers to colleges to assess needs, contribute to curriculum development, and create faculty development institutes. Note that in this case, volunteers and assigned staff were able to use their core professional skills to address a social need, a far cry from typical volunteer programs. Microsoft has achieved results that have benefited many communities while having a direct—and potentially significant—impact on the company.

20

G At the heart of any strategy is a unique value proposition: a set of needs a company can meet for its chosen customers that others cannot. The most strategic CSR occurs when a company adds a social dimension to its value proposition, making social impact integral to the overall strategy. Consider Whole Foods Market, whose value proposition is to sell organic, natural and healthy food products to customers who are passionate about food and the environment. The company's sourcing emphasizes purchases from local farmers through each store's procurement process. Buyers screen out foods containing any of nearly 100 common ingredients that the company considers unhealthy or environmentally damaging. The same standards apply to products made internally. Whole Foods’ commitment to natural and environmentally friendly operating practices extends well beyond sourcing. Stores are constructed using a minimum of virgin raw materials. Recently, the company purchased renewable wind energy credits equal to 100% of its electricity use in all of its stores and facilities, the only Fortune 500 company to offset its electricity consumption entirely. Spoiled produce and biodegradable waste are trucked to regional centers for composting. Whole Foods' vehicles are being converted to run on biofuels. Even the cleaning products used in its stores are environmentally friendly. And through its philanthropy, the company has created the Animal Compassion Foundation to develop more natural and humane ways of raising farm animals. In short, nearly every aspect of the company’s value chain reinforces the social dimensions of its value proposition, distinguishing Whole Foods from its competitors.

PART 2 — QUESTIONS

Questions 14-20

The reading passage has seven paragraphs, A-G.

Choose the correct heading for paragraphs A-G from the list below.

i. **How CSR may help one business to expand**

ii. **CSR in many aspects of a company's business**

iii. **A CSR initiative without a financial gain**

iv. **Lack of action by the state of social issues**

v. **Drives or pressures motivate companies to address CSR**

vi. **the past illustrates business are responsible for future outcomes**

vii. **Companies applying CSR should be selective**

viii. **Reasons that business and society benefit each other**

Questions 21-22

Complete the following summary of the paragraphs of Reading Passage, using no more than two words from the Reading Passage for each answer.

The implement of CSR, HOW?

Promotion of CSR requires the understanding of interdependence between business and society. Corporations workers' productivity generally needs health care, education, and given **21** _____. Restrictions imposed by government and companies both protect consumers from being treated unfairly. Improvement of the safety standard can reduce the **22** _____ of accidents in the workplace. Similarly society becomes pool of more human needs and aspirations.

Questions 23-26

Use the information in the passage to match the companies (listed A-C) with opinions or deeds below.

NB: you may use any letter more than once

A. General Electronics

B. Microsoft

C. Whole foods market

	A	B	C
23 The disposable waste	○	○	○
24 The way company purchases as goods	○	○	○
25 Helping the undeveloped	○	○	○
26 ensuring the people have the latest information	○	○	○

PASSAGE 3

Read the text below and answer questions 27-40.

TV Addiction 2

A Excessive cravings do not necessarily involve physical substances. Gambling can become compulsive; sex can become obsessive. One activity, however, stands out for its prominence and ubiquity—the world's most popular pastime, television. Most people admit to having a love-bate relationship with it. They complain about the "boob tube" and "couch potatoes," then they settle into their sofas and grab the remote control. Parents commonly fret about their children's viewing (if not their own). Even researchers who study TV for a living marvel at the medium's hold on them personally. Percy Tannenbaum of the University of California at Berkeley has written: "Among life's more embarrassing moments have been countless occasions when I am engaged in conversation in a room while a TV set is on, and I cannot for the life of me stop from periodically glancing over to the screen. This occurs not only during dull conversations but during reasonably interesting ones just as well."

B Scientists have been studying the effects of television for decades, generally focusing on whether watching violence on TV correlates with being violent in real life. Less attention has been paid to the basic allure of the small screen—the medium, as opposed to the message.

C The term "TV addiction" is imprecise and laden with value judgments, but it captures the essence of a very real phenomenon. Psychologists and psychiatrists formally define substance dependence as a disorder characterized by criteria that include spending a great deal of time using the substance; using it more often than one intends; thinking about reducing use or making repeated unsuccessful efforts to reduce use; giving up important social, family or occupational activities to use it; and reporting withdrawal symptoms when one stops using it.

D All these criteria can apply to people who watch a lot of television. That does not mean that watching television, in itself, is problematic. Television can teach and amuse; it can reach aesthetic heights; it can provide much needed distraction and escape. The difficulty arises when people strongly sense that they ought not to watch as much as they do and yet find themselves strangely unable to reduce their viewing. Some knowledge of how the medium exerts its pull may help heavy viewers gain better control over their lives.

E The amount of time people spend watching television is astonishing. On average, individuals in the industrialized world devote three hours a day to the pursuit—fully half of their leisure time, and more than on any single activity save work and sleep. At this rate, someone who lives to 75 would spend nine years in front of the tube. To some commentators, this devotion means simply that people enjoy TV and make a conscious decision to watch it. But if that is the whole story, why do so many people experience misgivings about how much they view? In Gallup polls in 1992 and 1999, two out of five adult respondents and seven out of 10 teenagers said they spent too much time watching TV. Other surveys have consistently shown that roughly 10 percent of adults call themselves TV addicts.

F What is it about TV that has such a hold on US? In part, the attraction seems to spring from our biological 'orienting response.' First described by Ivan Pavlov in 1927, the orienting response is our instinctive visual or auditory reaction to any sudden or novel stimulus. It is part of our evolutionary heritage, a built-in sensitivity to movement and potential predatory threats.

G In 1986 Byron Reeves of Stanford University, Esther Thorson of the University of Missouri and their colleagues began to study whether the simple formal features of television-cuts, edits, zooms, pans, sudden noises—activate the orienting response, thereby keeping attention on the screen. By watching how brain waves were affected by formal features, the researchers concluded that these stylistic tricks can indeed trigger involuntary responses and 'derive their attention-al value through the evolutionary significance of detecting movement.... It is the form, not the content, of television that is unique.'

H The orienting response may partly explain common viewer remarks such as: "If a television is on, I just can't keep my eyes off it," "I don't want to watch as much as I do, but I can't help it," and "I feel hypnotized when I watch television." In the years since Reeves and Thorson published then pioneering work, researchers have delved deeper. Annie Lang's research team at Indiana University has shown that heart rate decreases for four to six seconds after an orienting stimulus. In ads, action sequences and music videos, formal features frequently come at a rate of one per second, thus activating the orienting response continuously.

I Lang and her colleagues have also investigated whether formal features affect people's memory of what they have seen. In one of their studies, participants watched a program and then filled out a score sheet. Increasing the frequency of edits (defined here as a change from one camera angle to another in the same visual scene) improved memory recognition, presumably because it focused attention on the screen. Increasing the frequency of cuts—changes to a new visual scene-had a similar effect but only up to a point. If the number of cuts exceeded 10 in two minutes, recognition dropped off sharply.

J Producers of educational television for children have found that formal features can help learning. But increasing the rate of cuts and edits eventually overloads the brain. Music videos and commercials that use rapid intercutting of unrelated scenes are designed to hold attention more than they are to convey information. People may remember the name of the product or band, but the details of the ad itself float in one ear and out the other. The orienting response is overworked. Viewers still attend to the screen, but they feel tired and worn out, with little compensating psychological reward. Our ESM findings show much the same thing.

K Sometimes the memory of the product is very subtle. Many ads today are deliberately oblique: they have an engaging story line, but it is hard to tell what they are trying to sell. Afterward you may not remember the product consciously. Yet advertisers believe that if they have gotten your attention, when you later go to the store you will feel better or more comfortable with a given product because you have a vague recollection of having heard of it.

PART 3 — QUESTIONS

Questions 27-30

Do the following statements agree with the claims of the writer in Reading Passage?

27 Even researcher find sometimes it is more interesting in watching TV than talking with others in personal experience

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

28 Information medium as TV has always been the priority for scientific research.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

29 It is partially unscientific to use the term ‘TV addiction’.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

30 Children do not know why they exercise too little.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

Questions 31-33

Choose THREE letters, A-F.

31 **32** **33** Which THREE of the following are benefits of watching TV?

- **A** ☐ artistic inspiration
- **B** ☐ family reunion
- **C** ☐ relieve stress
- **D** ☐ learn knowledge and education
- **E** ☐ work efficiency
- **F** ☐ ease communicative conflict

Questions 34-37

Look at the following researchers (Questions 34-37) and the list of statements below. Match each researcher with the correct statements.

A. It is the specific media formal characteristic that counts.

B. TV distraction shows human physical reaction to a new and prompted stimulus

C. Conveying information is the most important thing.

D. It is hard to ignore the effects of TV.

E. Whether people can remember deeper of the content relates with the format.

F. The heart rate remains stable when watching.

G. Clinically reliance on TV does not meet the criteria of an addiction.

	A	B	C	D	E	F	G
34 Percy Tannenbaum	○	○	○	○	○	○	○
35 Ivan Pavlov	○	○	○	○	○	○	○
36 Byron Reeves and Esther Thorson	○	○	○	○	○	○	○
37 Annie Lang	○	○	○	○	○	○	○

Questions 38-40

Complete the following summary of the paragraphs of Reading Passage, using NO MORE THAN TWO WORDS from the Reading Passage for each answer.

TV is becoming a worldwide **38** _____. Some people love it and spend a great deal of time watching it. According to some surveys, a small group even claim themselves as **39** _____. One researcher believes that this attraction comes from our human instinct, described as **40** _____ which is built in part of our physiological evolution.

Answer Key

#	Answer	Explanation
1	**i**	These turtles arc more typical of warmer waters and only occur in Irish waters when they stray off course
2	**iv**	Some explanations of this phenomenon have found that sea turtles can detect the angle and intensity of the earth's magnetic fields
3	**ix**	It is thought that after leaving their nesting beach as hatchlings (when they measure 4.5 cm in length), these tiny turtles enter the North Atlantic Gyre (a giant circular ocean current) that takes them from America, across to Europe (Azores area), down towards North Africa, before being transported back again to America via a different current
4	**viii**	Once they did, their fate was sealed, as the cooler waters of the North East Atlantic are too cold for loggerheads (unlike leatherback turtles which have many anatomical and physiological adaptations to enable them to swim in our seas). Once in cool waters, the body of a loggerhead begins to shut down as they get 'cold stunned', then get hypothermia and die
5	**x**	Other critical factors causing the leatherbacks' decline are pollution such as plastics (leatherbacks eat this debris thinking it is jellyfish; fishing practices such as longline fishing and gill nets, and development on habitat areas
6	**iii**	Some scientists now speculate that the Leatherback may play an important role in the recovery of diminishing fish populations
7	**35,000**	Scientists have estimated that there are only about 35,000 Leatherback turtles in the world
8	**The bony carapace**	As the last surviving member of its family, the leatherback turtle has several distinguishing characteristics that differentiate it from other sea turtles. Its most notable feature is that it lacks the bony carapace of the other extant sea turtles
9	**Cold water / water temperature(s)**	because water temperatures here are far too cold for their survival
10	**Florida,America / Florida and America / The north American**	It is likely that they may have originated from Florida, America

#	Answer	Explanation
11	**(detecting) magnetic fields / earth's magnetic fields**	Some explanations of this phenomenon have found that sea turtles can detect the angle and intensity of the earth's magnetic fields
12	**(Its) meat**	The leatherback, unlike the Green Sea turtle, is not often killed for its meat
13	**Jellyfish**	The rapid decline in Leatherback populations over the last 50 years has been accompanied by a significant increase in jellyfish and a marked decrease in fish in our oceans
14	**v**	Broadly speaking, proponents of CSR have used four arguments to make their case: moral obligation, sustainability, license to operate, and reputation
15	**viii**	Successful corporations need a healthy society At the same time, a healthy society needs successful companies
16	**vi**	Many firms that failed to anticipate the consequences of this evolving body of research have been bankrupted by the results. No longer can companies be content to monitor only the obvious social impacts of today. Without a careful process for identifying evolving social effects of tomorrow, firms may risk their very survival
17	**vii**	Instead, each company must select issues that intersect with its particular business
18	**iii**	No matter how beneficial the program is, it remains incidental to the company's business, and the direct effect on GE's recruiting and retention is modest
19	**i**	The shortage of information technology workers is a significant constraint on Microsoft's growth; currently, there are more than 450,000 unfilled IT positions in the United States alone Microsoft has achieved results that have benefited many communities while having a direct—and potentially significant—impact on the company
20	**ii**	In short, nearly every aspect of the company's value chain reinforces the social dimensions of its value proposition, distinguishing Whole Foods from its competitors
21	**Equal opportunity**	Education, health care, and equal opportunity are essential to a productive workforce
22	**internal costs**	Safe products and working conditions not only attract customers but lower the internal costs of accidents

#	Answer	Explanation
23	**C**	Spoiled produce and biodegradable waste are trucked to regional centers for composting
24	**C**	The company's sourcing emphasizes purchases from local farmers through each store's procurement process. Buyers screen out foods containing any of nearly 100 common ingredients that the company considers unhealthy or environmentally damaging
25	**A**	A good example is GE's program to adopt underperforming public high schools near several of its major u.s. facilities
26	**B**	Microsoft recognizes, however, that community colleges face special challenges: IT curricula are not standardized, technology used in classrooms is often outdated, and there are no systematic professional development programs to keep faculty up to date. Microsoft's $50 million five-year initiative was aimed at all three problems
27	**TRUE**	Even researchers who study TV for a living marvel at the medium's hold on them personally. Percy Tannenbaum of the University of California at Berkeley has written: "Among life's more embarrassing moments have been countless occasions when I am engaged in conversation in a room while a TV set is on, and I cannot for the life of me stop from periodically glancing over to the screen. This occurs not only during dull conversations but during reasonably interesting ones just as well."
28	**FALSE**	Less attention has been paid to the basic allure of the small screen—the medium, as opposed to the message
29	**TRUE**	The term "TV addiction" is imprecise and laden with value judgments, but it captures the essence of a very real phenomenon
30	**NOT GIVEN**	Parents commonly fret about their children's viewing (if not their own)
31	**A / C / D**	Television can teach and amuse; it can reach aesthetic heights; it can provide much needed distraction and escape
32	**A / C / D**	Television can teach and amuse; it can reach aesthetic heights; it can provide much needed distraction and escape
33	**A / C / D**	Television can teach and amuse; it can reach aesthetic heights; it can provide much needed distraction and escape
34	**D**	Percy Tannenbaum of the University of California at Berkeley has written: "Among life's more embarrassing moments have been countless occasions when I am engaged in conversation in a room while a TV set is on, and I cannot for the life of me stop from

#	Answer	Explanation
		periodically glancing over to the screen. This occurs not only during dull conversations but during reasonably interesting ones just as well.”
35	**B**	First described by Ivan Pavlov in 1927, the orienting response is our instinctive visual or auditory reaction to any sudden or novel stimulus
36	**A**	the researchers concluded that these stylistic tricks can indeed trigger involuntary responses and ‘derive their attention-al value through the evolutionary significance of detecting movement It is the form, not the content, of television that is unique.’
37	**E**	Lang and her colleagues have also investigated whether formal features affect people’s memory of what they have seen
38	**Popular pastime**	One activity, however, stands out for its prominence and ubiquity —the world’s most popular pastime, television
39	**TV addicts**	Other surveys have consistently shown that roughly 10 percent of adults call themselves TV addicts
40	**Orienting response**	In part, the attraction seems to spring from our biological ‘orienting response.’ First described by Ivan Pavlov in 1927, the orienting response is our instinctive visual or auditory reaction to any sudden or novel stimulus

Test 49

PASSAGE 1

Read the text below and answer questions 1-13.

Timekeeper 2: Invention of Marine Chronometer

A. It was, as Dava Sobel has described a phenomenon: 'the greatest scientific problem of the age'. The reality was that in the 18th century no one had ever made a clock that could suffer the great rolling and pitching of a ship and the large changes in temperature whilst still keeping time accurately enough to be of any use. Indeed, most of the scientific community thought such clock impossibility. Knowing one's position on the earth requires two very simple but essential coordinates; rather like using a street map where one thinks in terms of how far one is up/down and how far side to side.

B. The longitude is a measure of how far around the world one has come from home and has no naturally occurring base line like the equator. The crew of a given ship was naturally only concerned with how far round they were from their own particular home base. Even when in the middle of the ocean, with no land in sight, knowing this longitude position is very simple in theory. The key to knowing how far around the world you are from home is to know, at that very moment, what time it is back home. A comparison with your local time (easily found by checking the position of the Sim) will then tell you the time difference between you and home, and thus how far round the Earth you are from home.

C. Up until the middle of the 18th century, navigators had been unable to determine their position at sea with accuracy and they faced the huge attendant risks of shipwreck or running out of supplies before reaching then destination. The angular position of Moon and other bright stars was recorded in three-hour intervals of Greenwich Time. In order to determine longitude, sailors had to measure the angle between Moon centre and a given star - lunar distance - together with height of both planets using the naval sextant. The sailors also had to calculate the Moon's position if seen form the centre of Earth. Time corresponding to Greenwich Time was determined using the nautical almanac. Then the difference between the obtained time and local time served for calculation in longitude from Greenwich. The great flaw in this 'simple' theory was - how does the sailor know time back home when he is in the middle of an ocean?

D. The obvious and again simple answer is that he takes an accurate clock with him, which he sets to home time before leaving. All he has to do is keep it wound up and running, and he must never reset the hands throughout the voyage This clock then provides 'home time', so if, for example, it is midday on board your ship and your 'home time' clock says that at that same moment it is midnight at home, you know immediately there is a twelve hour time-difference and you must be exactly round the other side of the world, 180 degrees of longitude from home.

E. After 1714 when the British government offered the huge sum of £20,000 for a solution to the problem, with the prize to be administered by die splendidly titled Board of Longitude. The Government prize of £20,000 was the highest of three sums on offer for varying degrees of accuracy, the full prize only payable for a method that could find the longitude at sea within half a degree. If the solution was to be by timekeeper (and there were other methods since the prize was offered for any solution to the problem), then the timekeeping required to achieve this goal would have to be within 2.8 seconds a day, a performance considered impossible for any clock at sea and unthinkable for a watch, even under the very best conditions.

F. It was this prize, worth about £2 million today, which inspired the self-taught Yorkshfre carpenter, John Harrison, to attempt a design for a practical marine clock. During the latter part of his early career, he worked with his younger brother James. Their first major project was a revolutionary turret clock for the stables at Brocklesby Park, seat of the Pelham family. The clock was revolutionary because it required no lubrication. 18th century clock oils were uniformly poor and one of the major causes of failure in clocks of the period. Rather than concentrating on improvements to the oil, Harrison designed a clock which didn't need it. In 1730 Harrison created a description and drawings for a proposed marine clock to compete for the Longitude Prize and went to London seeking financial assistance. He presented his ideas to Edmond Halley, the Astronomer Royal. Halley referred him to George Graham, the country's foremost clockmaker. He must have been impressed by Harrison, for Graham personally loaned Harrison money to build a model of his marine clock. It took Harrison five years to build Harrison Number One or HI. He demonstrated it to members of the Royal Society who spoke on his behalf to the Board of Longitude. The clock was the first proposal that the Board considered to be worthy of a sea trial. In 1736,

G. After several attempts to design a betterment of HI, Harrison believed that the ' solution to the longitude problem lay in an entirely different design. H4 is completely different from the other three timekeepers. It looks like a very large pocket watch. Harrison's son William set sail for the West Indies, with H4, aboard the ship Deptford on 18 November 1761. It was a remarkable achievement but it would be some time before the Board of Longitude was sufficiently satisfied to award Harrison the prize.

H. John Hadley, an English mathematician, developed sextant, who was a competitor of Harrison at that time for the luring prize. A sextant is an instrument used for measuring angles, for example between the sun and the horizon, so that the position of a ship or aeroplane can be calculated. Making this measurement is known as sighting the object, shooting the object, or taking a sight and it is an essential part of celestial navigation. The angle, and the time when it was measured, can be used to calculate a position line on a nautical or aeronautical chart. A sextant can also be used to measure the Lunar distance between the moon and another celestial object (e.g., star, planet) in order to determine Greenwich time which is important because it can then be used to determine the longitude.

I. The majority within this next generation of chronometer pioneers were English, but the story is by no means wholly that of English achievement. One French name, Pierre Le Roy of Paris, stands out as a major presence in the early history of the chronometer. Another great name in the story is that of the Lancastrian, Thomas Eamshaw, a slightly younger contemporary of John Arnold's. It was Eamshaw who created the final form of chronometer escapement, the spring

detent escapement, and finalized the format and the production system for the marine chronometer, making it truly an article of commerce, and a practical means of safer navigation at sea over the next century and half.

PART 1 — QUESTIONS

Questions 1-5

Which paragraph contains the following information?

NB: you may use any letter more than once

	A	B	C	D	E	F	G	H	I
1 introduction of a millman under awards	○	○	○	○	○	○	○	○	○
2 the definition of an important geographical term	○	○	○	○	○	○	○	○	○
3 a rival against Harrison's invention emerged	○	○	○	○	○	○	○	○	○
4 problems of sailor encountered in identifying the position on the sea	○	○	○	○	○	○	○	○	○
5 economic assist from another counterpart	○	○	○	○	○	○	○	○	○

Questions 6-8

Do the following statements agree with the information given in Reading Passage 1?

6 It is with no great effort by sailors to calculate the position when in the center of the ocean theoretically.

- A ○ YES
- B ○ NO
- C ○ NOT GIVEN

7 To determine the longitude, a measurement of distance from moon to a given star is a must.

- A ○ YES

B ○ NO

C ○ NOT GIVEN

8 In theory, by calculating the longitude degrees covered by a sail journey, the distance between the start and the end points can be obtained.

A ○ YES

B ○ NO

C ○ NOT GIVEN

Questions 9-13

Complete the following summary of the paragraphs of Reading Passage, using no more than two words and/or a number from the Reading Passage for each answer.

Hundred years ago, sailors tried to identify their time by checking the sun or stars, but the trouble was that they did need a reliable clock which showed time of **9** _____. And the timekeeper required would be to precisely tell a tangible time lapse confined to **10** _____.

An extraordinary craftsman, Harrison, once created a novel clock which did not rely on **11** _____ to work properly. Later on, competitive mode of **12** _____ was another prominent device designed by Hadley, which calculated angle between sun and the earth. Base on Harrison's effort, Earns haw eventually implement key components for **13** _____, which had been used ever since.

PASSAGE 2

Read the text below and answer questions 14-27.

Father of modern management

14

A. It's been said that Peter Drucker invented the discipline of management Before he wrote his first book on the topic, he knew of only two companies in the world with management development programs. Ten years after the book's publication, 3,000 companies were teaching the subject. Widely considered as the father of "modem management," he wrote 39 books and countless scholarly and popular articles exploring how humans are organized in all sectors of society—business, government and the nonprofit world. His writings have predicted many of the major developments of the late twentieth century, including privatization and decentralization; the rise of Japan to a world economic power; the decisive importance of marketing; and the emergence of the information society with its necessity of lifelong learning.

15

B. Drucker has said that writing is die foundation of everything he does. In 1937, he published his first book, which was written in Europe. The End of Economic Man: A Study of the New Totalitarianism examined the spiritual and social origins of fascism. In 1940, before the United States entered World War n, he wrote The Future of Industrial Man, in which he presented his social vision for the postwar world. In 1943, General Motors asked Drucker to study its management practices. Drucker accepted and spent 18 months researching and writing the 1945 book. Concept of the Corporation.

16

C. The concepts Drucker introduced in the 1940s and 1950s have endured. In 1954, Drucker wrote his first book that taught people how to manage. Tided The Practice of Management, it introduced the concept of "management by objectives". Management by objectives require managers to establish goals for theft subordinates and devise means of measuring results. Workers are then left alone to perform as they will and measure theft performance. Drucker wrote, "It is not possible to be effective unless one first decides what one wants to accomplish. He went on to explain that every worker must be given the tools "to appraise himself, rather than be appraised and controlled from the outside. Management by objectives has become an accepted business concept and is probably Drucker's most important contribution. Drucker issued challenges to junior, middle and senior management: 'The very term "middle management" is becoming meaningless [as some] will have to learn how to work with people over whom they have no direct line control, to work transnationally, and to create, maintain, and

run systems-none of which are traditionally middle management tasks. "It is top management that faces the challenge of setting directions for the enterprise, of managing the fundamentals.

17

D. Drucker interviewed executives and workers, visited plants, and attended board meetings. While the book focused on General Motors, Drucker went on to discuss the industrial corporation as a social institution and economic policy in the postwar era. He introduced previously unknown concepts such as cooperation between labor and management, decentralization of management, and viewing workers as resources rather than costs. Drucker saw people as a resource, and considered that they would be more able to satisfy customers if they had more involvement in then jobs and gained some satisfaction from doing them. Drucker claimed that an industrial society allows people to realize their dreams of personal achievement and equal opportunity-the need to manage business by balancing a variety of needs and goals, rather than subordinating an institution to a single value. This concept of management by objectives forms the keynote of his 1954 landmark The Practice of Management. He referred to decentralization as 'a system of local self government, in which central management tells division managers what to do, but not how to do it. The young executives are given the freedom to make decisions — and mistakes — and learn from the experience. Top leaders at General Motors disliked the book and discouraged their executives from reading it. Many other American executives criticized Concept for its challenge to management authority.

18

E. Drucker wasn't immune to criticism. The Wall Street Journal researched several of his lectures in 1987 and reported that he was sometimes loose with facts. Drucker was off the mark, for example, when he told an audience that English was the official language for all employees at Japan's Mitsui trading company. And he was known for his prescience. Given the recent involvement of the US government with financial companies, he was probably correct in his forecast when he anticipated, for instance, that the nation’s financial center would shift from New York to Washington, others maintain that one of Drucker's core concepts—"management by objectives"—is flawed and has never really been proven to work effectively. Specifically, critics say that the system is difficult to implement, and that companies often wind up overemphasizing control, as opposed to fostering creativity, to meet their goals. Drucker didn't shy away from controversy, either.

19

F. Throughout his career, Drucker expanded his position that management was "a liberal art " and he infused his management advice with interdisciplinary lessons including history, sociology, psychology, philosophy, culture and religion. He also strongly believed that all institutions, including those in the private sector, had a responsibility for the whole society. "The fact is," Drucker wrote in 1973, "that in modem society there is no other leadership group but managers. If the managers of our major institutions, especially in business, do not take

responsibility for the common good, no one else can or will." In his books, lectures and interviews, the emergence of knowledge workers is only one of the demographic changes Drucker warns businesses to prepare for. Others include a decreasing birth rate in developed countries, a shift in population from rural to urban centers, shifts in distribution of disposable income and global competitiveness. Drucker believes these changes will have a tremendous impact on business. Drucker held a profound skepticism of macroeconomic theory and contended that economists of all schools fail to explain significant aspects of modem economies. Business "gums" have come and gone during the last 50 years, but Drucker's message continues to inspire managers. During the 1990s, Drucker wrote about social, political and economic changes of the" postcapitalist" era, which he says are as profound as those of the industrial revolution. In Managing for the Future: The 1990s and Beyond (1992), Drucker discussed the emergence of the "knowledge worker" — whose resources include specialized learning or competency rather than land, labor or other forms of capital.

PART 2 — QUESTIONS

Questions 14-19

Reading Passage 2 has 6 paragraphs A-F. Choose die correct heading for paragraphs A-F from the list of headings below.

i. **Introducing new management concepts to postwar era**

ii. **Ideas that stood the test of time**

iii. **Early publications**

iv. **Shifting the focus of management in modem manufactures**

v. **Thinker and scholar with world-wide popularity**

vi. **Drucker's concepts are flawed**

vii. **The changing role of employees in management**

viii. **Find fault with Drucker**

ix. **Iconic view of "management by objectives"**

Questions 20-23

Do the following statements agree with the information given in Reading Passage 2?

20 Drucker believed the employees should enjoy the same status as the employers in a company

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

21 middle management tasks will change since companies become more complicated and run business globally

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

22 Drucker strongly support that economists of schools have resources to explain the problems of modem economies at least in a macroeconomics scope

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

23 Drucker's ideas proposed half a century ago are out of date in modem days

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

Questions 24-25

Choose TWO letters from A-E.

24 **25** Which TWO of the following are true of Drucker's views?

- **A** ☐ Managers should be responsible for the common good of the whole society.
- **B** ☐ Young executives should be given chances to start from low level jobs
- **C** ☐ More emphasis should be laid on fostering the development of the union.
- **D** ☐ Management should facilitate workers with tools of self-appraisal instead of controlling them from the outside.
- **E** ☐ management should go beyond an isolate discipline as to incorporate ideas with many subjects

Questions 26-27

Choose TWO letters from A-E.

26 **27** Which TWO of the following are mentioned in the passage as criticisms to Drucker and his views?

- **A** ☐ He did not show enough respect to Japanese employees when he said English was the official language for all employees at Japan's Mitsui trading company.
- **B** ☐ His lectures are too broad and lack of being precise and accurate about the facts,

C ☐ His concepts helped corporate executives but not average workers.

D ☐ His ideas are sometimes impractical and result in opposite outcomes.

E ☐ He was overstating the case for knowledge workers when warning businesses to get prepared.

PASSAGE 3

Read the text below and answer questions 28-40.

Extinct: the Giant Deer

Toothed cats, mastodons, giant sloths, woolly rhinos, and many other big, shaggy mammals are widely thought to have died out around the end of the last ice age, some 10,500 years ago.

A. The Irish elk is also known as the giant deer (Megaloceros giganteus). Analysis of ancient bones and teeth by scientists based in Britain and Russia show the huge herbivore survived until about 5,000 B.C.—more than three millennia later than previously believed. The research team says this suggests additional factors, besides climate change, probably hastened the giant deer's eventual extinction. The factors could include hunting or habitat destruction by humans.

B. The Irish elk, so-called because its well-preserved remains are often found in lake sediments under peat bogs in Ireland, first appeared about 400,000 years ago in Europe and central Asia. Through a combination of radiocarbon dating of skeletal remains and the mapping of locations where the remains were unearthed, the team shows the Irish elk was widespread across Europe before the last "big freeze." The deer's range later contracted to the Ural Mountains, in modern-day Russia, which separate Europe from Asia.

C. The giant deer made its last stand in western Siberia, some 3,000 years after the ice sheets receded, said the study's co-author, Adrian Lister, professor of palaeobiology at University College London, England. "The eastern foothills of the Urals became very densely forested about 8,000 years ago, which could have pushed them on to the plain," he said. He added that pollen analysis indicates the region then became very dry in response to further climactic change, leading to the loss of important food plants. "In combination with human pressures, this could have finally snuffed them out," Lister said.

D. Hunting by humans has often been put forward as a contributory cause of extinctions of the Pleistocene mega fauna. The team, though, said their new date for the Irish elk's extinction hints at an additional human-made problem—habitat destruction. Lister said, "We haven't got just hunting 7,000 years ago—this was also about the time the first Neolithic people settled in the region. They were farmers who would have cleared the land." The presence of humans may help explain why the Irish elk was unable to tough out the latest of many climatic fluctuations—periods it had survived in the past.

E. Meanwhile, Lister cast doubt on another possible explanation for the deer's demise—the male's huge antlers. Some scientists have suggested this exaggerated feature—the result of females preferring stags with the largest antlers, possibly because they advertised a male's fitness —contributed to the mammal's downfall. They say such antlers would have been a serious inconvenience in the dense forests that spread northward after the last ice age. But, Lister said, "That's a hard argument to make, because the deer previously survived perfectly well through wooded interglacials [warmer periods between ice ages]." Some research has

suggested that a lack of sufficient high-quality forage caused the extinction of the elk. High amounts of calcium and phosphate compounds are required to form antlers, and therefore large quantities of these minerals are required for the massive structures of the Irish Elk. The males (and male deer in general) met this requirement partly from their bones, replenishing them from food plants after the antlers were grown or reclaiming the nutrients from discarded antlers (as has been observed in extant deer). Thus, in the antler growth phase. Giant Deer were suffering from a condition similar to osteoporosis. When the climate changed at the end of the last glacial period, the vegetation in the animal's habitat also changed towards species that presumably could not deliver sufficient amounts of the required minerals, at least in the western part of its range.

F. The extinction of megafauna around the world was almost completed by the end of the last ice age. It is believed that megafauna initially came into existence in response to glacial conditions and became extinct with the onset of warmer climates. Tropical and subtropical areas have experienced less radical climatic change. The most dramatic of these changes was the transformation of a vast area of north Africa into the world's largest desert. Significantly, Africa escaped major faunal extinction as did tropical and sub-tropical Asia. The human exodus from Africa and our entrance into the Americas and Australia were also accompanied by climate change. Australia's climate changed from cold-dry to warm-dry. As a result, surface water became scarce. Most inland lakes became completely dry or dry in the warmer seasons. Most large, predominantly browsing animals lost their habitat and retreated to a narrow band in eastern Australia, where there was permanent water and better vegetation. Some animals may have survived until about 7000 years ago. If people have been in Australia for up to 60 000 years, then megafauna must have co-existed with humans for at least 30 000 years. Regularly hunted modem kangaroos survived not only 10 000 years of Aboriginal hunting, but also an onslaught of commercial shooters.

G. The group of scientists led by A.J. Stuart focused on northern Eurasia, which he was taking as Europe, plus Siberia, essentially, where they 've got the best data that animals became extinct in Europe during the Late Pleistocene. Some cold-adapted animals, go through into the last part of the cold stage, and then become extinct up there. So you've actually got two phases of extinction. Now, neither of these coincide — these are Neanderthals here being replaced by modem humans. There's no obvious coincidence between the arrival of humans or climatic change alone and these extinctions. There's a climatic change here, so there's a double effect here. Again, as animals come through to the last part of the cold stage, here there's a fundamental change in the climate, reorganization of vegetation, and the combination of the climatic change and the presence of humans -- of advanced Paleolithic humans — causes this wave of extinction. There's a profound difference between the North American data and that of Europe, which summarize that the extinctions in northern Eurasia, in Europe, are moderate and staggered, and in North America severe and sudden. And these things relate to the differences in the timing of human arrival. The extinctions follow from human predation, but only at times of fundamental changes in the environment.

PART 3 — QUESTIONS

Questions 28-32

Complete the following summary of the paragraphs of Reading Passage, using no more than three words and/or a number from the Reading Passage for each answer.

Having been preserved well in Europe and central Asia, the remains of the Irish elk was initially found approximately **28** _____. Around **29** _____, they were driven to live in the plain after being restricted to the Ural Mountains. Hunting was considered as one of the important factors of Irish elk's extinction, people have not started hunting until **30** _____ when Irish elk used to get through under a variety of climatic fluctuations.

The huge antlers may possibly contribute to the reason why Irish elk extinct, which was highly controversial as they live pleasantly over the span of **31** _____. Generally, it is well-known that, at the last maximum ice age, mammals become extinct about **32** _____.

Questions 33-35

Answer the questions below.

Choose NO MORE THAN THREE WORDS from the passage for each answer.

33 What kind of physical characteristics eventually contributed to the extinction of Irish elk?

_____

34 What kind of nutrient substance needed in maintaining the huge size of Irish elk?

_____

35 What geographical evidence suggested the advent of human resulted in the extinction of Irish elk? _____

Questions 36-39

Matching choose the letter A-D

A. Eurasia

B. Australia

C. Asia

D. Africa

	A	B	C	D
36 the continents where humans imposed little impact on large mammals extinction	○	○	○	○
37 the continents where the climatic change was mild and fauna remains	○	○	○	○
38 the continents where both humans and climatic change are the causes	○	○	○	○
39 the continents where the climatic change along caused a massive extinction	○	○	○	○

Questions 40-40

Choose the correct letter, A, B, C or D.

40 Which statement is true according the Stuart team's finding?

A ○ Neanderthals rather than modem humans caused the extinction in Europe

B ○ Paleolithic humans in Europe along kill the big animals such as Giant deer

C ○ climatic change was not solely responsible for the mega fauna extinction in Europe

D ○ moderate and staggered extinction was mainly the result of fundamental climatic change

Answer Key

#	Answer	Explanation
1	**F**	It was this prize, worth about £2 million today, which inspired the self-taught Yorkshfre carpenter, John Harrison, to attempt a design for a practical marine clock
2	**B**	The longitude is a measure of how far around the world one has come from home and has no naturally occurring base line like the equator
3	**H**	John Hadley, an English mathematician, developed sextant, who was a competitor of Harrison at that time for the luring prize
4	**C**	Up until the middle of the 18th century, navigators had been unable to determine their position at sea with accuracy and they faced the huge attendant risks of shipwreck or running out of supplies before reaching then destination
5	**F**	Halley referred him to George Graham, the country's foremost clockmaker. He must have been impressed by Harrison, for Graham personally loaned Harrison money to build a model of his marine clock
6	**YES**	Even when in the middle of the ocean, with no land in sight, knowing this longitude position is very simple in theory
7	**NO**	If the solution was to be by timekeeper (and there were other methods since the prize was offered for any solution to the problem), then the timekeeping required to achieve this goal would have to be within 2.8 seconds a day, a performance considered impossible for any clock at sea and unthinkable for a watch, even under the very best conditions
8	**NOT GIVEN**	The longitude is a measure of how far around the world one has come from home and has no naturally occurring base line like the equator. The crew of a given ship was naturally only concerned with how far round they were from their own particular home base. Even when in the middle of the ocean, with no land in sight, knowing this longitude position is very simple in theory
9	**Home**	The obvious and again simple answer is that he takes an accurate clock with him, which he sets to home time before leaving
10	**2.8s/2.8 seconds**	then the timekeeping required to achieve this goal would have to be within 2.8 seconds a day, a performance considered impossible for any clock at sea and unthinkable for a watch, even under the very best conditions

#	Answer	Explanation
11	**Oil/lubrication**	The clock was revolutionary because it required no lubrication
12	**Sextant**	John Hadley, an English mathematician, developed sextant, who was a competitor of Harrison at that time for the luring prize
13	**Marine chronometer**	It was Eamshaw who created the final form of chronometer escapement, the spring detent escapement, and finalized the format and the production system for the marine chronometer, making it truly an article of commerce, and a practical means of safer navigation at sea over the next century and half
14	**v**	Widely considered as the father of “modem management,” he wrote 39 books and countless scholarly and popular articles exploring how humans are organized in all sectors of society—business, government and the nonprofit world
15	**iii**	In 1937, he published his first book, which was written in Europe
16	**ix**	Management by objectives has become an accepted business concept and is probably Drucker’s most important contribution
17	**vii**	He introduced previously unknown concepts such as cooperation between labor and management, decentralization of management, and viewing workers as resources rather than costs
18	**viii**	Drucker wasn’t immune to criticism. The Wall Street Journal researched several of his lectures in 1987 and reported that he was sometimes loose with facts
19	**ii**	Business “gums” have come and gone during the last 50 years, but Drucker’s message continues to inspire managers
20	**NOT GIVEN**	He introduced previously unknown concepts such as cooperation between labor and management, decentralization of management, and viewing workers as resources rather than costs
21	**TRUE**	‘The very term “middle management” is becoming meaningless [as some] will have to learn how to work with people over whom they have no direct line control, to work transnationally, and to create, maintain, and run systems-none of which are traditionally middle management tasks
22	**FALSE**	Drucker held a profound skepticism of macroeconomic theory and contended that economists of all schools fail to explain significant aspects of modem economies
23	**FALSE**	The concepts Drucker introduced in the 1940s and 1950s have endured
24	**A / E**	Throughout his career, Drucker expanded his position that management was “a liberal art ” and he infused his management advice with interdisciplinary lessons including history, sociology,

#	Answer	Explanation
		psychology, philosophy, culture and religion. He also strongly believed that all institutions, including those in the private sector, had a responsibility for the whole society. “The fact is,” Drucker wrote in 1973, “that in modem society there is no other leadership group but managers. If the managers of our major institutions, especially in business, do not take responsibility for the common good, no one else can or will.”
25	**A / E**	Throughout his career, Drucker expanded his position that management was “a liberal art ” and he infused his management advice with interdisciplinary lessons including history, sociology, psychology, philosophy, culture and religion. He also strongly believed that all institutions, including those in the private sector, had a responsibility for the whole society. “The fact is,” Drucker wrote in 1973, “that in modem society there is no other leadership group but managers. If the managers of our major institutions, especially in business, do not take responsibility for the common good, no one else can or will.”
26	**B / D**	The Wall Street Journal researched several of his lectures in 1987 and reported that he was sometimes loose with facts Specifically, critics say that the system is difficult to implement, and that companies often wind up overemphasizing control, as opposed to fostering creativity, to meet their goals
27	**B / D**	The Wall Street Journal researched several of his lectures in 1987 and reported that he was sometimes loose with facts Specifically, critics say that the system is difficult to implement, and that companies often wind up overemphasizing control, as opposed to fostering creativity, to meet their goals
28	**400,000 years ago**	The Irish elk, so-called because its well-preserved remains are often found in lake sediments under peat bogs in Ireland, first appeared about 400,000 years ago in Europe and central Asia
29	**8,000 years ago**	The eastern foothills of the Urals became very densely forested about 8,000 years ago, which could have pushed them on to the plain
30	**7,000 years ago**	We haven’t got just hunting 7,000 years ago—this was also about the time the first Neolithic people settled in the region
31	**Wooded interglacials**	But, Lister said, “That’s a hard argument to make, because the deer previously survived perfectly well through wooded interglacials [warmer periods between ice ages].”
32	**10,500 years ago**	Toothed cats, mastodons, giant sloths, woolly rhinos, and many other big, shaggy mammals are widely thought to have died out around the end of the last ice age, some 10,500 years ago

#	Answer	Explanation
33	**Male’s huge anlers**	Meanwhile, Lister cast doubt on another possible explanation for the deer’s demise—the male’s huge antlers. Some scientists have suggested this exaggerated feature—the result of females preferring stags with the largest antlers, possibly because they advertised a male’s fitness —contributed to the mammal’s downfall
34	**Minerals**	High amounts of calcium and phosphate compounds are required to form antlers, and therefore large quantities of these minerals are required for the massive structures of the Irish Elk
35	**Habitat destruction**	The team, though, said their new date for the Irish elk’s extinction hints at an additional human-made problem—habitat destruction
36	**B**	If people have been in Australia for up to 60 000 years, then megafauna must have co-existed with humans for at least 30 000 years. Regularly hunted modem kangaroos survived not only 10 000 years of Aboriginal hunting, but also an onslaught of commercial shooters
37	**D**	Tropical and subtropical areas have experienced less radical climatic change. The most dramatic of these changes was the transformation of a vast area of north Africa into the world’s largest desert. Significantly, Africa escaped major faunal extinction as did tropical and sub-tropical Asia
38	**A**	The group of scientists led by A.J. Stuart focused on northern Eurasia, which he was taking as Europe, plus Siberia, essentially, where they ‘ve got the best data that animals became extinct in Europe during the Late Pleistocene Again, as animals come through to the last part of the cold stage, here there’s a fundamental change in the climate, reorganization of vegetation, and the combination of the climatic change and the presence of humans — of advanced Paleolithic humans — causes this wave of extinction
39	**C**	Significantly, Africa escaped major faunal extinction as did tropical and sub-tropical Asia
40	**C**	There’s no obvious coincidence between the arrival of humans or climatic change alone and these extinctions

Test 50

PASSAGE 1

You should spend about 20 minutes on Questions 1-13 which are based on the Reading Passage below.

New Agriculture in Oregon, US

A. Onion growers in eastern Oregon are adopting a system that saves water and keeps topsoil in place, while producing the highest quality "super colossal" onions. Pear growers in southern Oregon have reduced their use of some of the most toxic pesticides by up to two-thirds, and are still producing top-quality pears. Range managers throughout the state have controlled the poisonous weed tansy ragwort with insect predators and saved the Oregon livestock industry up to $4.8 million a year.

B. These are some of the results Oregon growers have achieved in collaboration with Oregon State University (OSU) researchers as they test new farming methods including integrated pest management (IPM). Nationwide, however, IFM has not delivered results comparable to those in Oregon. A recent U.S General Accounting Office (GAO) report indicates that while integrated pest management can result in dramatically reduced pesticide use, the federal government has been lacking in effectively promoting that goal and implementing IPM. Farmers also blame the government for not making the new options of pest management attractive. "Wholesale changes in the way that farmers control the pests on their farms is an expensive business." Tony Brown, of the National Farmers Association says. "If the farmers are given tax breaks to offset the expenditure, then they would willingly accept the new practices." The report goes on to note that even though the use of the riskiest pesticides has declined nationwide, they still make up more than 40 percent of all pesticides used today; and national pesticide use has risen by 40 million kilograms since 1992. "Our food supply remains the safest and highest quality on Earth but we continue to overdose our farmland with powerful and toxic pesticides and to under-use the safe and effective alternatives," charged Patrick Leahy, who commissioned the report. Green action groups disagree about the safety issue. "There is no way that habitual consumption of foodstuffs grown using toxic chemicals of the nature found on today's farms can be healthy for consumers," noted Bill Bowler, spokesman for Green Action, one of many lobbyists interested in this issue.

C. The GAO report singles out Oregon's apple and pear producers who have used the new IPM techniques with growing success. Although Oregon is clearly ahead of the nation, scientists at OSU are taking the Government Accounting Office criticisms seriously. "We must continue to develop effective alternative practices that will reduce environmental hazards and produce high quality products," said Paul Jepson, a professor of entomology at OSU and new director of

D. OSU's Integrated Plant Protection Centre (IPPC). The IPPC brings together scientists from OSU's Agricultural Experiment Station, OSU Extension service, the u.s. Department of Agriculture and Oregon farmers to help develop agricultural systems that will save water and

soil, and reduce pesticides. In response to the GAO report, the Centre is putting even more emphasis on integrating research and farming practices to improve Oregon agriculture environmentally and economically.

E. "The GAO report criticizes agencies for not clearly communicating the goals of IPM," said Jepson. "Our challenge is to greatly improve the communication to and from growers, to learn what works and what doesn't. The work coming from OSU researchers must be adopted in the field and not simply languish in scientific journals."

F. In Oregon, growers and scientists are working together to instigate new practices. For example, a few years ago scientists at OSU's Malheur Experiment Station began testing a new drip irrigation system to replace old ditches that wasted water and washed soil and fertilizer into streams. The new system cut water and fertilizer use by half, kept topsoil in place and protected water quality.

G. In addition, the new system produced crops of very large onions, rated "super colossal" and highly valued by the restaurant industry and food processors. Art Pimms, one of the researchers at Malheur comments: "Growers are finding that when they adopt more environmentally benign practices, they can have excellent results. The new practices benefit the environment and give the growers their success."

H. OSU researchers in Malheur next tested straw mulch and found that it successfully held soil in place and kept the ground moist with less irrigation. In addition, and unexpectedly, the scientists found that the mulched soil created a home for beneficial beetles and spiders that prey on onion thrips - a notorious pest in commercial onion fields - a discovery that could reduce the need for pesticides. "I would never have believed that we could replace the artificial pest controls that we had before and still keep our good results," commented Steve Black, a commercial onion farmer in Oregon, "but instead we have actually surpassed expectations."

I. OSU researchers throughout the state have been working to reduce dependence on broad spectrum chemical sprays that are toxic to many kind of organisms, including humans. "Consumers are rightly putting more and more pressure on the industry to change its reliance on chemical pesticides, but they still want a picture-perfect product," said Rick Hilton, entomologist at OSU's Southern Oregon Research and Extension Centre, where researchers help pear growers reduce the need for highly toxic pesticides. Picture perfect pears are an important product in Oregon and traditionally they have required lots of chemicals. In recent years, the industry has faced stiff competition from overseas producers, so any new methods that growers adopt must make sense economically as well as environmentally. Hilton is testing a growth regulator that interferes with the molting of codling moth larvae. Another study used pheromone dispensers to disrupt codling moth mating. These and other methods of integrated pest management have allowed pear growers to reduce their use of organophosphates by two-thirds and reduce all other synthetic pesticides by even more and still produce top-quality pears. These and other studies around the state are part of the effort of the IPPC to find alternative farming practices that benefit both the economy and the environment.

PART 1 — QUESTIONS

Questions 1-8

Use the information in the passage to match the people (listed A-G) with opinions or deeds below.

NB you may use any letter more than once

A. Tony Brown

B. Patrick Leahy

C. Bill Bowler

D. Paul Jepson

E. Art Pimms

F. Steve Black

G. Rick Hilton

	A	B	C	D	E	F	G
1 There is a double-advantage to the new techniques.	○	○	○	○	○	○	○
2 The work on developing these alternative techniques is not finished.	○	○	○	○	○	○	○
3 Eating food that has had chemicals used in its production is dangerous to our health.	○	○	○	○	○	○	○
4 Changing current farming methods into a new one is not a cheap process.	○	○	○	○	○	○	○
5 Results have exceeded the anticipated goal.	○	○	○	○	○	○	○
6 The research done should be translated into practical projects.	○	○	○	○	○	○	○
7 The U.S. produces the best food in the world nowadays.	○	○	○	○	○	○	○

	A	B	C	D	E	F	G
8 Expectations of end users of agricultural products affect the products.	○	○	○	○	○	○	○

Questions 9-13

Do the following statements agree with the information given in Reading Passage 1?

YES if the statement is true

NO if the statement is false

NOT GIVEN if the information is not given in the passage

9 Integrated Pest Management has generally been regarded as a success in j the across the US.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

10 Oregon farmers of apples and pears have been promoted as successful examples of Integrated Pest Management.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

11 The IPPC uses scientists from different organisations globally

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

12 Shaw mulch experiments produced unplanned benefits.

- **A** ○ YES

B ○ NO

C ○ NOT GIVEN

13 The apple industry is now facing a lot of competition from abroad.

A ○ YES

B ○ NO

C ○ NOT GIVEN

PASSAGE 2

You should spend about 20 minutes on Questions 14-26 which are based on Reading Passage 2 below.

Intelligence and Giftedness

A. In 1904 the French minister of education, facing limited resources for schooling, sought a way to separate die unable from the merely lazy. Alfred Binet got the job of devising selection principles and his brilliant solution put a stamp on the study of intelligence and was the forerunner of intelligence tests still used today, he developed a thirty-problem test in 1905, which tapped several abilities related to intellect, such as judgment and reasoning, the test determined a given child's mental age', the test previously established a norm for children of a given physical age. (for example, five-year-olds on average get ten items correct), therefore, a child with a mental age of five should score 10, which would mean that he or she was functioning pretty much as others of that age. the child's mental age was then compared to his physical age.

B. A large disparity in the wrong direction (e.g., a child of nine with a mental age of four) might suggest inability rather than laziness and mean he or she was earmarked for special schooling, Binet, however, denied that the test was measuring intelligence, its purpose was simply diagnostic, for selection only. This message was however lost, and caused many problems and misunderstanding later.

C. Although Binet's test was popular, it was a bit inconvenient to deal with a variety of physical and mental ages. So in 1912 Wilhelm Stem suggested simplifying this by reducing die two to a single number, he divided the mental age by the physical age, and multiplied the result by 100. An average child, irrespective of age, would score 100. a number much lower than 100 would suggest the need for help, and one much higher would suggest a child well ahead of his peer.

D. This measurement is what is now termed the IQ (for intelligence quotient) score and it has evolved to be used to show how a person, adult or child, performed in relation to others, (the term IQ was coined by Lewis m. Terman, professor of psychology and education of Stanford university, in 1916. he had constructed an enormously influential revision of Binet's test, called the Stanford-Binet test, versions of which are still given extensively.)

E. The field studying intelligence and developing tests eventually coalesced into a sub-field of psychology called psychometrics (psycho for ‘mind’ and metrics for 'measurements'). The practical side of psychometrics (the development and use of tests) became widespread quite early, by 1917, when Einstein published his grand theory of relativity, mass-scale testing was already in use. Germany’s unrestricted submarine warfare (which led to the sinking of the Lusitania in 1915) provoked the United States to finally enter the First World War in the same year. The military had to build up an army very quickly; it had two million inductees to sort out. Who would become officers and who enlisted men? Psychometricians developed two intelligence tests that helped sort all these people out, at least to some extent, this was the first major use of testing to decide who lived and who died, as officers were a lot safer on the

battlefield, the tests themselves were given under horrendously bad conditions, and the examiners seemed to lack commonsense, a lot of recruits simply had no idea what to do and in several sessions most inductees scored zero! The examiners also came up with the quite astounding conclusion from the testing that the average American adult's intelligence was equal to that of a thirteen-year-old!

F. Intelligence testing enforced political and social prejudice, their results were used to argue that Jews ought to be kept out of the united states because they were so intelligently inferior that they would pollute the racial mix; and blacks ought not to be allowed to breed at all. And so abuse and test bias controversies continued to plaque psychometrics.

G. Measurement is fundamental to science and technology, science often advances in leaps and bounds when measurement devices improve, psychometrics has long tried to develop ways to gauge psychological qualities such as intelligence and more specific abilities, anxiety, extroversion, emotional stability, compatibility, with marriage partner, and so on. Their scores are often given enormous weight, a single IQ measurement can take on a life of its own if teachers and parents see it as definitive, it became a major issue in the 70s, when court cases were launched to stop anyone from making important decisions based on IQ test scores, the main criticism was and still is that current tests don’t really measure intelligence, whether intelligence can be measured at all is still controversial, some say it cannot others say that IQ tests are psychology’s greatest accomplishments

PART 2 — QUESTIONS

Questions 14-17

The reading Passage has seven paragraphs A-G.

Which paragraph contains the following information?

	A	B	C	D	E	F	G
14 IQ is just one single factor of human characteristics.	○	○	○	○	○	○	○
15 Discussion of methodology behind the Professor Stern's test.	○	○	○	○	○	○	○
16 Inadequacy of IQ test from Binet.	○	○	○	○	○	○	○
17 The definition of IQ was created by a professor.	○	○	○	○	○	○	○

Questions 18-21

Choose the correct letter, A, B, C or D.

18 Professor Binet devise the test to_____

- **A** ○ find those who do not perform satisfied
- **B** ○ choose the best one
- **C** ○ measure the intelligence
- **D** ○ establish the standard of intelligence

19 The test is designed according to_____

- **A** ○ math
- **B** ○ age
- **C** ○ reading skill
- **D** ○ gender

20 US Army used Intelligence tests to select_____

- **A** ○ Officers
- **B** ○ Normal Soldiers
- **C** ○ Examiners
- **D** ○ Submarine drivers.

21 the purpose of the text is to_____

- **A** ○ Give credit to the contribution of Binet in IQ test
- **B** ○ prove someone's theory is feasible,
- **C** ○ discuss the validity and limitation of test
- **D** ○ outline the history of the test

Questions 22-26

Do the following statements agree with the information given in Reading Passage 2?

TRUE if the statement is true

FALSE if the statement is false

NOT GIVEN if the information is not given in the passage

22 Part the intension in designing the test by professor Binet has been misunderstood.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

23 Age as a factor is completely overboked in the simplified tests by Wilhelm Stern

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

24 Einstein was a counter-example of IQ test conclusion.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

25 IQ test may probably bad to racial discrimination as a negative effect.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

26 The author regards measuring intelligent test as a goal hardly meaningful

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

PASSAGE 3

You should spend about 20 minutes on Questions 27-40 which are based on Reading Passage 3 below.

Paper or Computer?

27

A. Computer technology was supposed to replace paper. But that hasn't happened. Every country in the Western world uses more paper today, on a per-capita basis, than it did ten years ago. The consumption of uncoated free-sheet paper, for instance the most common kind of office paper — rose almost fifteen per cent in the United States between 1995 and 2000. This is generally taken as evidence of how hard it is to eradicate old, wasteful habits and of how stubbornly resistant we are to the efficiencies offered by computerization. A number of cognitive psychologists and ergonomics experts, however, don't agree. Paper has persisted, they argue, for very good reasons: when it comes to performing certain kinds of cognitive tasks, paper has many advantages over computers. The dismay people feel at the sight of a messy desk — or the spectacle of air-traffic controllers tracking flights through notes scribbled on paper strips - arises from a fundamental confusion about the role that paper plays in our lives.

28

B. The case for paper is made most eloquently in "The Myth of the Paperless Office", by two social scientists, Abigail Sellen and Richard Harper. They begin their book with an account of a study they conducted at the International Monetary Fund, in Washington, D.c. Economists at the I.M.F. spend most of their time writing reports on complicated economic questions, work that would seem to be perfectly suited to sitting in front of a computer. Nonetheless, the I.M.F. is awash in paper, and Sellen and Harper wanted to find out why. Their answer is that the business of writing reports - at least at the I.M.F. is an intensely collaborative process, involving the professional judgments and contributions of many people. The economists bring drafts of reports to conference rooms, spread out the relevant pages, and negotiate changes with one other. They go back to their offices and jot down comments in the margin, taking advantage of the freedom offered by the informality of the handwritten note. Then they deliver the annotated draft to the author in person, taking him, page by page, through the suggested changes. At the end of the process, the author spreads out all the pages with comments on his desk and starts to enter them on the computer — moving the pages around as he works, organizing and reorganizing, saving and discarding.

29

C. Without paper, this kind of collaborative and iterative work process would be much more difficult. According to Sellen and Harper, paper has a unique set of "affordances" — that is, qualities that permit specific kinds of uses. Paper is tangible: we can pick up a document, flip through it, read little bits here and there, and quickly get a sense of it. Paper is spatially flexible, meaning that we can spread it out and arrange it in the way that suits US best. And it's tailorable: we can easily annotate it, and scribble on it as we read, without altering the original text. Digital documents, of course, have then own affordances. They can be easily searched, shared, stored, accessed remotely, and linked to other relevant material. But they lack the affordances that really matter to a group of people working together on a report. Sellen and Harper write:

30

D. Paper enables a certain kind of thinking. Picture, for instance, the top of your desk. Chances are that you have a keyboard and a computer screen off to one side, and a clear space roughly eighteen inches square in front of your chair. What covers the rest of the desktop is probably piles- piles of papers, journals, magazines, binders, postcards, videotapes, and all the other artifacts of the knowledge economy. The piles look like a mess, but they aren't. When a group at Apple Computer studied piling behavior several years ago, they found that even the most disorderly piles usually make perfect sense to the piler, and that office workers could hold forth in great detail about the precise history and meaning of thefr piles. The pile closest to the cleared, eighteen-inch-square working area, for example, generally represents the most urgent business, and within that pile the most important document of all is likely to be at the top. Piles are living, breathing archives. Over time, they get broken down and resorted, sometimes chronologically and sometimes thematically and sometimes chronologically and thematically; clues about certain documents may be physically embedded in the file by, say, stacking a certain piece of paper at an angle or inserting dividers into the stack.

31

E. But why do we pile documents instead of filing them? Because piles represent the process of active, ongoing thinking. The psychologist Alison Kidd, whose research Sellen and Harper refer to extensively, argues that "knowledge workers" use the physical space of the desktop to hold "ideas which they cannot yet categorize or even decide how they might use." The messy desk is not necessarily a sign of disorganization. It may be a sign of complexity: those who deal with many unresolved ideas simultaneously cannot sort and file the papers on their desks, because they haven't yet sorted and filed the ideas in their head. Kidd writes that many of the people she talked to use the papers on their desks as contextual cues to'' recover a complex set of threads without difficulty and delay" when they come in on a Monday morning, or after their work has been interrupted by a phone call. What we see when we look at the piles on our desks is, in a sense, the contents of our brains.

32

F. This idea that paper facilitates a highly specialized cognitive and social process is a far cry from the way we have historically thought about the stuff. Paper first began to proliferate in the workplace in the late nineteenth century as part of the move toward "systematic management." To cope with the complexity of the industrial economy, managers were instituting company-wide policies and demanding monthly, weekly, or even daily updates from their subordinates. Thus was born the monthly sales report, and the office manual and the internal company newsletter. The typewriter took off in the eighteen-eighties, making it possible to create documents in a fraction of the time it had previously taken, and that was followed closely by the advent of carbon paper, which meant that a typist could create ten copies of that document simultaneously. Paper was important not to facilitate creative collaboration and thought but as an instrument of control.

PART 3 — QUESTIONS

Questions 27-32

The reading passage has seven paragraphs, A-F

Choose the correct heading for paragraphs A-F from the list below.

i. **paper continued as a sharing or managing must**

ii. **piles can be more inspiring rather than disorgnising**

iii. **Favorable situation that economists used paper pages**

iv. **overview of an unexpected situation: paper survived**

v. **comparison between efficiencies for using paper and using computer**

vi. **IMF′ paperless office seemed to be a waste of papers**

vii. **example of failure for avoidance of paper record**

viii. **There are advantages of using a paper in offices**

ix. **piles reflect certain characteristics in people′ thought**

x. **joy of having the paper square in front of computer**

Questions 33-36

Complete the following summary of the paragraphs of Reading Passage, using no more than three words from the Reading Passage for each answer.

Compared with digital documents, paper has several advantages. First it allows clerks to work in a **33** _____ way among colleagues. Next, paper is not like virtual digital versions, it's **34** _____. Finally, because it is **35** _____, note or comments can be effortlessly added as related information. However, shortcoming comes at the absence of convenience on task which is for a **36** _____.

Questions 37-40

Choose the correct letter, A, B, C or D.

37 What do the economists from IMF say that their way of writing documents?

A ○ they note down their comments for freedom on the drafts

B ○ they finish all writing individually

C ○ they share ideas on before electronic version was made

D ○ they use electronic version fully

38 What is the implication of the "Piles " mentioned in the passage?

A ○ they have underlying orders

B ○ they are necessarily a mess

C ○ they are in time sequence order

D ○ they are in alphabetic order

39 What does the manager believe in sophisticated economy?

A ○ recorded paper can be as management tool

B ○ carbon paper should be compulsory

C ○ Teamwork is the most important

D ○ monthly report is the best way

40 According to the end of this passage, what is the reason why paper is not replaced by electronic vision?

A ○ paper is inexpensive to buy

B ○ it contributed to management theories in western countries

C ○ people need time for changing their old habit

D ○ it is collaborative and functional for tasks implement and management

Answer Key

#	Answer	Explanation
1	**E**	Art Pimms, one of the researchers at Malheur comments: “Growers are finding that when they adopt more environmentally benign practices, they can have excellent results. The new practices benefit the environment and give the growers their success.”
2	**D**	“We must continue to develop effective alternative practices that will reduce environmental hazards and produce high quality products,” said Paul Jepson, a professor of entomology at OSU and new director of
3	**C**	“There is no way that habitual consumption of foodstuffs grown using toxic chemicals of the nature found on today’s farms can be healthy for consumers,” noted Bill Bowler, spokesman for Green Action, one of many lobbyists interested in this issue
4	**A**	“Wholesale changes in the way that farmers control the pests on their farms is an expensive business.” Tony Brown, of the National Farmers Association says
5	**F**	“I would never have believed that we could replace the artificial pest controls that we had before and still keep our good results,” commented Steve Black, a commercial onion farmer in Oregon, “but instead we have actually surpassed expectations.”
6	**D**	The work coming from OSU researchers must be adopted in the field and not simply languish in scientific journals
7	**B**	“Our food supply remains the safest and highest quality on Earth but we continue to overdose our farmland with powerful and toxic pesticides and to under-use the safe and effective alternatives,” charged Patrick Leahy, who commissioned the report
8	**G**	“Consumers are rightly putting more and more pressure on the industry to change its reliance on chemical pesticides, but they still want a picture-perfect product,” said Rick Hilton, entomologist at OSU’s Southern Oregon Research and Extension Centre, where researchers help pear growers reduce the need for highly toxic pesticides
9	**NO**	Nationwide, however, IFM has not delivered results comparable to those in Oregon
10	**YES**	The GAO report singles out Oregon’s apple and pear producers who have used the new IPM techniques with growing success

#	Answer	Explanation
11	**NO**	The IPPC brings together scientists from OSU's Agricultural Experiment Station, OSU Extension service, the u.s. Department of Agriculture and Oregon farmers to help develop agricultural systems that will save water and soil, and reduce pesticides
12	**YES**	OSU researchers in Malheur next tested straw mulch and found that it successfully held soil in place and kept the ground moist with less irrigation. In addition, and unexpectedly, the scientists found that the mulched soil created a home for beneficial beetles and spiders that prey on onion thrips – a notorious pest in commercial onion fields – a discovery that could reduce the need for pesticides
13	**NOT GIVEN**	Picture perfect pears are an important product in Oregon and traditionally they have required lots of chemicals. In recent years, the industry has faced stiff competition from overseas producers, so any new methods that growers adopt must make sense economically as well as environmentally
14	**G**	psychometrics has long tried to develop ways to gauge psychological qualities such as intelligence and more specific abilities, anxiety, extroversion, emotional stability, compatibility, with marriage partner, and so on
15	**C**	So in 1912 Wilhelm Stem suggested simplifying this by reducing die two to a single number, he divided the mental age by the physical age, and multiplied the result by 100
16	**B**	Binet, however, denied that the test was measuring intelligence, its purpose was simply diagnostic, for selection only
17	**D**	the term IQ was coined by Lewis m. Terman, professor of psychology and education of Stanford university, in 1916
18	**B**	Alfred Binet got the job of devising selection principles
19	**B**	the test determined a given child's mental age', the test previously established a norm for children of a given physical age
20	**A**	Who would become officers and who enlisted men? Psychometricians developed two intelligence tests that helped sort all these people out, at least to some extent, this was the first major use of testing to decide who lived and who died, as officers were a lot safer on the battlefield, the tests themselves were given under horrendously bad conditions, and the examiners seemed to lack commonsense, a lot of recruits simply had no idea what to do and in several sessions most inductees scored zero
21	**C**	the main criticism was and still is that current tests don't really measure intelligence, whether intelligence can be measured at all

#	Answer	Explanation
		is still controversial, some say it cannot others say that IQ tests are psychology’s greatest accomplishments
22	**TRUE**	Binet, however, denied that the test was measuring intelligence, its purpose was simply diagnostic, for selection only. This message was however lost, and caused many problems and misunderstanding later
23	**FALSE**	he divided the mental age by the physical age, and multiplied the result by 100
24	**NOT GIVEN**	The practical side of psychometrics (the development and use of tests) became widespread quite early, by 1917, when Einstein published his grand theory of relativity, mass-scale testing was already in use
25	**TRUE**	Intelligence testing enforced political and social prejudice, their results were used to argue that Jews ought to be kept out of the united states because they were so intelligently inferior that they would pollute the racial mix; and blacks ought not to be allowed to breed at all
26	**NOT GIVEN**	whether intelligence can be measured at all is still controversial, some say it cannot others say that IQ tests are psychology’s greatest accomplishments
27	**iv**	Computer technology was supposed to replace paper. But that hasn’t happened. Every country in the Western world uses more paper today, on a per-capita basis, than it did ten years ago
28	**iii**	The economists bring drafts of reports to conference rooms, spread out the relevant pages, and negotiate changes with one other
29	**viii**	According to Sellen and Harper, paper has a unique set of “affordances” — that is, qualities that permit specific kinds of uses. Paper is tangible: we can pick up a document, flip through it, read little bits here and there, and quickly get a sense of it. Paper is spatially flexible, meaning that we can spread it out and arrange it in the way that suits US best. And it’s tailorable: we can easily annotate it, and scribble on it as we read, without altering the original text
30	**ii**	The piles look like a mess, but they aren’t. When a group at Apple Computer studied piling behavior several years ago, they found that even the most disorderly piles usually make perfect sense to the piler, and that office workers could hold forth in great detail about the precise history and meaning of thefr piles
31	**ix**	What we see when we look at the piles on our desks is, in a sense, the contents of our brains

#	Answer	Explanation
32	**i**	Paper first began to proliferate in the workplace in the late nineteenth century as part of the move toward “systematic management.”
33	**Collaborative and interative**	Without paper, this kind of collaborative and iterative work process would be much more difficult
34	**Tangible**	Paper is tangible: we can pick up a document, flip through it, read little bits here and there, and quickly get a sense of it
35	**Tailorable**	And it’s tailorable: we can easily annotate it, and scribble on it as we read, without altering the original text
36	**Group of people**	But they lack the affordances that really matter to a group of people working together on a report
37	**C**	The economists bring drafts of reports to conference rooms, spread out the relevant pages, and negotiate changes with one other At the end of the process, the author spreads out all the pages with comments on his desk and starts to enter them on the computer — moving the pages around as he works, organizing and reorganizing, saving and discarding
38	**A**	The piles look like a mess, but they aren’t. When a group at Apple Computer studied piling behavior several years ago, they found that even the most disorderly piles usually make perfect sense to the piler, and that office workers could hold forth in great detail about the precise history and meaning of thefr piles
39	**A**	Paper was important not to facilitate creative collaboration and thought but as an instrument of control
40	**D**	Without paper, this kind of collaborative and iterative work process would be much more difficult

Test 51

PASSAGE 1

You should spend about 20 minutes on Questions 1-13 which are based on Reading Passage below.

Terminated Dinosaur Era

A. The age of dinosaurs, which ended with the cataclysmic bang of a meteor impact 65 million years ago, may also have begun with one. Researchers found recently the first direct, though tentative, geological evidence of a meteor impact 200 million years ago, coinciding with a mass extinction that eliminated half of the major groups of life and opened the evolutionary door for what was then a relatively small group of animals: dinosaurs.

B. The cause and timing of the ascent of dinosaurs has have been much debated. It has been impossible to draw any specific conclusions because the transition between the origin of dinosaurs and their ascent to dominance has not been sampled in detail. "There is a geochemical signature of something important happening, probably an asteroid impact, just before the time in which familiar dinosaur-dominated communities appear," said Dr. Paul E. Olsen, a professor of earth and environmental sciences at Columbia University's Lamont-Doherty Earth Observatory in Palisades, N.Y.

C. Olsen and his colleagues studied vertebrate fossils from 80 sites in four different ancient rift basins, part of a chain of rifts that formed as North America began to split apart from the supercontinent that existed 230-190 million years ago. In the layer of rock corresponding to the extinction, the scientists found elevated amounts of the rare element iridium. A precious metal belonging to the platinum group of elements, iridium is more abundant in meteorites than in rocks.

D. On Earth, A similar spike of iridium in 65 million-year-old rocks gave rise in the 1970s to the theory that a meteor caused the demise of the dinosaurs. That theory remained controversial for years until it was corroborated by other evidence and the impact site was found off the Yucatan Peninsula. Scientists will need to examine the new iridium anomaly similarly. The levels are only about one-tenth as high as those found at the later extinction. That could mean that the meteor was smaller or contained less iridium or that a meteor was not involved—iridium can also come from the Earth's interior, belched out by volcanic eruptions. Dr. Michael J. Benton, a professor of vertebrate paleontology at the University of Bristol in England, described the data as "the first reasonably convincing evidence of an iridium spike".

E. The scientists found more evidence of rapid extinction in a database of 10,000 fossilized footprints in former lake basins from Virginia to Nova Scotia. Although individual species cannot usually be identified solely from their footprints — the tracks of a house cat, for example, resemble those of a baby tiger — footprints are much more plentiful than fossil bones and can provide a more complete picture of the types of animals walking around. "It makes it very easy

for us to tell the very obvious signals of massive fauna change," Dr. Olsen said. Because the sediment piles up quickly in lake basins, the researchers were able to assign a date to each footprint, based on the layer of rock where it was found. They determined that the mix of animals walking across what is now the East Coast of North America changed suddenly about 200 million years ago.

F. The tracks of several major reptile groups continue almost up to the layer of rock marking the end of the Triassic geologic period 202 million years ago, and then vanish in younger layers from the Jurassic period. "I think the footprint methodology is very novel and very exciting," said Dr. Peter D. Ward, a professor of geology at the University of Washington. He called the data "very required more research. Last year, researchers led by Dr. Ward reported that the types of carbon in rock changed abruptly at this time, indicating a sudden dying off of plants over less than 50,000 years. The footprint research reinforces the hypothesis that the extinction was sudden.

G. Several groups of dinosaurs survived that extinction, and the footprints show that new groups emerged soon afterward. Before the extinction, about one-fifth of the footprints were left by dinosaurs; after the extinction, more than half were from dinosaurs. The changes, the researchers said, occurred within 30,000 years — a geological blink of an eye. The scientists postulate that the asteroid or comet impact and the resulting death of Triassic competitors allowed a few groups of carnivorous dinosaurs to evolve in size very quickly and dominate the top of the terrestrial food chain globally.

H. Among the creatures that disappeared in the extinction were the dominant predators at the time: 15-foot-long rauisuchians with great knife-like teeth and phytosaurs that resembled large crocodiles. Dinosaurs first evolved about 230 million years ago, but they were small, competing in a crowded ecological niche. Before the extinction 200 million years ago. the largest of the meat-eating dinosaurs were about the see of large dogs. Not terribly impressive." Dr. Olsen said. The dinosaurs quickly grew. The toe-to-heel length of the foot of a meat eater from the Jurassic period was on average 20 percent longer than its Triassic ancestor. Larger feet can carry bigger bodies; the scientists infer the dinosaurs doubled in weight, eventually evolving into fearsome velociraptors, Tyrannosaurus rex and other large carnivorous dinosaurs.

I. The spurt in evolution is similar to the rise of mammals after the extinction of dinosaurs. Mammals, no larger than small dogs during the age of dinosaurs, diversified into tigers, elephants, whales and people after the reptilian competition died away. The success of the dinosaurs after the Triassic-Jurassic extinction may be why they did not survive the second extinction. "Small animals always do better in catastrophic situations. Dr. Olsen said, because they can survive on smaller amounts of food." He also pointed out that scientists now believe the small dinosaurs did survive. "We just call them birds," he said.

PART 1 — QUESTIONS

Questions 1-6

Use the information in the passage to match the people (listed A- C) with opinions or deeds listed below.

Write the appropriate letter (A-C).

A. Paul Olsen

B. Michael Benton

C. Peter Ward

	A	B	C
1 Large animals are in a disadvantageous position when disasters happen.	○	○	○
2 Radical changes in carbon types are related to massive extinction of vegetation.	○	○	○
3 The changes in earth's animal species become easier to identify by adding footprint investigation.	○	○	○
4 Geochemical evidence suggests an asteroid impact before dinosaurs appeared.	○	○	○
5 Footprint study is a way of research.	○	○	○
6 Persuasive clues of an iridium spike were discovered for the first time.	○	○	○

Questions 7-13

Do the following statements agree with the information given in Reading Passage?

TRUE if the statement is true

FALSE if the statement is false

NOT GIVEN if the information is not given in the passage

7 The rare element, iridium, was presented both on earth and in meteorites.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

8 The meteor impact theory had been suspected before the discovery of the impact site and other supporting evidence.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

9 Footprints are of little value in providing information, in comparison to fossil bones, because individual species cannot be identified with footprints.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

10 According to scientists, the transition to a dinosaur-dominated era took place very quickly by geological time scales.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

11 The creatures that disappeared in the extinction were the dominantly the 15-foot-long rauisuchians and large crocodiles.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

12 Tyrannosaurus rex was larger in body size than other carnivorous dinosaurs.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

13 Large dinosaurs died out but small ones evolved and competed with birds and mammals.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

PASSAGE 2

You should spend about 20 minutes on Questions 14-27 which are based on Reading Passage below.

Detection of a meteorite Lake

A. AS THE SUN rose over picturesque Lake Bosumtwi, a team of Syracuse University researchers prepared for another day of using state-of-the-art equipment to help unlock the mysteries hidden below the lake bottom. Nestled in the heart of Ghana, the lake holds an untapped reservoir of information that could help scientists predict future climate changes by looking at evidence from the past. This information will also improve the scientists' understanding of the changes that occur in a region struck by a massive meteorite

B. The project, led by earth sciences professor Christopher Scholz of the College of Arts and Sciences and funded by the National Science Foundation (NSF), is the first large-scale effort to study Lake Bosumtwi, which formed 1.1 million years ago when a giant meteor crashed into the Earth's surface. The resulting crater is one of the largest and most well-preserved geologically young craters in the world, says Scholz, who is collaborating on the project with researchers from the University of Arizona, the University of South Carolina, the University of Rhode Island, and several Ghanaian institutions. "Our data should provide information about what happens when an impact hits hard, pre-Cambrian, crystalline rocks that are a billion years old," he says.

C. Equally important is the fact that the lake, which is about 8 kilometers in diameter, has no natural outlet. The rim of the crater rises about 250 meters above the water's surface. Streams flow into the lake, Scholz says, but the water leaves only by evaporation, or by seeping through the lake sediments. For the past million years, the lake has acted as a tropical rain, filling and drying with changes in precipitation and the tropical climate. The record of those changes is hidden in sediment below the lake bottom. "The lake is one of the best sites in the world for the study of ropical climate changes," Scholz says. "The tropics are the heat engine for the Earth's climate. To understand global climate, we need to have records of climate changes from many sites around the world, including the tropics."

D. Before the researchers could explore the lake's subsurface, they needed a boat with a large, working deck area that could carry eight tons of scientific equipment. The boat dubbed R/V Kilindi was built in Florida last year. It was constructed in modules that were dismantled, packed inside a shipping container, and reassembled over a 10-day period in late November and early December 1999 in the rural village of Abono, Ghana. The research team then spent the next two weeks testing the boat and equipment before returning to the United States for the holidays.

E. In mid-January, five members of the team—Keely Brooks, an earth sciences graduate student; Peter Cattaneo, a research analyst; and Kiram Lezzar, a postdoctoral scholar, all from SU; James McGill, a geophysical field engineer; and Nick Peters, a Ph.D. student in geophysics from the University of Miami—returned to Abono to begin collecting data about the lake's subsurface using a technique called seismic reflection profiling. In this process, a high-pressure air gun is used to create small, pneumatic explosions in the water. The sound energy penetrates

about 1,000 to 2,000 meters into the lake's subsurface before bouncing back to the surface of the water.

F. The reflected sound energy is detected by underwater microphones-called hydrophones—embedded in a 50-meter-long cable that is towed behind the boat as it crosses the lake in a carefully designed grid pattern. On-board computers record the signals, and the resulting data are then processed and analyzed in the laboratory. “The results will give US a good idea of the shape of the basin, how thick the layers of sediment are, and when and where there were major changes in sediment accumulation,” Scholz says. “We are now developing three-dimensional perspective of the lake’s subsurface and the layers of sediment that have been laid down.”

G. Team members spent about four weeks in Ghana collecting the data. They worked seven, days a week/ arriving at the lake just after sunrise. On a good day, when everything went as planned, the team could collect data and be back at the dock by early afternoon. Except for a few relatively minor adjustments, the equipment and the boat worked well. Problems that arose were primarily non-scientific—tree stumps, fishing nets, cultural barriers, and occasional misunderstandings with local villagers.

H. Lake Bosumtwi, the largest natural freshwater lake in the country, is sacred to the Ashanti people, who believe their souls come to the lake to bid farewell to their god. The lake is also the primary source of fish for the 26 surrounding villages. Conventional canoes and boats are forbidden. Fishermen travel on the lake by floating on traditional planks they propel with small paddles. Before die research project could begin, Scholz and his Ghanaian counterparts had to secure special permission from tribal chiefs to put the R/V Kilindi on the lake.

I. When the team began gathering data, rumors flew around the lake as to why the researchers were there. "Some thought we were dredging the lake for gold, others thought we were going to drain the lake or that we had bought the lake," Cattaneo says. "But once the local people understood why we were there, they were very helpful"

PART 2 — QUESTIONS

Questions 14-18

Do the following statements agree with the information given in Reading Passage?

TRUE if the statement is true

FALSE if the statement is false

NOT GIVEN if the information is not given in the passage

14 With the investigation of the lake, scientist may predict the climate changes in the future.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

15 The crater resulted from a meteorite impact is the largest and most preserved one in the world.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

16 The water stored in lake Bosumtwi was gone only by seeping through the lake sediments.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

17 Historical climate changes can be detected by the analysis of the sediment in the lake.

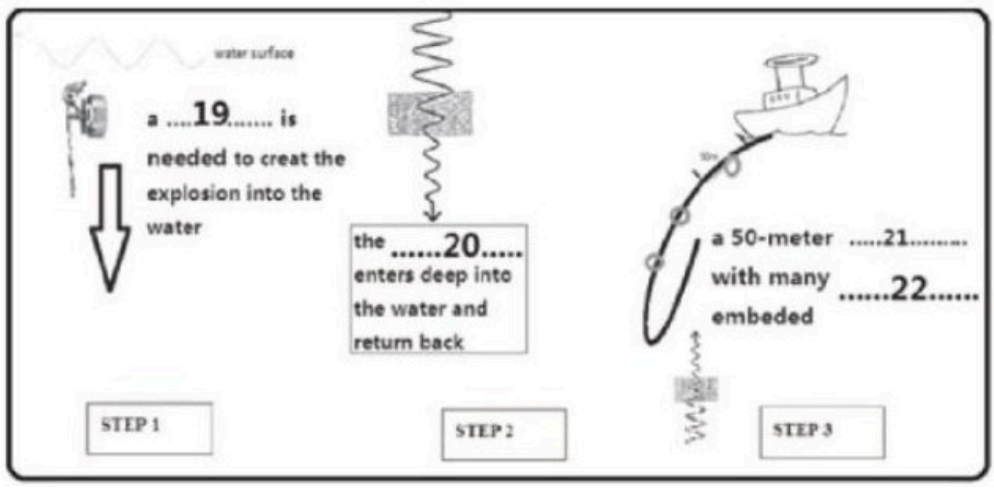
- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

18 The greatest obstacle to research of scientists had been the interference by the locals due to the indigenous believes.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

Questions 19-22

There are three steps of collecting data from the lake as followings, please filling the blanks in the Flow Chart below, using no more than three words from the Reading Passage for each answer:



19 _____

20 _____

21 _____

22 _____

Questions 23-27

Complete the following summary of the paragraphs of Reading Passage, using no more than three words from the Reading Passage for each answer.

The boat-double R/V Kilindi crossed the lake was dismantled and stored in a **23** _____. The technology they used called **24** _____; They created sound energy in to 1000-2000 metres in to the bottom of the lake, and used separate

equipment to collect the returned waves. Then the data had been analyzed and processed in the **25** _____. Scholz also added that they were now building **26** _____ view of the sediment or sub-image in the bottom of the lake. Whole set of equipment works well yet the ship should avoid physical barrier including tree stumps or **27** _____ floating on the surface of the lake.

PASSAGE 3

You should spend about 20 minutes on Questions 28-40 which are based on Reading Passage below.

Internal and External Marketing

A. Employees need to hear the same messages that you send out to the marketplace. At most companies, however, internal and external communications are often mismatched. This can be very confusing, and it threatens employees' perceptions of the company's integrity: They are told one thing by management but observe that a different message is being sent to the public. One health insurance company, for instance, advertised that the welfare of patients was the company's number one priority, while employees were told that theft main goal was to increase the value of theft stock options through cost reductions. And one major financial services institution told customers that it was making a major shift in focus from being a financial retailer to a financial adviser, but, a year later, research showed that the customer experience with the company had not changed. It turned out that company leaders had not made an effort to sell the change internally, so employees were still churning out transactions and hadn't changed theft behavior to match theft new adviser role.

B. Enabling employees to deliver on customer expectations is important, of course, but it's not the only reason a company needs to match internal and external messages. Another reason is to help push the company to achieve goals that might otherwise be out of reach. In 1997, when IBM launched its e-business campaign (which is widely credited for turning around the company's image), it chose to ignore research that suggested consumers were unprepared to embrace IBM as a leader in e-business. Although to the outside world this looked like an external marketing effort, IBM was also using the campaign to align employees around the idea of the Internet as the future of technology. The internal campaign changed the way employees thought about everything they did, from how they named products to how they organized staff to how they approached selling. The campaign was successful largely because it gave employees a sense of direction and purpose, which in turn restored theft confidence in IBM's ability to predict the future and lead the technology industry. Today, research shows that people are four times more likely to associate the term "e-business" with IBM than with its nearest competitor, Microsoft.

C. The type of "two-way branding" that IBM did so successfully strengthens both sides of the equation. Internal marketing becomes stronger because it can draw on the same "big idea" as advertising. Consumer marketing becomes stronger because the messages are developed based on employees' behavior and attitudes, as well as on the company's strengths and capabilities—indeed, the themes are drawn from the company's very soul. This process can result in a more distinct advertising idea because marketers are more likely to create a message that's unique to the company.

D. Perhaps even more important, by taking employees into account, a company can avoid creating a message that doesn't resonate with staff or, worse, one that builds resentment. In 1996, United Airlines shelved its "Come Fly the Friendly Skies" slogan when presented with a

survey that revealed the depth of customer resentment toward the airline industry. In an effort to own up to the industry's shortcomings. United launched a new campaign, "Rising," in which it sought to differentiate itself by acknowledging poor service and promising incremental improvements such as better meals. While this was a logical premise for the campaign given the tenor of the times, a campaign focusing on customers' distaste for flying was deeply discouraging to the staff. Employee resentment ultimately made it impossible for United to deliver the improvements it was promising, which in turn undermined the "Rising" pledge. Three years later. United decided employee opposition was undermining its success and pulled the campaign. It has since moved to a more inclusive brand message with the line "United," which both audiences can embrace. Here, a fundamental principle of advertising—find and address a customer concern—failed United because it did not consider the internal market.

E. When it comes to execution, the most common and effective way to link internal and external marketing campaigns is to create external advertising that targets both audiences. IBM used this tactic very effectively when it launched its e-business campaign. It took out an eight-page ad in the Wall Street Journal declaring its new vision, a message directed at both customers and internal stakeholders. This is an expensive way to capture attention, but if used sparingly, it is the most powerful form of communication; in fact, you need do it only once for everyone in the company to read it. There's a symbolic advantage as well. Such a tactic signals that the company is taking its pledge very seriously; it also signals transparency—the same message going out to both audiences.

F. Advertising isn't the only way to link internal and external marketing. At Nike, a number of senior executives now hold the additional title of "Corporate Storyteller." They deliberately avoid stories of financial successes and concentrate on parables of "just doing it," reflecting and reinforcing the company's ad campaigns. One tale, for example, recalls how legendary coach and Nike cofounder Bill Bowerman, in an effort to build a better shoe for his team, poured rubber into the family waffle iron, giving birth to the prototype of Nike's famous Waffle Sole. By talking about such inventive moves, the company hopes to keep the spirit of innovation that characterizes its ad campaigns alive and well within the company.

G. But while their messages must be aligned, companies must also keep external promises a little ahead of internal realities. Such promises provide incentives for employees and give them something to live up to. In the 1980s, Ford turned "Quality is Job " from an internal rallying cry into a consumer slogan in response to the threat from cheaper, more reliable Japanese cars. It did so before the claim was fully justified, but by placing it in the public arena, it gave employees an incentive to match the Japanese. If the promise is pushed too far ahead, however, it loses credibility. When a beleaguered British Rail launched a campaign announcing service improvement under the banner "We're Getting There," it did so prematurely. By drawing attention to the gap between the promise and the reality, it prompted destructive press coverage. This, in turn, demoralized staff, who had been legitimately proud of the service advances they had made.

PART 3 — QUESTIONS

Questions 28-34

Use the information in the passage to match the company with correct category or deeds below. Write the appropriate letters A-F.

NB: you may use any letter more than once

A. legendary anecdote inspire employee successfully

B. advertisement campaign inspire employees and ensure leading role in business

C. improper ads campaign brings negative effect

D. internal and external announcement are different

E. campaign brings positive and realistic expectation internally

F. a bad slogan that failed both to win support internally and raise standard to its poor service

	A	B	C	D	E	F
28 Health insurance company / Financial services institution	○	○	○	○	○	○
29 British Rail	○	○	○	○	○	○
30 IBM	○	○	○	○	○	○
31 United Airlines	○	○	○	○	○	○
32 United Airlines	○	○	○	○	○	○
33 Nike	○	○	○	○	○	○
34 Ford	○	○	○	○	○	○

Questions 35-38

Do the following statements agree with the information given in Reading Passage 3?

TRUE if the statement is true

FALSE if the statement is false

NOT GIVEN if the information is not given in the passage

35 Employers in almost all companies successfully make their employees fully understand the outside campaign.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

36 Currently IBM is more prominent in the area of E-business

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

37 United Airline finally gave up an ads slogan due to a survey in 1996.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

38 Nike had improved company performance through telling employees legendary corporation stories.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

Questions 39-40

Choose TWO correct letters below

39 **40** Please choose TWO approaches in the passage mentioned that were employed as company strategy:

- **A** ☐ promoting the visual effect of their products' advertisement

B ☐ launching inspiring campaigns internally

C ☐ introducing inner competition

D ☐ learning how to tell stories among senior executives

E ☐ applying an appropriate slogan

Answer Key

#	Answer	Explanation
1	**A**	“Small animals always do better in catastrophic situations. Dr. Olsen said, because they can survive on smaller amounts of food.”
2	**C**	Last year, researchers led by Dr. Ward reported that the types of carbon in rock changed abruptly at this time, indicating a sudden dying off of plants over less than 50,000 years
3	**A**	“It makes it very easy for us to tell the very obvious signals of massive fauna change,” Dr. Olsen said
4	**A**	“There is a geochemical signature of something important happening, probably an asteroid impact, just before the time in which familiar dinosaur-dominated communities appear,” said Dr. Paul E. Olsen, a professor of earth and environmental sciences at Columbia University’s Lamont-Doherty Earth Observatory in Palisades, N.Y
5	**C**	“I think the footprint methodology is very novel and very exciting,” said Dr. Peter D. Ward, a professor of geology at the University of Washington
6	**B**	Dr. Michael J. Benton, a professor of vertebrate paleontology at the University of Bristol in England, described the data as “the first reasonably convincing evidence of an iridium spike”
7	**TRUE**	In the layer of rock corresponding to the extinction, the scientists found elevated amounts of the rare element iridium. A precious metal belonging to the platinum group of elements, iridium is more abundant in meteorites than in rocks
8	**TRUE**	On Earth, A similar spike of iridium in 65 million-year-old rocks gave rise in the 1970s to the theory that a meteor caused the demise of the dinosaurs. That theory remained controversial for years until it was corroborated by other evidence and the impact site was found off the Yucatan Peninsula
9	**FALSE**	Although individual species cannot usually be identified solely from their footprints — the tracks of a house cat, for example, resemble those of a baby tiger — footprints are much more plentiful than fossil bones and can provide a

#	Answer	Explanation
		more complete picture of the types of animals walking around
10	**TRUE**	The changes, the researchers said, occurred within 30,000 years — a geological blink of an eye
11	**FALSE**	Among the creatures that disappeared in the extinction were the dominant predators at the time: 15-foot-long rauisuchians with great knife-like teeth and phytosaurs that resembled large crocodiles
12	**NOT GIVEN**	Larger feet can carry bigger bodies; the scientists infer the dinosaurs doubled in weight, eventually evolving into fearsome velociraptors, Tyrannosaurus rex and other large carnivorous dinosaurs
13	**NOT GIVEN**	He also pointed out that scientists now believe the small dinosaurs did survive. “We just call them birds,” he said
14	**TRUE**	Nestled in the heart of Ghana, the lake holds an untapped reservoir of information that could help scientists predict future climate changes by looking at evidence from the past
15	**NOT GIVEN**	The resulting crater is one of the largest and most well-preserved geologically young craters in the world, says Scholz
16	**FALSE**	Streams flow into the lake, Scholz says, but the water leaves only by evaporation, or by seeping through the lake sediments
17	**TRUE**	For the past million years, the lake has acted as a tropical rain, filling and drying with changes in precipitation and the tropical climate. The record of those changes is hidden in sediment below the lake bottom
18	**FALSE**	“But once the local people understood why we were there, they were very helpful”
19	**(high-pressure) air gun**	In this process, a high-pressure air gun is used to create small, pneumatic explosions in the water
20	**sound energy/sound wave**	In this process, a high-pressure air gun is used to create small, pneumatic explosions in the water. The sound energy penetrates about 1,000 to 2,000 meters into the lake’s subsurface before bouncing back to the surface of the water

#	Answer	Explanation
21	**cable**	The reflected sound energy is detected by underwater microphones-called hydrophones—embedded in a 50-meter-long cable that is towed behind the boat as it crosses the lake in a carefully designed grid pattern
22	**hydrophones/underwater microphones**	The reflected sound energy is detected by underwater microphones-called hydrophones—embedded in a 50-meter-long cable that is towed behind the boat as it crosses the lake in a carefully designed grid pattern
23	**shipping container**	It was constructed in modules that were dismantled, packed inside a shipping container, and reassembled over a 10-day period in late November and early December 1999 in the rural village of Abono, Ghana
24	**seismic reflection profiling**	In mid-January, five members of the team—Keely Brooks, an earth sciences graduate student; Peter Cattaneo, a research analyst; and Kiram Lezzar, a postdoctoral scholar, all from SU; James McGill, a geophysical field engineer; and Nick Peters, a Ph.D. student in geophysics from the University of Miami—returned to Abono to begin collecting data about the lake's subsurface using a technique called seismic reflection profiling
25	**laboratory**	On-board computers record the signals, and the resulting data are then processed and analyzed in the laboratory
26	**three-dimensional**	We are now developing three-dimensional perspective of the lake's subsurface and the layers of sediment that have been laid down
27	**fishing nets**	Problems that arose were primarily non-scientific—tree stumps, fishing nets, cultural barriers, and occasional misunderstandings with local villagers
28	**D**	They are told one thing by management but observe that a different message is being sent to the public. One health insurance company, for instance, advertised that the welfare of patients was the company's number one priority, while employees were told that theft main goal was to increase the value of theft stock options through cost reductions. And one major financial services institution told customers that it was making a major shift in focus from being a financial retailer to a financial adviser, but, a year later, research showed that the customer experience with the company had not changed
29	**C**	When a beleaguered British Rail launched a campaign announcing service improvement under the banner "We're Getting There," it did so prematurely. By drawing attention

#	Answer	Explanation
		to the gap between the promise and the reality, it prompted destructive press coverage. This, in turn, demoralized staff, who had been legitimately proud of the service advances they had made
30	**B**	The campaign was successful largely because it gave employees a sense of direction and purpose, which in turn restored theft confidence in IBM's ability to predict the future and lead the technology industry
31	**F**	United launched a new campaign, "Rising," in which it sought to differentiate itself by acknowledging poor service and promising incremental improvements such as better meals. While this was a logical premise for the campaign given the tenor of the times, a campaign focusing on customers' distaste for flying was deeply discouraging to the staff. Employee resentment ultimately made it impossible for United to deliver the improvements it was promising, which in turn undermined the "Rising" pledge
32	**C**	While this was a logical premise for the campaign given the tenor of the times, a campaign focusing on customers' distaste for flying was deeply discouraging to the staff. Employee resentment ultimately made it impossible for United to deliver the improvements it was promising, which in turn undermined the "Rising" pledge
33	**A**	At Nike, a number of senior executives now hold the additional title of "Corporate Storyteller." They deliberately avoid stories of financial successes and concentrate on parables of "just doing it," reflecting and reinforcing the company's ad campaigns. One tale, for example, recalls how legendary coach and Nike cofounder Bill Bowerman, in an effort to build a better shoe for his team, poured rubber into the family waffle iron, giving birth to the prototype of Nike's famous Waffle Sole. By talking about such inventive moves, the company hopes to keep the spirit of innovation that characterizes its ad campaigns alive and well within the company
34	**E**	In the 1980s, Ford turned "Quality is Job " from an internal rallying cry into a consumer slogan in response to the threat from cheaper, more reliable Japanese cars. It did so before the claim was fully justified, but by placing it in the public arena, it gave employees an incentive to match the Japanese
35	**FALSE**	At most companies, however, internal and external communications are often mismatched

#	Answer	Explanation
36	**TRUE**	Today, research shows that people are four times more likely to associate the term “e-business” with IBM than with its nearest competitor, Microsoft
37	**TRUE**	In 1996, United Airlines shelved its “Come Fly the Friendly Skies” slogan when presented with a survey that revealed the depth of customer resentment toward the airline industry
38	**NOT GIVEN**	By talking about such inventive moves, the company hopes to keep the spirit of innovation that characterizes its ad campaigns alive and well within the company
39	**B / E**	The internal campaign changed the way employees thought about everything they did, from how they named products to how they organized staff to how they approached selling It has since moved to a more inclusive brand message with the line “United,” which both audiences can embrace
40	**B / E**	The internal campaign changed the way employees thought about everything they did, from how they named products to how they organized staff to how they approached selling It has since moved to a more inclusive brand message with the line “United,” which both audiences can embrace

Test 52

PASSAGE 1

Read the text below and answer questions 1-13.

OTTER

A. Otters have long, thin bodies and short legs - ideal for pushing through dense undergrowth or hunting in tunnels. An adult male may be up to 4 feet long and 30lbs. Females are smaller typically. The Eurasian otter's nose is about the smallest among the otter species and has a characteristic shape described as a shallow 'W. An otter's tail (or rudder, or stem) is stout at the base and tapers towards the tip where it flattens. This forms part of the propulsion unit when swimming fast under water. Otter fur consists of two types of hair: stout guard hairs which form a waterproof outer covering, and under-fur which is dense and fine, equivalent to an otter's thermal underwear. The fur must be kept in good condition by grooming. Sea water reduces the waterproofing and insulating qualities of otter fur when salt water in the fin. This is why freshwater pools are important to otters living on the coast. After swimming, they wash the salts off in the pools and then squirm on the ground to rub dry against vegetation.

B. Scent is used for hunting on land, for communication and for detecting danger, otterine sense of smell is likely to be similar in sensitivity to dogs. Otters have small eyes and are probably short-sighted on land. But they do have the ability to modify the shape of the lens in the eye to make it more spherical, and hence overcome the refraction of water. In clear water and good light, otters can hunt fish by sight. The otter's eyes and nostrils are placed high on its head so that it can see and breathe even when the rest of the body is submerged. Underwater, the otter holds its legs against the body, except for steering, and the hind end of the body is flexed in a series of vertical undulations. River otters have webbing which extends for much of the length of each digit, though not to the very end. Giant otters and sea otters have even more prominent webs, while the Asian short-clawed otter has no webbing - they hunt for shrimps in ditches and paddy fields so they don't need the swimming speed. Otter ears are tiny for streamlining, but they still have very sensitive hearing and are protected by valves which close them against water pressure.

C. A number of constraints and preferences limit suitable habitats for otters. Water is a must and the rivers must be large enough to support a healthy population of fish. Being such shy and wary creatures, they will prefer territories where man's activities do not impinge greatly. Of course, there must also be no other otter already in residence - this has only become significant again recently as populations start to recover. Coastal otters have a much more abundant food supply and ranges for males and females may be just a few kilometres of coastline. Because male ranges are usually larger a male otter may find his range overlaps with two or three females - not bad! Otters will eat anything that they can get hold of - there are records of sparrows and snakes and slugs being gobbled. Apart from fish the most common prey are crayfish, crabs and water birds. Small mammals are occasionally taken, most commonly rabbits but sometimes even moles.

D. Eurasian otters will breed any time where food is readily available. In places where condition is more severe, Sweden for example where the lakes are frozen for much of winter, cubs are born in spring. This ensures that they are well grown before severe weather returns. In the Shetlands, cubs are born in summer when fish is more abundant. Though otters can breed every year, some do not. Again, this depends on food availability. Other factors such as food range and quality of the female may have an effect. Gestation for Eurasian otter is 63 days, with the exception of Lutra canadensis whose embryos may undergo delayed implantation. Otters normally give birth in more secure dens to avoid disturbances. Nests are lined with bedding to keep the cubs warm while mummy is away feeding.

E. Otters normally give birth in more secure dens to avoid disturbances. Nests are lined with bedding (reeds, waterside plants, grass) to keep the cubs warm while is away feeding. Litter Size varies between 1 and 5. For some unknown reason, coastal otters tend to produce smaller litters. At five weeks they open their eyes - a tiny cub of 700g. At seven weeks they're weaned onto solid food. At ten weeks they leave the nest, blinking into daylight for the first time. After three months they finally meet the water and learn to swim. After eight months they are hunting, though the mother still provides a lot of food herself. Finally, after nine months she can chase them all away with a clear conscience, and relax - until the next fella shows up.

F. The plight of the British otter was recognised in the early 60s, but it wasn't until the late 70s that the chief cause was discovered. Pesticides, such as dieldrin and aldrin, were first used in 1955 in agriculture and other industries - these chemicals are very persistent and had already been recognised as the cause of huge declines in the population of peregrine falcons, sparrow hawks and other predators. The pesticides entered the river systems and the food chain - micro-organisms, fish and finally otters, with every step increasing the concentration of the chemicals. From 1962 the chemicals were phased out, but while some species recovered quickly, otter numbers did not - and continued to fall into the 80s. This was probably due mainly to habitat destruction and road deaths. Acting on populations fragmented by the sudden decimation in the 50s and 60s, the loss of just a handful of otters in one area can make an entire population unviable and spell the end.

G. Otter numbers are recovering all around Britain - populations are growing again in the few areas where they had remained and have expanded from those areas into the rest of the country. This is almost entirely due to legislation, conservation efforts, slowing down and reversing the destruction of suitable otter habitat and reintroductions from captive breeding programs. Releasing captive-bred otters is seen by many as a last resort. The argument runs that where there is no suitable habitat for them they will not survive after release and where there is suitable habitat, natural populations should be able to expand into the area. However, reintroducing animals into a fragmented and fragile population may add just enough impetus for it to stabalise and expand, rather than die out. This is what the Otter Trust accomplished in Norfolk, where the otter population may have been as low as twenty animals at the beginning of the 1980s. The Otter Trust has now finished its captive breeding program entirely, great news because it means it is no longer needed.

PART 1 — QUESTIONS

Questions 1-9

The reading Passage has seven paragraphs A-G.

Which paragraph contains the following information?

NB: You may use any letter more than once.

	A	B	C	D	E	F	G
1 A description of how otters regulate vision underwater	○	○	○	○	○	○	○
2 The fit-for-purpose characteristics of otter's body shape	○	○	○	○	○	○	○
3 A reference to an underdeveloped sense	○	○	○	○	○	○	○
4 An explanation of why agriculture failed in otter conservation efforts	○	○	○	○	○	○	○
5 A description of some of the otter's social characteristics	○	○	○	○	○	○	○
6 A description of how baby otters grow	○	○	○	○	○	○	○
7 The conflicted opinions on how to preserve	○	○	○	○	○	○	○
8 A reference to legislative act	○	○	○	○	○	○	○
9 An explanation of how otters compensate for heat loss	○	○	○	○	○	○	○

Questions 10-13

Answer the questions below.

Choose NO MORE THAN THREE WORDS from the passage for each answer

10 What affects the outer fur of otters? _____

11 What skill is not necessary for Asian short-clawed otters? _____

12 Which type of otters has the shortest range? _____

13 Which type of animals do otters hunt occasionally? _____

PASSAGE 2

Read the text below and answer questions 14-26.

BIRD MIGRATION 2

14

A. Birds have many unique design features that enable them to perform such amazing feats of endurance. They are equipped with lightweight, hollow bones, intricately designed feathers providing both lift and thrust for rapid flight, navigation systems superior to any that man has developed, and an ingenious heat conserving design that, among other things, concentrates all blood circulation beneath layers of warm, waterproof plumage, leaving them fit to face life in the harshest of climates. Theft respiratory systems have to perform efficiently during sustained flights at altitude, so they have a system of extracting oxygen from their lungs that for exceeds that of any other animal. During the later stages of the summer breeding season, when food is plentiful, their bodies are able to accumulate considerable layers of fat, in order to provide sufficient energy for theft long migratory flights.

15

B. The fundamental reason that birds migrate is to find adequate food during the winter months when it is in short supply. This particularly applies to birds that breed in the temperate and Arctic regions of the Northern Hemisphere, where food is abundant during the short growing season. Many species can tolerate cold temperatures if food is plentiful, but when food is not available they must migrate. However, intriguing questions remain.

16

C. One puzzling fact is that many birds journey much further than would be necessary just to find food and good weather. Nobody knows, for instance, why British swallows, which could presumably survive equally well if they spent the winter in equatorial Africa, instead fly several thousands of miles further to theft preferred winter home in South Africa Cape Province. Another mystery involves the huge migrations performed by arctic terns and mudflat-feeding shorebirds that breed close to Polar Regions. In general, the further north a migrant species breeds, the further south it spends the winter. For arctic terns this necessitates an annual round trip of 25,000 miles. Yet, en route to then final destination in far-flung southern latitudes, all these individuals overfly other areas of seemingly suitable habitat spanning two hemispheres. While we may not fully understand bird's reasons for going to particular places, we can marvel at then feats.

17

D. One of the greatest mysteries is how young birds know how to find the traditional wintering areas without parental guidance. Very few adults migrate with juveniles in tow, and youngsters may even have little or no inkling of then parents' appearance. A familiar example Is that of the cuckoo, which lays its eggs in another species' nest and never encounters its young again. It is mind boggling to consider that, once raised by its host species, the young cuckoo makes it own way to ancestral wintering grounds in the tropics before returning single-handedly to northern Europe the next season to seek out a mate among its own kind. The obvious implication is that it inherits from its parents an inbuilt route m ạ p and direction-finding capability, as well as a mental image of what another cuckoo looks like. Yet nobody has the slightest idea as to how this is possible.

18

E. Mounting evidence has confirmed that birds use the positions of the sun and stars to obtain compass directions. They seem also to be able to detect the earth's magnetic field, probably due to having minute crystals of magnetite in the region of then brains. However, true navigation also requires an awareness of position and time, especially when lost. Experiments have shown that after being taken thousands of miles over an unfamiliar land-mass, birds are still capable of returning rapidly to nest sites. Such phenomenal powers are the product of computing a number of sophisticated cues, including an inborn map of the night sky and the pull of the earth's magnetic field. How the buds use then 'instruments' remains unknown, but one thing is clear: they see the world with a superior sensory perception to ours. Most small birds migrate at night and take then direction from the position of the setting sun. However, as well as seeing the sun go down, they also seem to see the plane of polarized light caused by it, which calibrates then compass. Traveling at night provides other benefits. Daytime predators are avoided and the danger of dehydration due to flying for long periods in warm, sunlit skies is reduced. Furthermore, at night the air is generally cool and less turbulent and so conducive to sustained, stable flight.

19

F. Nevertheless, all journeys involve considerable risk, and part of the skill in arriving safely is setting off at the right time. This means accurate weather forecasting, and utilizing favorable winds. Birds are adept at both, and, in laboratory tests, some have been shown to detect the minute difference in barometric pressure between the floor and ceiling of a room. Often birds react to weather changes before there is any visible sign of them. Lapwings, which feed on grassland, flee west from the Netherlands to the British Isles, France and Spain at the onset of a cold snap. When the ground surface freezes the birds could starve. Yet they return to Holland ahead of a thaw, their arrival linked to a pressure change presaging an improvement in the weather.

20

G. In one instance a Welsh Manx shearwater carried to America and released was back in its burrow on Skokholm Island, off the Pembrokeshire coast, one day before a letter announcing its release! Conversely, each autumn a small number of North American birds are blown across the Atlantic by fast-moving westerly tail winds. Not only do they arrive safely in Europe, but, based on ringing evidence, some make it back to North America the following spring, after probably spending the winter with European migrants in sunny African climes.

PART 2 — QUESTIONS

Questions 14-20

Choose the correct heading for each paragraph from the list of headings below.

i. **The best moment to migrate**

ii. **The unexplained rejection of closer feeding ground**

iii. **The influence of weather on the migration route**

iv. **Physical characteristics that allow birds to migrate**

v. **The main reason why birds migrate**

vi. **The best wintering grounds for birds**

vii. **Research findings on how birds migrate**

viii. **Successful migration despite trouble of wind**

ix. **Contrast between long-distance migration and short-distance migration**

x. **Mysterious migration despite lack of teaching**

Questions 21-22

Choose TWO letters, A-E.

Which TWO of the following statements are true of bird migration?

21 **22** Which TWO of the following statements are true of bird migration?

- **A** ☐ Birds often fly further than they need to.
- **B** ☐ Birds traveling in family groups are safe
- **C** ☐ Birds flying at night need less water.
- **D** ☐ Birds have much sharper eye-sight than humans
- **E** ☐ Only share birds are resistant to strong winds.

Questions 23-26

Complete the sentences below using NO MORE THAN TWO WORDS from the passage.

- It is a great mystery that young birds like cuckoos can find their wintering grounds without **23** _____.
- Evidence shows birds can tell directions vice a **24** _____ by observing the sun and theaters.
- One advantage for birds flying at night is that they can avoid contact with **25** _____.
- Laboratory tests show that birds can detect weather without **26** _____ signs.

PASSAGE 3

Read the text below and answer questions 27-40.

Talc Powder

A. Peter Brigg discovers how talc from Luzenac's Trimouns in France find its way into food and agricultural products -from chewing gum to olive oil. High in the French Pyrenees, some 1,700m above see level, lies Trimouns, a huge deposit of hydrated magnesium silicate - talc to you and me. Talc from Trimouns, and from ten other Luzenac mines across the globe, is used in the manufacture of a vast array of everyday products extending from paper, paint and plaster to cosmetics, plastics and car tyres. And of course there is always talc's best known end use: talcum powder for babies' bottoms. But the true versatility of this remarkable mineral is nowhere better displayed than in its sometimes surprising use in certain niche markets in the food and agriculture industries.

B. Take, for example, the chewing gum business. Every year. Talc de Luzenac France - which owns and operates the Trimouns mine and is a member of the international Luzenac Group (art of Rio Tinto minerals) - supplies about 6,000 tones of talc to chewing gum manufacturers in Europe. "We've been selling to this sector of the market since the 1960s," says Laurent Fournier, sales manager in Luzenac's Specialties business unit in Toulouse. "Admittedly, in terms of our total annual sales of talc, the amount we supply to chewing gum manufacturers is relatively small, but we see it as a valuable niche market: one where customers place a premium on securing supplies from a reliable, high quality source. Because of this, long term allegiance to a proven suppler is very much a feature of this sector of the talc market." Switching sources - in the way that you might choose to buy, say, paperclips from Supplier A rather than from Supplier B - is not a easy option for chewing gum manufacturers," Fournier says. "The cost of reformulating is high, so when customers are using a talc grade that works, even if it's expensive, they are understandably reluctant to switch."

C. But how is talc actually used in the manufacture of chewing gum? Patrick Delord, an engineer with a degree in agronomics, who has been with Luzenac for 22 years and is now senior market development manager. Agriculture and Food, in Europe, explains that chewing gums has four main components. "The most important of them is the gum base," he says. "It's the gum base that puts the chew into chewing gum. It binds all the ingredients together, creating a soft, smooth texture. To this the manufacturer then adds sweeteners, softeners and flavourings. Our talc is used as a filler in the gum base. The amount varies between, say, ten and 35 per cent, depending on the type of gum. Fruit flavoured chewing gum, for example, is slightly acidic and would react with the calcium carbonate that the manufacturer might otherwise use as a filler. Talc, on the other hand, makes an ideal filler because it's non-reactive chemically. In the factory, talc is also used to dust the gum base pellets and to stop the chewing gum sticking during the lamination and packing process," Delord adds.

D. The chewing gum business is, however, just one example of talc's use in the food sector. For the past 20 years or so, olive oil processors in Spain have been taking advantage of talc's unique characteristics to help them boost the amount of oil they extract from crushed olives.

According to Patrick Delord, talc is especially useful for treating what he calls “difficult” olives. After the olives are harvested -preferably early in the morning because their taste is better if they are gathered in the cool of the day - they are taken to the processing plant. There they are crushed and then stirred for 30-45 minutes. In the old days, the resulting paste was passed through an olive press but nowadays it’s more common to add water and the mixture to separate the water and oil from the solid matter. The oil and water are then allowed to settle so that the olive oil layer can be decanted off (and bottled. “Difficult” olives are those that are more reluctant than the norm to yield up their full oil content. This may be attributable to the particular species of olive, or to its water content and the time of year the olives are collected - at the beginning and the end of the season their water content is often either too high or too low. These olives are easy to recognize because they produce a lot of extra foam during the stirring process, a consequence of an excess of a fine solid that acts as a natural emulsifier. The oil in this emulsion is lost when the water is disposed of. Not only that, if the waste water is disposed of directly into local fields - often the case in many smaller processing operations - the emulsified oil may take some time to biodegrade and so be harmful to the environment.

E. “If you add between a half and two per cent of talc by weight during the stirring process, it absorbs the natural emulsifier in the olives and so boosts the amount of oil you can extract,” says Delord. “In addition, talc’s flat, ‘platey’ structure helps increase the size of the oil droplets liberated during stirring, which again improves the yield. However, because talc is chemically inert, it doesn’t affect the colour, taste, appearance or composition of the resulting olive oil.”

F. If the use of talc in olive oil processing and in chewing gum is long established, new applications in the food and agriculture industries are also constantly being sought by Luzenac. One such promising new market is fruit crop protection, being pioneered in the US. Just like people, fruit can get sunburned. In fact, in very sunny regions up to 45 per cent of a typical crop can be affected by heat stress and sunburn. However, in the case of fruit, it’s not so much the ultra violet rays which harm the crop as the high surface temperature that the sun’s rays create.

G. To combat this, farmers normally use either chemicals or spray a continuous fine canopy of mist above the fruit trees or bushes. The trouble is, this uses a lot of water - normally a precious commodity in hot, sunny areas - and it is therefore expensive. What’s more, the ground can quickly become waterlogged. “So our idea was to coat the fruit with talc to protect it from the sun,” says Greg Hunter, a marketing specialist who has been with Luzenac for ten years. “But to do this, several technical challenges had first to be overcome. Talc is very hydrophobic: it doesn’t like water. So in order to have a viable product we needed a wettable powder - something that would go readily into suspension so that it could be sprayed onto the fruit. It also had to break the surface tension of the cutin (the natural waxy, waterproof layer on the fruit) and of course it had to wash off easily when the fruit was harvested. No-one’s going to want an apple that’s covered in talc.”

H. Initial trials in the state of Washington in 2003 showed that when the product was sprayed onto Granny Smith apples, it reduced their surface temperature and lowered the incidence of sunburn by up to 60 per cent. Today the new product, known as Invelop Maximum SPF, is in its second commercial year on the US market. Apple growers are the primary target although Hunter believes grape growers represent another sector with long term potential. He is also

hopeful of extending sales to overseas markets such as Australia, South America and southern Europe.

PART 3 — QUESTIONS

Questions 27-32

Use the information in the passage to match each use of talc power with correct application from A, B or C.

NB you may use any letter more than once

A. Fruit protection

B. Chewing gum business

C. Olive oil extraction

	A	B	C
27 Talc is used to increase the size of drops.	○	○	○
28 Talc is applied to reduce foaming.	○	○	○
29 Talc is employed as a filler of base.	○	○	○
30 Talc is modified and prevented sunburn.	○	○	○
31 Talc is added to stop stickiness.	○	○	○
32 Talc is used to increase production.	○	○	○

Questions 33-38

Complete the following summary of the paragraphs of Reading Passage, using no more than two words and/or a number from the Reading Passage for each answer.

Spanish olive oil industry has been using talc in oil extraction process for about **33** _____ years. It is useful in dealing with difficult olives which often produce high amount of **34** _____ because of the high content of solid materials. When smaller factories release **35** _____, it could be **36** _____ to the environment because it is hard to **37** _____ and usually takes time as it contains emulsified oil. However, talc power added in the process is able to absorb the

emulsifier oil. It improves the oil extraction production, because with aid of talc powder, size of oil **38** _____ increased.

Questions 39-40

Answer the questions below using NO MORE THAN THREE WORDS from the passage for each answer.

39 In which process is talc used to clear the stickiness of chewing gum? _____

40 Which group of farmers does Invelop intend to target in a long view? _____

Answer Key

#	Answer	Explanation
1	B	But they do have the ability to modify the shape of the lens in the eye to make it more spherical, and hence overcome the refraction of water
2	A	Otters have long, thin bodies and short legs – ideal for pushing through dense undergrowth or hunting in tunnels
3	B	Otters have small eyes and are probably short-sighted on land
4	F	Pesticides, such as dieldrin and aldrin, were first used in 1955 in agriculture and other industries – these chemicals are very persistent and had already been recognised as the cause of huge declines in the population of peregrine falcons, sparrow hawks and other predators
5	C	Being such shy and wary creatures, they will prefer territories where man's activities do not impinge greatly. Of course, there must also be no other otter already in residence – this has only become significant again recently as populations start to recover. Coastal otters have a much more abundant food supply and ranges for males and females may be just a few kilometres of coastline. Because male ranges are usually larger a male otter may find his range overlaps with two or three females – not bad
6	E	At five weeks they open their eyes – a tiny cub of 700g. At seven weeks they're weaned onto solid food. At ten weeks they leave the nest, blinking into daylight for the first time. After three months they finally meet the water and learn to swim. After eight months they are hunting, though the mother still provides a lot of food herself. Finally, after nine months she can chase them all away with a clear conscience, and relax – until the next fella shows up
7	G	Releasing captive-bred otters is seen by many as a last resort. The argument runs that where there is no suitable habitat for them they will not survive after release and where there is suitable habitat, natural populations should be able to expand into the area. However, reintroducing animals into a fragmented and fragile population may add just enough impetus for it to stabalise and expand, rather than die out
8	G	This is almost entirely due to legislation, conservation efforts, slowing down and reversing the destruction of suitable otter habitat and reintroductions from captive breeding programs

#	Answer	Explanation
9	**A**	Otter fur consists of two types of hair: stout guard hairs which form a waterproof outer covering, and under-fur which is dense and fine, equivalent to an otter's thermal underwear
10	**Sea water/Salt water**	Sea water reduces the waterproofing and insulating qualities of otter fur when salt water in the fin
11	**(the) swimming speed**	Giant otters and sea otters have even more prominent webs, while the Asian short-clawed otter has no webbing – they hunt for shrimps in ditches and paddy fields so they don't need the swimming speed
12	**Coastal otters**	Coastal otters have a much more abundant food supply and ranges for males and females may be just a few kilometres of coastline
13	**Small mammals**	Small mammals are occasionally taken
14	**iv**	Birds have many unique design features that enable them to perform such amazing feats of endurance
15	**v**	The fundamental reason that birds migrate is to find adequate food during the winter months when it is in short supply
16	**ii**	Yet, en route to then final destination in far-flung southern latitudes, all these individuals overfly other areas of seemingly suitable habitat spanning two hemispheres
17	**x**	One of the greatest mysteries is how young birds know how to find the traditional wintering areas without parental guidance
18	**vii**	Mounting evidence has confirmed that birds use the positions of the sun and stars to obtain compass directions
19	**i**	Nevertheless, all journeys involve considerable risk, and part of the skill in arriving safely is setting off at the right time
20	**viii**	In one instance a Welsh Manx shearwater carried to America and released was back in its burrow on Skokholm Island, off the Pembrokeshire coast, one day before a letter announcing its release! Conversely, each autumn a small number of North American birds are blown across the Atlantic by fast-moving westerly tail winds. Not only do they arrive safely in Europe, but, based on ringing evidence, some make it back to North America the following spring, after probably spending the winter with European migrants in sunny African climes
21	**A / C**	One puzzling fact is that many birds journey much further than would be necessary just to find food and good weather Daytime predators are avoided and the danger of dehydration due to flying for long periods in warm, sunlit skies is reduced

#	Answer	Explanation
22	**A / C**	One puzzling fact is that many birds journey much further than would be necessary just to find food and good weather Daytime predators are avoided and the danger of dehydration due to flying for long periods in warm, sunlit skies is reduced
23	**parental guidance**	One of the greatest mysteries is how young birds know how to find the traditional wintering areas without parental guidance
24	**compass**	Mounting evidence has confirmed that birds use the positions of the sun and stars to obtain compass directions
25	**predators**	Daytime predators are avoided and the danger of dehydration due to flying for long periods in warm, sunlit skies is reduced
26	**visible**	Often birds react to weather changes before there is any visible sign of them
27	**C**	In addition, talc's flat, 'platey' structure helps increase the size of the oil droplets liberated during stirring, which again improves the yield
28	**C**	These olives are easy to recognize because they produce a lot of extra foam during the stirring process, a consequence of an excess of a fine solid that acts as a natural emulsifier "If you add between a half and two per cent of talc by weight during the stirring process, it absorbs the natural emulsifier in the olives and so boosts the amount of oil you can extract,"
29	**B**	Our talc is used as a filler in the gum base
30	**A**	Talc is very hydrophobic: it doesn't like water. So in order to have a viable product we needed a wettable powder – something that would go readily into suspension so that it could be sprayed onto the fruit Initial trials in the state of Washington in 2003 showed that when the product was sprayed onto Granny Smith apples, it reduced their surface temperature and lowered the incidence of sunburn by up to 60 per cent
31	**B**	In the factory, talc is also used to dust the gum base pellets and to stop the chewing gum sticking during the lamination and packing process," Delord adds
32	**C**	olive oil processors in Spain have been taking advantage of talc's unique characteristics to help them boost the amount of oil they extract from crushed olives
33	**20/twenty**	For the past 20 years or so, olive oil processors in Spain have been taking advantage of talc's unique characteristics to help them boost the amount of oil they extract from crushed olives

#	Answer	Explanation
34	**(extra) foam**	These olives are easy to recognize because they produce a lot of extra foam during the stirring process, a consequence of an excess of a fine solid that acts as a natural emulsifier
35	**waste water**	Not only that, if the waste water is disposed of directly into local fields – often the case in many smaller processing operations – the emulsified oil may take some time to biodegrade and so be harmful to the environment
36	**harmful**	Not only that, if the waste water is disposed of directly into local fields – often the case in many smaller processing operations – the emulsified oil may take some time to biodegrade and so be harmful to the environment
37	**bidegrade**	Not only that, if the waste water is disposed of directly into local fields – often the case in many smaller processing operations – the emulsified oil may take some time to biodegrade and so be harmful to the environment
38	**droplets**	In addition, talc's flat, 'platey' structure helps increase the size of the oil droplets liberated during stirring, which again improves the yield
39	**Lamination and packing**	In the factory, talc is also used to dust the gum base pellets and to stop the chewing gum sticking during the lamination and packing process," Delord adds
40	**Grape growers**	Apple growers are the primary target although Hunter believes grape growers represent another sector with long term potential

Test 53

PASSAGE 1

The Dinosaurs Footprints and Extinction

A EVERYBODY knows that the dinosaurs were killed by an asteroid. Something big hit the earth 65 million years ago and, when the dust had fallen, so had the great reptiles. There is thus a nice, if ironic, symmetry in the idea that a similar impact brought about the dinosaurs' rise. That is the thesis proposed by Paul Olsen, of Columbia University, and his colleagues in this week's Science.

B Dinosaurs first appear in the fossil record 230m years ago, dining the Triassic period. But they were mostly small, and they shared the earth with lots of other sorts of reptile. It was in the subsequent Jurassic, which began 202million years ago, that they overran the planet and turned into the monsters depicted in the book and movie “Jurassic Park”. (Actually, though, the dinosaurs that appeared on screen were from the still more recent Cretaceous period.) Dr Olsen and his colleagues are not the first to suggest that the dinosaurs inherited the earth as the result of an asteroid strike. But they are the first to show that the takeover did, indeed, happen in a geological eyeblink.

C Dinosaur skeletons are rare. Dinosaur footprints are, however, surprisingly abundant. And the sizes of the prints are as good an indication of the sizes of the beasts as are the skeletons themselves. Dr Olsen and his colleagues therefore concentrated on prints, not bones.

D The prints in question were made in eastern North America, a part of the world then full of rift valleys similar to those in East Africa today. Like the modem African rift valleys, the Triassic /Jurassic American ones contained lakes, and these lakes grew and shrank at regular intervals because of climatic changes caused by periodic shifts in the earth's orbit. (A similar phenomenon is responsible for modem ice ages.) That regularity, combined with reversals in the earth's magnetic field, which are detectable in the tiny fields of certain magnetic minerals, means that rocks from this place and period can be dated to within a few thousand years. As a bonus, squish lake-edge sediments are just the things for recording the tracks of passing animals. By dividing the labour between themselves, the ten authors of the paper were able to study such tracks at 80 sites.

E The researchers looked at 18 so-called ichnotaxa. These are recognisable types of footprint that cannot be matched precisely with the species of animal that left them. But they can be matched with a general sort of animal, and thus act as an indicator of the fate of that group, even when there are no bones to tell the story. Five of the ichnotaxa disappear before the end of the Triassic, and four march confidently across the boundary into the Jurassic. Six, however, vanish at the boundary, or only just splutter across it; and three appear from nowhere, almost as soon as the Jurassic begins.

F That boundary itself is suggestive. The first geological indication of the impact that killed the dinosaurs was an unusually high level of iridium in rocks at the end of the Cretaceous, when the beasts disappear from the fossil record. Iridium is normally rare at the earth's surface, but it is more abundant in meteorites. When people began to believe the impact theory, they started looking for other Cretaceous-end anomalies. One that turned up was a surprising abundance of fern spores in rocks just above the boundary layer—a phenomenon known as a “fern spike”

G That matched the theory nicely. Many modem ferns are opportunists. They cannot compete against plants with leaves, but if a piece of land is cleared by, say, a volcanic emption, they are often the first things to set up shop there. An asteroid strike would have scoured much of the earth of its vegetable cover, and provided a paradise for ferns. A fem spike in the rocks is thus a good indication that souther terrible has happened.

H Both an iridium anomaly and a fem spike appear in rocks at the end of the Triassic, too. That accounts for the disappearing ichnotaxa: the creatures that made them did not survive the holocaust. The surprise is how rapidly the new ichnotaxa appear.

I Dr Olsen and his colleagues suggest that the explanation for this rapid increase in size may be a phenomenon called ecological release. This is seen today when reptiles (which, in modem times, tend to be small creatures) reach islands where they face no competitors. The most spectacular example is on the Indonesian island of Komodo, where local lizards have grown so large that they are often referred to as dragons. The dinosaurs, in other words, could flourish only when the competition had been knocked out.

J That leaves the question of where the impact happened. No large hole in the earth's crust seems to be 202m years old. It may, of course, have been overlooked. Old craters are eroded and buried, and not always easy to find. Alternatively, it may have vanished. Although continental crust is more or less permanent, the ocean floor is constantly recycled by the tectonic processes that bring about continental drift. There is no ocean floor left that is more than 200m years old, so a crater that formed in the ocean would have been swallowed up by now.

K There is a third possibility, however. This is that the crater is known, but has been misdated. The Manicouagan “structure”, a crater in Quebec, is thought to be 214m years old. It is huge—some 100km across—and seems to be the largest of between three and five craters that formed within a few hours of each other as the lumps of a disintegrated comet hit the earth one by one.

PART 1 — QUESTIONS

Questions 1-6

Do the following statements agree with the information given in Reading Passage 1?

YES if the statement agrees with the information

NO if the statement contradicts the information

NOT GIVEN if there is no information on this

1 Dr Paul Olsen and his colleagues believe that asteroid knock may also lead to dinosaurs' boom.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

2 Books and movie like Jurassic Park often exaggerate the size of the dinosaurs.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

3 Dinosaur footprints are more adequate than dinosaur skeletons.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

4 The prints were chosen by Dr Olsen to study because they are more detectable than earth magnetic field to track a date of geological precise within thousands years.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

5 Ichnotaxa showed that footprints of dinosaurs offer exact information of the trace left by an individual species.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

6 We can find more Iridium in the earth's surface than in meteorites.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

Questions 7-13

Complete the following summary of the paragraphs of Reading Passage, using no more than two words from the Reading Passage for each answer.

Dr Olsen and his colleagues applied a phenomenon named **7** _____ to explain the large size of the Eubrontes, which is a similar case to that nowadays reptiles invade a place where there are no **8** _____; for example, on an island called Komodo, indigenous huge lizards grow so big that people even regarding them as **9** _____. However, there were no old impact trace being found? The answer may be that we have **10** _____ the evidence. Old craters are difficult to spot or it probably **11** _____ due to the effect of the earth moving. Even a crater formed in Ocean had been **12** _____ under the impact of crust movement. Beside the third hypothesis is that the potential evidences — some craters may be **13** _____.

PASSAGE 2

WHAT COOKBOOKS REALLY TEACH US

A Shelves bend under their weight of cookery books. Even a medium-sized bookshop contains many more recipes than one person could hope to cook m a lifetime. Although the recipes in one book are often similar to those in another, their presentation varies wildly, from an array of vegetarian cookbooks to instructions on cooking the food that historical figures might have eaten. The reason for this abundance is that cookbooks promise to bring about a land of domestic transformation for the user. The daily routine can be put to one side and they liberate the user, if only temporarily. To follow their instructions is to turn a task which has to be performed every day into an engaging, romantic process. Cookbooks also provide an opportunity to delve into distant cultures without having to turn up at an airport to get there.

B The first Western cookbook appeared just over 1,600 years ago. De re coquinara (it means concerning cookery[1]) is attributed to a Roman gourmet named Apicius. It is probably a complilation of Roman and Greek recipes, some or all of them drawn from manuscripts that were later lost. The editor was sloppy, allowing several duplicated recipes to sneak in. Yet Apicius's book set die tone of cookery advice in Europe for more than a thousand years. As a cookbook it is unsatisfactory with very basic instructions. Joseph Vehling, a chef who translated Apicius in the 1930s, suggested the author had beat obscure on purpose, in case his secrets leaked out.

C But a more likely reason is that Apicius's recipes were written by and for professional cooks, who could follow their shorthand. This situation continued for hundreds of years. There was no order to cookbooks: a cake recipe might be followed by a mutton one. But then, they were not written for careful study. Before the 19th century few educated people cooked for themselves.

D The wealthiest employed literate chefs; others presumably read recipes to their servants. Such cooks would have been capable of creating dishes from the vaguest of instructions. The invention of printing might have been expected to lead to greater clarity but at first the reverse was true. As words acquired commercial value, plagiarism exploded Recipes were distorted through reproduction A recipe for boiled capon in The Good Huswives Jewell, printed in 1596t advised the cook to add three or four dates. By 1653, when the recipe was given by a different author in A Book of Fruits & Flowers, the cook was told to set the dish aside for three or four days.

E The dominant theme in 16th and 17th century cookbooks was order. Books combined recipes and household advice, on the assumption that a well-made dish, a well-ordered larder and well-disciplined children were equally important. Cookbooks thus became a symbol of dependability in chaotic times. They hardly seem to have been affected by the English civil war or the revolutions in America and France.

F In the 1850s Isabella Beeton published The Book of Household Management. Like earlier cookery writers she plagiarised freely, lifting not just recipes but philosophical observations from other hooks. If Beetons recipes wore not wholly new, though, the way in which she

presented them certainly was. She explains when the chief ingredients are most likely to be in season, how long the dish will take to prepare and even how much it is likely to cost. Beetons recipes were well suited to her times. Two centuries earlier, an understanding of rural ways had been so widespread that one writer could advise cooks to heat water until it was a little hotter than milk comes from a cow. By the 1850b Britain was industrialising. The growing urban midrib class needed details, and Beeton provided them in full.

G In France, cookbooks were last becoming even more systematic. Compared with Britain, France had produced few books written for the ordinary householder by the end of the 19th century. The most celebrated French cookbooks were written by superstar chefs who had a clear sense of codifying a unified approach to sophisticated French cooking. The 5,000 recipes in Auguste Escoffiers Le Guide Culinaire (The Culinary Guide), published in 1902, might as well have been written in stone, given the book's reputation among French chefs, many of whom still consider it the definitive reference book.

H What Escoffier did for French cooking, Fannie Farmer did for American home cooking. She not only synthesised American cuisine; she elevated it to the status of science. 'Progress in civilisation has been accompanied by progress in cookery,' she breezily announced in The Boston Cooking-School Cook Book, before launching into a collection of recipes that sometimes resembles a book of chemistry experiments. She was occasionally over-fussy. She explained that currants should be picked between June 28th and July 3rd, but not when it is raining. But in the main her book is reassuringly authoritative. Its recipes are short, with no unnecessary chat and no unnecessary spices.

I In 1950 Mediterranean Food by Elizabeth David launched a revolution in cooking advice in Britain. In some ways Mediterranean Food recalled even older cookbooks but the smells and noises that filled David's books were not mere decoration for her recipes. They were the point of her books. When she began to write, many ingredients were not widely available or affordable. She understood this, acknowledging in a later edition of one of her books that even if people could not very often make the dishes here described, it was stimulating to think about them.' David's books were not so much cooking manuals as guides to the kind of food people might well wish to eat.

PART 2 — QUESTIONS

Questions 14-16

Complete the summary below. Choose NO MORE THAN TWO WORDS firm the passage for each answer.

Why are there so many cookery books?

There are a great number more cookery books published than is really necessary and it is their **14** _____ which makes them differ from each other. There are such large numbers because they offer people an escape from their **15** _____ and some give the user the chance to inform themselves about other **16** _____.

Questions 17-21

Reading Passage has nine paragraphs, A-I Which paragraph contains the following information?

NB: YOU MAY USE ANY LETTER MORE THAN ONCE.

	A	B	C	D	E	F	G	H	I
17 cookery books providing a sense of stability during periods of unrest	○	○	○	○	○	○	○	○	○
18 details in recipes being altered as they were passed on	○	○	○	○	○	○	○	○	○
19 knowledge which was in danger of disappearing	○	○	○	○	○	○	○	○	○
20 the negative effect on cookery books of a new development	○	○	○	○	○	○	○	○	○
21 a period when there was no need for cookery books to be precise	○	○	○	○	○	○	○	○	○

Questions 22-26

Look at the following statements (Questions 22-26) and list of books (A-E) below. Match each statement with the correct book.

A. De re coquinara

B. The Book of Household Management

C. Le Guide Culinaire

D. The Boston Cooking-School Cook Book

E. Mediterranean Food

	A	B	C	D	E
22 Its recipes were easy to follow despite the writer's attention to detail.	○	○	○	○	○
23 Its writer may have deliberately avoided pawing on details.	○	○	○	○	○
24 It appealed to ambitious ideas people have about cooking.	○	○	○	○	○
25 Its writer used ideas from other books but added additional related information.	○	○	○	○	○
26 It put into print ideas which are still respected today.	○	○	○	○	○

PASSAGE 3

Learning lessons from the past

A Many past societies collapsed or vanished, leaving behind monumental ruins such as those that the poet Shelley imagined in his sonnet, Ozymandias. By collapse, I mean a drastic decrease in human population size and/or political/economic/social complexity, over a considerable area, for an extended time. By those standards, most people would consider the following past societies to have been famous victims of full-fledged collapses rather than of just minor declines: the Anasazi and Cahokia within the boundaries of the modem US, the Maya cities in Central America, Moche and Tiwanaku societies in South America, Norse Greenland, Mycenean Greece and Minoan Crete in Europe, Great Zimbabwe in Africa, Angkor Wat and the Harappan Indus Valley cities in Asia, and Easter Island in the Pacific Ocean.

B The monumental ruins left behind by those past societies hold a fascination for all of us. We marvel at them when as children we first learn of them through pictures. When we grow up, many of US plan vacations in order to experience them at first hand. We feel drawn to their often spectacular and haunting beauty, and also to the mysteries that they pose. The scales of the ruins testify to the former wealth and power of their builders. Yet these builders vanished, abandoning the great structures that they had created at such effort. How could a society that was once so mighty end up collapsing?

C It has long been suspected that many of those mysterious abandonments were at least partly triggered by ecological problems: people inadvertently destroying the environmental resources on which their societies depended. This suspicion of unintended ecological suicide (ecocide) has been confirmed by discoveries made in recent decades by archaeologists, climatologists, historians, paleontologists, and palynologists (pollen scientists). The processes through which past societies have undermined themselves by damaging their environments fall into eight categories, whose relative importance differs from case to case: deforestation and habitat destruction, soil problems, water management problems, overhunting, overfishing, effects of introduced species on native species, human population growth, and increased impact of people.

D Those past collapses tended to follow somewhat similar courses constituting variations on a theme. Writers find it tempting to draw analogies between the course of human societies and the course of individual human lives - to talk of a society’s birth, growth, peak, old age and eventual death. But that metaphor proves erroneous for many past societies: they declined rapidly after reaching peak numbers and power, and those rapid declines must have come as a surprise and shock to their citizens. Obviously, too, this trajectory is not one that all past societies followed unvaryingly to completion: different societies collapsed to different degrees and in somewhat different ways, while many societies did not collapse at all.

E Today many people feel that environmental problems overshadow all the other threats to global civilisation. These environmental problems include the same eight that undermined past societies, plus four new ones: human-caused climate change, build up of toxic chemicals in the environment, energy shortages, and full human utilisation of the Earth’s photosynthetic

capacity. But the seriousness of these current environmental problems is vigorously debated. Are the risks greatly exaggerated, or conversely are they underestimated? Will modem technology solve our problems, or is it creating new problems faster than it solves old ones? When we deplete one resource (eg wood, oil, or ocean fish), can we count on being able to substitute some new resource (eg plastics, wind and solar energy, or farmed fish)? Isn't the rate of human population growth declining, such that were already on course for the world's population to level off at some manageable number of people?

F Questions like this illustrate why those famous collapses of past civilisations have taken on more meaning than just that of a romantic mystery. Perhaps there are some practical lessons that we could learn from all those past collapses. But there are also differences between the modem world and its problems, and those past societies and their problems. We shouldn't be so naive as to think that study of the past will yield simple solutions, directly transferable to our societies today. We differ from past societies in some respects that put US at lower risk than them; some of those respects often mentioned include our powerful technology (ie its beneficial effects), globalisation, modem medicine, and greater knowledge of past societies and of distant modem societies. We also differ from past societies in some respects that put US at greater risk than them: again, our potent technology (ie its unintended destructive effects), globalisation (such that now a problem in one part of the world affects all the rest), the dependence of millions of US on modem medicine for our survival, and our much larger human population. Perhaps we can still learn from the past, but only if we think carefully about its lessons.

PART 3 — QUESTIONS

Questions 27-29

Choose the correct letter. A, B, c or D.

27 When the writer describes the impact of monumental ruins today, he emphasises

- **A** ○ the income they generate from tourism.
- **B** ○ the area of land they occupy.
- **C** ○ then archaeological value.
- **D** ○ then romantic appeal.

28 Recent findings concerning vanished civilisations

- **A** ○ have overturned long-held beliefs.
- **B** ○ caused controversy amongst scientists.
- **C** ○ come from a variety of disciplines.
- **D** ○ identified one main cause of environmental damage.

29 What does the writer say about ways in which former societies collapsed?

- **A** ○ The pace of decline was usually similar.
- **B** ○ The likelihood of collapse would have been foreseeable.
- **C** ○ Deterioration invariably led to total collapse.
- **D** ○ Individual citizens could sometimes influence the course of events.

Questions 30-34

Do the following statements agree with the views of the writer in Reading Passage ? Write

YES if the statement agrees with the claims of the writer

NO if the statement contradicts the claims of the writer

NOT GIVEN if it is impossible to say what the writer thinks about this

30 It is widely believed that environmental problems represent the main danger faced by the modern world.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

31 The accumulation of poisonous substances is a relatively modern problem.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

32 There is general agreement that the threats posed by environmental problems are very serious.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

33 Some past societies resembled present-day societies more closely than others.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

34 We should be careful when drawing comparisons between past and present.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

Questions 35-39

Complete each sentence with the correct ending, A-F, below.

• Evidence of the greatness of some former civilisations **35** _____

• The parallel between an individual's life and the life of a society **36** _____

• The number of environmental problems that societies face **37** _____

• The power of technology **38** _____

• A consideration of historical events and trends **39** _____

A. **is not necessarily valid.**

B. **provides grounds for an optimistic outlook,**

C. **exists in the form of physical structures.**

D. **is potentially both positive and negative.**

E. **will not provide direct solution for present problems.**

F. **is greater now than in the past**

Questions 40-40

Choose the correct letter, A, B, c or D

40 What is the main argument of Reading Passage 3?

A ○ There are differences as well as similarities between past and present societies.

B ○ More should be done to preserve the physical remains of earlier civilisations.

C ○ Some historical accounts of great civilisations are inaccurate.

D ○ Modem societies are dependent on each other for then continuing survival.

Answer Key

#	Answer	Explanation
1	**YES**	There is thus a nice, if ironic, symmetry in the idea that a similar impact brought about the dinosaurs' rise. That is the thesis proposed by Paul Olsen, of Columbia University, and his colleagues in this week's Science
2	**NOT GIVEN**	turned into the monsters depicted in the book and movie "Jurassic Park". (Actually, though, the dinosaurs that appeared on screen were from the still more recent Cretaceous period.)
3	**YES**	Dinosaur skeletons are rare. Dinosaur footprints are, however, surprisingly abundant. And the sizes of the prints are as good an indication of the sizes of the beasts as are the skeletons themselves
4	**NOT GIVEN**	Dinosaur skeletons are rare. Dinosaur footprints are, however, surprisingly abundant. And the sizes of the prints are as good an indication of the sizes of the beasts as are the skeletons themselves. Dr Olsen and his colleagues therefore concentrated on prints, not bones
5	**NO**	These are recognisable types of footprint that cannot be matched precisely with the species of animal that left them
6	**NO**	Iridium is normally rare at the earth's surface, but it is more abundant in meteorites
7	**ecological release**	Dr Olsen and his colleagues suggest that the explanation for this rapid increase in size may be a phenomenon called ecological release
8	**competitors**	This is seen today when reptiles (which, in modem times, tend to be small creatures) reach islands where they face no competitors
9	**dragons**	The most spectacular example is on the Indonesian island of Komodo, where local lizards have grown so large that they are often referred to as dragons
10	**overlooked**	It may, of course, have been overlooked
11	**(have) vanished**	Old craters are eroded and buried, and not always easy to find. Alternatively, it may have vanished
12	**swallowed (up)**	There is no ocean floor left that is more than 200m years old, so a crater that formed in the ocean would have been swallowed up by now

#	Answer	Explanation
13	**misdated**	There is a third possibility, however. This is that the crater is known, but has been misdated
14	**presentation**	Although the recipes in one book are often similar to those in another, their presentation varies wildly, from an array of vegetarian cookbooks to instructions on cooking the food that historical figures might have eaten
15	**(daily) routine**	The daily routine can be put to one side and they liberate the user, if only temporarily
16	**cultures**	Cookbooks also provide an opportunity to delve into distant cultures without having to turn up at an airport to get there
17	**E**	Cookbooks thus became a symbol of dependability in chaotic times. They hardly seem to have been affected by the English civil war or the revolutions in America and France
18	**D**	Recipes were distorted through reproduction A recipe for boiled capon in The Good Huswives Jewell, printed in 1596t advised the cook to add three or four dates. By 1653, when the recipe was given by a different author in A Book of Fruits & Flowers, the cook was told to set the dish aside for three or four days
19	**F**	Two centuries earlier, an understanding of rural ways had been so widespread that one writer could advise cooks to heat water until it was a little hotter than milk comes from a cow. By the 1850b Britain was industrialising
20	**D**	The invention of printing might have been expected to lead to greater clarity but at first the reverse was true. As words acquired commercial value, plagiarism exploded Recipes were distorted through reproduction
21	**C**	But a more likely reason is that Apicius's recipes were written by and for professional cooks, who could follow their shorthand. This situation continued for hundreds of years
22	**D**	She was occasionally over-fussy. She explained that currants should be picked between June 28th and July 3rd, but not when it is raining. But in the main her book is reassuringly authoritative. Its recipes are short, with no unnecessary chat and no unnecessary spices
23	**A**	Joseph Vehling, a chef who translated Apicius in the 1930s, suggested the author had beat obscure on purpose, in case his secrets leaked out
24	**E**	David's books were not so much cooking manuals as guides to the kind of food people might well wish to eat

#	Answer	Explanation
25	**B**	Like earlier cookery writers she plagiarised freely, lifting not just recipes but philosophical observations from other hooks. If Beetons recipes wore not wholly new, though, the way in which she presented them certainly was. She explains when the chief ingredients are most likely to be in season, how long the dish will take to prepare and even how much it is likely to cost
26	**C**	The 5,000 recipes in Auguste Escoffiers Le Guide Culinaire (The Culinary Guide), published in 1902, might as well have been written in stone, given the book's reputation among French chefs, many of whom still consider it the definitive reference book
27	**D**	We feel drawn to their often spectacular and haunting beauty, and also to the mysteries that they pose
28	**C**	This suspicion of unintended ecological suicide (ecocide) has been confirmed by discoveries made in recent decades by archaeologists, climatologists, historians, paleontologists, and palynologists (pollen scientists)
29	**A**	Those past collapses tended to follow somewhat similar courses constituting variations on a theme. Writers find it tempting to draw analogies between the course of human societies and the course of individual human lives – to talk of a society's birth, growth, peak, old age and eventual death. But that metaphor proves erroneous for many past societies: they declined rapidly after reaching peak numbers and power, and those rapid declines must have come as a surprise and shock to their citizens
30	**YES**	Today many people feel that environmental problems overshadow all the other threats to global civilisation
31	**YES**	These environmental problems include the same eight that undermined past societies, plus four new ones: human-caused climate change, build up of toxic chemicals in the environment, energy shortages, and full human utilisation of the Earth's photosynthetic capacity
32	**NO**	But the seriousness of these current environmental problems is vigorously debated
33	**NOT GIVEN**	But there are also differences between the modem world and its problems, and those past societies and their problems
34	**YES**	Perhaps we can still learn from the past, but only if we think carefully about its lessons
35	**C**	The scales of the ruins testify to the former wealth and power of their builders

#	Answer	Explanation
36	**A**	Writers find it tempting to draw analogies between the course of human societies and the course of individual human lives – to talk of a society's birth, growth, peak, old age and eventual death. But that metaphor proves erroneous for many past societies: they declined rapidly after reaching peak numbers and power, and those rapid declines must have come as a surprise and shock to their citizens
37	**F**	These environmental problems include the same eight that undermined past societies, plus four new ones: human-caused climate change, build up of toxic chemicals in the environment, energy shortages, and full human utilisation of the Earth's photosynthetic capacity
38	**D**	We differ from past societies in some respects that put US at lower risk than them; some of those respects often mentioned include our powerful technology (ie its beneficial effects), globalisation, modem medicine, and greater knowledge of past societies and of distant modem societies. We also differ from past societies in some respects that put US at greater risk than them: again, our potent technology (ie its unintended destructive effects)
39	**E**	We shouldn't be so naive as to think that study of the past will yield simple solutions, directly transferable to our societies today
40	**A**	Perhaps there are some practical lessons that we could learn from all those past collapses. But there are also differences between the modem world and its problems, and those past societies and their problems

Test 54

PASSAGE 1

You should spend about 20 minutes on Questions 1-13, which are based on Reading Passage 1 below.

Finches on Islands

A Today, the quest continues. On Daphne Major —one of the most desolate of the Galápagos Islands, an uninhabited volcanic cone where cacti and shrubs seldom grow higher than a researcher's knee Peter and Rosemary Grant have spent more than three decades watching Darwin's finches respond to the challenges of storms, drought and competition for food. Biologists at Princeton University, the Grants know and recognize many of the individual birds on the island and can trace the birds' lineages back through time. They have witnessed Darwin's principle in action again and again, over many generations of finches.

B The Grants' most dramatic insights have come from watching the evolving bill of the medium ground finch. The plumage of this sparrow-sized bird ranges from dull brown to jet black. At first glance, it may not seem particularly striking, but among scientists who study evolutionary biology, the medium ground finch is a superstar. Its bill is a middling example in the array of shapes and sizes found among Galapagos finches: heftier than that of the small ground finch, which specializes in eating small, soft seeds, but petite compared to that of the large ground finch, an expert at cracking and devouring big, hard seeds.

C When the Grants began their study in the 1970s, only two species of finch lived on Daphne Major, the medium ground finch and the cactus finch. The island is so small that the researchers were able to count and catalogue every bird. When a severe drought hit in 1977, the birds soon devoured the last of the small, easily eaten seeds. Smaller members of the medium ground finch population, lacking the bill strength to crack large seeds, died out.

D Bill and body size are inherited traits, and the next generation had a high proportion of big-billed Individuals. The Grants had documented natural selection at work the same process that over many millennia, directed the evolution of the Galápagos' 14 unique finch species, all descended from a common ancestor that readied the islands a few million years ago.

E Eight years later, heavy rains brought by an El Nino transformed the normally meager vegetation on Daphne Major. Vines and other plants that in most years struggle for survival suddenly flourished, choking out the plants that provide large seeds to the finches. Small seeds came to dominate the food supply, and big birds with big bills died out at a higher rate than smaller ones. 'Natural selection is observable,' Rosemary Grant says. 'It happens when the environment changes. When local conditions reverse themselves, so does the direction of adaptation.'

F Recently, the Grants witnessed another form of natural selection acting on the medium ground finch: competition from bigger, stronger cousins. In 1982, a third finch, the large ground

finch, came to live on Daphne Major. The stout bills of these birds resemble the business end of a crescent wrench. Their arrival was the first such colonization recorded on the Galapagos in nearly a century of scientific observation. 'We realized,' Peter Grant says, 'we had a very unusual and potentially important event to follow.' For 20 years, the large ground finch coexisted with the medium ground finch, which shared the supply of large seeds with its bigger-billed relative. Then, in 2002 and 2003, another drought struck. None of the birds nested that year, and many died out. Medium ground finches with large bills, crowded out of feeding areas by the more powerful large ground finches, were hit particularly hard.

G When wetter weather returned in 2004, and the finches nested again, the new generation of the medium ground finch was dominated by smaller birds with smaller bills, able to survive on smaller seeds. This situation, says Peter Grant, marked the first time that biologists have been able to follow the complete process of an evolutionary change due to competition between species and the strongest response to natural selection that he had seen in 33 years of tracking Galapagos finches.

H On the inhabited island of Santa Cruz, just south of Daphne Major, Andrew Hendry of McGill University and Jeffrey Podos of the University of Massachusetts at Amherst have discovered a new, man-made twist in finch evolution. Their study focused on birds living near the Academy Bay research station, on the fringe of the town of Puerto Ayora. The human population of the area has been growing fast—from 900 people in 1974 to 9,582 In 2001. 'Today Puerto Ayora is full of hotels and mai tai bars,' Hendry says. 'People have taken this extremely arid place and tried to turn it Into a Caribbean resort.'

I Academy Bay records dating back to the early 1960s show that medium ground finches captured there had either small or large bills. Very few of the birds had mid-size bills. The finches appeared to be In the early stages of a new adaptive radiation: If the trend continued, the medium ground finch on Santa Cruz could split Into two distinct subspecies, specializing in different types of seeds. But in the late 1960s and early 70s, medium ground finches with medium-sized bills began to thrive at Academy Bay along with small and large-billed birds. The booming human population had introduced new food sources, including exotic plants and bird feeding stations stocked with rice. Bill size, once critical to the finches' survival, no longer made any difference. 'Now an intermediate bill can do fine,' Hendry says.

J At a control site distant from Puerto Ayora, and relatively untouched by humans, the medium ground finch population remains split between large- and small-billed birds. On undisturbed parts of Santa Cruz, there Is no ecological niche for a middling medium ground finch, and the birds continue to diversify. In town, though there are still many finches, once-distinct populations are merging.

K The finches of Santa Cruz demonstrate a subtle process in which human meddling can stop evolution In Its tracks, halting the formation of new species. In a time when global biodiversity continues Its downhill slide, Darwin's finches have yet another unexpected lesson to teach. 'If we hope to regain some of the diversity that's already been lost,' Hendry says, 'we need to protect not just existing creatures, but also the processes that drive the origin of new species.'

PART 1 — QUESTIONS

Questions 1-4

Complete the table below.

Choose NO MORE THAN TWO WORDS from the Reading Passage.

Year	Climate	Finch's condition
1977	**1** _____	small-beak birds failing to survive, without the power to open **2** _____
1985	**3** _____ brought by El Nino	big-beak birds dying out, with **4** _____ as the main food resource

Questions 5-8

Complete the following summary, using NO MORE THAN TWO WORDS from the Reading Passage for each answer.

On the remote island of Santa Cruz, Andrew Hendry and Jeffrey Podos conducted a study on reversal **5** _____ due to human activity. In the early 1960s medium ground finches were found to have a larger or smaller beak. But in the late 1960s and early 70s, finches with **6** _____ flourished. The study speculates that it is due to the growing **7** _____ who brought in alien plants with intermediate-size seeds into the area and the birds ate **8** _____ sometimes.

Questions 9-13

Do the following statements agree with the information given in Reading Passage 1?

9 Grants' discovery has questioned Darwin's theory.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

10 The cactus finches are less affected by food than the medium ground finch.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

11 In 2002 and 2003, all the birds were affected by the drought.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

12 The discovery of Andrew Hendry and Jeffrey Podos was the same as that of the previous studies.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

13 It is shown that the revolution in finches on Santa Cruz is likely a response to human intervention.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

PASSAGE 2

You should spend about 20 minutes on Questions 14-26, which are based on Reading Passage 2 below.

Flight from reality?

Mobiles are barred, but passenger can tap away on their laptops to their heart's content. Is one really safer than the other? In the US, a Congressional subcommittee drilled airline representatives and regulators about the issue last month. But the committee heard that using cellphones in planes may indeed pose a risk, albeit a slight one. This would seem to vindicate the treatment of Manchester oil worker Neil Whitehouse, who was sentenced last summer to a year in jail by a British court for refusing to turn off his mobile phone on a flight home from Madrid. Although he was only typing a message to be sent on landing, not actually making a call, the court decided that he was putting the flight at risk.

A The potential for problems is certainly there. Modern airliners are packed with electronic devices that control the plane and handle navigation and communications. Each has to meet stringent safeguards to make sure it doesn't emit radiation that would interfere with other devices in the plane—standards that passengers' personal electronic devices don't necessarily meet. Emissions from inside the plane could also interfere with sensitive antennae on the fixed exterior.

B But despite running a number of studies, Boeing, Airbus and various government agencies haven't been able to find clear evidence of problems caused by personal electronic devices, including mobile phones. "We've done our own studies. We've found cellphones actually have no impact on the navigation system," says Maryanne Greczyn, a spokeswoman for Airbus Industries of North America in Herndon, Virginia. Nor do they affect other critical systems, she says. The only impact Airbus found? "Sometimes when a passenger is starting or finishing a phone call, the pilot hears a very slight beep in the headset," she says.

C The best evidence yet of a problem comes from a report released this year by Britain's Civil Aviation Authority. Its researchers generated simulated cellphone transmissions inside two Boeing aircraft. They concluded that the transmissions could create signals at a power and frequency that would not affect the latest equipment, but exceeded the safety threshold established in 1984 and might therefore affect some of the older equipment on board. This doesn't mean "mission critical" equipment such as the navigation system and flight controls. But the devices that could be affected, such as smoke detectors and fuel level indicators, could still create serious problems for the flight crew if they malfunction.

D Many planes still use equipment certified to the older standards, says Dan Hawkes, head of avionics at the CAA's Safety Regulation Group. The CAA study doesn't prove the equipment will actually fail when cellphone signals actually cause devices to fail.

E In 1996, RTCA, a consultant hired by the Federal Aviation Administration in the US to conduct tests, determined that potential problems from personal electronic devices were "low".

Nevertheless, it recommended a ban on their use during "critical" periods of flight, such as take-off and landing. RTCA didn't actually test cellphones, but nevertheless recommended their wholesale ban on flights. But if "better safe than sorry" is the current policy, it's applied inconsistently, according to Marshall Cross, the chairman of MegaWave Corporation, based in Boylston, Massachusetts. Why are cellphones outlawed when no one considers a ban on laptops? "It's like most things in life. The reason is a little bit technical, a little bit economic and a little bit political," says Cross.

F The company wrote a report for the FAA in 1998 saying it is possible to build an on-board system that can detect dangerous signals from electronic devices. But Cross's personal conclusion is that mobile phones aren't the real threat. "You'd have to stretch things pretty far to figure out how a cellphone could interfere with a plane's systems," he says. Cellphones transmit in ranges of around 400, 800 or 1800 megahertz. Since no important piece of aircraft equipment operates at those frequencies, the possibility of interference is very low, Cross says. The use of computers and electronic game systems is much more worrying, he says. They can generate very strong signals at frequencies that could interfere with plane electronics, especially if a mouse is attached (the wire operates as an antenna) or if their built-in shielding is somehow damaged. Some airlines are even planning to put sockets for laptops in seatbacks.

G There's fairly convincing anecdotal evidence that some personal electronic devices have interfered with systems. Air crew on one flight found that the autopilot was being disconnected, and narrowed the problem down to a passenger's portable computer. They could actually watch the autopilot disconnect when they switched the computer on. Boeing bought the computer, took it to the airline's labs and even tested it on an empty flight. But as with every other reported instance of interference, technicians were unable to replicate the problem.

H Some engineers, however, such as Bruce Donham of Boeing, say that common sense suggests phones are more risky than laptops. "A device capable of producing a strong emission is not as safe as a device which does not have any intentional emission," he says. Nevertheless, many experts think it's illogical that cellphones are prohibited when computers aren't. Besides, the problem is more complicated than simply looking at power and frequency. In the air, the plane operates in a soup of electronic emissions, created by its own electronics and by ground-based radiation. Electronic devices in the cabin—especially those emitting a strong signal—can behave unpredictably, reinforcing other signals, for instance, or creating unforeseen harmonics that disrupt systems.

I Despite the Congressional subcommittee hearings last month, no one seems to be working seriously on a technical solution that would allow passengers to use their phones. That's mostly because no one - besides cellphone users themselves - stands to gain a lot if the phones are allowed in the air. Even the cellphone companies don't want it. They are concerned that airborne signals could cause problems by flooding a number of the networks' base stations at once with the same signal. This effect, called big footing, happens because airborne cellphone signals tend to go to many base stations at once, unlike land calls which usually go to just one or two stations. In the US, even if FAA regulations didn't prohibit cellphones in the air, Federal Communications Commission regulations would.

J Possible solutions might be to enhance airliners' electronic insulation, or to fit detectors which warned flight staff when passenger devices were emitting dangerous signals. But Cross complains that neither the FAA, the airlines nor the manufacturers are showing much interest in developing these. So despite Congressional suspicions and the occasional irritated (or jailed) mobile user, the industry's "better safe than sorry" policy on mobile phones seems likely to continue. In the absence of firm evidence that the international airline industry is engaged in a vast conspiracy to overcharge its customers, a delayed phone call seems a small price to pay for even the tiniest reduction in the chances of a plane crash. But you'll still be allowed to use your personal computer during a flight. And while that remains the case, airlines can hardly claim that logic has prevailed.

PART 2 — QUESTIONS

Questions 14-17

Complete the following summary of the paragraphs of Reading Passage, using no more than three words from the Reading Passage for each answer.

The would-be risk surly exists, since the avionic systems on modern aircraft are used to manage flight and deal with **14** _____. Those devices are designed to meet the safety criteria which should be free from interrupting **15** _____. The personal use of mobile phone may cause the sophisticated **16** _____ outside of plane to dysfunction. Though definite interference in piloting devices has not been scientifically testified, the devices such as those which detect **17** _____ in cabinet could be affected.

Questions 18-22

Use the information in the passage to match the Organization (listed A-E) with opinions or deeds below.

A. British Civil Aviation Authority

B. Maryanne Greczyn

C. RTCA

D. Marshall Cross

E. Boeing company

	A	B	C	D	E
18 Mobile usages should be forbidden in a specific time.	○	○	○	○	○
19 Computers are more dangerous than cell phones.	○	○	○	○	○
20 finding that tile mobile phones pose little risk on flight' navigation devices.	○	○	○	○	○
21 The disruption of laptops is not as dangerous as cellphones.	○	○	○	○	○

	A	B	C	D	E
22 The mobile signal may have impact on earlier devices.	○	○	○	○	○

Questions 23-26

Do the following statements agree with the information given in Reading Passage 2?

23 Almost all scientists accept that cellphones have higher emission than that of personal computers.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

24 Some people believe that radio emission will interrupt the equipment on plane.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

25 The signal interference-detecting device has not yet been developed because they are in priority far neither administrative department nor offer economic incentive.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

26 FAA initiated open debate with Federal Communications Commission.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

PASSAGE 3

You should spend about 20 minutes on Questions 27-40, which are based on Reading Passage 3 below.

Communicating Conflict!

Section A

As far back as Hippocrates' time (460-370 B.C.) people have tried to understand other people by characterizing them according to personality type or temperament. Hippocrates believed there were four different body fluids that influenced four basic types of temperament. His work was further developed 500 years later by Galen. These days there are any number of self-assessment tools that relate to the basic descriptions developed by Galen, although we no longer believe the source to be the types of body fluid that dominate our systems.

Section B

The values in self-assessments that help determine personality style, learning styles, communication styles, conflict-handling styles, or other aspects of individuals is that they help depersonalize conflict in interpersonal relationships. The depersonalization occurs when you realize that others aren't trying to be difficult, but they need different or more information than you do. They're not intending to be rude: they are so focused on the task they forget about greeting people. They would like to work faster but not at the risk of damaging the relationships needed to get the job done. They understand there is a job to do. But it can only be done right with the appropriate information, which takes time to collect. When used appropriately, understanding communication styles can help resolve conflict on teams. Very rarely are conflicts true personality issues. Usually they are issues of style, information needs, or focus.

Section C

Hippocrates and later Galen determined there were four basic temperaments: sanguine, phlegmatic, melancholic and choleric. These descriptions were developed centuries ago and are still somewhat apt, although you could update the wording, in today's world, they translate into the four fairly common communication styles described below:

Section D

The sanguine person would be the expressive or spirited style of communication. These people speak in pictures. They invest a lot of emotion and energy in their communication and often speak quickly, putting their whole body into it. They are easily sidetracked onto a story that may or may not illustrate the point they are trying to make. Because of their enthusiasm, they are great team motivators. They are concerned about people and relationships. Their high levels of energy can come on strong at times and their focus is usually on the bigger picture, which means they sometimes miss the details or the proper order of things. These people find conflict or differences of opinion invigorating and love to engage in a spirited discussion. They love change and are constantly looking for new and exciting adventures.

Section E

The phlegmatic person - cool and persevering - translates into the technical or systematic communication style. This style of communication is focused on facts and technical details. Phlegmatic people have an orderly, methodical way of approaching tasks, and their focus is very much on the task, not on the people, emotions, or concerns that the task may evoke. The focus is also more on the details necessary to accomplish a task.

Sometimes the details overwhelm the big picture and focus needs to be brought back to the context of the task. People with this style think the facts should speak for themselves, and they are not as comfortable with conflict. They need time to adapt to change and need to understand both the logic of it and the steps involved.

Section F

The melancholic person who is softhearted and oriented toward doing things for others translates into the considerate or sympathetic communication style. A person with this communication style is focused on people and relationships. They are good listeners and do things for other people—sometimes to the detriment of getting things done for themselves. They want to solicit everyone's opinion and make sure everyone is comfortable with whatever is required to get the job done. At times this focus on others can distract from the task at hand. Because they are so concerned with the needs of others and smoothing over issues, they do not like conflict. They believe that change threatens the status quo and tends to make people feel uneasy, so people with this communication style, like phlegmatic, people need time to consider the changes in order to adapt to them.

Section G

The choleric temperament translates into the bold or direct style of communication. People with this style are brief in their communication - the fewer words the better. They are big picture thinkers and love to be involved in many things at once. They are focused on tasks and outcomes and often forget that the people involved in carrying out the tasks have needs. They don't do detail work easily and as a result can often underestimate how much time it takes to achieve the task. Because they are so direct, they often seem forceful and can be very intimidating to others. They usually would welcome someone challenging them. But most other styles are afraid to do so. They also thrive on change, the more the better.

Section H

A well-functioning team should have all of these communication styles for true effectiveness. All teams need to focus on the task, and they need to take care of relationships in order to achieve those tasks. They need the big picture perspective or the context of their work, and they need the details to be identified and taken care of for success. We all have aspects of each style within us. Some of us can easily move from one style to another and adapt our style to the needs of the situation at hand—whether the focus is on tasks or relationships. For others, a dominant style is very evident, and it is more challenging to see the situation from the perspective of another style.

The work environment can influence communication styles either by the type of work that is required or by the predominance of one style reflected in that environment. Some people use one style at work and another at home. The good news about communication styles is that we all have the ability to develop flexibility in our styles. The greater the flexibility we have, the more skilled we usually are at handling possible and actual conflicts. Usually it has to be relevant to us to do so, either because we think it is important or because there are incentives in our environment to encourage it. The key is that we have to want to become flexible with our communication style. As Henry Ford said, "Whether you think you can or you can't, you're right!"

PART 3 — QUESTIONS

Questions 27-34

Reading Passage 3 has eight sections A-H.

Choose the correct heading for each section from the list of headings below.

i. Different personality types mentioned

ii. recommendation of combined styles for group

iii. Historical explanation of understanding personality

iv. A lively and positive attitude person depicted

v. A personality likes challenge and direct communication

vi. different characters illustrated

vii. Functions of understanding communication styles

viii. Cautious and considerable person cited

ix. Calm and Factual personality illustrated

x. Self-assessment determines one's temperament

	i	ii	iii	iv	v	vi	vii	viii	ix	x
27 Section A	○	○	○	○	○	○	○	○	○	○
28 Section B	○	○	○	○	○	○	○	○	○	○
29 Section C	○	○	○	○	○	○	○	○	○	○
30 Section D	○	○	○	○	○	○	○	○	○	○
31 Section E	○	○	○	○	○	○	○	○	○	○
32 Section F	○	○	○	○	○	○	○	○	○	○
33 Section G	○	○	○	○	○	○	○	○	○	○
34 Section H	○	○	○	○	○	○	○	○	○	○

Questions 35-39

Do the following statements agree with the information given in Reading Passage 3?

35 it is believed that sanguine people do not like variety

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

36 Melancholic and phlegmatic people have similar characteristics

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

37 It is the sanguine personality that needed most in the workplace.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

38 It is possible for someone to change type of personality.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

39 work surrounding can affect which communication style is the most effective.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

Questions 40-40

Choose the correct letter A, B, C or D.

40 The author thinks self-assessment tools can be able to

- **A** ○ assist to develop one's personality in a certain scenario.
- **B** ○ help to understand colleagues and resolve problems
- **C** ○ improve relationship with boss of company
- **D** ○ change others behaviour and personality

Answer Key

#	Answer	Explanation
1	**(severe) drought**	When a severe drought hit in 1977, the birds soon devoured the last of the small, easily eaten seeds
2	**large seeds**	Smaller members of the medium ground finch population, lacking the bill strength to crack large seeds, died out
3	**heavy rains**	Eight years later, heavy rains brought by an El Nino transformed the normally meager vegetation on Daphne Major
4	**small seeds**	Small seeds came to dominate the food supply, and big birds with big bills died out at a higher rate than smaller ones
5	**finch evolution**	On the inhabited island of Santa Cruz, just south of Daphne Major, Andrew Hendry of McGill University and Jeffrey Podos of the University of Massachusetts at Amherst have discovered a new, man-made twist in finch evolution
6	**medium-sized bills**	But in the late 1960s and early 70s, medium ground finches with medium-sized bills began to thrive at Academy Bay along with small and large-billed birds
7	**human population**	The booming human population had introduced new food sources, including exotic plants and bird feeding stations stocked with rice
8	**rice**	The booming human population had introduced new food sources, including exotic plants and bird feeding stations stocked with rice
9	**FALSE**	They have witnessed Darwin’s principle in action again and again, over many generations of finches
10	**NOT GIVEN**	When the Grants began their study in the 1970s, only two species of finch lived on Daphne Major, the medium ground finch and the cactus finch
11	**TRUE**	None of the birds nested that year, and many died out
12	**FALSE**	On the inhabited island of Santa Cruz, just south of Daphne Major, Andrew Hendry of McGill University and Jeffrey Podos of the University of Massachusetts at Amherst have discovered a new, man-made twist in finch evolution
13	**TRUE**	On the inhabited island of Santa Cruz, just south of Daphne Major, Andrew Hendry of McGill University and Jeffrey Podos of the

#	Answer	Explanation
		University of Massachusetts at Amherst have discovered a new, man-made twist in finch evolution
14	**navigation and communications**	Modern airliners are packed with electronic devices that control the plane and handle navigation and communications
15	**radiation**	Each has to meet stringent safeguards to make sure it doesn't emit radiation that would interfere with other devices in the plane —standards that passengers' personal electronic devices don't necessarily meet
16	**antennae**	Emissions from inside the plane could also interfere with sensitive antennae on the fixed exterior
17	**smoke**	But the devices that could be affected, such as smoke detectors and fuel level indicators, could still create serious problems for the flight crew if they malfunction
18	**C**	In 1996, RTCA, a consultant hired by the Federal Aviation Administration in the US to conduct tests, determined that potential problems from personal electronic devices were "low". Nevertheless, it recommended a ban on their use during "critical" periods of flight, such as take-off and landing
19	**D**	The use of computers and electronic game systems is much more worrying, he says
20	**B**	"We've done our own studies. We've found cellphones actually have no impact on the navigation system," says Maryanne Greczyn, a spokeswoman for Airbus Industries of North America in Herndon, Virginia
21	**E**	Some engineers, however, such as Bruce Donham of Boeing, say that common sense suggests phones are more risky than laptops
22	**A**	The best evidence yet of a problem comes from a report released this year by Britain's Civil Aviation Authority. Its researchers generated simulated cellphone transmissions inside two Boeing aircraft. They concluded that the transmissions could create signals at a power and frequency that would not affect the latest equipment, but exceeded the safety threshold established in 1984 and might therefore affect some of the older equipment on board
23	**FALSE**	Some engineers, however, such as Bruce Donham of Boeing, say that common sense suggests phones are more risky than laptops
24	**TRUE**	Each has to meet stringent safeguards to make sure it doesn't emit radiation that would interfere with other devices in the plane —standards that passengers' personal electronic devices don't necessarily meet

#	Answer	Explanation
25	**TRUE**	That's mostly because no one – besides cellphone users themselves – stands to gain a lot if the phones are allowed in the air Possible solutions might be to enhance airliners' electronic insulation, or to fit detectors which warned flight staff when passenger devices were emitting dangerous signals. But Cross complains that neither the FAA, the airlines nor the manufacturers are showing much interest in developing these
26	**NOT GIVEN**	in the US, even if FAA regulations didn't prohibit cellphones in the air, Federal Communications Commission regulations would.
27	**iii**	As far back as Hippocrates' time (460-370 B.C.) people have tried to understand other people by characterizing them according to personality type or temperament
28	**vii**	When used appropriately, understanding communication styles can help resolve conflict on teams
29	**i**	Hippocrates and later Galen determined there were four basic temperaments: sanguine, phlegmatic, melancholic and choleric
30	**iv**	The sanguine person would be the expressive or spirited style of communication. These people speak in pictures. They invest a lot of emotion and energy in their communication and often speak quickly, putting their whole body into it. They are easily sidetracked onto a story that may or may not illustrate the point they are trying to make. Because of their enthusiasm, they are great team motivators
31	**ix**	The phlegmatic person – cool and persevering – translates into the technical or systematic communication style. This style of communication is focused on facts and technical details
32	**viii**	The melancholic person who is softhearted and oriented toward doing things for others translates into the considerate or sympathetic communication style
33	**v**	The choleric temperament translates into the bold or direct style of communication They usually would welcome someone challenging them
34	**ii**	A well-functioning team should have all of these communication styles for true effectiveness
35	**FALSE**	They love change and are constantly looking for new and exciting adventures
36	**TRUE**	so people with this communication style, like phlegmatic, people need time to consider the changes in order to adapt to them

#	Answer	Explanation
37	**NOT GIVEN**	A well-functioning team should have all of these communication styles for true effectiveness
38	**TRUE**	Some of us can easily move from one style to another and adapt our style to the needs of the situation at hand—whether the focus is on tasks or relationships
39	**TRUE**	The work environment can influence communication styles either by the type of work that is required or by the predominance of one style reflected in that environment
40	**B**	The values in self-assessments that help determine personality style, learning styles, communication styles, conflict-handling styles, or other aspects of individuals is that they help depersonalize conflict in interpersonal relationships. The depersonalization occurs when you realize that others aren't trying to be difficult, but they need different or more information than you do

Test 55

PASSAGE 1

Read the text below and answer Questions 1-14.

Agriculture and Tourism

A Linkages between the Agri-Food Sector and Tourism offer significant opportunities for the development of both sectors within the region. These linkages could lead to ensuring the sustainability of the region's tourism product thus ensuring it preservation. Agriculture and tourism — two of Wisconsin's most industries — are teaming up in southwestern Wisconsin has found that tourists, rural communities, and some farmers could benefit from stronger efforts to promote and market agricultural tourism there. In 1990, agricultural tourism project members surveyed 290 visitors to the annual Monroe Cheese Festival and 164 visitors to the Picnic on the Farm, a one-time event held in Platteville in conjunction with the Chicago Bears summer training camp. More than one-half of those surveyed responded favorably to a proposed tour, saying they would be interested in participating in some type of agricultural tour in southwestern Wisconsin. Survey respondents reported that they would prefer to visit cheese factories, sausage processing plants, dairy farms, and historical farm sites, as well as enjoy an old-fashioned picnic dinner. The study also found strong interest in visiting specialty farms (strawberries, cranberries, poultry, etc.). More than 75 percent of the Cheese Day visitors planned ahead for the trip, with 37 percent planning at least two months in advance.

B More than 40 percent of the visitors came to Monroe for two- or three-day visits. Many stopped at other communities on their way to Cheese Days. Visitors at both events indicated that they were there to enjoy themselves and were willing to spend money on food and arts and crafts. They also wanted the opportunity to experience the “country” while there. The study found that planning around existing events should take into account what brought visitors to the area and provide additional attractions that will appeal to them. For example, visitors to Cheese Days said they were on a holiday and appeared to be more open to various tour proposals. Picnic visitors came specifically to see the Chicago Bears practice. They showed less interest in a proposed agricultural tour than Cheese Day visitors, but more interest in a picnic dinner.

C The study identified three primary audiences for agricultural tourism: 1) elderly people who take bus tours to see the country; 2) families interested in tours that could be enjoyed by both parents and children; and 3) persons already involved in agriculture, including international visitors. Agricultural tourism can serve to educate urban tourists about the problems and challenges facing farmers, says Andy Lewis, Grant county community development agent. While agriculture is vital to Wisconsin, more and more urban folk are becoming isolated from the industry. In fact, Lewis notes, farmers are just as interested in the educational aspects of agricultural tours as they are in any financial returns.

D “Farmers feel that urban consumers are out of touch with farming,” Lewis says. “If tourists can be educated on issues that concern farmers, those visits could lead to policies more

favorable to agriculture." Animal rights and the environment are examples of two issues that concern both urban consumers and farmers. Farm tours could help consumers get the farmer's perspective on these issues, Lewis notes. Several Wisconsin farms already offer some type of learning experience for tourists. However, most agricultural tourism enterprises currently market their businesses independently, leading to a lack of a concerted effort to promote agricultural tourism as an industry.

E Lewis is conducting the study with Jean Murphy, assistant community development agent. Other participants include UW-Platteville Agricultural Economist Bob Acton, the Center for Integrated Agricultural Systems, UW-Extension Recreation Resources Center, the Wisconsin Rural Development Center, and Hidden Valleys, a Southwestern Wisconsin regional tourism organization. This past fall, Murphy organized several workshops with some Green and Grant County farmers, local business leaders, and motor coach tour operators to discuss how best to organize and put on farm tours. Committees were formed to look at the following: tour site evaluations, inventory of the area's resources, tour marketing, and familiarization of tours. The fourth committee is organizing tours for people such as tour bus guides and local reporters to help better educate them about agricultural tourism. Green County farmers already have experience hosting visitors during the annual Monroe Cheese Days. Green county Tourism Director Larry Lindgren says these farmers are set to go ahead with more formal agricultural tours next year. The tours will combine a farm visit with a visit to a local cheese factory and a picnic lunch.

F Another farm interested in hosting an organized tour is Sinsinawa, a 200-acre Grant County farm devoted to sustainable agriculture and run by the Dominican Sisters. Education plays a major role at the farm, which has an orchard, dairy and beef cows, and hogs. Farm tours could be combined with other activities in the area such as trips to the Mississippi River and/or visits to historical towns orlandmarks, Lewis says. The project will help expose farmers to the tourism industry and farm vacations as a way to possibly supplement incomes, he adds. While farm families probably wouldn't make a lot of money through farm tours, they would be compensated for their time, says Lewis. Farmers could earn additional income through the sale of farm products, crafts, and recreational activities.

PART 1 — QUESTIONS

Questions 1-4

The reading Passage has six paragraphs A-F.

Which paragraph contains the following information? Write the correct letter A-F.

	A	B	C	D	E	F
1 About half of all the tourists would spend several days in Monroe.	○	○	○	○	○	○
2 Most visitors responded positively to a survey project on farm tour.	○	○	○	○	○	○
3 Cooperation across organisations in research for agriculture tours has been carried out.	○	○	○	○	○	○
4 Agriculture tour assist tourists to understand more issues concerning animal and environment.	○	○	○	○	○	○

Questions 5-9

Which of following statements belongs to the visitor categories in the box Please choose A, B or c for each question.

Write the correct letter A, B or C.

NB: You may use any letter more than once.

A. Cheese Festival visitors

B. Picnic visitors

C. Both of them

	A	B	C
5 have focused destination	○	○	○
6 majority prepare well before going beforehand.	○	○	○
7 are comparably less keen on picnic meal	○	○	○

	A	B	C
8 show interest in activities such as visiting factory tour and fruit	○	○	○
9 are willing to accept a variety of tour recommendation.	○	○	○

Questions 10-14

Complete the following summary of the paragraphs of Reading Passage, using no more than two words from the Reading Passage for each answer.

Through farm tour, visitors can better understand significant issues such as **10** _____ and enviroment. In autumn, Murphy organised **11** _____ and bring other participants together to develop local tour market. Larry Lindgren said the farmers already had experience of farm tours with factory visiting and a **12** _____. In Sinsinawa, a large area of the farmland contains an orchard, cow, etc. which is managed and operated by **13** _____; Lewis said the project will probably bring extra **14** _____ for local farmers.

PASSAGE 2

Read the text below and answer Questions 15-27.

Cosmetics in Ancient Past

A Since cosmetics and perfumes are still in wide use today, it is interesting to compare the attitudes, customs and beliefs related to them in ancient times to those of our own day and age. Cosmetics and perfumes have been popular since the dawn of civilization; it is shown by the discovery of a great deal of pertinent archeological material, dating from the third millennium BC. Mosaics, glass perfume flasks, stone vessels, ovens, cooking-pots, clay jars, etc., some inscribed by the hand of the artisan. Evidence also appears in the Bible and other classical writings, where it is written that spices and perfumes were prestigious products known throughout the ancient world and coveted by kings and princes. The written and pictorial descriptions, as well as archaeological findings, all show how important body care and aesthetic appearance were in the lives of the ancient people. The chain of evidence spans many centuries, detailing the usage of cosmetics in various cultures from the earliest period of recorded history.

B In antiquity, however, at least in the onset, cosmetics served in religious ceremonies and for healing purposes. Cosmetics were also connected with cultic worship and witchcraft: to appease the various gods, fragrant ointments were applied to the statuary images and even to their attendants. From this, in the course of time, developed the custom of personal use, to enhance the beauty of the face and the body, and to conceal defects.

C Perfumes and fragrant spices were precious commodities in antiquity, very much in demand, and at times even exceeded silver and gold in value. Therefore, they were luxury products, used mainly in the temples and in the homes of the noble and the wealthy. The Judean kings kept them in treasure houses (2 Kings 20:13). And the Queen of Sheba brought to Solomon "camels laden with spices, gold in great quantity and precious stones. (1 Kings 10:2,10). However, within time, the use of cosmetics became the custom of that period. The use of cosmetics became widespread among the lower classes as well as among the wealthy; in the same way they washed the body, so they used to care for the body with substances that softened the skin and anoint it with fragrant oils and ointments.

D Facial treatment was highly developed and women devoted many horns to it They used to spread various scented creams on the face and to apply makeup in vivid and contrasting colors. An Egyptian papyrus from the 16th century BC contains detailed recipes to remove blemishes, wrinkles, and other signs of age. Greek and Roman women would cover their faces in the evening with a "beauty mask" to remove blemishes, which consisted mainly of flour mixed with fragrant spices, leaving it on their face all night. The next morning they would wash it off with asses' milk. The very common creams used by women in the ancient Far East, particularly important in the hot climate and prevalent in that area of the globe, were made up of oils and aromatic scents. Sometimes the oil in these creams was extracted from olives, almonds, gourds, sesame, or from trees and plants; but, for those of limited means, scented animal and fish fat were commonly used.

E Women in the ancient past commonly put colors around their eyes. Besides beautification, its purpose was also medicinal as covering the sensitive skin of the lids with colored ointments that prevailed dryness and eye diseases: the eye-paint repelled the little flies that transmitted eye inflammations. Egyptian women colored tile upper eyelid black and the lower one green, and painted the space between the upper lid and the eyebrow gray or blue. The women of Mesopotamia favored yellows and reds. The use of kohl for painting the eyes is mentioned three times in the Bible, always with disapproval by the sages (2 Kings, 9:30; Jeremiah 4:30; Ezekiel 23:40). In contrast. Job named one of his daughters "Keren Happukh" — "horn of eye paint" (Job 42:14).

F Great importance was attached to the care for hair in ancient times. Long hair was always considered a symbol of beauty, and kings, nobles and dignitaries grew their hair long and kept it well-groomed and cared for. Women devoted much time to the style of the hair; while not cutting, they would apply much care to it by arranging it skillfully in plaits and "building it up" sometimes with the help of wigs. Egyptian women generally wore their hair flowing down to their shoulders or even longer. In Mesopotamia, women cherished long hair as a part of their beauty, and hair flowing down their backs in a thick plait and tied with a ribbon is seen in art. Assyrian women wore their hair shorter, braiding and binding it in a bun at the back. In Ancient Israel, brides would wear their hair long on the wedding day as a sign of their virginity. Ordinary people and slaves, however, usually wore their hair short, mainly for hygienic reasons, since they could not afford to invest in the kind of treatment that long hair required.

G From the Bible and Egyptian and Assyrian sources, as well as the words of classical authors, it appears that the centers of the trade in aromatic resins and incense were located in the kingdoms of Southern Arabia, and even as far as India, where some of these precious aromatic plants were grown. "Dealers from Sheba and Rammah dealt with you, offering the choicest spices..." (Ezekiel 27:22). The Nabateans functioned as the important middlemen in this trade; Palestine also served as a very important component, as the trade routes crisscrossed the country. It is known that the Egyptian Queen Hatsheput (15th century BC) sent a royal expedition to the Land of Punt (Somalia) in order to bring back myrrh seedlings to plant in her temple. In Assyrian records of tribute and spoils of war, perfumes and resins are mentioned; the text from the time of Tukulti-Ninurta II (890-884 BC) refers to balls of myrrh as part of the tribute brought to the Assyrian king by the Aramaean kings. The trade in spices and perfumes is also mentioned in the Bible as written in Genesis (37:25-26), "Camels carrying gum tragacanth and balm and myrrh".

PART 2 — QUESTIONS

Questions 15-21

Reading Passage 2 has 7 paragraphs A-G.

Which paragraph contains the following information?

	A	B	C	D	E	F	G
15 recipes to conceal facial defects caused by aging	○	○	○	○	○	○	○
16 perfumes were presented to conquerors in war	○	○	○	○	○	○	○
17 long hair of girls had special meanings in marriage	○	○	○	○	○	○	○
18 evidence exists in abundance showing cosmetics use in ancient times	○	○	○	○	○	○	○
19 protecting eyes from fly-transmitted diseases	○	○	○	○	○	○	○
20 from witchcraft to beautification	○	○	○	○	○	○	○
21 more expensive than gold	○	○	○	○	○	○	○

Questions 22-27

Do the following statements agree with the information given in Reading Passage 2?

Write

TRUE if the statement is true

FALSE if the statement is false

NOT GIVEN if the information is not given

22 The written record for cosmetics and perfumes dates back to the third millennium BG

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

23 Since perfumes and spices woe luxury products, their use was exclusive to the noble and the wealthy.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

24 In ancient Far East, fish fata woe used OS cream by women from poor households.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

25 The teachings in the Bible were repeatedly against the use of kohl for painting the eye».

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

26 Long hair as a symbol of beauty was worn solely by women of ancient cultures

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

27 The Egyptian Queen Hataheput sent a royal expedition to Font to establish a trade route for myrrh

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

PASSAGE 3

Read the text below and answer Questions 28-40.

Asian Space 2 Satellite Technology

The space age began with the launch of the Russian artificial satellite Sputnik in 1957 and developed further with the race to the moon between the United States and Russia. This rivalry was characterized by advanced technology and huge budgets. In this process there were spectacular successes, some failures, but also many spin-offs.

Europe, Japan, China, and India quickly joined this space club of the superpowers. With the advent of relatively low cost high performance mini-satellites and launchers, the acquisition of indigenous space capabilities by smaller nations in Asia has become possible. How, in what manner, and for what purpose will these capabilities be realized?

28

A Rocket technology has progressed considerably since the days of 'fire arrows' (bamboo poles filled with gunpowder) first used in China around 500 BC, and, during the Sung Dynasty, to repel Mongol invaders at the battle of Kaifeng (Kai-fung fu) in AD 1232. These ancient rockets stand in stark contrast to the present-day Chinese rocket launch vehicles, called the 'Long March', intended to place a Chinese astronaut in space by 2005 and, perhaps, to achieve a Chinese moon-landing by the end of the decade.

29

B In the last decade there has been a dramatic growth in space activities in Asia both in the utilization of space-based services and the production of satellites and launchers. This rapid expansion has led many commentators and analysts to predict that Asia will become a world space power. The space age has had dramatic affects worldwide with direct developments in space technology influencing telecommunications, meteorological forecasting, earth resource and environmental monitoring, and disaster mitigation (flood, forest fires, and oil spills). Asian nations have been particularly eager to embrace these developments.

30

C New and innovative uses for satellites are constantly being explored with potential revolutionary effects, such as in the field of health and telemedicine, distance education, crime prevention (piracy on the high seas), food and agricultural planning and production (rice crop monitoring). Space in Asia is very much influenced by the competitive commercial space sector, the emergence of low cost mini-satellites, and the globalization of industrial and financial markets. It is not evident how Asian space will develop in the coming decades in the face of these trends. It is, however, important to understand and assess the factors and forces that

shape Asian space activities and development in determining its possible consequences for the region.

D At present, three Asian nations, Japan, China, and India, have comprehensive end-to-end space capabilities and possess a complete space infrastructure: space technology, satellite manufacturing, rockets, and spaceports. Already self-sufficient in terms of satellite design and manufacturing, South Korea is currently attempting to join then ranks with its plans to develop a launch site and spaceport. Additionally, nations in Southeast Asia as well as those bordering the Indian subcontinent (Nepal, Pakistan, and Bangladesh) have, or are starting to develop, indigenous space programmes. The Association of Southeast Asian Nations (ASEAN) has, in varying degrees, embraced space applications using foreign technology and over the past five years or so its space activities have been expanding. Southeast Asia is predicted to become the largest and fastest growing market for commercial space products and applications, driven by telecommunications (mobile and fixed services), the Internet, and remote sensing applications. In the development of this technology, many non-technical factors, such as economics, politics, culture, and history, interact and play important roles, which in turn affect Asian technology.

31

E Asia, and Southeast Asia in particular, suffers from a long list of recurrent large-scale environmental problems including storms and flooding, forest fires and deforestation, and crop failures. Thus the space application that has attracted the most attention in this region is remote sensing. Remote sensing satellites equipped with instruments to take photographs of the ground at different wavelengths provide essential information for natural resource accounting, environmental management, disaster prevention and monitoring, land-use mapping, and sustainable development planning. Progress in these applications has been rapid and impressive. ASEAN members, unlike Japan, China, and India, do not have their own remote sensing satellites, however most of its member nations have facilities to receive, process, and interpret such data from American and European satellites. In particular, Thailand, Malaysia, and Singapore have world-class remote sensing processing facilities and research programmes. ASEAN has plans to develop (and launch) its own satellites and in particular remote sensing satellites. Japan is regarded as the dominant space power in Asia and its record of successes and quality of technologies are equal to those of the West. In view of the technological challenges and high risks involved in space activities, a very long, and expensive, learning curve has been followed to obtain those successes achieved. Japan' s satellite manufacturing was based on the old and traditional defense and military procurement methodologies as practiced in the US and Europe.

32

F In recent years there have been fundamental changes in the way satellites are designed and built to drastically reduce costs. The emergence of ‘small satellites' and then quick adoption by Asian countries as a way to develop low-cost satellite technology and rapidly establish a space capability has given these countries the possibility to shorten their learning curve by a decade or more. The global increase of technology transfer mechanisms and use of readily available

commercial technology to replace costly space and military standard components may very well result in a highly competitive Asian satellite manufacturing industry.

G The laws of physics are the same to Tokyo as in Toulouse, and the principles of electronics and mechanics know no political or cultural boundaries. However, no such immutability applies to engineering practices and management; they are -very much influenced by education, culture, and history. These factors, in turn, have an affect on costs, lead times, product designs and, eventually, international sales. Many Asian nations are sending their engineers to be trained in the fast Highly experienced, they return to work in the growing Asian space industry. Will this acquisition of technical expertise, coupled perhaps with the world-renowned Japanese manufacturing and management techniques, be applied to build world-class satellites and reduce costs?

PART 3 — QUESTIONS

Questions 28-32

The reading passage has seven paragraphs, A-G

Choose the correct heading for paragraphs A-G from the list below. Write the correct number, i-ix.

i. **Western countries provide essential assistance**

ii. **Unbalanced development for an essential space technology**

iii. **Innovative application compelled by competition**

iv. **An ancient invention which is related to the future**

v. **Military purpose of satellite**

vi. **Rockets for application in ancient China**

vii. **Space development in Asia in the past**

viii. **Non-technology factors counts**

ix. **competitive edge gained by more economically feasible satellite**

Questions 33-36

Match the following reasons for each question according to the information given in the passage

Write the correct letter A-F.

A. Because it helps administrate the crops.

B. Because there are some unapproachable areas, c Because the economic level in that area is low.

D. Because there are influences from some other social factors.

E. Because it can be used in non-peaceful purpose.

F. Because disasters such as bush fire happened in Southeast Asia.

	A	B	D	E	F
33 Why remote-photographic technology is used to resolve environmental problems?	○	○	○	○	○

	A	B	D	E	F
34 Why satellites technology is used in medicine area?	○	○	○	○	○
35 Why Asian countries satellite technology is limited for development?	○	○	○	○	○
36 Why satellites technology is deployed in agricultural area?	○	○	○	○	○

Questions 37-40

Do the following statements agree with the information given in Reading Passage 3

Write

TRUE if the Statement is true

FALSE if the statement is false

NOT GIVEN if the information is not given in the passage

37 Ancient China had already deployed rockets as a military purpose as early as 500 years ago.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

38 Space technology has enhanced literacy of Asia.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

39 photos taken by satellites with certain technology help predict some natural catastrophes prevention and surveillance.

- **A** ○ TRUE
- **B** ○ FALSE

C ○ NOT GIVEN

40 commercial competition constitutes a boosting factor to Asian technology development.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

Answer Key

#	Answer	Explanation
1	B	More than 40 percent of the visitors came to Monroe for two- or three-day visits
2	A	More than one-half of those surveyed responded favorably to a proposed tour, saying they would be interested in participating in some type of agricultural tour in southwestern Wisconsin
3	E	Lewis is conducting the study with Jean Murphy, assistant community development agent. Other participants include UW-Platteville Agricultural Economist Bob Acton, the Center for Integrated Agricultural Systems, UW-Extension Recreation Resources Center, the Wisconsin Rural Development Center, and Hidden Valleys, a Southwestern Wisconsin regional tourism organization
4	D	Animal rights and the environment are examples of two issues that concern both urban consumers and farmers. Farm tours could help consumers get the farmer's perspective on these issues, Lewis notes
5	B	Picnic visitors came specifically to see the Chicago Bears practice
6	A	More than 75 percent of the Cheese Day visitors planned ahead for the trip, with 37 percent planning at least two months in advance
7	A	They showed less interest in a proposed agricultural tour than Cheese Day visitors, but more interest in a picnic dinner
8	C	In 1990, agricultural tourism project members surveyed 290 visitors to the annual Monroe Cheese Festival and 164 visitors to the Picnic on the Farm, a one-time event held in Platteville in conjunction with the Chicago Bears summer training camp. More than one-half of those surveyed responded favorably to a proposed tour, saying they would be interested in participating in some type of agricultural tour in southwestern Wisconsin. Survey respondents reported that they would prefer to visit cheese factories, sausage processing plants, dairy farms, and historical farm sites, as well as enjoy an old-fashioned picnic dinner. The study also found strong interest in visiting specialty farms (strawberries, cranberries, poultry, etc.)
9	A	For example, visitors to Cheese Days said they were on a holiday and appeared to be more open to various tour proposals

#	Answer	Explanation
10	**animal rights**	Animal rights and the environment are examples of two issues that concern both urban consumers and farmers
11	**workshops**	This past fall, Murphy organized several workshops with some Green and Grant County farmers, local business leaders, and motor coach tour operators to discuss how best to organize and put on farm tours
12	**picnic (lunch)**	The tours will combine a farm visit with a visit to a local cheese factory and a picnic lunch
13	**dominican Sisters**	Another farm interested in hosting an organized tour is Sinsinawa, a 200-acre Grant County farm devoted to sustainable agriculture and run by the Dominican Sisters
14	**incomes**	The project will help expose farmers to the tourism industry and farm vacations as a way to possibly supplement incomes, he adds
15	**D**	An Egyptian papyrus from the 16th century BC contains detailed recipes to remove blemishes, wrinkles, and other signs of age
16	**G**	In Assyrian records of tribute and spoils of war, perfumes and resins are mentioned; the text from the time of Tukulti-Ninurta II (890-884 BC) refers to balls of myrrh as part of the tribute brought to the Assyrian king by the Aramaean kings
17	**F**	In Ancient Israel, brides would wear their hair long on the wedding day as a sign of their virginity
18	**A**	Cosmetics and perfumes have been popular since the dawn of civilization; it is shown by the discovery of a great deal of pertinent archeological material, dating from the third millennium BC
19	**E**	Besides beautification, its purpose was also medicinal as covering the sensitive skin of the lids with colored ointments that prevailed dryness and eye diseases: the eye-paint repelled the little flies that transmitted eye inflammations
20	**B**	Cosmetics were also connected with cultic worship and witchcraft: to appease the various gods, fragrant ointments were applied to the statuary images and even to their attendants. From this, in the course of time, developed the custom of personal use, to enhance the beauty of the face and the body, and to conceal defects
21	**C**	Perfumes and fragrant spices were precious commodities in antiquity, very much in demand, and at times even exceeded silver and gold in value

#	Answer	Explanation
22	**NOT GIVEN**	Cosmetics and perfumes have been popular since the dawn of civilization; it is shown by the discovery of a great deal of pertinent archeological material, dating from the third millennium BC
23	**FALSE**	The use of cosmetics became widespread among the lower classes as well as among the wealthy; in the same way they washed the body, so they used to care for the body with substances that softened the skin and anoint it with fragrant oils and ointments
24	**TRUE**	The very common creams used by women in the ancient Far East, particularly important in the hot climate and prevalent in that area of the globe, were made up of oils and aromatic scents. Sometimes the oil in these creams was extracted from olives, almonds, gourds, sesame, or from trees and plants; but, for those of limited means, scented animal and fish fat were commonly used
25	**TRUE**	The use of kohl for painting the eyes is mentioned three times in the Bible, always with disapproval by the sages (2 Kings, 9:30; Jeremiah 4:30; Ezekiel 23:40)
26	**FALSE**	Long hair was always considered a symbol of beauty, and kings, nobles and dignitaries grew their hair long and kept it well-groomed and cared for
27	**NOT GIVEN**	It is known that the Egyptian Queen Hatsheput (15th century BC) sent a royal expedition to the Land of Punt (Somalia) in order to bring back myrrh seedlings to plant in her temple
28	**iv**	Rocket technology has progressed considerably since the days of ‘fire arrows’ (bamboo poles filled with gunpowder) first used in China around 500 BC, and, during the Sung Dynasty, to repel Mongol invaders at the battle of Kaifeng (Kai-fung fu) in AD 1232. These ancient rockets stand in stark contrast to the present-day Chinese rocket launch vehicles, called the ‘Long March’, intended to place a Chinese astronaut in space by 2005 and, perhaps, to achieve a Chinese moon-landing by the end of the decade
29	**vii**	In the last decade there has been a dramatic growth in space activities in Asia both in the utilization of space-based services and the production of satellites and launchers
30	**iii**	New and innovative uses for satellites are constantly being explored with potential revolutionary effects, such as in the field of health and telemedicine, distance education, crime prevention (piracy on the high seas), food and agricultural planning and production (rice crop monitoring). Space in Asia is very much influenced by the competitive commercial space sector, the

#	Answer	Explanation
		emergence of low cost mini-satellites, and the globalization of industrial and financial markets
31	**ii**	ASEAN members, unlike Japan, China, and India, do not have their own remote sensing satellites, however most of its member nations have facilities to receive, process, and interpret such data from American and European satellites
32	**ix**	In recent years there have been fundamental changes in the way satellites are designed and built to drastically reduce costs. The emergence of 'small satellites' and then quick adoption by Asian countries as a way to develop low-cost satellite technology and rapidly establish a space capability has given these countries the possibility to shorten their learning curve by a decade or more. The global increase of technology transfer mechanisms and use of readily available commercial technology to replace costly space and military standard components may very well result in a highly competitive Asian satellite manufacturing industry
33	**F**	Asia, and Southeast Asia in particular, suffers from a long list of recurrent large-scale environmental problems including storms and flooding, forest fires and deforestation, and crop failures. Thus the space application that has attracted the most attention in this region is remote sensing
34	**B**	New and innovative uses for satellites are constantly being explored with potential revolutionary effects, such as in the field of health and telemedicine, distance education, crime prevention (piracy on the high seas), food and agricultural planning and production (rice crop monitoring)
35	**D**	In the development of this technology, many non-technical factors, such as economics, politics, culture, and history, interact and play important roles, which in turn affect Asian technology
36	**A**	New and innovative uses for satellites are constantly being explored with potential revolutionary effects, such as in the field of health and telemedicine, distance education, crime prevention (piracy on the high seas), food and agricultural planning and production (rice crop monitoring)
37	**FALSE**	Rocket technology has progressed considerably since the days of 'fire arrows' (bamboo poles filled with gunpowder) first used in China around 500 BC, and, during the Sung Dynasty, to repel Mongol invaders at the battle of Kaifeng (Kai-fung fu) in AD 1232

#	Answer	Explanation
38	**NOT GIVEN**	New and innovative uses for satellites are constantly being explored with potential revolutionary effects, such as in the field of health and telemedicine, distance education, crime prevention (piracy on the high seas), food and agricultural planning and production (rice crop monitoring)
39	**TRUE**	Remote sensing satellites equipped with instruments to take photographs of the ground at different wavelengths provide essential information for natural resource accounting, environmental management, disaster prevention and monitoring, land-use mapping, and sustainable development planning
40	**TRUE**	Space in Asia is very much influenced by the competitive commercial space sector, the emergence of low cost mini-satellites, and the globalization of industrial and financial markets

Test 56

PASSAGE 1

Koalas

A Koalas are just too nice for their own good. And except for the occasional baby taken by birds of prey, koalas have no natural enemies. In an ideal world, the life of an arboreal couch potato would be perfectly safe and acceptable.

B Just two hundred years ago, koalas flourished across Australia. Now they seem to be in decline, but exact numbers are not available as the species would not seem to be 'under threat'. Their problem, however, has been man, more specifically, the white man. Koala and aborigine had co-existed peacefully for centuries.

C Today koalas are found only in scattered pockets of southeast Australia, where they seem to be at risk on several fronts. The koala's only food source, the eucalyptus tree has declined. In the past 200 years, a third of Australia's eucalyptus forests have disappeared. Koalas have been killed by parasites, chlamydia epidemics and a tumour-causing retro-virus. And every year 11000 are killed by cars, ironically most of them in wildlife sanctuaries, and thousands are killed by poachers. Some are also taken illegally as pets. The animals usually soon die, but they are easily replaced.

D Bush fires pose another threat. The horrific ones that raged in New South Wales recently killed between 100 and 1000 koalas. Many that were taken into sanctuaries and shelters were found to have burnt their paws on the glowing embers. But zoologists say that the species should recover. The koalas will be aided by the eucalyptus, which grows quickly and is already burgeoning forth after the fires. So the main problem to their survival is their slow reproductive rate - they produce only one baby a year over a reproductive lifespan of about nine years.

E The latest problem for the species is perhaps more insidious. With plush, grey fur, dark amber eyes and button nose, koalas are cuddliness incarnate. Australian zoos and wildlife parks have taken advantage of their uncomplaining attitudes, and charge visitors to be photographed hugging the furry bundles. But people may not realise how cruel this is, but because of the koala's delicate disposition, constant handling can push an already precariously balanced physiology over the edge.

F Koalas only eat the foliage of certain species of eucalyptus trees, between 600 and 1250 grams a day. The tough leaves are packed with cellulose, tannins, aromatic oils and precursors of toxic cyanides. To handle this cocktail, koalas have a specialised digestive system. Cellulose-digesting bacteria in the break down fibre, while a specially adapted gut and liver process the toxins. To digest their food properly, koalas must sit still for 21 hours every day.

G Koalas are the epitome of innocence and inoffensiveness. Although they are capable of ripping open a man's arm with their needle-sharp claws, or giving a nasty nip, they simply

wouldn't. If you upset a koala, it may blink or swallow, or hiccup. But attack? No way! Koalas are just not aggressive. They use their claws to grip the hard smooth bark of eucalyptus trees.

H They are also very sensitive, and the slightest upset can prevent them from breeding, cause them to go off their food, and succumb to gut infections. Koalas are stoic creatures and put on a brave face until they are at death's door. One day they may appear healthy, the next they could be dead. Captive koalas have to be weighed daily to check that they are feeding properly. A sudden loss of weight is usually the only warning keepers have that their charge is ill. Only two keepers plus a vet were allowed to handle London Zoo's koalas, as these creatures are only comfortable with people they know. A request for the koala to be taken to meet the Queen was refused because of the distress this would have caused the marsupial. Sadly, London's Zoo no longer has a koala. Two years ago the female koala died of a cancer caused by a retrovirus. When they come into heat, female koalas become more active, and start losing weight, but after about sixteen days, heat ends and the weight piles back on. London's koala did not. Surgery revealed hundreds of pea-sized tumours.

Almost every zoo in Australia has koalas - the marsupial has become the Animal Ambassador of the nation, but nowhere outside Australia would handling by the public be allowed. Koala cuddling screams in the face of every rule of good care. First, some zoos allow koalas to be passed from stranger to stranger, many children who love to squeeze. Secondly, most people have no idea of how to handle the animals; they like to cling on to their handler, all in their own good time and use his or her arm as a tree. For such reasons, the Association of Fauna and Marine parks, an Australian conservation society is campaigning to ban koala cuddling. Policy on koala handling is determined by state government authorities. "And the largest of the numbers in the Australian Nature Conservation Agency, with the aim of instituting national guidelines. Following a wave of publicity, some zoos and wildlife parks have stopped turning their koalas into photo.

PART 1 — QUESTIONS

Questions 1-5

Choose the correct letter, A, B, c or D.

Write the correct letter.

1 The main reason why koala declined is that they are killed EXCEPT FOR

- **A** ◯ by poachers
- **B** ◯ by diseases they got
- **C** ◯ giving too many birth yet survived little!
- **D** ◯ accidents on the road

2 What can help koalas folly digest their food?

- **A** ◯ toxic substance in the leaves
- **B** ◯ organs that dissolve the fibres
- **C** ◯ remaining inactive for a period to digest
- **D** ◯ eating eucalyptus trees

3 What would koalas do when facing the dangerous situation?

- **A** ◯ show signs of being offended
- **B** ◯ counter attack furiously
- **C** ◯ use sharp claws to rip the man
- **D** ◯ use claws to grip the bark of trees.

4 In what ways Australian zoos exploit koalas?

- **A** ◯ encourage people to breed koalas as pets
- **B** ◯ allow tourists to hug the koalas
- **C** ◯ put them on the trees as a symbol

D ○ establish a koala campaign

5 What would the government do to protect koalas from being endangered?

A ○ introduce koala protection guidelines

B ○ close some of the zoos

C ○ encourage people to resist visiting the zoos

D ○ persuade the public to learn more knowledge

Questions 6-12

Do the following statements agree with the information given in Reading Passage 1

write

YES if the Statement is true

NO if the statement is false

NOT GIVEN if the information is not given in the passage

6 new coming human settlers caused danger to koalas.

A ○ YES

B ○ NO

C ○ NOT GIVEN

7 Koalas can still be seen in most of the places in Australia.

A ○ YES

B ○ NO

C ○ NOT GIVEN

8 it takes decade for the eucalyptus trees to recover after the fire.

A ○ YES

B ○ NO

C ○ NOT GIVEN

9 Koalas will fight each other when food becomes scarce.

A ○ YES

B ○ NO

C ○ NOT GIVEN

10 It is not easy to notice that koalas are ill.

A ○ YES

B ○ NO

C ○ NOT GIVEN

11 Koalas are easily infected with human contagious disease via cuddling

A ○ YES

B ○ NO

C ○ NOT GIVEN

12 Koalas like to hold a person's arm when they are embraced.

A ○ YES

B ○ NO

C ○ NOT GIVEN

Questions 13-13

Choose the correct letter, A, B, c or D.

Write the correct letter.

13 From your opinion this article written by

A ○ a journalist who write for magazine

B ○ a zoo keeper in London Zoo.

C ○ a tourist who traveling back from Australia

D ○ a government official who studies koalas to establish a law

PASSAGE 2

Antarctica - in from the cold? (Updated version)

A A little over a century ago, men of the ilk of Scott, Shackleton and Mawson battled against Antarctica's blizzards, cold and deprivation. In the name of Empire and in an age of heroic deeds they created an image of Antarctica that was to last well into the 20th century - an image of remoteness, hardship, bleakness and isolation that was the province of only the most courageous of men. The image was one of a place removed from everyday reality, of a place with no apparent value to anyone.

B As we enter the 21st century, our perception of Antarctica has changed. Although physically Antarctica is no closer and probably no warmer, and to spend time there still demands a dedication not seen in ordinary life, the continent and its surrounding ocean are increasingly seen to an integral part of Planet Earth, and a key component in the Earth System. Is this because the world seems a little smaller these days, shrunk by TV and tourism, or is it because Antarctica really does occupy a central spot on Earth's mantle? Scientific research during the past half century has revealed - and continues to reveal – that Antarctica's great mass and low temperature exert a major influence on climate and ocean circulation, factors which influence the lives of millions of people all over the globe.

C Antarctica was not always cold. The slow break-up of the super-continent Gondwana with the northward movements of Africa, South America, India and Australia eventually created enough space around Antarctica for the development of an Antarctic Circumpolar Current (ACC), that flowed from west to east under the influence of the prevailing westerly winds. Antarctica cooled, its vegetation perished, glaciation began and the continent took on its present-day appearance. Today the ice that overlies the bedrock is up to 4km thick, and surface temperatures as low as -89.2deg c have been recorded. The icy blast that howls over the ice cap and out to sea -the so-called katabatic wind - can reach 300 km/hr, creating fearsome wind chill effects.

D Out of this extreme environment come some powerful forces that reverberate around the world. The Earth's rotation, coupled to the generation of cells of low pressure off the Antarctic coast, would allow Astronauts a view of Antarctica that is as beautiful as it is awesome. Spinning away to the northeast, the cells grow and deepen, whipping up the Southern Ocean into the mountainous seas so respected by mariners. Recent work is showing that the temperature of the ocean may be a better predictor of rainfall in Australia than is the pressure difference between Darwin and Tahiti - the Southern Oscillation Index. By receiving more accurate predictions, graziers in northern Queensland are able to avoid overstocking in years when rainfall will be poor. Not only does this limit their losses but it prevents serious pasture degradation that may take decades to repair. CSIRO is developing this as a prototype forecasting system, but we can confidently predict that as we know more about the Antarctic and Southern Ocean we will be able to enhance and extend our predictive ability.

E The ocean's surface temperature results from the interplay between deepwater temperature, air temperature and ice. Each winter between 4 and 19 million square km of sea ice form,

locking up huge quantities of heat close to the continent. Only now can we start to unravel the influence of sea ice on the weather that is experienced in southern Australia. But in another way the extent of sea ice extends its influence far beyond Antarctica. Antarctic krill - the small shrimp-like crustaceans that are the staple diet for baleen whales, penguins, some seals, flighted sea birds and many fish - breed well in years when sea ice is extensive and poorly when it is not. Many species of baleen whales and flighted sea birds migrate between the hemispheres and when the krill are less abundant they do not thrive.

F The circulatory system of the world's oceans is like a huge conveyor belt, moving water and dissolved minerals and nutrients from one hemisphere to the other, and from the ocean's abyssal depths to the surface. The ACC is the longest current in the world, and has the largest flow. Through it, the deep flows of the Atlantic, Indian and Pacific Oceans are joined to form part of a single global thermohaline circulation. During winter, ahe howling katabatics sometimes scour the ice off patches of the sea's surface leaving large ice-locked lagoons, or 'polynyas'. Recent research has shown that as fresh sea ice forms, it is continuously stripped away by the wind and may be blown up to 90km in a single day. Since only fresh water freezes into ice, the water that remains becomes increasingly salty and dense, sinking until it spills over the continental shelf. Cold water carries more oxygen than warm water, so when it rises, well into the northern hemisphere, it reoxygenates and revitalises the ocean. The state of the northern oceans, and their biological productivity, owe much to what happens in the Antarctic.

PART 2 — QUESTIONS

Questions 14-18

The reading Passage has seven paragraphs A-F.

Which paragraph contains the following information?

Write the correct letter A-F.

	A	B	C	D	E	F
14 The example of research on weather prediction on agriculture	○	○	○	○	○	○
15 Antarctic sea ice brings life back to the world oceans' vitality.	○	○	○	○	○	○
16 A food chain that influence the animals living pattern based on Antarctic fresh sea ice	○	○	○	○	○	○
17 The explanation of how atmosphere pressure above Antarctica can impose effect on global climate change	○	○	○	○	○	○
18 Antarctica was once thought to be a forgotten and insignificant continent	○	○	○	○	○	○

Questions 19-21

Please match the natural phenomenon with correct determined factor. Choose the correct answer from the box; Write the correct letter A-F.

Globally, mass Antarctica's size and **19** _____ influence the climate change

20 _____ circulated under contributory force from wind blowing from the west

Southern Oscillation Index based on air pressure can predict **21** _____ in Australia

A. **Antarctic Circumpolar Current (ACC)** B. **katabatic winds** C. **rainfall**

D. **temperature** E. **glaciers** F. **pressure**

Questions 22-26

Choose the correct letter. A, B, c or D.

Write your answers.

22 In the paragraph B, the author want to tell which of the following truth about Antarctic?

- **A** ○ To show Antarctica has been a central topic of global warming in Mass media
- **B** ○ To illustrate its huge see ice brings food to million lives to places in the world
- **C** ○ To show it is the heart and its significance to the global climate and current
- **D** ○ To illustrate it locates in the central spot on Earth geographically

23 Why do Australian farmers keep an eye on the Antarctic ocean temperature?

- **A** ○ Help farmers reduce then economic or ecological losses
- **B** ○ Retrieve grassland decreased in the overgrazing process
- **C** ○ Prevent animal from dying
- **D** ○ A cell provides fertilizer for the grassland

24 What is the final effect of katabatic winds?

- **A** ○ Increase the moving speed of ocean current
- **B** ○ Increase salt level near ocean surface
- **C** ○ Bring fresh ice into southern oceans
- **D** ○ Pile up the mountainous ice cap respected by mariners

25 The break of the continental shelf is due to the

- **A** ○ Salt and density increase
- **B** ○ Salt and density decrease
- **C** ○ global warming resulting a rising temperature

D ○ fresh ice melting into ocean water

26 The decrease in number of Whales and seabirds is due to

A ○ killers whales are more active around

B ○ Sea birds are affected by high sea level salty

C ○ less sea ice reduces productivity of food source

D ○ seals fail to reproduce babies

PASSAGE 3

Language strategy In Multinational Company

A The importance of language management in multinational companies has never been greater than today. Multinationals are becoming ever more conscious of the importance of global coordination as a source of competitive advantage and language remains the ultimate barrier to aspirations of international harmonization. Before attempting to consider language management strategies, companies will have to evaluate the magnitude of the language barrier confronting them and in doing so they will need to examine it in three dimensions: the Language Diversity, the Language Penetration and the Language Sophistication. Companies next need to turn their attention to how they should best manage language. There is a range of options from which MNCs can formulate their language strategy.

B Lingua Franca: The simplest answer, though realistic only for English speaking companies, is to rely on ones native tongue. As recently as 1991 a survey of British exporting companies found that over a third used English exclusively in dealings with foreign customers. This attitude that “one language fits all” has also been carried through into the Internet age. A survey of the web sites of top American companies confirmed that over half made no provision for foreign language access, and another found that less than 10% of leading companies were able to respond adequately to emails other than in the company's language. Widespread though it is however, reliance on a single language is a strategy that is fatally flawed. It makes no allowance for the growing trend in Linguistic Nationalism whereby buyers in Asia, South America and the Middle East in particular are asserting their right to “work in the language of the customer". It also fails to recognize the increasing vitality of languages such as Spanish, Arabic and Chinese that overtime are likely to challenge the dominance of English as a lingua franca. In the IT arena it ignores the rapid globalization of the Internet where the number of English-language e-commerce transactions, emails and web sites, is rapidly diminishing as a percentage of the total. Finally, the total reliance on a single language puts the English speaker at risk in negotiations. Contracts, rules and legislation are invariably written in the local language, and a company unable to operate in that language is vulnerable.

C Functional Multilingualism: Another improvised approach to Language is to rely on what has been termed "Functional Multilingualism". Essentially what this means is to muddle through, relying on a mix of languages, pidgins and gestures to communicate by whatever means the parties have at their disposal. In a social context such a shared effort to make one another understand might be considered an aid to the bonding process with the frustration of communication being regularly punctuated by moments of absurdity and humor. However, as the basis for business negotiations it appears very hit-and-nuts. And yet Hagen's recent study suggests that 16% of international business transaction; are conducted in a "cocktail of languages." Functional Multilingualism shares the same defects as reliance on a lingua franca and increases the probability of cognitive divergence between the parties engaged in the communication.

D External Language Resources: A more rational and obvious response to the language barrier is to employ external resources such as translators and interpreters, and certainly there are many excellent companies specialized in these fields. However, such a response is by no means an end to the language barrier. For a start these services can be very expensive with a top Simultaneous Interpreter, commanding daily rates as high as a partner in an international consulting company. Secondly, any good translator or interpreter will insist that to be fully effective they must understand the context of the subject matter. This is not always possible. In some cases it is prohibited by the complexity or specialization of the topic. Sometimes by lack of preparation time but most often the obstacle is the reluctance of the parties to explain the wider context to an 'outsider". Another problem is that unless there has been considerable pre-explaining between the interpreter and his clients it is likely that there will be ambiguity and cultural overtones in the source messages the interpreter has to work with. They will of course endeavour to provide a hi-fidelity translation but in this circumstance the intelpreter has to use initiative and guess work. This clearly injects a potential source of misunderstanding into the proceedings. Finally while a good interpreter will attempt to convey not only the meaning but also the spirit of any communication, there can be no doubt that there is a loss of rhetorical power when communications go through a third party. So in situations requiring negotiation, persuasion, humor etc. the use of an interpreter is a poor substitute for direct communication.

E Training: The immediate and understandable reaction to any skills-shortage in a business is to consider personnel development and certainly the language training industry is well developed. Offering programs at almost every level and in numerous languages. However, without doubting the value of language training no company should be deluded into believing this to be assured of success. Training in most companies is geared to the economic cycle. When times are good, money is invested in training. When belts get tightened, training is one of the first "luxuries" to be pared down. In a study conducted across four European countries, nearly twice as many companies said they needed language training in coming years as had conducted training in past years. This disparity between "good intentions" and "actual delivery", underlines the problems of relying upon training for language skills. Unless the company is totally committed to sustaining the strategy even though bad times, it will fail.

F One notable and committed leader in the field of language training has been the Volkswagen Group. They have developed a language strategy over many years and in many respects can be regarded as a model of how to manage language professionally. However, the Volkswagen approach underlines that language training has to be considered a strategic rather than a tactical solution. In their system to progress from "basics" to "communications competence" in a language requires the completion of 6 language stages each one demanding approximately 90 hours of refresher course, supported by many more hours of self-study, spread over a 6-9 month period. The completion of each stage is marked by a post-stage achievement test, which is a pre-requisite for continued training. So even this professionally managed program expects a minimum of three years of fairly intensive study to produce an accountant. Engineer, buyer or salesperson capable of working effectively in a foreign language. Clearly companies intending to pursue this route need to do so with realistic expectations and with the intention of sustaining the program over many years. Except in terms of "brush-up" courses for people who were previously fluent in a foreign language, training cannot be considered a quick fix and

PART 3 — QUESTIONS

Questions 27-32

Complete the following summary of the Whole Paragraphs of Reading Passage, choosing A-L words from the following options.

MNCs often encounter language barrier in their daily strategy, then they seek several approaches to solve such problems. First, native language gives them a realistic base in a different language speaking country, but problem turned up when they deal with oversea **27** _____. For example, operation on translation of some key **28** _____, it is inevitable to generate differences by rules from different countries. Another way is to rely on a combination of spoken language and **29** _____, yet a report written that over one-tenth business **30** _____ processed in a party language setting. Third way: hire translators. However, firstly it is **31** _____, besides if they are not well-prepared, they have to resort to his/her own **32** _____ work.

A. **gestures** B. **clients** C. **transaction**

D. **understanding and assumption** E. **accurate** F. **documents**

G. **managers** H. **body language** I. **long-term** J. **effective** K. **rivals**

L. **costly**

Questions 33-39

Answer the questions below.

Choose NO MORE THAN THREE WORDS AND/OR A NUMBER from the passage for each answer.

33 What understandable reaction does Training pay attention to according to the author?

_____

34 In what term does the writer describe training during economy depression?

_____

35 What contribution does Volkswagen Group set up for multinational companies?

_____

36 What does Volkswagen Group consider language training as in their company?

_____

37 How many stages are needed from basic course to advanced in training? _____

38 How long does a refresher course (single stage) need normally? _____

39 At least how long is needed for a specific professional to acquire a foreign language?

_____

Questions 40-40

Choose the correct letter, A, B, c or D.

Write your answers.

40 What is the Main function of this passage?

- **A** ○ to reveal all kinds of language problems that companies may encounter
- **B** ○ to exhibits some well-known companies successfully dealing with language difficulties
- **C** ○ to evaluate various approaches for language barrier in multinational companies
- **D** ○ to testify that training is only feasible approach to solve language problem

Answer Key

#	Answer	Explanation
1	**C**	So the main problem to their survival is their slow reproductive rate – they produce only one baby a year over a reproductive lifespan of about nine years
2	**C**	To digest their food properly, koalas must sit still for 21 hours every day
3	**A**	If you upset a koala, it may blink or swallow, or hiccup
4	**B**	Australian zoos and wildlife parks have taken advantage of their uncomplaining attitudes, and charge visitors to be photographed hugging the furry bundles
5	**A**	Policy on koala handling is determined by state government authorities. “And the largest of the numbers in the Australian Nature Conservation Agency, with the aim of instituting national guidelines
6	**YES**	Their problem, however, has been man, more specifically, the white man. Koala and aborigine had co-existed peacefully for centuries
7	**NO**	Today koalas are found only in scattered pockets of southeast Australia, where they seem to be at risk on several fronts
8	**NO**	The koalas will be aided by the eucalyptus, which grows quickly and is already burgeoning forth after the fires
9	**NOT GIVEN**	The koala’s only food source, the eucalyptus tree has declined
10	**YES**	Koalas are stoic creatures and put on a brave face until they are at death’s door. One day they may appear healthy, the next they could be dead. Captive koalas have to be weighed daily to check that they are feeding properly. A sudden loss of weight is usually the only warning keepers have that their charge is ill
11	**NOT GIVEN**	Australian zoos and wildlife parks have taken advantage of their uncomplaining attitudes, and charge visitors to be photographed hugging the furry bundles. But people may not realise how cruel this is, but because of the koala’s delicate disposition, constant handling can push an already precariously balanced physiology over the edge
12	**YES**	Secondly, most people have no idea of how to handle the animals; they like to cling on to their handler, all in their own good time and use his or her arm as a tree

#	Answer	Explanation
13	**A**	In an ideal world, the life of an arboreal couch potato would be perfectly safe and acceptable
14	**D**	Recent work is showing that the temperature of the ocean may be a better predictor of rainfall in Australia than is the pressure difference between Darwin and Tahiti – the Southern Oscillation Index. By receiving more accurate predictions, graziers in northern Queensland are able to avoid overstocking in years when rainfall will be poor
15	**F**	Cold water carries more oxygen than warm water, so when it rises, well into the northern hemisphere, it reoxygenates and revitalises the ocean
16	**E**	Antarctic krill – the small shrimp-like crustaceans that are the staple diet for baleen whales, penguins, some seals, flighted sea birds and many fish – breed well in years when sea ice is extensive and poorly when it is not. Many species of baleen whales and flighted sea birds migrate between the hemispheres and when the krill are less abundant they do not thrive
17	**C**	created enough space around Antarctica for the development of an Antarctic Circumpolar Current (ACC), that flowed from west to east under the influence of the prevailing westerly winds. Antarctica cooled, its vegetation perished, glaciation began and the continent took on its present-day appearance
18	**A**	The image was one of a place removed from everyday reality, of a place with no apparent value to anyone
19	**D**	Scientific research during the past half century has revealed – and continues to reveal – that Antarctica's great mass and low temperature exert a major influence on climate and ocean circulation, factors which influence the lives of millions of people all over the globe
20	**A**	The slow break-up of the super-continent Gondwana with the northward movements of Africa, South America, India and Australia eventually created enough space around Antarctica for the development of an Antarctic Circumpolar Current (ACC), that flowed from west to east under the influence of the prevailing westerly winds
21	**C**	Recent work is showing that the temperature of the ocean may be a better predictor of rainfall in Australia than is the pressure difference between Darwin and Tahiti – the Southern Oscillation Index
22	**C**	Scientific research during the past half century has revealed – and continues to reveal – that Antarctica's great mass and low

#	Answer	Explanation
		temperature exert a major influence on climate and ocean circulation, factors which influence the lives of millions of people all over the globe
23	**A**	By receiving more accurate predictions, graziers in northern Queensland are able to avoid overstocking in years when rainfall will be poor. Not only does this limit their losses but it prevents serious pasture degradation that may take decades to repair
24	**C**	Recent research has shown that as fresh sea ice forms, it is continuously stripped away by the wind and may be blown up to 90km in a single day
25	**C**	Antarctica was not always cold
26	**C**	Antarctic krill – the small shrimp-like crustaceans that are the staple diet for baleen whales, penguins, some seals, flighted sea birds and many fish – breed well in years when sea ice is extensive and poorly when it is not. Many species of baleen whales and flighted sea birds migrate between the hemispheres and when the krill are less abundant they do not thrive
27	**B**	As recently as 1991 a survey of British exporting companies found that over a third used English exclusively in dealings with foreign customers
28	**F**	Contracts, rules and legislation are invariably written in the local language, and a company unable to operate in that language is vulnerable
29	**A**	Essentially what this means is to muddle through, relying on a mix of languages, pidgins and gestures to communicate by whatever means the parties have at their disposal
30	**C**	And yet Hagen's recent study suggests that 16% of international business transaction; are conducted in a "cocktail of languages."
31	**L**	For a start these services can be very expensive with a top Simultaneous Interpreter, commanding daily rates as high as a partner in an international consulting company
32	**D**	They will of course endeavour to provide a hi-fidelity translation but in this circumstance the intelpreter has to use initiative and guess work
33	**personnel development**	The immediate and understandable reaction to any skills-shortage in a business is to consider personnel development and certainly the language training industry is well developed

#	Answer	Explanation
34	**(the) (first) luxuries**	When times are good, money is invested in training. When belts get tightened, training is one of the first “luxuries” to be pared down
35	**a language strategy/a model**	They have developed a language strategy over many years and in many respects can be regarded as a model of how to manage language professionally
36	**strategic (solution)**	However, the Volkswagen approach underlines that language training has to be considered a strategic rather than a tactical solution
37	**6/6 language stages/6 stages / six/six language stages/six stages**	In their system to progress from “basics” to “communications competence” in a language requires the completion of 6 language stages
38	**90 hours/ninety hours**	each one demanding approximately 90 hours of refresher course
39	**three years/3 years / three years minimum/3 years minimum**	So even this professionally managed program expects a minimum of three years of fairly intensive study to produce an accountant. Engineer, buyer or salesperson capable of working effectively in a foreign language
40	**C**	There is a range of options from which MNCs can formulate their language strategy

Test 57

PASSAGE 1

Read the text below and answer questions 1-14.

THE ORIGIN OF WRITING

Writing was first invented by the Sumerians in ancient Mesopotamia before 3,000 BC. It was also independently invented in Meso-America before 600 BC and probably independently invented in China before 1,300 BC. It may have been independently invented in Egypt around 3,000 BC although given the geographical proximity between Egypt and Mesopotamia the Egyptians may have learnt writing from the Sumerians.

There are three basic types of writing systems. The written signs used by the writing system could represent either a whole word, a syllable or an individual sound. Where the written sign represents a word the system is known as logographic as it uses logograms which are written signs that represent a word. The earliest writing systems such as the Sumerian cuneiform, Egyptian hieroglyphics and Mayan glyphs are predominantly logographics as are modem Chinese and Japanese writing systems. Where the written sign represents a syllable the writing system is known as syllabic. Syllabic writing systems were more common in the ancient world than they are today. The Linear A and B writing systems of Minoan Crete and Mycenaean Greece are syllabic. The most common writing systems today are alphabetical. These involve the written sign (a letter) representing a single sound (known as a phoneme). The earliest known alphabetical systems were developed by speakers of semetic languages around 1700 BC in the area of modem day Israel and Palestine. All written languages will predominately use one or other of the above systems. They may however partly use the other systems. No written language is purely alphabetic, syllabic or logographic but may use elements from any or all systems.

Such fully developed writing only emerged after development from simplier systems. Talley sticks with notches on them to represent a number of sheep or to record a debt have been used in the past. Knotted strings have been used as a form of record keeping particularly in the area around the Pacific rim. They reached their greatest development with the Inca quipus where they were used to record payment of tribute and to record commercial transactions. A specially trained group of quipu makers and readers managed the whole system. The use of pictures for the purpose of communication was used by native Americans and by the Ashanti and Ewe people in Africa. Pictures can show qualities and characteristics which can not be shown by tally sticks and knot records. They do not however amount to writing as they do not bear a conventional relationship to language.

An alternative idea was that a system by which tokens, which represented objects like sheep, were placed in containers and the containers were marked on the outside indicating the number and type of tokens within the container gave rise to writing in Mesopotamia. The marks on the outside of the container were a direct symbolic representation of the tokens inside the

container and an indirect symbolic representation of the object the token represented. The marks on the outside of the containers were graphically identical to some of the earliest pictograms used in Sumerian cuneiform, the worlds first written language. However cuneiform has approximately 1,500 signs and the marks on the ouside of the containers can only explain the origins of a few of those signs.

The first written language was the Sumerian cuneiform. Writing mainly consisted of records of numbers of sheep, goats and cattle and quantites of grain. Eventually clay tablets were used as a writing surface and were marked with a reed stylus to produce the writing. Thousands of such clay tablets have been found in the Sumerian city of Uruk. The earliest Sumerian writing consists of pictures of the objects mentioned such as sheep or cattle. Eventually the pictures became more abstract and were to consist of straight lines that looked like wedges.

The earliest cuneiform was an accounting system consisting of pictograms representing commodities such as sheep and a number. The clay tablets found might for example simply state “ten sheep”. Such writing obviously has its limitations and would not be regarded as a complete writing system. A complete writing system only developed with the process of phonctization. This occurs when the symbol ceases to represent an object and begins to represent a spoken sound, which in early cuneiform would be a word. This process was assisted when the symbols which initally looked very like the object they represented gradually became more abstract and less clearly related to an object. However while the symbol became more closely connected to words, it was words dealing with objects, such as sheep, bird or pot. It was still not possible to write more abstract ideas such as father, running, speech or foreigner.

The solution to this problem was known as the rebus principle. Words with the same or similar pronuciation to an abstract word could be used to represent the abstract word. The sign for eye could be used to represent the word “I”. The sign for deer could represent the word “dear”. Which word is referred to by the picture is decided by an additional sign. Pictographs which originally represented a word began to represent the sound of the word. The rebus principle is used to represent abstract words in all word writing systems in Sumer, Egypt, China and in the Aztec and Mayan writing in central America.

The Rebus principle lead to cuneiform becoming a form of logo-syllabic writing consisting of both logograms and syllabic writing. The effect of the change from logographic to logo-syllabic writing was substantial. Logographic writing cannot produce normal prose and is resticted to nouns, numbers, names and adjectives. The vast majority of early Sumerian writing consisted of bureaucratic records of products received or products distributed. Only when syllabic writing was introduced into cuneiform did it become possible to write prose such as myths and royal propaganda.

The next major development in writing in the old world was the development of the alphabet. The alphabet was developed out of Egyptian hieroglyphs which contained 24 signs for 24 Egyptian consonants. About 1700 BC Semites who knew Egyptian hieroglyphs began making certain changes in their writing system. They put the letters in a particular sequence and gave them simple names to assist learning and ease of memory. They also dropped the logograms and other signs used in hieroglyphs and just kept the Egyptian consonants and resticted the signs to those for individual consonants. Finally, they introduced vowels into their alphabet.

Alphabets were soon to spread over most of the world as they provide both flexibility and simplicity for a writing system.

PART 1 — QUESTIONS

Questions 1-3

Complete the summary below.

Choose NO MORE THAN TWO WORDS from the passage for each answer.

There are three types of writing systems. Logography utilizes written signs representing a **1** _____. Syllabic writing systems were more common in the ancient world, as they adopt written sign symbolizing a **2** _____. The most common alphabetical systems use a letter to represent a **3** _____.

Questions 4-10

Do the following statements agree with the information given in Reading Passage 1?

TRUE if the statement is true

FALSE if the statement is false

NOT GIVEN if the information is not given in the passage

4 There is no language that adopts elements from only one writing system.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

5 Inca quipus used talley sticks to track payments and commercial transactions.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

6 The marks on the outside of the containers originated from pictograms used in Sumerian cuneiform.

- **A** ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

7 The first written language was created to document the quantities and types of livestock and food.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

8 Cuneiform could not express abstract concepts at all.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

9 Affected by the rebus principle, cuneiform combined the elements of both logograms and syllabic writing.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

10 Most countries adopt alphabetical writing systems due to their flexibility and simplicity.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

Questions 11-14

Use the information in the passage to match the options (listed A - E) with statements below.

NB Some options may match more than one statement.

A. Egyptians

B. Native Americans

C. Semites

D. Chinese

E. Sumerians

	A	B	C	D	E
11 developed the alphabet from Egyptian hieroglyphs.	○	○	○	○	○
12 used pictures for the purpose of communication.	○	○	○	○	○
13 invented a written language which consisted of signs looked like wedges.	○	○	○	○	○
14 might have independently invented writing 5,000 years ago.	○	○	○	○	○

PASSAGE 2

Read the text below and answer questions 15-27.

Aqua product: New Zealand's Igae Biodiesel

A. The world's first wild algae biodiesel produced in New Zealand by Aquaflow Bionomic Corporation, was successfully test driven in Wellington by the Minister for Energy and Climate Change Issues, David Parker. In front of a crowd of invited guests, media and members of the public, the Minister filled up a diesel-powered Land Rover with Aquaflow B5 blend bio-diesel and then drove the car around the forecourt of Parliament Buildings in Central Wellington. Green Party co-leader, Jeanette Fitzsimons was also on board. Marlborough-based Aquaflow announced in May 2006 that it had produced the world's first bio-diesel derived from wild microalgae sourced from local sewage ponds.

B. "We believe we are the first company in the world to test drive a car powered by wild algae-based biodiesel. This will come as a surprise to some international bio-diesel industry people who believe that this break-through is still years away" explains Aquaflow spokesperson Barrie Leay. "A bunch of inventive Kiwis, and an Aussie, have developed this fuel in just over a year", he comments. "This is a huge opportunity for New Zealand and a great credit to the team of people who saw the potential in this technology from day one."

C. Bio-diesel based on algae could eventually become a sustainable, low cost, cleaner burning fuel alternative for New Zealand, powering family cars, trucks, buses and boats. It can also be used for other purposes such as heating or distributed electricity generation. There is now a global demand for billions of litres of biodiesel per year. Algae are also readily available and produced in huge volumes in nutrient rich waste streams such as at the settling ponds of Effluent Management Systems (EMS). It is a renewable indigenous resource ideally suited to the production of fuel and other useful by-products. The breakthrough comes after technology start-up, Aquaflow, agreed to undertake a pilot with Marlborough District Council late last year to extract algae from the settling ponds of its EMS based in Blenheim. By removing the main contaminant to use as a fuel feedstock, Aquaflow is also helping clean up the council's water discharge - a process known as bio-remediation. Dairy farmers, and many food processors too, can benefit in similar ways by applying the harvesting technology to their nutrient- rich waste streams.

D. Blended with conventional mineral diesel, bio-diesel can run vehicles without the need for vehicle modifications. Fuel derived from algae can also help meet the Government B5 (5% blended) target, with the prospect of this increasing over time as bio-fuel production increases. "Our next step is to increase capacity to produce one million litres of bio-diesel from the Marlborough sewerage ponds over the next year" says Leay. Aquaflow will launch a prospectus pre-Christmas as the company has already attracted considerable interest from potential investors. The test drive bio-diesel was used successfully in a static engine test at Massey University's Wellington campus on Monday, December 11.

E. Today Algae are used by humans in many ways; for example, as fertilizers, soil conditioners and livestock feed. Aquatic and microscopic species are cultured in clear tanks or ponds and are either harvested or used to treat effluents pumped through the ponds. Algaculture on a large scale is an important type of aquaculture in some places. Naturally growing seaweeds are an important source of food, especially in Asia. They provide many vitamins including: A, B, B2, B6, niacin and c, and are rich in iodine, potassium, iron, magnesium and calcium. In addition commercially cultivated microalgae, including both Algae and Cyan-bacteria, are marketed as nutritional supplements, such as Spirulina Chlorella and the Vitamin-C supplement, Dunaliella, high in beta-carotene. Algae are national foods of many nations: China consumes more than 70 species, including choy, a cyano-bacterium considered a vegetable; Japan, over 20 species. The natural pigments produced by algae can be used as an alternative to chemical dyes and coloring agents.

F. Algae are the simplest plant organisms that convert sunlight and carbon dioxide in the air around us into stored energy through the well understood process of photosynthesis. Algae are rich in lipids and other combustible elements and Aquaflow is developing technology that will allow these elements to be extracted in a cost effective way. The proposed process is the subject of a provisional patent. Although algae are good at taking most of the nutrients out of sewage, too much algae can taint the water and make it smell. So, councils have to find a way of cleaning up the excess algae in their sewerage outflows and then either dispose of it or find alternative uses for it. And that’s where Aquaflow comes in.

G. Unlike some bio-fuels which require crops to be specially grown and thereby compete for land use with food production, and use other scarce resources of fuel, chemicals and fertiliser, the source for algae-based biodiesel already exists extensively and the process produces a sustainable net energy gain by capturing free solar energy from the sun.

PART 2 — QUESTIONS

Questions 15-19

Which paragraphs stale the following information?

You may use any letter more than once

	A	B	C	D	E	F	G
15 It is unnecessary to modify vehicles driven by bio-diesel.	○	○	○	○	○	○	○
16 Some algae are considered edible plants.	○	○	○	○	○	○	○
17 Algae could be part of a sustainable and recycled source.	○	○	○	○	○	○	○
18 Algae bio-diesel is superior to other bio-fuels in lot a ways.	○	○	○	○	○	○	○
19 overgrown algea also can be a potential threat to environment	○	○	○	○	○	○	○

Questions 20-24

Complete the following summary of the paragraphs of Reading Passage, using more than two words from the Reading Passage for each answer.

Bio-diesel based on algae could become a substitute for **20** _____ in New Zealand. It could be used for **21** _____ vehicles such as cars and boats. As a result, billions of litres of bio-diesel are required world wide each year. Algae can be obtained from **22** _____ with nutrient materials. With the technology breakthrough, algae are extracted and the **23** _____ is removed from the settling ponds. Dairy farmers, and many food processors can adopt such **24** _____ technology.

Questions 25-27

Choose words from the passage to answer the questions. Write NO MORE THAN THREE WORDS AND/OR A NUMBER for each answer.

25 What environmental standard would bio-diesel vehicles are to meet? _____

26 What is to do as the immediate plan for coming years for Aquaflow? _____

27 Through what kind of process do algae obtain and store energy? _____

PASSAGE 3

Read the text below and answer questions 28-40.

British Architecture 2

A. Architecture is about evolution, not revolution. It used to be thought that once the Romans pulled out of Britain in the fifth century, their elegant villas, carefully-planned towns and engineering marvels like Hadrian's Wall simply fell into decay as British culture was plunged into the Dark Ages. It took the Norman Conquest of 1066 to bring back the light, and the gothic cathedral-builders of the Middle Ages played an important part in the revival of British culture. However, the truth is not as simple as that Romano-British culture - and that included architecture along with language, religion, political organization and the arts - survived long after the Roman withdrawal. And although the Anglo-Saxons had a sophisticated building style of their own, little survives to bear witness to their achievements as the vast majority of Anglo-Saxon buildings were made of wood.

B. Even so, the period between the Norman landing at Pevensey in 1066 and the day in 1485 when Richard III lost his horse and his head at Bosworth, ushering in the Tudors and the Early Modern period, marks a rare flowering of British building. And it is all the more remarkable because the underlying ethos of medieval architecture was 'fitness for purpose'. The great cathedrals and parish churches that lifted up their towers to heaven were not only acts of devotion in stone; they were also fiercely functional buildings. Castles served their particular purpose and their battlements and turrets were for use rather than ornament. In a sense, the buildings of the 16th century were also governed by fitness for purpose - only now, the purpose was very different. In domestic architecture, in particular, buildings were used to display status and wealth.

C. This stately and curious workmanship showed itself in various ways. A greater sense of security led to more outward-looking buildings, as opposed to the medieval arrangement where the need for defense created houses that faced inward onto a courtyard or series of courtyards. This allowed for much more in the way of exterior ornament. The rooms themselves tended to be bigger and lighter - as an expensive commodity, the use of great expanses of glass was in itself a statement of wealth. There was also a general move towards balanced and symmetrical exteriors with central entrances.

D. With the exception of Inigo Jones (1573-1652), whose confident handling of classical detail and proportion set him apart from all other architects of the period, most early 17th century buildings tended to take the innocent exuberance of late Tudor work one step further. But during the 1640s and 50s the Civil War and its aftermath sent many gentlemen and nobles to the Continent either to escape the fighting or, when the war was lost, to follow Charles II into exile. There they came into contact with French, Dutch and Italian architecture and, with Charles's restoration in 1660, there was a flurry of building activity as royalists reclaimed their property and built themselves houses reflecting the latest European trends. The British Baroque was a reassertion of authority, an expression of absolutist ideology by men who remembered a world turned upside down during the Civil War. The style is heavy and rich, sometimes

overblown and melodramatic. The politics which underpin it are questionable, but its products are breathtaking.

E. The huge glass-and-iron Crystal Palace, designed by Joseph Paxton to house the Great Exhibition of 1851, shows another strand to 19th century architecture - one which embraced new industrial processes. But it wasn't long before even this confidence in progress came to be regarded with suspicion. Mass production resulted in buildings and furnishings that were too perfect, as the individual craftsman no longer had a major role in their creation. Railing against the dehumanising effects of industrialisation, reformers like John Ruskin and William Morris made a concerted effort to return to hand-crafted, pre-industrial manufacturing techniques. Morris's influence grew from the production of furniture and textiles, until by the 1880s a generation of principled young architects was following his call for good, honest construction.

F. The most important trends in early 20th century architecture simply passed Britain by. Whilst Gropius was working on cold, hard expanses of glass, and Le Corbusier was experimenting with the use of reinforced concrete frames, we had staid establishment architects like Edwin Lutyens producing Neo-Georgian and Renaissance country houses for an outmoded landed class. In addition there were slightly batty architect-craftsmen, the heirs of William Morris, still trying to turn the clock back to before the Industrial Revolution by making chairs and spurning new technology. Only a handful of Modern Movement buildings of any real merit were produced here during the 1920s and 1930s, and most of these were the work of foreign architects such as Serge Chermayeff, Berthold Lubetkin and Erno Goldfinger who had settled in this country.

G. After the Second World War the situation began to change. The Modern Movement's belief in progress and the future struck a chord with the mood of post-war Britain and, as reconstruction began under Attlee's Labour government in 1945, there was a desperate need for cheap housing which could be produced quickly. The use of prefabricated elements, metal frames, concrete cladding and the absence of decoration - all of which had been embraced by Modernists abroad and viewed with suspicion by the British -were adopted to varying degrees for housing developments and schools. Local authorities, charged with the task of rebuilding city center, became important patrons of architecture. This represented a shift away from the private individuals who had dominated the architectural scene for centuries.

H. Since the War it has been corporate bodies like these local authorities, together with national and multinational companies, and large educational institutions, which have dominated British architecture. By the late 1980s the Modern Movement, unfairly blamed for the social experiments implicit in high-rise housing, had lost out to irony and spectacle in the shape of post-modernism, with its cheerful borrowings from anywhere and any period. But now, in the new Millennium, even post-modernism is showing signs of age. What comes next? Post-post-modernism?

PART 3 — QUESTIONS

Questions 28-34

Complete the sentences below.

Choose NO MORE THAN THREE WORDS from the passage for each answer.

- The Anglo-Saxon architecture failed to last because the buildings were constructed in **28** _____.
- Different from the medieval architecture, the buildings of the 16th century represents **29** _____.
- The costly glass was applied widely as an **30** _____ in that years
- Inigo Jones was skilled at handling **31** _____ style.
- William Morris favored the production of **32** _____ made in pre-industrial manufacturing techniques.
- The architects such as **33** _____ provided the landlord with conservative houses.
- After World War Two, the architect commission shifted from individual to **34** _____.

Questions 35-40

Choose the correct letter, A, B, C or D.

35 The feature of medieval architecture was

- **A** ○ immense
- **B** ○ useful
- **C** ○ decorative
- **D** ○ bizarre

36 What contributes to the outward-looking buildings in the 16th century?

- **A** ○ safety
- **B** ○ beauty

C ○ quality

D ○ technology

37 Why were the buildings in the 1660s influenced by the latest European trends?

A ○ Because the war was lost.

B ○ Because the craftsman came from all over the Europe,

C ○ Because the property belongs to the gentlemen and nobles.

D ○ Because the monarch came back from the continent.

38 What kind of sense did the British Baroque imply?

A ○ tough

B ○ steady

C ○ mild

D ○ conservative

39 The individual craftsman was no more the key to creation for the appearance of

A ○ Crystal Palace

B ○ preindustrial manufacturing return

C ○ industrial process in scale

D ○ ornament

40 The building style changed after World War Two as a result of

A ○ abundant materials

B ○ local authority

C ○ shortage of cheap housing

D ○ conservative views

Answer Key

#	Answer	Explanation
1	**Word**	Where the written sign represents a word the system is known as logographic as it uses logograms which are written signs that represent a word
2	**Syllable**	Where the written sign represents a syllable the writing system is known as syllabic
3	**Single sound/ phoneme**	The most common writing systems today are alphabetical. These involve the written sign (a letter) representing a single sound (known as a phoneme)
4	**TRUE**	No written language is purely alphabetic, syllabic or logographic but may use elements from any or all systems
5	**FALSE**	Knotted strings have been used as a form of record keeping particularly in the area around the Pacific rim. They reached their greatest development with the Inca quipus where they were used to record payment of tribute and to record commercial transactions
6	**NOT GIVEN**	The marks on the outside of the containers were graphically identical to some of the earliest pictograms used in Sumerian cuneiform, the worlds first written language
7	**TRUE**	The first written language was the Sumerian cuneiform. Writing mainly consisted of records of numbers of sheep, goats and cattle and quantites of grain
8	**FALSE**	The rebus principle is used to represent abstract words in all word writing systems in Sumer, Egypt, China and in the Aztec and Mayan writing in central America
9	**TRUE**	The Rebus principle lead to cuneiform becoming a form of logo-syllabic writing consisting of both logograms and syllabic writing
10	**NOT GIVEN**	Alphabets were soon to spread over most of the world as they provide both flexibility and simplicity for a writing system
11	**C**	The alphabet was developed out of Egyptian hieroglyphs which contained 24 signs for 24 Egyptian consonants. About 1700 BC Semites who knew Egyptian hieroglyphs began making certain changes in their writing system
12	**B**	The use of pictures for the purpose of communication was used by native Americans and by the Ashanti and Ewe people in Africa

#	Answer	Explanation
13	**E**	The earliest Sumerian writing consists of pictures of the objects mentioned such as sheep or cattle. Eventually the pictures became more abstract and were to consist of straight lines that looked like wedges
14	**A**	It may have been independently invented in Egypt around 3,000 BC although given the geographical proximity between Egypt and Mesopotamia the Egyptians may have learnt writing from the Sumerians
15	**D**	Blended with conventional mineral diesel, bio-diesel can run vehicles without the need for vehicle modifications
16	**E**	Algae are national foods of many nations: China consumes more than 70 species, including choy, a cyano-bacterium considered a vegetable; Japan, over 20 species
17	**C**	Bio-diesel based on algae could eventually become a sustainable, low cost, cleaner burning fuel alternative for New Zealand, powering family cars, trucks, buses and boats. It can also be used for other purposes such as heating or distributed electricity generation. There is now a global demand for billions of litres of biodiesel per year. Algae are also readily available and produced in huge volumes in nutrient rich waste streams such as at the settling ponds of Effluent Management Systems (EMS). It is a renewable indigenous resource ideally suited to the production of fuel and other useful by-products
18	**G**	Unlike some bio-fuels which require crops to be specially grown and thereby compete for land use with food production, and use other scarce resources of fuel, chemicals and fertiliser, the source for algae-based biodiesel already exists extensively and the process produces a sustainable net energy gain by capturing free solar energy from the sun
19	**F**	Although algae are good at taking most of the nutrients out of sewage, too much algae can taint the water and make it smell
20	**(burning) fuel**	Bio-diesel based on algae could eventually become a sustainable, low cost, cleaner burning fuel alternative for New Zealand, powering family cars, trucks, buses and boats
21	**powering**	Bio-diesel based on algae could eventually become a sustainable, low cost, cleaner burning fuel alternative for New Zealand, powering family cars, trucks, buses and boats
22	**waste streams**	Algae are also readily available and produced in huge volumes in nutrient rich waste streams such as at the settling ponds of Effluent Management Systems (EMS)

#	Answer	Explanation
23	**contaminant/main contaminant**	By removing the main contaminant to use as a fuel feedstock, Aquaflow is also helping clean up the council's water discharge – a process known as bio-remediation
24	**harvesting**	Dairy farmers, and many food processors too, can benefit in similar ways by applying the harvesting technology to their nutrient- rich waste streams
25	**Goverment B5**	Fuel derived from algae can also help meet the Government B5 (5% blended) target, with the prospect of this increasing over time as bio-fuel production increases
26	**increase capacity**	"Our next step is to increase capacity to produce one million litres of bio-diesel from the Marlborough sewerage ponds over the next year" says Leay
27	**photosynthesis**	Algae are the simplest plant organisms that convert sunlight and carbon dioxide in the air around US into stored energy through the well understood process of photosynthesis
28	**wood**	And although the Anglo-Saxons had a sophisticated building style of their own, little survives to bear witness to their achievements as the vast majority of Anglo-Saxon buildings were made of wood
29	**status and weath**	In a sense, the buildings of the 16th century were also governed by fitness for purpose – only now, the purpose was very different. In domestic architecture, in particular, buildings were used to display status and wealth
30	**expensive commodity**	as an expensive commodity, the use of great expanses of glass was in itself a statement of wealth
31	**classical**	With the exception of Inigo Jones (1573-1652), whose confident handling of classical detail and proportion set him apart from all other architects of the period, most early 17th century buildings tended to take the innocent exuberance of late Tudor work one step further
32	**furniture and textiles**	reformers like John Ruskin and William Morris made a concerted effort to return to hand-crafted, pre-industrial manufacturing techniques. Morris's influence grew from the production of furniture and textiles
33	**Edwin Lutyens**	we had staid establishment architects like Edwin Lutyens producing Neo-Georgian and Renaissance country houses for an outmoded landed class
34	**local authorities**	Local authorities, charged with the task of rebuilding city center, became important patrons of architecture. This represented a shift away from the private individuals who had dominated the architectural scene for centuries

#	Answer	Explanation
35	**B**	And it is all the more remarkable because the underlying ethos of medieval architecture was ‘fitness for purpose’. The great cathedrals and parish churches that lifted up their towers to heaven were not only acts of devotion in stone; they were also fiercely functional buildings. Castles served their particular purpose and their battlements and turrets were for use rather than ornament
36	**A**	A greater sense of security led to more outward-looking buildings, as opposed to the medieval arrangement where the need for defense created houses that faced inward onto a courtyard or series of courtyards
37	**D**	There they came into contact with French, Dutch and Italian architecture and, with Charles’s restoration in 1660, there was a flurry of building activity as royalists reclaimed their property and built themselves houses reflecting the latest European trends
38	**A**	The British Baroque was a reassertion of authority, an expression of absolutist ideology by men who remembered a world turned upside down during the Civil War. The style is heavy and rich, sometimes overblown and melodramatic
39	**C**	Mass production resulted in buildings and furnishings that were too perfect, as the individual craftsman no longer had a major role in their creation
40	**C**	After the Second World War the situation began to change. The Modern Movement’s belief in progress and the future struck a chord with the mood of post-war Britain and, as reconstruction began under Attlee’s Labour government in 1945, there was a desperate need for cheap housing which could be produced quickly

Test 58

PASSAGE 1

Read the text below and answer questions 1-13.

Radio Automation forerunner of the integrated circuit

Today they are everywhere. Production lines controlled by computers and operated by robots. There's no chatter of assembly workers, just the whirr and click of machines. In the mid-1940s, the workerless factory was still the stuff of science fiction. There were no computers to speak of and electronics was primitive. Yet hidden away in the English countryside was a highly automated production line called ECME, which could turn out 1500 radio receivers a day with almost no help from human hands.

A John Sargrove, the visionary engineer who developed the technology, was way ahead of his time. For more than a decade, Sargrove had been trying to figure out how to make cheaper radios. Automating the manufacturing process would help. But radios didn't lend themselves to such methods: there were too many parts to fit together and too many wires to solder. Even a simple receiver might have 30 separate components and 80 hand-soldered connections. At every stage, things had to be tested and inspected. Making radios required highly skilled labour —and lots of it.

B In 1944, Sargrove came up with the answer. His solution was to dispense with most of the fiddly bits by inventing a primitive chip—a slab of Bakelite with all the receiver's electrical components and connections embedded in it. This was something that could be made by machines, and he designed those too. At the end of the war, Sargrove built an automatic production line, which he called ECME (electronic circuit-making equipment), in a small factory in Effingham, Surrey.

C An operator sat at one end of each ECME line, feeding in die plates. She didn't need much skill, only quick hands. From now on, everything was controlled by electronic switches and relays. First stop was the sandblaster, which roughened the surface of the plastic BO that molten metal would stick to it The plates were then cleaned to remove any traces of grit The machine automatically checked that the surface was rough enough before sending the plate to the spraying section. There, eight nozzles rotated into position and sprayed molten zinc over both sides of the plate. Again, the nozzles only began to spray when a plate was in place. The plate whizzed on. The next stop was the milling machine, which ground away the surface layer of metal to leave the circuit and other components in the grooves and recesses. Now the plate was a composite of metal and plastic. It sped on to be lacquered and have its circuits tested. By the time it emerged from the end of the line, robot hands had fitted it with sockets to attach components such as valves and loudspeakers. When ECME was working flat out; the whole process took 20 seconds.

D ECME was astonishingly advanced. Electronic eyes, photocells that generated a small current when a panel arrived, triggered each step in the operation, BO avoiding excessive wear and tear on the machinery. The plates were automatically tested at each stage as they moved along the conveyor. And if more than two plates in succession were duds, the machines were automatically adjusted—or if necessary halted In a conventional factory, I workers would test faulty circuits and repair them. But Sargrove's assembly line produced circuits so cheaply they just threw away the faulty ones. Sargrove’s circuit board was even more astonishing for the time. It predated the more familiar printed circuit, with wiring printed on aboard, yet was more sophisticated. Its built-in components made it more like a modem chip.

E When Sargrove unveiled his invention at a meeting of the British Institution of Radio Engineers in February 1947, the assembled engineers were impressed. So was the man from The Times. ECME, he reported the following day, "produces almost without human labour, a complete radio receiving set. This new method of production can be equally well applied to television and other forms of electronic apparatus.

F The receivers had many advantages over their predecessors, wit components they were more robust. Robots didn't make the sorts of mistakes human assembly workers sometimes did. "Wiring mistakes just cannot happen," wrote Sargrove. No wires also meant the radios were lighter and cheaper to ship abroad. And with no soldered wires to come unstuck, the radios were more reliable. Sargrove pointed out that the circuit boards didn't have to be flat. They could be curved, opening up the prospect of building the electronics into the cabinet of Bakelite radios.

G Sargrove was all for introducing this type of automation to other products. It could be used to make more complex electronic equipment than radios, he argued. And even if only part of a manufacturing process were automated, the savings would be substantial. But while his invention was brilliant, his timing was bad. ECME was too advanced for its own good. It was only competitive on huge production runs because each new job meant retooling the machines. But disruption was frequent. Sophisticated as it was, ECME still depended on old-fashioned electromechanical relays and valves—which failed with monotonous regularity. The state of Britain's economy added to Sargrove's troubles. Production was dogged by power cuts and post-war shortages of materials. Sargrove's financial backers began to get cold feet.

H There was another problem Sargrove hadn't foreseen. One of ECME's biggest advantages—the savings on the cost of labour—also accelerated its downfall. Sargrove's factory had two ECME production lines to produce the two c ŭ cuits needed for each radio. Between them these did what a thousand assembly workers would otherwise have done. Human hands were needed only to feed the raw material in at one end and plug the valves into then sockets and fit the loudspeakers at the other. After that, the only job left was to fit the pair of Bakelite panels into a radio cabinet and check that it worked.

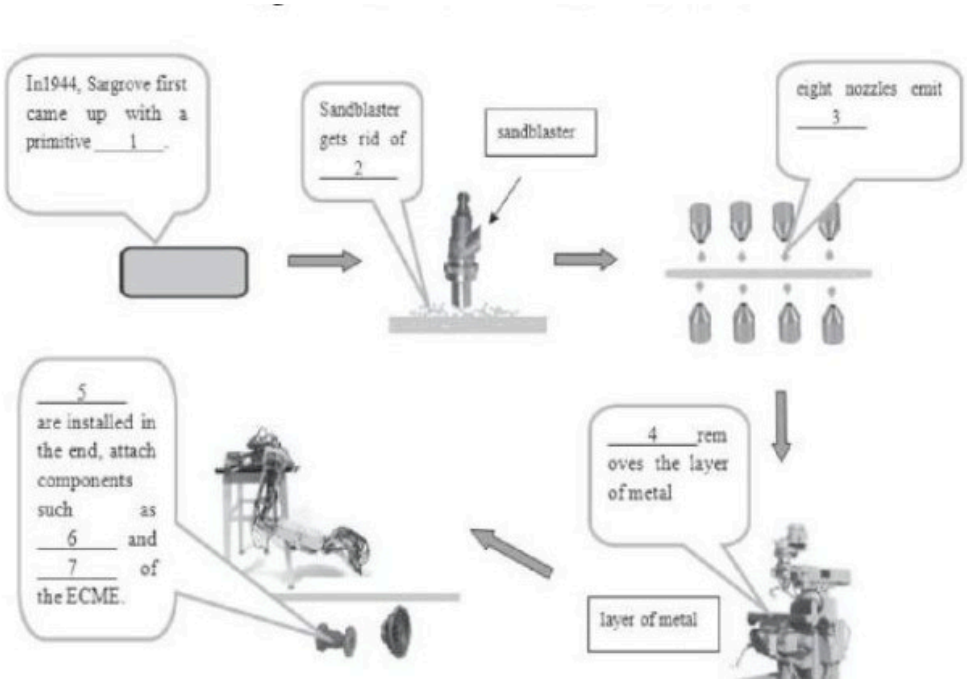
I Sargrove saw automation as the way to solve post-war labour shortages. With somewhat Utopian idealism, he imagined his new technology would free people from boring, repetitive jobs on the production line and allow them to do more interesting work. "Don't get the idea that we are out to rob people of then jobs," he told the Daily Mnror. "Our task is to liberate men and women from being slaves of machines."

J The workers saw things differently. They viewed automation in the same light as the everlasting light bulb or the suit that never wears out—as a threat to people's livelihoods. If automation spread, they wouldn't be released to do more exciting jobs. They'd be released to join the dole queue. Financial backing for ECME fizzled out. The money dried up. And Britain lost its lead in a technology that would transform industry just a few years later.

PART 1 — QUESTIONS

Questions 1-7

Complete the following chart of the paragraphs of Reading Passage, using no more than two words from the Reading Passage for each answer.



1 _____

2 _____

3 _____

4 _____

5 _____

6 _____

7 _____

Questions 8-11

Complete the following summary of the paragraphs of Reading Passage, using one word from the Reading Passage for each answer.

Sargrove had been dedicated to create a **8** _____ radio by automation of manufacture. The old version of radio had a large number of independent **9** _____. After this innovation made, wireless-style radios became **10** _____ and inexpensive to export oversea. As the Sargrove saw it, the real benefit of ECME's radio was that it reduced **11** _____ of manual work; which can be easily copied to other industries of manufacturing electronic devices.

Questions 12-13

Choose the correct letter A, B, C or D.

12 What were workers attitude towards ECME Model initialy

- **A** ○ anxious
- **B** ○ welcoming
- **C** ○ boring
- **D** ○ inspiring

13 What is the main idea of this passage?

- **A** ○ approach to reduce the price of radio
- **B** ○ a new generation of fully popular products and successful business
- **C** ○ application of die automation in the early stage
- **D** ○ ECME technology can be applied in many product fields

PASSAGE 2

Read the text below and answer questions 14-26.

Bestcom CONSIDERATE COMPUTING

A "YOUR BATTERY IS NOW FULLY CHARGED," ANNOUNCED THE LAPTOP COMPUTER to its owner, Donald A. Norman, with enthusiasm—perhaps even a hint of pride? in its synthetic voice. To be sure, distractions and multitasking are hardly new to the human condition. "A complicated life, continually interrupted by competing requests for attention, is as old as procreation," laughs Ted Selker of the Massachusetts Institute of Technology Media Lab. But increasingly, it is not just our kids pulling us three ways at once; it is also a relentless barrage of e-mail, alerts, alarms, calls, instant messages and automated notifications, none of them coordinated and all of them oblivious to whether we are busy—or even present. "It's ridiculous that my own computer can't figure out whether I'm in front of it, but a public toilet can," exclaims Roel Vertegaal of Queen's University in Ontario.

B Humanity has connected itself through roughly three billion networked telephones, computers, traffic lights— even refrigerators and picture frames— because these things make life more convenient and keep US available to those we care about. So although we could simply turn off the phones, close the e-mail program, and shut the office door when it is time for a meeting or a stretch of concentrated work, we usually don't. We just endure the consequences.

C Numerous studies have shown that when people are unexpectedly interrupted, they not only work less efficiently but also make more mistakes. "It seems to add cumulatively to a feeling of frustration," Picard reports, and that stress response makes it hard to regain focus. It isn't merely a matter of productivity and the pace of life. For pilots, drivers, soldiers and doctors, errors of inattention can be downright dangerous. "If we could just give our computers and phones some understanding of the limits of human attention and memory, it would make them seem a lot more thoughtful and courteous," says Eric Horvitz of Microsoft Research. Horvitz, Vertegaal, Selker and Picard are among a small but growing number of researches trying to teach computers, phones, care and other gadgets to behave less like egocentric oafs and more likeconsiderate colleagues.

D "Attentive" computing systems have begun appearing in newer Volvos and IBM has introduced Websphere communications software with a basic busyness sense. Microsoft has beat running extensive in-house tests of a much more sophisticated system since 2003. Within a few years, companies may be able to offer every office worker a software version of the personal receptionist that only comer-suite executives enjoy today. But if such an offer should land in your inbox, be sure to read the print before you sign. An attentive system, by definition, is one that Ì B always watching. That considerate computer may come to know more about your work habits than you do.

E Most people aren't as busy as they think they are, which is why we can usually tolerate interruptions from our inconsiderate electronic paraphernalia. James Fogarty and Scott E.

Hudson of Carnegie Mellon University recently teamed up with Jennifer Lai of IBM Research to study 10 managers, researchers and interns at work. They videotaped the subjects and periodically had them rate then “interruptibility.” The amount of time the workers spent in leave-me-alone mode varied from person to person and day to day, ranging from 10 to 51 percent. On average, the subjects wanted to work without interruption about one third of the time. In studies of Microsoft employees, Horvitz has similarly found that they typically spend more than 65 percent of theft day in a state of low attention.

F Today’s phones and computers, winch naively assume that die user is never too busy to take a call, read an email, or click “OK” on an alert box, thus are probably correct about two thirds of time. To be useful, then, considerate systems will have to be more than 65 percent accurate in sensing when their users are near theft cognitive limits.

G Bestcom/Enhanced Telephony, a Microsoft prototype based on Horvitz’s weak, digs a little deeper into each user’s computer to find clues about what they are up to. Microsoft launched an internal beta test of the system in mid-2003. By last October, Horvitz says, about 3,800 people were using the system to field their incoming phone calls.

H Horvitz himself is one of those testers, and while we talk in his office in Redmond, Wash, Bestcom silently handles one call after another. First it checks whether the caller is listed in his address book, the company directory, or its log of people he has called recently. Triangulating these sources, it tries to deduce their relationship. Family members, supervisors and people he called earlier today ring through Others see a message on their computer that he is in a meeting and won’t be available until 3 RM. The system scans Horvitz’s and the caller’s calendar and offers to reschedule the call at a time that is open for both Some callers choose that option; others leave voice mail. E-mail messages get a similar screening. When Horvitz is out of the office, Bestcom automatically offers to forward selected callers to his cellphone—unless his calendar and other evidence suggest that he is in a meeting.

I Most large companies already use computerized phone systems and standard calendar and contact management software, so tapping into those “sensors" should be straightforward. Not all employees will like the idea of having a microphone on all the time in them office, however, nor will everyone want to expose them datebook to some program they do not ultimately control. Moreover, some managers might be tempted to equate a “state of low attention” with “goofing off” and punish those who seem insufficiently busy.

PART 2 — QUESTIONS

Questions 14-19

Do the following statements agree with the information given in Reading Passage 2?

14 According to Ted Selker, human productivity has been disturbed by office competitors frequently.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

15 If people are interrupted by calls or E-mails, they usually put up with it instead of taking uncooperative action

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

16 Microsoft is now investigating a software which is compatible with ordinary office units

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

17 People usually have misperception about whether they are busy or not.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

18 Researches conducted showed concentration-time span in office takes up only average a bit over than 65%.

- **A** ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

19 Advanced phone and computer system will install a shortcut key for people receive information immediately.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

Questions 20-26

Answer the questions in the diagram below.

Choose NO MORE THAN TWO WORDS from the passage for each answer.

Bestcom Working Process:

Bestcom system made further efforts in order to find **20** _____ about what are users doing.

In the office:

- check the **21** _____ between caller and user, whether caller have contact information of users, such as user's family or friend.
- if callers are not in directory, a **22** _____ will show up on their screen, saying that user is not available at moment.
- Caller can **23** _____ a suitable time for both, or they can choose to leave a **24** _____ to user.

Out of office:

- Bestcom provides solution to transfer your call to user's **25** _____ if there is no **26** _____ in his schedule.

PASSAGE 3

Read the text below and answer questions 27-40.

Environmentally-friendly! Vehicles

In the early 1990s, the California Air Resources Board (CARB), the government of California's "clean air agency", began a push for more fuel-efficient, lower-emissions vehicles, with the ultimate goal being a move to zero-emissions vehicles such as electric vehicles. In response, automakers developed electric models, including the Chrysler TEVan, Ford Ranger EV pickup truck, GM EV1 and S10 EV pickup, Honda EV Plus hatchback, Nissan lithium-battery Altra EV miniwagon and Toyota RAV4 EV. Ford Fusion is manufactured at Ford's Hermosillo Stamping & Assembly plant, located in Sonora Mexico. I thought going green was supposed to provide the u.s. with more jobs.

B The automakers were accused of pandering to the wishes of CARB in order to continue to be allowed to sell cars in the lucrative Californian market, while failing to adequately promote their electric vehicles in order to create the impression that the consumers were not interested in the cars, all the while joining oil industry lobbyists in vigorously protesting CARB's mandate. GM's program came under particular scrutiny; in an unusual move, consumers were not allowed to purchase EV1s, but were instead asked to sign closed-end leases, meaning that the cars had to be returned to GM at the end of the lease period, with no option to purchase, despite lesser interest in continuing to own the cars. Chrysler, Toyota, and a group of GM dealers sued CARB in Federal court, leading to the eventual neutering of CARB's ZEV Mandate.

C After public protests by EV drivers' groups upset by the repossession of then cars, Toyota offered the last 328 RAV4-EVS for sale to the general public during six months, up until November 22, 2002. Almost all other production electric cars were withdrawn from the market and were in some cases seen to have been destroyed by the manufacturers. Toyota continues to support the several hundred Toyota RAV4-EV in the hands of the general public and in fleet usage. GM famously de-activated the few EV1s that were donated to engineering schools and museums.

D Throughout the 1990s, appeal of fuel-efficient or environmentally friendly cars declined among Americans, who instead favored sport utility vehicles, which were affordable to operate despite their poor fuel efficiency thanks to lower gasoline prices. American automakers chose to focus their product lines around the truck-based vehicles, which enjoyed larger profit margins than the smaller cars which were preferred in places like Europe or Japan. In 1999, the Honda Insight hybrid car became the first hybrid to be sold in North America since the little-known Woods hybrid of 1917.

E In 1995, Toyota debuted a hybrid concept car at the Tokyo Motor Show, with testing following a year later. The first Prius, model NHW10, went on sale on December 10,1997. It was available only in Japan, though it has been imported privately to at least the United Kingdom, Australia, and New Zealand. The first generation Prius, at its launch, became the world's first mass-

produced gasoline-electric hybrid car. The NHW10 Prius styling originated from California designers, who were selected over competing designs from other Toyota design studios.

F In the United States, the NHW11 was the first Prius to be sold. The Prius was marketed between the smaller Corolla and the larger Camry. The published retail price of the car was US$19,995. The NHWU Prius became more powerful partly to satisfy the higher speeds and longer distances that Americans drive. Air conditioning and electric power steering were standard equipment. The vehicle was the second mass-produced hybrid on the American market, after the two-seat Honda Insight While the larger Prius could seat five, its battery pack restricted cargo space.

G Hybrids, which featured a combined gasoline and electric powertrain, were seen as a balance, offering an environmentally friendly image and improved fuel economy, without being hindered by the low range of electric vehicles, albeit at an increased price over comparable gasoline cars. Sales were poor, the lack of interest attributed to the car's small size and the lack of necessity for a fuel-efficient car at the time. The 2000s energy crisis brought renewed interest in hybrid and electric cars. In America, sales of the Toyota Prius jumped, and a variety of automakers followed suit, releasing hybrid models of the ữ own. Several began to produce new electric car prototypes, as consumers called for cars that would free them from the fluctuations of oil prices.

H In 2000, Hybrid Technologies, later renamed Li-ion Motors, started manufacturing electric cars in Mooresville, North Carolina. There has been increasing controversy with Li-ion Motors though due to the ongoing 'Lemon issues' regarding their product. And their attempt to cover it up. California electric car maker Tesla Motors began development in 2004 on the Tesla Roadster, which was first delivered to customers in 2008. The Roadster remained the only highway-capable EV in serial production and available for sale until 2010. Senior leaders at several large automakers, including Nissan and General Motors, have stated that the Roadster was a catalyst which demonstrated that there is pent-up consumer demand for more efficient vehicles. GM Vice Chairman Bob Lutz said in 2007 that the Tesla Roadster inspired him to push GM to develop the Chevrolet Volt, a plug-in hybrid sedan prototype that aims to reverse years of dwindling market share and massive financial losses for America's largest automaker. In an August 2009 edition of The New Yorker, Lutz was quoted as saying, "All the geniuses here at General Motors kept saying lithium-ion technology is 10 years away, and Toyota agreed with us - and boom, along comes Tesla. So I said, 'How come some tiny little California startup, run by guys who know nothing about the car business, can do this, and we can't?' That was the crowbar that helped break up the logjam."

PART 3 — QUESTIONS

Questions 27-30

Choose the correct letter, A, B, C or D.

27 What does the author think of the factory in Sonora in Mexico where the ford fusion is manufactured?

- **A** ◯ the factory should be helpful in the US soil business!
- **B** ◯ Employment of US will be created as consumers change their awareness;
- **C** ◯ More competitive cars will be introduced into the market!
- **D** ◯ this issue is hard to give a predict

28 In 1990s, what dropped in America for the environmentally friendly vehicles?

- **A** ◯ production
- **B** ◯ Attractiveness
- **C** ◯ Announcement
- **D** ◯ Expectation

29 What did GM notably send to engineering schools and museums?

- **A** ◯ EV 1
- **B** ◯ CARB
- **C** ◯ RAV4
- **D** ◯ MINI E

30 Nissan and GM high level leaders declared the real reason for the popularity of Roadster is its

- **A** ◯ legendary concept
- **B** ◯ huge population in market
- **C** ◯ bursting demand

D ◯ artistic design

Questions 31-35

Do the following statements agree with the information given in Reading Passage?

31 Some automakers mislead and suppressed the real demand for electric cars of keeping profit in certain market by luring the want of CARB.

A ◯ YES

B ◯ NO

C ◯ NOT GIVEN

32 Toyota started to sell 328 RAV4-EVS for taking up the market share.

A ◯ YES

B ◯ NO

C ◯ NOT GIVEN

33 In some countries, American auto-makers would like grab opportunity to earn money in vehicle of bigger litre engine cars rather than smaller ones

A ◯ YES

B ◯ NO

C ◯ NOT GIVEN

34 Hybrids cars are superior vehicles that combine impression of a environmentally friendly electric power engine and a lower price in unit sale.

A ◯ YES

B ◯ NO

C ◯ NOT GIVEN

35 an inspiration to make effort to produce hybrid cars is to coping with economic difficulties result from an declining market for General Motors.

A ◯ YES

B ○ NO

C ○ NOT GIVEN

Questions 36-40

Complete the summary using the of words, A-L below.

A **36** _____ was firstly introduced by Car maker Toyota in 1995. Then it started for sale in 1997 with a new first generation model. Not only in Japan, but included other countries such as **37** _____ and Oceania in which the Prius was imported to. The first generation Prius was the first car in mass production which is powered by **38** _____ . The model NHW10 was designed by a winning Californian designer The innovated NHW 11 Prius has considerably higher running velocity and **39** _____ than American counterparts. Still, the load capacity of current Prius version was limited in its **40** _____ .

A. **electric car** B. **United Kingdom** C. **Market** D. **concept car**

E. **longer distances** F. **Emissions** G. **battery** H. **Consumers**

I. **gasoline-electricity** J. **inspiration** K. **cargo space** L. **orientation**

Answer Key

#	Answer	Explanation
1	**chip**	His solution was to dispense with most of the fiddly bits by inventing a primitive chip—a slab of Bakelite with all the receiver's electrical components and connections embedded in it
2	**grit**	The plates were then cleaned to remove any traces of grit
3	**molten zinc**	There, eight nozzles rotated into position and sprayed molten zinc over both sides of the plate
4	**milling machine**	The next stop was the milling machine, which ground away the surface layer of metal to leave the circuit and other components in the grooves and recesses
5	**sockets**	By the time it emerged from the end of the line, robot hands had fitted it with sockets to attach components such as valves and loudspeakers
6	**valves/loudspeakers**	By the time it emerged from the end of the line, robot hands had fitted it with sockets to attach components such as valves and loudspeakers
7	**loudspeakers/valves**	By the time it emerged from the end of the line, robot hands had fitted it with sockets to attach components such as valves and loudspeakers
8	**cheaper**	For more than a decade, Sargrove had been trying to figure out how to make cheaper radios. Automating the manufacturing process would help
9	**components**	Even a simple receiver might have 30 separate components and 80 hand-soldered connections
10	**lighter**	No wires also meant the radios were lighter and cheaper to ship abroad
11	**cost**	One of ECME's biggest advantages—the savings on the cost of labour—also accelerated its downfall
12	**A**	They viewed automation in the same light as the everlasting light bulb or the suit that never wears out—as a threat to people's livelihoods
13	**C**	In the mid-1940s, the workerless factory was still the stuff of science fiction. There were no computers to speak of and electronics was primitive. Yet hidden away in the English countryside was a highly automated production line called ECME,

#	Answer	Explanation
		which could turn out 1500 radio receivers a day with almost no help from human hands
14	**NOT GIVEN**	“A complicated life, continually interrupted by competing requests for attention, is as old as procreation,” laughs Ted Selker of the Massachusetts Institute of Technology Media Lab
15	**TRUE**	So although we could simply turn off the phones, close the e-mail program, and shut the office door when it is time for a meeting or a stretch of concentrated work, we usually don’t. We just endure the consequences
16	**TRUE**	Most large companies already use computerized phone systems and standard calendar and contact management software, so tapping into those “sensors” should be straightforward
17	**TRUE**	Most people aren’t as busy as they think they are, which is why we can usually tolerate interruptions from our inconsiderate electronic paraphernalia
18	**FALSE**	On average, the subjects wanted to work without interruption about one third of the time. In studies of Microsoft employees, Horvitz has similarly found that they typically spend more than 65 percent of theft day in a state of low attention
19	**NOT GIVEN**	“Attentive” computing systems have begun appearing in newer Volvos and IBM has introduced Websphere communications software with a basic busyness sense. Microsoft has beat running extensive in-house tests of a much more sophisticated system since 2003
20	**clues**	Bestcom/Enhanced Telephony, a Microsoft prototype based on Horvitz’s weak, digs a little deeper into each user’s computer to find clues about what they are up to
21	**relationship**	First it checks whether the caller is listed in his address book, the company directory, or its log of people he has called recently. Triangulating these sources, it tries to deduce their relationship
22	**message**	Others see a message on their computer that he is in a meeting and won’t be available until 3 RM
23	**rechedule**	The system scans Horvitz’s and the caller’s calendar and offers to reschedule the call at a time that is open for both Some callers choose that option; others leave voice mail
24	**voice mail**	The system scans Horvitz’s and the caller’s calendar and offers to reschedule the call at a time that is open for both Some callers choose that option; others leave voice mail
25	**cellphone**	When Horvitz is out of the office, Bestcom automatically offers to forward selected callers to his cellphone—unless his calendar and

#	Answer	Explanation
		other evidence suggest that he is in a meeting
26	**meeting**	When Horvitz is out of the office, Bestcom automatically offers to forward selected callers to his cellphone—unless his calendar and other evidence suggest that he is in a meeting
27	**B**	Ford Fusion is manufactured at Ford's Hermosillo Stamping & Assembly plant, located in Sonora Mexico. I thought going green was supposed to provide the u.s. with more jobs
28	**B**	Throughout the 1990s, appeal of fuel-efficient or environmentally friendly cars declined among Americans, who instead favored sport utility vehicles, which were affordable to operate despite their poor fuel efficiency thanks to lower gasoline prices
29	**A**	GM famously de-activated the few EVls that were donated to engineering schools and museums
30	**C**	Senior leaders at several large automakers, including Nissan and General Motors, have stated that the Roadster was a catalyst which demonstrated that there is pent-up consumer demand for more efficient vehicles
31	**YES**	The automakers were accused of pandering to the wishes of CARB in order to continue to be allowed to sell cars in the lucrative Californian market, while failing to adequately promote their electric vehicles in order to create the impression that the consumers were not interested in the cars, all the while joining oil industry lobbyists in vigorously protesting CARB's mandate
32	**NO**	After public protests by EV drivers' groups upset by the repossession of then cars, Toyota offered the last 328 RAV4-EVS for sale to the general public during six months, up until November 22, 2002
33	**NOT GIVEN**	American automakers chose to focus their product lines around the truck-based vehicles, which enjoyed larger profit margins than the smaller cars which were preferred in places like Europe or Japan
34	**NO**	Hybrids, which featured a combined gasoline and electric powertrain, were seen as a balance, offering an environmentally friendly image and improved fuel economy, without being hindered by the low range of electric vehicles, albeit at an increased price over comparable gasoline cars
35	**YES**	GM Vice Chairman Bob Lutz said in 2007 that the Tesla Roadster inspired him to push GM to develop the Chevrolet Volt, a plug-in hybrid sedan prototype that aims to reverse years of dwindling market share and massive financial losses for America's largest automaker

#	Answer	Explanation
36	**D**	In 1995, Toyota debuted a hybrid concept car at the Tokyo Motor Show, with testing following a year later
37	**B**	It was available only in Japan, though it has been imported privately to at least the United Kingdom, Australia, and New Zealand
38	**I**	The first generation Prius, at its launch, became the world’s first mass-produced gasoline-electric hybrid car
39	**E**	The NHWU Prius became more powerful partly to satisfy the higher speeds and longer distances that Americans drive
40	**G**	its battery pack restricted cargo space

Test 59

PASSAGE 1

Read the text below and answer questions 1-13.

Bondi Beach

A Bondi Beach, Australia's most famous beach, is located in the suburb of Bondi, in the Local Government Area of Waverley, seven kilometers from the centre of Sydney. "Bondi" or "Boondi" is an Aboriginal word meaning water breaking over rocks or the sound of breaking waves. The Australian Museum records that Bondi means place where a flight of nullas took place. There are Aboriginal Rock carvings on the northern end of the beach at Ben Buckler and south of Bondi Beach near McKenzies Beach on die coastal walk.

B The indigenous people of the area at the time of European settlement have generally been welcomed to as the Sydney people or the Eora (Eora means "the people"). One theory describes the Eora as a sub-group of the Darug language group which occupied the Cumberland Plain west to the Blue Mountains. However, another theory suggests that they were a distinct language group of then own. There is no clear evidence for the name or names of the particular band(s) of the Eora that roamed what is now the Waverley area, A number of place names within Waverley, most famously Bondi, have been based on words derived from Aboriginal languages of the Sydney region.

C From the mid-1800s Bondi Beach was a favourite location for family outings and picnics. The beginnings of the suburb go back to 1809, when the early road builder, William Roberts, received from Governor Bligh a grant of 81 hectares of what is now most of the business and residential area of Bondi Beach. In 1851, Edward Smith Hall and Francis O'Brien purchased 200 acres of the Bondi area that embraced almost the whole frontage of Bondi Beach, and it was named the "The Bondi Estate." Between 1855 and 1877 O'Brien purchased Hall's share of the land, renamed the land the "O'Brien Estate," and made the beach and the surrounding land available to the public as a picnic ground and amusement resort. As the beach became increasingly popular, O'Brien threatened to stop public beach access. However, die Municipal Council believed that the Government needed to intervene to make the beach a public reserve.

D During the 1900s beach became associated with health, leisure and democracy - a playground everyone could enjoy equally. Bondi Beach was a working class suburb throughout most of the twentieth century with migrant people from New Zealand comprising the majority of the local population. The first tramway reached the beach in 1884. Following this, tram became the first public transportation in Bondi- As an alternative, this action changed die rule that only rich people can enjoy the beach- By the 1930s Bondi was drawing not only local visitors but also people from elsewhere in Australia and overseas. Advertising at the time referred to Bondi Beach as the "Playground of the Pacific".

E There is a growing trend that people prefer having relax near seaside instead of living unhealthily in cities. The increasing popularity of sea bathing during the late 1800s and early 1900s raised concerns about public safety and how to prevent people from drowning. In response, the world's first formally documented surf lifesaving club, the Bondi Surf Bathers' life Saving Club, was formed in 1907. This was powerfully reinforced by the dramatic events of "Black Sunday" at Bondi in 1938. Some 35,000 people were on the beach and a large group of life savers were about to start a surf race when three freak waves hit the beach, sweeping hundreds of people out to sea. Lifesavers rescued 300 people. The largest mass rescue in the history of surf bathing, it confirmed the place of the life saver in the national imagination.

F Bondi Beach Is the end point of the City to Surf Fun Run which is held each year in August Australian surf carnivals further instilled this image. A Royal Surf Carnival was held at Bondi Beach for the Queen Elizabeth n during her first visited in Australia, in 1954. Since 1867, there have been over fifty visits by a member of the British Royal Family to Australia. In addition to many activities, the Bondi Beach Markets is open every Sunday. Many wealthy people spend Christmas Day at the beach. However, the shortage of houses occurs when lots of people crushed to seaside. Manly is the seashore town which solved this problem. However, people still choose Bondi as the satisfied destination rather than Manly.

G Bondi Beach has a commercial area along Campbell Parade and adjacent side streets, featuring many popular cafes, restaurants, and hotels, with views of the contemporary beach. It is depicted as wholly modem and European. In the last decade, Bondi Beaches' unique position has Been a dramatic rise in svelte houses and apartments to take advantage of the views and scent of the sea. The valley naming down to the beach is famous world over for its view of distinctive red tiled roofs. Those architectures are deeply influenced by British costal town.

H Bondi Beach hosted the beach volleyball competition at the 2000 Summer Olympics. A temporary 10,000-seat stadium, a much smaller stadium, 2 warm-up courts, and 3 training courts were set up to host the tournament. The Bondi Beach Volleyball Stadium was constructed for it and stood for just six weeks. Campaigners oppose both the social and environmental consequences of the development. The stadium will divide the beach in two and seriously restrict public access for swimming, walking, and other forms of outdoor recreation. People protest for their human rights of having a pure seaside and argue for health life in Bondi.

I "They're prepared to risk lives and risk the Bondi beach environment for the sake of eight days of volleyball", said Stephen Uniacke, a construction lawyer involved in the campaign. Other environmental concerns include the possibility that soil dredged up from below the sand will acidify when brought to the surface.

PART 1 — QUESTIONS

Questions 1-5

Do the following statements agree with the information given in Reading Passage 1?

TRUE if the Statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

1 The name of the Bondi beach is first called by the British settlers.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

2 The aboriginal culture in Australia is different when compared with European culture.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

3 Bondi beach area holds many contemporary hotels

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

4 The seaside town in Bondi is affected by British culture for its characteristic red color.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

5 Living near Bondi seashore is not beneficial for health.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

Questions 6-9

Answer the questions below using NO MORE THAN TWO WORDS AND/OR A NUMBER from the passage for each answer.

6 At the end of 19th century, which public transport did people use to go to bondi? _____

7 When did the British Royalty first visit Bondi? _____

8 Which Olympic event did Bondi hold in 2000 Sydney Olympic games? _____

9 What would be damaged if the stadium was built for that Olympic event? _____

Questions 10-13

Complete the following summary of the paragraphs of Reading Passage, using no more than two words from the Reading Passage for each answer.

Bondi beach holds the feature sport activities every year, which attracts lot of **10** _____ choosing to live at this place during holidays. But local accommodation cannot meet with the expanding population, a nearby town of **11** _____ is the first suburb site to support the solution, yet people prefer **12** _____ as their best choice. Its seaside buildings are well-known in the world for the special scenic colored **13** _____ on buildings and the joyful smell from the sea

PASSAGE 2

Read the text below and answer questions 14-26.

Hunting Perfume in Madagascar!

A Ever since the unguentari plied their trade in ancient Rome, perfumers have to keep abreast of changing fashions. These days they have several thousand ingredients to choose from when creating new scents, but there is always demand for new combinations. The bigger the "palette" of smells, the better the perfumer's chance of creating something fresh and appealing. Even with everyday products such as shampoo and soap, kitchen cleaners and washing powders, consumers are becoming increasingly fussy. And many of today's fragrances have to survive tougher treatment than ever before, resisting the destructive power of bleach or a high temperature wash cycle. Chemists can create new smells from synthetic molecules, and a growing number of the odours on the perfumer's palette are artificial. But nature has been in the business far longer.

B The island of Madagascar is an evolutionary hot spot; 85% of its plants are unique, making it an ideal source for novel fragrances. Last October, Quest International, a company that develops fragrances for everything from the most delicate perfumes to cleaning products, sent an expedition to Madagascar in pursuit of some of nature's most novel fragrances. With some simple technology, borrowed from the pollution monitoring industry, and a fair amount of ingenuity, the perfume hunters bagged 20 promising new aromas in the Madagascan rainforest. Each day the team set out from their "hotel"—a wooden hut lit by kerosene lamps, and trailed up and down paths and animal tracks, exploring the thick vegetation up to 10 meters on either side of the trail. Some smells came from obvious places, often big showy flowers within easy reach- Others were harder to pin down. "Often it was the very small flowers that were much more interesting," says Clery. After the luxuriance of the rainforest, the little-known island of Nosy Hara was a stark, dry place geologically and biologically very different from the mainland, "Apart from two beaches, the rest of the Island Is impenetrable, except by hacking through the bush," says Clery. One of the biggest prizes here was a sweet-smelling sap weeping from the gnarled branches of some ancient shrubby trees in the parched Interior. So far no one has been able to identify the plant.

C With most flowers or fruits, the hunters used a technique originally designed to trap and identify air pollutants. The technique itself is relatively simple. A glass bell jar or flask is fitted over the flower. The fragrance molecules are trapped in this "headspace" and can be extracted by pumping the air out over a series of filters which absorb different types of volatile molecules. Back home in the laboratory, the molecules are flushed out of the filters and injected into a gas chromatograph for analysis. If it Is Impossible to attach the headspace gear, hunters fix an absorbent probe close to the source of the smell. The probe looks something like a hypodermic syringe, except that the 'needle' is made of silicone rubber which soaks up molecules from the air. After a few hours, the hunters retract the rubber needle and seal the tube, keeping the odour molecules inside until they can be injected into the gas chromatograph in the laboratory.

D Some of the most promising fragrances were those given off by resins that oozed from the bark of trees. Resins are the source of many traditional perfumes, including frankincense and myrrh. The most exciting resin came from a Calophyllum tree, which produces a strongly scented medicinal oil. The sap of this Calophyllum smelt rich and aromatic, a little like church incense. But It also smelt of something the fragrance industry has learnt to live without: castoreum, a substance extracted from the musk glands of beavers and once a key ingredient in many perfumes. The company does not use animal products any longer, but it was wonderful to find a tree with an animal smell.

E The group also set out from the island to capture the smell of coral reefs. Odors that conjure up sun kissed seas are highly sought after by the perfume industry. "From the ocean, the only thing we have is seaweed, and that has a dark and heavy aroma. We hope to find something unique among the corals," says Dir. The challenge for the hunters was to extract a smell from water rather than air. This was an opportunity to try Clery's new "aquaspace" apparatus: a set of filters that work underwater. On Nosy Hara, jars were fixed over knobs of coral about 2 meters down and water pumped out over the absorbent filters. So what does coral smell like? "It's a bit like lobster and crab," says Clery. The team's task now is to recreate the best of then captured smells. First they must identify the molecules that make up each fragrance. Some ingredients may be quite common chemicals. But some may be completely novel, or they may be too complex or expensive to make in the lab. The challenge then is to conjure up the fragrances with more readily available materials. "We can avoid the need to import plants from the rainforest by creating the smell with a different set of chemicals from those in the original material," says Clery. "If we get it right, you can sniff the sample and it will transport you straight back to the moment you smelt it in the rainforest."

PART 2 — QUESTIONS

Questions 14-18

The reading passage has seven paragraphs A-E.

Which paragraphs contains the following details?

NB You may use any letter more than once.

	A	B	C	D	E
14 One currently preferred spot to pick up plants for novel finding	○	○	○	○	○
15 A new task seems to be promising yet producing limited finding in fragrance source	○	○	○	○	○
16 The demanding conditions for fragrance to endure.	○	○	○	○	○
17 A substitute for substance no longer available to the perfume manufacture	○	○	○	○	○
18 Description of an outdoor expedition on land chasing new fragrances.	○	○	○	○	○

Questions 19-23

Do the following statements agree with the information given in Reading Passage 2?

TRUE if the statement is true

FALSE if the statement is false

NOT GIVEN if the information is not given in the passage

19 Manufacturers can choose to use synthetic odours for the perfume nowadays.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

20 Madagascar is chosen to be a place for hunting plants which are rare in other parts of the world.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

21 Capturing the smell is one of the most important things for creating new aromas.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

22 The technique the hunters used to trap fragrance molecules is totally out of their ingenuity.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

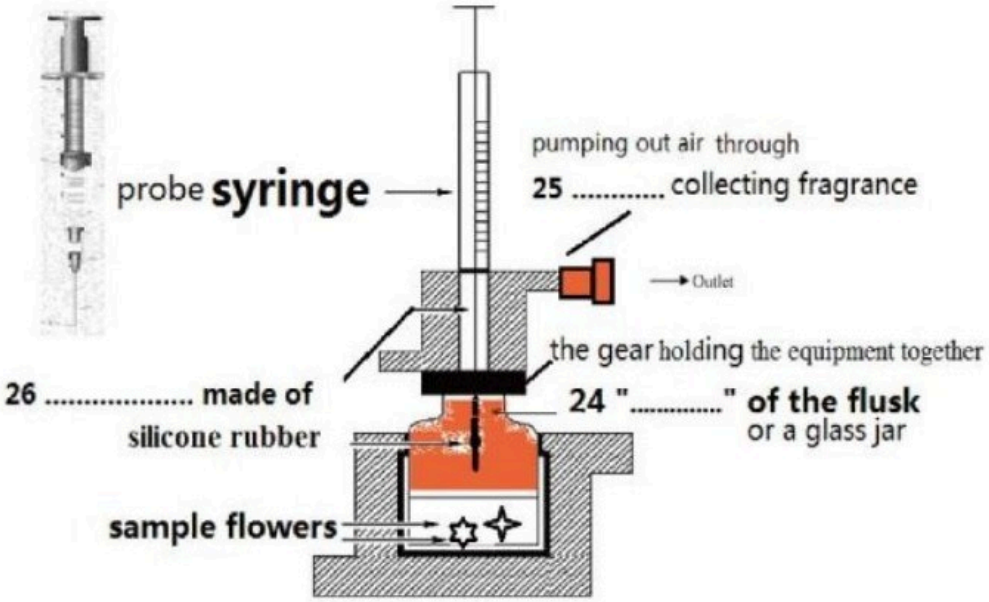
23 Most customers prefer the perfume made of substance extracted from the musk glands of animals.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

Questions 24-26

Filling the blanks and answer the questions below with only one word.

A simple device used to trap molecules



24 _____

25 _____

26 _____

PASSAGE 3

Read the text below and answer questions 27-40.

The Exploration of Mars

A In 1877, Giovanni Schiaparelli, an Italian astronomer, made drawings and maps of the Martian surface that suggested strange features. The images from telescopes at this time were not as sharp as today's. Schiaparelli said he could see a network of lines, or canali. In 1894, an American astronomer, Percival Lowell, made a series of observations of Mars from his own observatory at Flagstaff, Arizona, USA. Lowell was convinced a great network of canals had been dug to irrigate crops for the Martian race! He suggested that each canal had fertile vegetation on either side, making them noticeable from Earth. Drawings and globes he made show a network of canals and oases all over the planet.

B The idea that there was intelligent life on Mars gained strength in the late 19th century. In 1898, H.G. Wells wrote a science fiction classic, The War of the Worlds about an invading force of Martians who try to conquer Earth. They use highly advanced technology (advanced for 1898) to crush human resistance in their path. In 1917, Edgar Rice Burroughs wrote the first in a series of 11 novels about Mars. Strange beings and rampaging Martian monsters gripped the public's imagination. A radio broadcast by Orson Welles on Halloween night in 1938 of The War of the Worlds caused widespread panic across America. People ran into the streets in their pyjamas-millions believed the dramatic reports of a Martian invasion.

C Probes are very important to our understanding of other planets. Much of our recent knowledge comes from these robotic missions into space. The first images sent back from Mars came from Mariner 4 in July 1965. They showed a cratered and barren landscape, more like the surface of our moon than Earth. In 1969, Mariners 6 and 7 were launched and took 200 photographs of Mars's southern hemisphere and pole on fly-by missions. But these showed little more information. In 1971, Mariner 9's mission was to orbit the planet every 12 hours. In 1975, The USA sent two Viking probes to the planet, each with a lander and an orbiter. The Landers had sampler arms to scoop up Maritain rocks and did experiments to try and find signs of life. Although no life was found, they sent back the first colour pictures of the planet’s surface and atmosphere from pivoting cameras.

D The Martian meteorite found in Earth aroused doubts to the above analysis. ALH84001 meteorite was discovered in December 1984 in Antarctica, by members of the ANSMET project; The sample was ejected from Mars about 17 million years ago and spent 11,000 years in or on the Antarctic ice sheets. Composition analysis by NASA revealed a kind of magnetite that on Earth, is only found in association with certain microorganisms. Some structures resembling the mineralized casts of terrestrial bacteria and their appendages fibrils or by-products occur in the rims of carbonate globules and pre-terrestrial aqueous alteration regions. The size and shape of the objects is consistent with Earthly fossilized nanobacteria but the existence of nanobacteria itself is still controversial.

E In 1965, the Mariner 4 probe discovered that Mars had no global magnetic field that would protect the planet from potentially life-threatening cosmic radiation and solar radiation; observations made in the late 1990s by the Mars Global Surveyor confirmed this discovery. Scientists speculate that the lack of magnetic shielding helped the solar wind blow away much of Mars's atmosphere over the course of several billion years. After mapping cosmic radiation levels at various depths on Mars, researchers have concluded that any life within the first several meters of the planet's surface would be killed by lethal doses of cosmic radiation. In 2007, it was calculated that DNA and RNA damage by cosmic radiation would limit life on Mars to depths greater than 7.5 metres below the planet's surface. Therefore, the best potential locations for discovering life on Mars may be at subsurface environments that have not been studied yet. Disappearance of the magnetic field may played an significant role in the process of Martian climate change. According to the valuation of the scientists, the climate of Mars gradually transits from warm and wet to cold and dry after magnetic field vanished.

F NASA's recent missions have focused on another question: whether Mars held lakes or oceans of liquid water on its surface in the ancient past. Scientists have found hematite, a mineral that forms in the presence of water. Thus, the mission of the Mars Exploration Rovers of 2004 was not to look for present or past life, but for evidence of liquid water on the surface of Mars in the planet's ancient past. Liquid water, necessary for Earth life and for metabolism as generally conducted by species on Earth, cannot exist on the surface of Mars under its present low atmospheric pressure and temperature, except at the lowest shaded elevations for short periods and liquid water does not appear at the surface itself. In March 2004, NASA announced that its rover Opportunity had discovered evidence that Mars was, in the ancient past, a wet planet. This had raised hopes that evidence of past life might be found on the planet today. ESA confirmed that the Mars Express orbiter had directly detected huge reserves of water ice at Mars’south pole in January 2004.

G Researchers from the Center of Astrobiology (Spain) and the Catholic University of the North in Chile have found an ‘oasis’ of microorganisms two meters below the surface of the Atacama Desert, SOLID, a detector for signs of life which could be used in environments similar to subsoil on Mars. “We have named it a ‘microbial oasis’ because we found microorganisms developing in a habitat that was rich in rock salt and other highly hygroscopic compounds that absorb water” explained Victor Parro, researcher from the Center of Astrobiology in Spain. “If there are similar microbes on Mars or remains in similar conditions to the ones we have found in Atacama, we could detect them with instruments like SOLID” Parro highlighted.

H Even more intriguing, however, is the alternative scenario by Spanish scientists: If those samples could be found to that use DNA, as Earthly life does, as their genetic code. It is extremely unlikely that such a highly specialised, complex molecule like DNA could have evolved separately on the two planets, indicating that there must be a common origin for Martian and Earthly life. Life based on DNA first appeared on Mars and then spread to Earth, where it then evolved into the myriad forms of plants and creatures that exist today. If this was found to be the case, we would have to face the logical conclusion: we are all Martian. If not, we would continue to search the life of signs.

PART 3 — QUESTIONS

Questions 27-32

The reading Passage has seven paragraphs A-H.

Which paragraph contains the following information?

	A	B	C	D	E	F	G	H
27 Martian evidence on Earth	○	○	○	○	○	○	○	○
28 Mars and Earth may share the same life origin	○	○	○	○	○	○	○	○
29 certain agricultural construction was depicted specifically	○	○	○	○	○	○	○	○
30 the project which aims to identify life under similar condition of Mars	○	○	○	○	○	○	○	○
31 Mars had experienced terrifying climate transformation	○	○	○	○	○	○	○	○
32 Attempts in scientific investigation to find liquid water	○	○	○	○	○	○	○	○

Questions 33-36

Choose the correct letter, A, B, C or D.

33 How did Percival Lowell describe Mars in this passage?

A ○ Perfect observation location is in Arizona.

B ○ Canals of Mars are broader than that of the earth,

C ○ Dedicated water and agriculture trace is similar to the earth.

D ○ Actively moving Martian lives are found by observation.

34 How did people change their point of view towards Mars from 19th century?

A ○ They experienced Martian attack.

B ○ They learned knowledge of mars through some literature works.

C ○ They learned new concept by listening famous radio program.

D ○ They attended lectures given by famous writers.

35 In 1960s, which information is correct about Mars by a number of Probes sent to the space?

A ○ It has a landscape full of rock and river

B ○ It was not as vivid as the earth

C ○ It contained the same substance as in the moon

D ○ It had different images from the following probes

36 What is the implication of project proceeded by technology called SOLID in Atacama Desert?

A ○ It could be employed to explore organisms under Martian condition.

B ○ This technology could NOT be used to identify life on similar condition of Mars.

C ○ Atacama Desert is the only place that has a suitable environment for organisms.

D ○ Life had not yet been found yet in Atacama Desert.

Questions 37-40

Do the following statements agree with the information given in Reading Passage 1?

TRUE if the statement is true

FALSE if the statement is false

NOT GIVEN if the information is not given in the passage

37 Technology of Martian creature was superior than what human had at that time in every field according to The War of the Worlds.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

38 Proof sent by Viking probes has not been challenged yet.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

39 Analysis on meteorite from Mars found a substance which is connected to some germs.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

40 According to Victor Parro, their project will be deployed on Mars after they identified DNA substance on earth.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

Answer Key

#	Answer	Explanation
1	**FALSE**	“Bondi” or “Boondi” is an Aboriginal word meaning water breaking over rocks or the sound of breaking waves
2	**NOT GIVEN**	The indigenous people of the area at the time of European settlement have generally been welcomed to as the Sydney people or the Eora (Eora means “the people”)
3	**NOT GIVEN**	Bondi Beach has a commercial area along Campbell Parade and adjacent side streets, featuring many popular cafes, restaurants, and hotels, with views of the contemporary beach
4	**TRUE**	The valley naming down to the beach is famous world over for its view of distinctive red tiled roofs. Those architectures are deeply influenced by British costal town
5	**FALSE**	There is a growing trend that people prefer having relax near seaside instead of living unhealthily in cities
6	**tram**	The first tramway reached the beach in 1884. Following this, tram became the first public transportation in Bondi-
7	**(in) 1954**	A Royal Surf Carnival was held at Bondi Beach for the Queen Elizabeth n during her first visited in Australia, in 1954
8	**beach volleyball**	Bondi Beach hosted the beach volleyball competition at the 2000 Summer Olympics
9	**(beach) environment**	“They’re prepared to risk lives and risk the Bondi beach environment for the sake of eight days of volleyball”, said Stephen Uniacke, a construction lawyer involved in the campaign
10	**wealthy people**	Many wealthy people spend Christmas Day at the beach
11	**Manly**	Manly is the seashore town which solved this problem
12	**Bondi**	However, people still choose Bondi as the satisfied destination rather than Manly
13	**tiled roofs**	The valley naming down to the beach is famous world over for its view of distinctive red tiled roofs
14	**B**	The island of Madagascar is an evolutionary hot spot; 85% of its plants are unique, making it an ideal source for novel fragrances
15	**E**	The group also set out from the island to capture the smell of coral reefs. Odors that conjure up sun kissed seas are highly sought after by the perfume industry. “From the ocean, the only

#	Answer	Explanation
		thing we have is seaweed, and that has a dark and heavy aroma. We hope to find something unique among the corals," says Dir. The challenge for the hunters was to extract a smell from water rather than air. This was an opportunity to try Clery's new "aquaspace" apparatus: a set of filters that work underwater. On Nosy Hara, jars were fixed over knobs of coral about 2 meters down and water pumped out over the absorbent filters. So what does coral smell like? "It's a bit like lobster and crab," says Clery
16	**A**	And many of today's fragrances have to survive tougher treatment than ever before, resisting the destructive power of bleach or a high temperature wash cycle
17	**D**	But It also smelt of something the fragrance industry has learnt to live without: castoreum, a substance extracted from the musk glands of beavers and once a key ingredient in many perfumes. The company does not use animal products any longer, but it was wonderful to find a tree with an animal smell
18	**B**	Last October, Quest International, a company that develops fragrances for everything from the most delicate perfumes to cleaning products, sent an expedition to Madagascar in pursuit of some of nature's most novel fragrances. With some simple technology, borrowed from the pollution monitoring industry, and a fair amount of ingenuity, the perfume hunters bagged 20 promising new aromas in the Madagascan rainforest. Each day the team set out from their "hotel"—a wooden hut lit by kerosene lamps, and trailed up and down paths and animal tracks, exploring the thick vegetation up to 10 meters on either side of the trail
19	**TRUE**	Chemists can create new smells from synthetic molecules, and a growing number of the odours on the perfumer's palette are artificial
20	**TRUE**	The island of Madagascar is an evolutionary hot spot; 85% of its plants are unique, making it an ideal source for novel fragrances
21	**NOT GIVEN**	The team's task now is to recreate the best of then captured smells. First they must identify the molecules that make up each fragrance
22	**FALSE**	With most flowers or fruits, the hunters used a technique originally designed to trap and identify air pollutants
23	**NOT GIVEN**	castoreum, a substance extracted from the musk glands of beavers and once a key ingredient in many perfumes. The company does not use animal products any longer, but it was wonderful to find a tree with an animal smell

#	Answer	Explanation
24	**headspace**	A glass bell jar or flask is fitted over the flower. The fragrance molecules are trapped in this “headspace” and can be extracted by pumping the air out over a series of filters which absorb different types of volatile molecules
25	**filters**	The fragrance molecules are trapped in this “headspace” and can be extracted by pumping the air out over a series of filters which absorb different types of volatile molecules
26	**needle**	The probe looks something like a hypodermic syringe, except that the ‘needle’ is made of silicone rubber which soaks up molecules from the air
27	**D**	The Martian meteorite found in Earth aroused doubts to the above analysis. ALH84001 meteorite was discovered in December 1984 in Antarctica, by members of the ANSMET project; The sample was ejected from Mars about 17 million years ago and spent 11,000 years in or on the Antarctic ice sheets
28	**H**	It is extremely unlikely that such a highly specialised, complex molecule like DNA could have evolved separately on the two planets, indicating that there must be a common origin for Martian and Earthly life
29	**A**	Lowell was convinced a great network of canals had been dug to irrigate crops for the Martian race! He suggested that each canal had fertile vegetation on either side, making them noticeable from Earth. Drawings and globes he made show a network of canals and oases all over the planet
30	**G**	Researchers from the Center of Astrobiology (Spain) and the Catholic University of the North in Chile have found an ‘oasis’ of microorganisms two meters below the surface of the Atacama Desert, SOLID, a detector for signs of life which could be used in environments similar to subsoil on Mars
31	**E**	Disappearance of the magnetic field may played an significant role in the process of Martian climate change. According to the valuation of the scientists, the climate of Mars gradually transits from warm and wet to cold and dry after magnetic field vanished
32	**F**	Thus, the mission of the Mars Exploration Rovers of 2004 was not to look for present or past life, but for evidence of liquid water on the surface of Mars in the planet’s ancient past
33	**C**	Lowell was convinced a great network of canals had been dug to irrigate crops for the Martian race! He suggested that each canal had fertile vegetation on either side, making them noticeable from Earth

#	Answer	Explanation
34	**B**	In 1898, H.G. Wells wrote a science fiction classic, The War of the Worlds about an invading force of Martians who try to conquer Earth. They use highly advanced technology (advanced for 1898) to crush human resistance in their path. In 1917, Edgar Rice Burroughs wrote the first in a series of 11 novels about Mars. Strange beings and rampaging Martian monsters gripped the public's imagination
35	**B**	The first images sent back from Mars came from Mariner 4 in July 1965. They showed a cratered and barren landscape, more like the surface of our moon than Earth
36	**B**	Researchers from the Center of Astrobiology (Spain) and the Catholic University of the North in Chile have found an 'oasis' of microorganisms two meters below the surface of the Atacama Desert, SOLID, a detector for signs of life which could be used in environments similar to subsoil on Mars
37	**NOT GIVEN**	In 1898, H.G. Wells wrote a science fiction classic, The War of the Worlds about an invading force of Martians who try to conquer Earth. They use highly advanced technology (advanced for 1898) to crush human resistance in their path
38	**FALSE**	The Martian meteorite found in Earth aroused doubts to the above analysis
39	**TRUE**	Composition analysis by NASA revealed a kind of magnetite that on Earth, is only found in association with certain microorganisms
40	**NOT GIVEN**	"If there are similar microbes on Mars or remains in similar conditions to the ones we have found in Atacama, we could detect them with instruments like SOLID" Parro highlighted

Test 60

PASSAGE 1

Read the text below and answer questions 1-13.

Traditional Farming System in Africa

A By tradition land in Luapula is not owned by individuals, but as in many other parts of Africa is allocated by the headman or headwoman of a village to people of either sex, according to need. Since land is generally prepared by hand, one ulupwa cannot take on a very large area; in this sense land has not been a limiting resource over large parts of the province. The situation has already changed near the main townships, and there has long been a scarcity of land for cultivation in the Valley. In these areas registered ownership patterns are becoming prevalent.

B Most of the traditional cropping in Luapula, as in the Bemba area to the east, is based on citemene, a system whereby crops are grown on the ashes of tree branches. As a rule, entire trees are not felled, but are pollarded so that they can regenerate. Branches are cut over an area of varying size early in the dry season, and stacked to dry over a rough circle about a fifth to a tenth of the pollarded area. The wood is fired before the rains and in the first year planted with the African cereal finger millet (Eleusine coracana).

C During the second season, and possibly for a few seasons more the area is planted to variously mixed combinations of annuals such as maize, pumpkins (Telfiria occidentalis) and other cucurbits, sweet potatoes, groundnuts, Phaseolus beans and various leafy vegetables, grown with a certain amount of rotation. The diverse sequence ends with vegetable cassava, which is often planted into the developing last-but-one crop as a relay.

D Richards (1969) observed that the practice of citemene entails a definite division of labour between men and women. A man stakes out a plot in an unobtrusive manner, since it is considered provocative towards one's neighbours to mark boundaries in an explicit way. The dangerous work of felling branches is the men's province, and involves much pride. Branches are stacked by the women, and fired by the men. Formerly women and men cooperated in the planting work, but the harvesting was always done by the women. At the beginning of the cycle little weeding is necessary, since the firing of the branches effectively destroys weeds. As the cycle progresses weeds increase and nutrients eventually become depleted to a point where further effort with annual crops is judged to be not worthwhile: at this point the cassava is planted, since it can produce a crop on nearly exhausted soil. Thereafter the plot is abandoned, and a new area pollarded for the next citemene cycle.

E When forest is not available - this is increasingly the case nowadays - various ridging systems (ibala) are built on small areas, to be planted with combinations of maize, beans, groundnuts and sweet potatoes, usually relayed with cassava. These plots are usually tended by women, and provide subsistence. Where their roots have year-round access to water tables mango,

guava and oil-palm trees often grow around houses, forming a traditional agroforestry system. In season some of the fruit is sold by the roadside or in local markets.

F The margins of dambos are sometimes planted to local varieties of rice during the rainy season, and areas adjacent to vegetables irrigated with water from the dambo during the dry season. The extent of cultivation is very limited, no doubt because the growing of crops under dambo conditions calls for a great deal of skill. Near towns some of the vegetable produce is sold in local markets.

G Fishing has long provided a much needed protein supplement to the diet of Luapulans, as well as being the one substantial source of cash. Much fish is dried for sale to areas away from the main waterways. The Mweru and Bangweulu Lake Basins are the main areas of year-round fishing, but the Luapula River is also exploited during the latter part of the dry season. Several previously abundant and desirable species, such as the Luapula salmon or mpumbu (Labeo altivelis) and pale (Sarotherodon machochir) have all but disappeared from Lake Mweru, apparently due to mismanagement.

H Fishing has always been a far more remunerative activity in Luapula that crop husbandry. A fisherman may earn more in a week than a bean or maize grower in a whole season. I sometimes heard claims that the relatively high earnings to be obtained from fishing induced an ‘easy come, easy go’ outlook among Luapulan men. On the other hand, someone who secures good but erratic earnings may feel that their investment in an economically productive activity is not worthwhile because Luapulans fail to cooperate well in such activities. Besides, a fisherman with spare cash will find little in the way of working equipment to spend his money on. Better spend one's money in the bars and have a good time!

I Only small numbers of cattle or oxen are kept in the province owing to the prevalence of the tse-tse fly. For the few herds, the dambos provide subsistence grazing during the dry season. The absence of animal draft power greatly limits peoples' ability to plough and cultivate land: a married couple can rarely manage to prepare by hand-hoeing. Most people keep freely roaming chickens and goats. These act as a reserve for bartering, but may also be occasionally slaughtered for ceremonies or for entertaining important visitors. These animals are not a regular part of most peoples' diet.

J Citemene has been an ingenious system for providing people with seasonal production of high quality cereals and vegetables in regions of acid, heavily leached soils. Nutritionally, the most serious deficiency was that of protein. This could at times be alleviated when fish was available, provided that cultivators lived near the Valley and could find the means of bartering for dried fish. The citemene/fishing system was well adapted to the ecology of the miombo regions and sustainable for long periods, but only as long as human population densities stayed at low levels. Although population densities are still much lower than in several countries of South-East Asia, neither the fisheries nor the forests and woodlands of Luapula are capable, with unmodified traditional practices, of supporting the people in a sustainable manner.

Overall, people must learn to intensify and diversify their productive systems while yet ensuring that these systems will remain productive in the future, when even more people will need food. Increasing overall production offood, though a vast challenge in itself, will not be enough,

however. At the same time storage and distribution systems must allow everyone access to at least a moderate share of the total.

PART 1 — QUESTIONS

Questions 1-4

Complete the sentences below with words taken from Reading Passage 1.

Choose NO MORE THAN TWO WORDS from the passage for each answer.

- In Luapula land allocation is in accordance with **1** _____
- The citemene system provides the land with **2** _____ where crops are planted.
- During the second season, the last planted crop is **3** _____
- Under suitable conditions, fruit trees are planted near **4** _____

Questions 5-8

Classify the following items with the correct description.

A. fish

B. oxen

C. goats

	A	B	C
5 be used in some unusual occasions, such as celebrations.	○	○	○
6 cannot thrive for being affected by the pests.	○	○	○
7 be the largest part of creating profit.	○	○	○
8 be sold beyond the local area.	○	○	○

Questions 9-12

Do the following statements agree with the information given in Reading Passage 1?

9 People rarely use animals to cultivate land.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

10 When it is a busy time, children usually took part in the labor force.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

11 The local residents eat goats on a regular time.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

12 Though citemene has been a sophisticated system, it could not provide enough protein.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

Questions 13-13

Choose the correct letter, A, B, C or D.

13 What is the writer’s opinion about the traditional ways of practices?

A ○ They can supply the nutrition that people need.

B ○ They are not capable of providing adequate support to the population,

C ○ They are productive systems that need no more improving.

D ○ They will be easily modified in the future.

PASSAGE 2

Read the text below and answer questions 14-26.

Griffith and American films

Movies are key cultural artifacts that offer a window into American cultural and social history. A mixture of art, business, and popular entertainment, the movies provide a host of insights into Americans' shifting ideals, fantasies, and preoccupations

14

A Many films of the early silent era dealt with gender relations. Before 1905, as Kathy Peiss has argued, movie screens were filled with salacious sexual imagery and risque humor, drawn from burlesque halls and vaudeville theaters. Early films offered many glimpses of women disrobing or of passionate kisses. As the movies' female audience grew, sexual titillation and voyeurism persisted. But an ever increasing number of film dealt with the changing work and sexual roles of women in a more sophisticated manner. While D.w. Griffith's films presented an idealized picture of the frail Victorian child-woman, and showed an almost obsessive preoccupation with female honor and chastity, other silent movies presented quite different images of femininity. These ranged from the exotic, sexually aggressive vamp to the athletic, energetic "serial queen"; the street smart urban working gal, who repels the sexual advances of her lascivious boss; and cigarette-smoking, alcohol drinking chorus girls or burlesque queens.

15

B In early 1910, director D.w. Griffith was sent by the Biograph Company to the west coast with his acting troupe, consisting of actors Blanche Sweet, Lillian Gish, Mary Pickford, Lionel Barrymore, and others. While there, the company decided to explore new territories, traveling several miles north to Hollywood, a little village that was friendly and enjoyed the movie company filming there. By focusing the camera on particular actors and actresses, Griffith inadvertently encouraged the development of the star system. As early as 1910, newspapers were deluged with requests for actors' names. But most studios refused to divulge their identities, fearing the salary demands of popular performers. As one industry observer put it, "In the 'star' your producer gets not only a 'production' value...but a 'trademark' value, and an 'insurance' value which are...very potent in guaranteeing the sale of this product." As the star system emerged, salaries soared. In the course of just two years, the salary of actress Mary Pickford rose from less than $400 a week in 1914 to $10,000 a week in 1916. This action made Griffith believe the big potential in movie industry. Thus many competitors completely copy the same system as Griffith used, for the considerable profits. Additionally, they also study the theory and methods which Griffith suggested.

16

C From the moment America entered the war, Hollywood feared that the industry would be subject to heavy-handed government censorship. But the government itself wanted no repeat of World War I, when the Committee on Public Information had whipped up anti-German hysteria and oversold the war as "a Crusade not merely to re-win the tomb of Christ, but to bring back to earth the rule of right, the peace, goodwill to men and gentleness he taught.”

17

D The formation of the movie trust ushered in a period of rationalization within the film industry. Camera and projecting equipment was standardized; film rental fees were fixed; theaters were upgraded; which improved the quality of movies by removing damaged prints from cnculation. This was also a period intense artistic and technical innovation, as pioneering directors like David Wark Griffith and others created a new language of film and revolutionized screen narrative.

18

E With just six months of film experience, Griffith, a former stage actor, was hired as a director by the Biograph Company and promised $50 a week and one-twentieth of a cent for every foot of film sold to a rental exchange. Each week, Griffith turned out two or three one-reelers. While earlier directors had used such cinematic devices as close ups, slow motion, fade-ins and fade-outs, lighting effects, and editing before, Griffith's great contribution to the movie industry was to show how these techniques could be used to create a wholly new style of storytelling, distinct from the theater. Griffith's approach to movie storytelling has been aptly called "photographic realism." This is not to say that he merely wished to record a story accurately; rather he sought to convey the illusion of realism. He demanded that his performers act less in a more lifelike manner, avoiding the broad, exaggerated gestures and pantomiming of emotions that characterized the nineteenth century stage. He wanted his performers to take on a role rather than directly addressing the camera. Above all, he used close-ups, lighting, editing, and other cinematic techniques convey suspense and other emotions and to focus the audience's attention on individual performers.

19

F During the 1920s and 1930s, a small group of film companies consolidated then control. Known as the "Big Five" - Paramount, Warner Brothers, RKO, 20th Century-Fox, and Lowe's (MGM) and the "Little Three" - Universal, Columbia, and United Artists, they formed fully integrated companies. The old film company’s opposition was shocked by new tycoons. The confusion of tongues in the foreign version of American films deepened when American directors themselves embarked on the shooting of the new version. They did not usually speak Spanish (or the given target language) and, at that time, there were only few translators at the studio’s disposal. For this reason, it was more general to contract Spanish directors, actors, and screenwriters to produce American films in Spanish for Latin American audiences and for the public in the Iberian Peninsula. Hollywood had depended on overseas markets for as much as

40 percent of its revenue. But in an effort to nurture then own film industries and prevent an excessive outflow of dollars, Britain, France, and Italy imposed stiff import tariffs and restrictive quotas on imported American movies.

G A basic problem facing today's Hollywood is the rapidly rising cost of making and marketing a movie: an average of $40 million today. The immense cost of producing movies has led the studios to seek guaranteed hits: blockbuster loaded with high-tech special effects, sequels, and remakes of earlier movies, foreign films, and even old TV shows. Hollywood has also sought to cope with rising costs by focusing ever more intently on its core audiences. Since the mid-1980s, the movie going audience has continued to decrease in size. Ticket sales fell from 1.2 billion in 1983 to 950 million in 1992, with the biggest drop occurring among adults. And since over half of Hollywood's profits are earned overseas, the target market has to be changed due to the increasing costs and salary of making a film. The industry has concentrated much of its energy on crude action films easily understood by an international audience, featuring stars like Arnold Schwarzenegger and Sylvester Stallone.

PART 2 — QUESTIONS

Questions 14-19

Choose the correct heading for each paragraph from the list of headings below.

i. **Detailed description for film system**

ii. **Griffith's contribution to American films**

iii. **The gender in development of American film**

iv. **Change the view of the American movie**

v. **People's reaction to making movies in the war period**

vi. **The increasing market of film in society**

vii. **Griffith improved the gender recognition in society**

Questions 20-23

Use the information in the passage to match the options below with the statements.

A. old company's opposition

B. huge drop happens among adults

C. the pressure to change its market

D. completely copy his system

	A	B	C	D
20 Griffith's successful in 1910s, led his rivals	○	○	○	○
21 The growing costs and salary in Hollywood which shows it has	○	○	○	○
22 The increasing new movie industries have a big impact on	○	○	○	○
23 In 1992, ticket sales declined dramatically, due to	○	○	○	○

Questions 24-26

Choose the correct letter, A, B, C or D.

24 Why Griffith believe the potential in making movies?

A ○ The gender development in American films

B ○ He used the star system successfully

C ○ He prefer the advanced movie techniques

D ○ He earns lots of money

25 What are other competitors' reaction to Griffith?

A ○ Adopt Griffith's theory and methods in making films

B ○ Completely copy his theory and methods

C ○ Try to catch up their innovations

D ○ Find a new system to against Griffith

26 What is the great change in films industries during 1920s and 1930s?

A ○ Try to seek the high-tech special efforts

B ○ Dismiss the needs of overseas audiences

C ○ Changed its goal market

D ○ Improved the foreign version of American movies

PASSAGE 3

Read the text below and answer questions 27-40.

The Persuaders

A We have long lived in an age where powerful images, catchy soundbites and too-good-to miss offers bombard from every quarter. All around US the persuaders are at work. Occasionally their methods are unsubtle—the planting kiss on a baby's head by a wannabe political leader, or a liquidation sale in a shop that has been "closing down" for well over a year, but generally the persuaders know what they are about and are highly capable. Be they politicians, supermarket chains, salespeople or advertisers, they know exactly what to do to sell us their images, ideas or produce. When it comes to persuasion, these giants rule supreme. They employ the most skilled image-makers and use the best psychological tricks to guarantee that even the most cautious among US are open to manipulation.

B We spend more time in them than we mean to, we buy 75 percent of our food from them and end up with products that we did not realize we wanted. Right form the start, supermarkets have been ahead of the game. For example, when Sainsbury introduced shopping baskets into its 1950s stores, it was a stroke of marketing genius. Now shoppers could browse and pick up items they previously would have ignored. Soon after came trolleys, and just as new roads attract more traffic, the same applied to trolley space. Pro Merlin Stone, IBM Professor of Relationship Marketing at Bristol Business School, says aisles are laid out to maximize profits. Stores pander to our money-rich, time-poor lifestyle. Low turnover products clothes and electrical goods are stocked at the back while high turnover items command position at the front.

C Stone believes supermarkets work hard to "stall" US because the more time we spend in them, the more we buy. Thus, great efforts are made to make the environment pleasant. Stores play music to relax US and some even pipe air from the in-store bakery around the shop. In the USA, fake aromas are sometimes used. Smell is both the most evocative and subliminal sense. In experiments, pleasant smells are effective in increasing our spending. A casino that fragranced only half its premise saw profit soar in the aroma—filled areas. The other success story from the supermarkets' perspective is the loyalty card. Punters may assume that they are being rewarded for their fidelity, but all the while they are trading information about their shopping habits. Loyal shoppers could be paying 30% more by sticking to their favourite shops for essential cosmetics

D Research has shown that 75 percent of profit comes from just 30 percent of customers. Ultimately, reward cards could be used to identify and better accommodate these "elite" shoppers. It could also be used to make adverts more relevant to individual consumers—rather like Spielberg's futuristic thriller Minority Report, in which Tom Cruise's character is bombarded with interactive personalized ads. If this sounds far-fetched, the data-gathering revolution has already seen the introduction of radio—frequency identification—away to electronically tag products to see who is buying what, FRID means they can follow the product into people homes.

E No matter how savvy we think we are to then ploys, the ad industry still wins. Adverts focus on what products do or on how they make US feel. Researcher Laurette Dube, in the Journal of Advertising Research, says when attitudes are base on “cognitive foundations” (logical reasoning), advertisers use informative appeals. This works for products with little emotional draw but high functionality, such as bleach. Where attitude are based on effect (i.e, emotions), ad teams try to tap into our feelings. Researchers at the University of Florida recently concluded that our emotional responses to adverts dominate over “cognition”.

F Advertisers play on our need to be safe (commercials for insurance), to belong (make customer feel they are in the group in fashion ads) and for self-esteem (aspirational adverts). With time and space at a premium, celebrities are often used as a quick way of meeting these needs—either because the celeb epitomizes success or because they seem familiar and so make the product seem “safe”. A survey of 4,000 campaigns found ads with celebs were 10 percent more effective than without. Humor also stimulates a rapid emotional response. Hwiman Chung, writing in the International Journal of Advertising, found that funny ads were remembered for longer than straight ones. Combine humor with sexual imagery—as in Wonderbra’s “Hello Boys” ads—and you are on to a winner.

G Slice-of-life ads are another tried and tested method—they paint a picture of life as you would like it, but still one that feels familiar. Abhilasha Mehta, in the Journal of Advertising Research, noted that the more one’s self-image tallies with the brand being advertised, the stronger the commercial. Ad makers also use behaviorist theories, recognizing that the more sensation we receive from an object, the better we know it. If an advert for a chocolate bar fails to cause salivation, it has probably failed. No wonder advertisements have been dubbed the “nervous system of the business world”.

H Probably all of US could make a sale if the product was something we truly believed in, but professional salespeople are in a different league the best of them can always sell different items to suitable customers in a best time. They do this by using very basic psychological techniques. Stripped to its simplest level, selling works by heightening the buyer’s perception of how much they need a product or service. Buyers normally have certain requirements by which they will judge the suitability of a product. The seller therefore attempts to tease out what these conditions are and then explains how then products’ benefit can meet these requirements.

I Richard Hession, author of Be a Great Salesperson says it is human nature to prefer to speak rather to listen, and good salespeople pander to this. They ask punters about then needs and offer to work with them to achieve then objectives. As a result, the buyer feels they are receiving a “consultation” rather than a sales pitch. All the while, the salesperson presents with a demeanour that takes it for granted that the sale will be made. Never will the words “if you buy” be used, but rather “when you buy”.

J Dr Rob Yeung, a senior consultant at business psychologists Kiddy and Partner, says most salespeople will build up a level of rapport by asking questions about hobbies, family and lifestyle. This has the double benefit of making the salesperson likeable while furnishing him or her with more information about the client’s wants. Yeung says effective salespeople try as far as possible to match their style of presenting themselves to how the buyer comes across. If the buyer cracks jokes, the salespeople will respond in kind. If the buyer wants detail, the seller

provides it, if they are more interested in the feel of the product, the seller will focus on this. At its most extreme, appearing empathetic can even include the salesperson attempting to "mirror" the hobby language of the buyer.

K Whatever the method used, all salespeople work towards one aim: "closing the deal". In fact, they will be looking for "closing signals" through then dealings with potential clients. Once again the process works by assuming success. The buyer is not asked "are you interested?" as this can invite a negative response. Instead the seller takes it for granted that the deal is effectively done: when the salesman asks you for a convenient delivery date or asks what color you want, you will probably respond accordingly. Only afterwards might you wonder why you proved such a pushover.

PART 3 — QUESTIONS

Questions 27-29

Choose the correct letter, A, B, C or D.

27 What is the supermarket's purpose of using "basket" in paragraph B?

- **A** ○ Create a convenient atmosphere of supermarket
- **B** ○ Make customers spend more time on shopping
- **C** ○ Relieve pressure on supermarket's traffic
- **D** ○ More than half items bought need carried

28 What is the quality of a best salesman possessed according to this passage?

- **A** ○ Sell the right product to right person
- **B** ○ Clearly state the instruction of a product
- **C** ○ Show professional background of one product
- **D** ○ Persuade customers to buy the product they sell

29 What's the opinion of Richard Hession?

- **A** ○ Pretend to be nice instead of selling goods
- **B** ○ Prefer to speak a lot to customers
- **C** ○ Help buyers to conclude then demands for ideal items
- **D** ○ Show great interpersonal skill

Questions 30-35

Which paragraph contains the following information?

NB: You may use any letter more than once.

	A	B	C	D	E	F	G	H	I	J	K
30 how do supermarkets distract consumers	○	○	○	○	○	○	○	○	○	○	○
31 how to build a close relationship between salespeople and buyer	○	○	○	○	○	○	○	○	○	○	○
32 people would be impressed by humor advertisement	○	○	○	○	○	○	○	○	○	○	○
33 methods for salespeople to get the order	○	○	○	○	○	○	○	○	○	○	○
34 how questions work for salespeople	○	○	○	○	○	○	○	○	○	○	○
35 different customer groups bring different profits	○	○	○	○	○	○	○	○	○	○	○

Questions 36-40

Complete the notes below using NO MORE THAN TWO WORDS from the passage.

Trolleys are bom for the increasing traffic in supermarket. The width of **36** _____ in supermarkets is broadened in order to generate the most profits. Research from **37** _____, satisfying aromas can motivate people buy more products. Except the effort of creating a comfortable surroundings, **38** _____ is another card that supermarkets play to reward their regular customers. For example, loyal customers spend 30% more in their loved shops for everyday necessary **39** _____. Clothes shops use advertisements to make buyer think they are belonging to part of a **40** _____; research from 4,000 campaigns reflect that humor advertisement received more emotional respect.

Answer Key

#	Answer	Explanation
1	**need**	allocated by the headman or headwoman of a village to people of either sex, according to need
2	**(the) ashes**	Most of the traditional cropping in Luapula, as in the Bemba area to the east, is based on citemene, a system whereby crops are grown on the ashes of tree branches
3	**(vegetable) cassava**	The diverse sequence ends with vegetable cassava, which is often planted into the developing last-but-one crop as a relay
4	**houses**	Where their roots have year-round access to water tables mango, guava and oil-palm trees often grow around houses, forming a traditional agroforestry system
5	**C**	Most people keep freely roaming chickens and goats. These act as a reserve for bartering, but may also be occasionally slaughtered for ceremonies or for entertaining important visitors
6	**B**	Only small numbers of cattle or oxen are kept in the province owing to the prevalence of the tse-tse fly
7	**A**	Fishing has long provided a much needed protein supplement to the diet of Luapulans, as well as being the one substantial source of cash
8	**A**	Much fish is dried for sale to areas away from the main waterways
9	**TRUE**	The absence of animal draft power greatly limits peoples' ability to plough and cultivate land: a married couple can rarely manage to prepare by hand-hoeing
10	**NOT GIVEN**	Richards (1969) observed that the practice of citemene entails a definite division of labour between men and women
11	**TRUE**	Most people keep freely roaming chickens and goats. These act as a reserve for bartering, but may also be occasionally slaughtered for ceremonies or for entertaining important visitors. These animals are not a regular part of most peoples' diet
12	**TRUE**	Citemene has been an ingenious system for providing people with seasonal production of high quality cereals and vegetables in regions of acid, heavily leached soils. Nutritionally, the most serious deficiency was that of protein
13	**B**	neither the fisheries nor the forests and woodlands of Luapula are capable, with unmodified traditional practices, of supporting the

#	Answer	Explanation
		people in a sustainable manner
14	iii	Many films of the early silent era dealt with gender relations
15	i	By focusing the camera on particular actors and actresses, Griffith inadvertently encouraged the development of the star system
16	v	From the moment America entered the war, Hollywood feared that the industry would be subject to heavy-handed government censorship
17	iv	This was also a period intense artistic and technical innovation, as pioneering directors like David Wark Griffith and others created a new language of film and revolutionized screen narrative
18	ii	While earlier directors had used such cinematic devices as close ups, slow motion, fade-ins and fade-outs, lighting effects, and editing before, Griffith's great contribution to the movie industry was to show how these techniques could be used to create a wholly new style of storytelling, distinct from the theater
19	vi	Hollywood had depended on overseas markets for as much as 40 percent of its revenue
20	D	Thus many competitors completely copy the same system as Griffith used, for the considerable profits
21	C	And since over half of Hollywood's profits are earned overseas, the target market has to be changed due to the increasing costs and salary of making a film
22	A	The old film company's opposition was shocked by new tycoons
23	B	Ticket sales fell from 1.2 billion in 1983 to 950 million in 1992, with the biggest drop occurring among adults
24	B	As the star system emerged, salaries soared. In the course of just two years, the salary of actress Mary Pickford rose from less than $400 a week in 1914 to $10,000 a week in 1916. This action made Griffith believe the big potential in movie industry
25	A	Additionally, they also study the theory and methods which Griffith suggested
26	D	The confusion of tongues in the foreign version of American films deepened when American directors themselves embarked on the shooting of the new version. They did not usually speak Spanish (or the given target language) and, at that time, there were only few translators at the studio's disposal. For this reason, it was more general to contract Spanish directors, actors, and

#	Answer	Explanation
		screenwriters to produce American films in Spanish for Latin American audiences and for the public in the Iberian Peninsula
27	**B**	For example, when Sainsbury introduced shopping baskets into its 1950s stores, it was a stroke of marketing genius. Now shoppers could browse and pick up items they previously would have ignored
28	**A**	the best of them can always sell different items to suitable customers in a best time
29	**D**	Richard Hession, author of Be a Great Salesperson says it is human nature to prefer to speak rather to listen, and good salespeople pander to this
30	**C**	Stone believes supermarkets work hard to “stall” US because the more time we spend in them, the more we buy. Thus, great efforts are made to make the environment pleasant. Stores play music to relax US and some even pipe air from the in-store bakery around the shop. In the USA, fake aromas are sometimes used
31	**J**	Dr Rob Yeung, a senior consultant at business psychologists Kiddy and Partner, says most salespeople will build up a level of rapport by asking questions about hobbies, family and lifestyle
32	**F**	Humor also stimulates a rapid emotional response. Hwiman Chung, writing in the International Journal of Advertising, found that funny ads were remembered for longer than straight ones
33	**K**	Whatever the method used, all salespeople work towards one aim: “closing the deal”. In fact, they will be looking for “closing signals” through then dealings with potential clients. Once again the process works by assuming success. The buyer is not asked “are you interested?” as this can invite a negative response. Instead the seller takes it for granted that the deal is effectively done: when the salesman asks you for a convenient delivery date or asks what color you want, you will probably respond accordingly
34	**K**	The buyer is not asked “are you interested?” as this can invite a negative response. Instead the seller takes it for granted that the deal is effectively done: when the salesman asks you for a convenient delivery date or asks what color you want, you will probably respond accordingly
35	**D**	Research has shown that 75 percent of profit comes from just 30 percent of customers
36	**aisles**	Pro Merlin Stone, IBM Professor of Relationship Marketing at Bristol Business School, says aisles are laid out to maximize profits

#	Answer	Explanation
37	**experiments**	In experiments, pleasant smells are effective in increasing our spending
38	**loyalty card**	The other success story from the supermarkets' perspective is the loyalty card. Punters may assume that they are being rewarded for their fidelity, but all the while they are trading information about their shopping habits
39	**cosmetics**	Loyal shoppers could be paying 30% more by sticking to their favourite shops for essential cosmetics
40	**group**	Advertisers play on our need to be safe (commercials for insurance), to belong (make customer feel they are in the group in fashion ads) and for self-esteem (aspirational adverts)

Test 61

PASSAGE 1

Tea and Industrial Revolution

1

A. Alan Macfarlane thinks he could rewrite history. The professor of anthropological science at King's College, Cambridge has, like other historians, spent decades trying to understand the enigma of the Industrial Revolution. Why did this particular important event the world-changing birth of industry - happen in Britain? And why did it happen at the end of the 18th century?

2

B. Macfarlane compares the question to a puzzle. He claims that there were about 20 different factors and all of them needed to be present before the revolution could happen. The chief conditions are to be found in history textbooks. For industry to 'take off', there needed to be the technology and power to drive factories, large urban populations to provide cheap labour easy transport to move goods around, an affluent middle-class willing to buy mass-produced objects, a market-driven economy, and a political system that allowed this to happen. While this was the case for England, other nations, such as Japan, Holland and France also met some of these criteria. All these factors must have been necessary but not sufficient to cause the revolution. Holland had everything except coal, while China also had many of these factors.

3

C. Most historians, however, are convinced that one or two missing factors are needed to solve the puzzle. The missing factors, he proposes, are to be found in every kitchen cupboard. Tea and beer, two of the nation's favorite drinks, drove the revolution. Tannin, the active ingredient in tea, and hops, used in making beer, both contain antiseptic properties. This -plus the fact that both are made with boiled water- helped prevent epidemics of waterborne diseases, such as dysentery, in densely populated urban areas. The theory initially sounds eccentric but his explanation of the detective work that went into his deduction and the fact his case has been strengthened by a favorable appraisal of his research by Roy Porter (distinguished medical historian) the skepticism gives way to wary admiration.

4

D. Historians had noticed one interesting factor around the mid-18th century that required explanation. Between about 165D and 1740, the population was static. But then there was a burst in population. The infant mortality rate halved in the space of 20 years, and this happened

in both rural areas and cities, and across all classes. Four possible causes have been suggested. There could have been a sudden change in the viruses and bacteria present at that time, but this is unlikely. Was there a revolution in medical science? But this was a century before Lister introduced antiseptic surgery. Was there a change in environmental conditions? There were improvements in agriculture that wiped out malaria, but these were small gains. Sanitation did not become widespread until the 19th century. The only option left was food. But the height and weight statistics show a decline. So the food got worse. Efforts to explain this sudden reduction in child deaths appeared to draw a blank.

5

E. This population burst seemed to happen at just the right time to provide labor for the Industrial Revolution. But why? When the Industrial Revolution started, it was economically efficient to have people crowded together forming towns and cities. But with crowded living conditions comes disease, particularly from human waste. Some research in the historical records revealed that there was a change in the incidence of waterborne disease at that time, the English were protected by the strong antibacterial agent in hops, which were added to make beer last. But in the late 17th century a tax was introduced on malt. The poor turned to water and gin, and in the 1720s the mortality rate began to rise again.

6

F. Macfarlane looked to Japan, which was also developing large cities about the same time, and also had no sanitation. Waterborne diseases in the Japanese population were far fewer than those in Britain. Could it be the prevalence of tea in their culture? That was when Macfarlane thought about the role of tea in Britain. The history of tea in Britain provided an extraordinary coincidence of dates. Tea was relatively expensive until Britain started direct hade with China in the early 18th century. By the 1740s, about the time that infant mortality was falling, the drink was common. Macfarlane guesses that the fact that water had to be boiled, together with the stomach-purifying properties of tea so eloquently described in Buddhist texts, meant that the breast milk provided by mothers was healthier than it had ever been. No other European nation drank tea so often as the British, which, by Macfarlane's logic, pushed the other nations out of the race for the Industrial Revolution.

7

G. But, if tea is a factor in the puzzle, why didn't this cause an industrial revolution in Japan? Macfarlane notes that in the 17th century, Japan had large cities, high literacy rates and even a futures market. However, Japan decided against a work-based revolution, by giving up labor-saving devices even animals, to avoid putting people out of work. Astonishingly, the nation that we now think of as one of the most technologically advanced, entered the 19th century having almost abandoned the wheel. While Britain was undergoing the Industrial Revolution, Macfarlane notes wryly, Japan was undergoing an industrious one.

PART 1 — QUESTIONS

Questions 1-7

Reading passage 1 has seven paragraphs, A-G

Choose the correct heading for paragraphs A -G from the list of headings below.

Write the correct number, i-x,

i. **Cases of Japan, Holland and France**

ii. **City development in Japan**

iii. **Tea drinking in Japan and Britain**

iv. **Failed to find a plausible cause for mystery about lower mortality rate**

v. **Preconditions necessary for industrial revolution**

vi. **Time and place of industrialization**

vii. **Conclusion drawn from the comparison with Japan**

viii. **Relation between population and changes of drink in Britain**

ix. **Two possible solutions to the puzzle**

Questions 8-13

Do the following statements agree with the information given in Reading Passage 1?

write

TRUE if the statement is true

FALSE if the statement is false

NOT GIVEN if the information is not given in the passage

8 The industrialization did not happen in China because of its inefficient railway transportation.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

9 Tea and beer contributed to protect people from waterborne disease.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

10 Roy Porter disagreed with the proposed theory about the missing factors

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

11 The reason of lower child deaths is fully explained by food.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

12 The British made beer by themselves.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

13 Tax on malt indirectly affected the increase of population in late 17th century

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

PASSAGE 2

Fossil files: "The Paleobiology Database"

14

A. Are we now living through the sixth extinction as our own activities destroy ecosystems and wipe out diversity? That's the doomsday scenario painted by many ecologists, and they may well be right. The trouble is we don't know for sure because we don't have a clear picture of how life changes between extinction events or what has happened in previous episodes. We don't even know how many species are alive today, let alone the rate at which they are becoming extinct. A new project aims to fill some of the gaps. The Paleobiology Database aspires to be an online repository of information about every fossil ever dug up. It is a huge undertaking that has been described as biodiversity's equivalent of the Human Genome Project. Its organizers hope that by recording the history of biodiversity they will gain an insight into how environmental changes have shaped life on Earth in the past and how they might do so in the future. The database may even indicate whether life can rebound no matter what we throw at it, or whether a human induced extinction could be without parallel, changing the rules that have applied throughout the rest of the planet's history.

15

B. But already the project is attracting harsh criticism. Some experts believe it to be seriously flawed. They point out that a database is only as good as the data fed into it, and that even if all the current fossil finds were catalogued, they would provide an incomplete inventory of life because we are far from discovering every fossilised species. They say that researchers should get up from their computers and get back into the dirt to dig up new fossils. Others are more sceptical still, arguing that we can never get the full picture because the fossil record is riddled with holes and biases.

16

C. Fans of the Paleobiology Database acknowledge that the fossil record will always be incomplete. But they see value in looking for global patterns that show relative changes in biodiversity. "The fossil record is the best tool we have for understanding how diversity and extinction work in normal times," says John Alroy from the National Center for Ecological Analysis and Synthesis in Santa Barbara. "Having a background extinction estimate gives US a benchmark for understanding the mass extinction that's currently under way. It allows us to say just how bad it is in relative terms."

17

D. To this end, the Paleobiology Database aims to be the most thorough attempt yet to come up with good global diversity curves. Every day between 10 and 15 scientists around the world add information about fossil finds to the database. Since it got up and running in 1998, scientists have entered almost 340,000 specimens, ranging from plants to whales to insects to dinosaurs to sea urchins. Overall totals are updated hourly at www.paleodb.org. Anyone can download data from the public part of the site and play with the numbers to their heart's content. Already, the database has thrown up some surprising results. Looking at the big picture, Alroy and his colleagues believe they have found evidence that biodiversity reached a plateau long ago, contrary to the received wisdom that species numbers have increased continuously between extinction events. "The traditional view is that diversity has gone up and up and up," he says. "Our research is showing that diversity limits were approached many tens of millions of years before the dinosaurs evolved, much less suffered extinction." This suggests that only a certain number of species can live on Earth at a time, filling a prescribed number of niches like spaces in a multi-storey car park. Once it's full, no more new species can squeeze in, until extinctions free up new spaces or something rare and catastrophic adds a new floor to the car park.

18

E. Alroy has also used the database to reassess the accuracy of species names. His findings suggest that irregularities in classification inflate the overall number of species in the fossil record by between 32 and 44 per cent. Single species often end up with several names, he says, due to misidentification or poor communication between taxonomists in different countries. Repetition like this can distort diversity curves. "If you have really bad taxonomy in one short interval, it will look like a diversity spike—a big diversification followed by a big extinction-when all that has happened is a change in the quality of names," says Alroy. For example, his statistical analysis indicates that of the 4861 North American fossil mammal species catalogued in the database, between 24 and 31 per cent will eventually prove to be duplicates.

19

F. Of course, the fossil record is undeniably patchy. Some places and times have left behind more fossil-filled rocks than others. Some have been sampled more thoroughly. And certain kinds of creatures—those with hard parts that lived in oceans, for example--are more likely to leave a record behind, while others, like jellyfish, will always remain a mystery. Alroy has also tried to account for this. He estimates, for example, that only 41 per cent of North American mammals that have ever lived are known from fossils, and he suspects that a similar proportion of fossils are missing from other groups, such as fungi and insects.

G. Not everyone is impressed with such mathematical wizardry. Jonathan Adrain from the University of Iowa in Iowa City points out that statistical wrangling has been known to create mass extinctions where none occurred. It is easy to misinterpret data. For example, changes in sea level or inconsistent sampling methods can mimic major changes in biodiversity. Indeed, a recent and thorough examination of the literature on marine bivalve fossils has convinced David

Jablonsky from the University of Chicago and his colleagues that their diversity has increased steadily over the past 5 million years.

H. With an inventory of all living species, ecologists could start to put the current biodiversity crisis in historical perspective. Although creating such a list would be a task to rival even the Palaeobiology Database, it is exactly what the San Francisco-based ALL Species Foundation hopes to achieve in the next 25 years. The effort is essential, says Harvard biologist Edward o. Wilson, who is alarmed by current rates of extinction. "There is a crisis. We've begun to measure it, and it's very high," Wilson says. "We need this kind of information in much more detail to protect all of biodiversity, not just the ones we know well." Let the counting continue.

PART 2 — QUESTIONS

Questions 14-19

The reading passage has seven paragraphs, A-F

Choose the correct heading for paragraphs A-F from the list below. Write the correct number, i-xi,

i. **Potential error exists in the database**

ii. **Supporter of database recleared its value**

iii. **The purpose of this paleobiology data**

iv. **Reason why some certain species were not included in it**

v. **Duplication of breed but with different names**

vi. **Achievement of Paleobiology Databasesince**

vii. **Criticism on the project which is waste of fund**

Questions 20-22

Use the information in the passage to match the people (listed A-C) with opinions or deeds below. Write the appropriate letters A-C

A. Jonathan Adrain

B. John Alroy

C. David Jablonsky

D. Edward o. Wilson

	A	B	C	D
20 Creating the Database would help scientist to identify connections of all species.	○	○	○	○
21 Believed in contribution of detailed statistics should cover beyond the known species.	○	○	○	○
22 reached a contradictory finding to the tremendous species die-out.	○	○	○	○

Questions 23-24

Choose the TWO correct letter following

23 **24** Please choose TWO CORRECT descriptions about the The Paleobiology Database in this passage:

- **A** ☐ almost all the experts welcome this project
- **B** ☐ intrigues both positive and negative opinions from various experts
- **C** ☐ all different creature in the database have unique name
- **D** ☐ aims to embrace all fossil information globally
- **E** ☐ get more information from record rather than the field

Questions 25-26

Choose the correct letter, A, B, c or D.

25 According to the passage, jellyfish belongs to which category of The Paleobiology Database?

- **A** ○ repetition breed
- **B** ○ untraceable species
- **C** ○ specifically detailed species
- **D** ○ currently living creature

26 What is the author's suggestion according to the end of passage?

- **A** ○ continue to complete counting the number of species in the Paleobiology Database
- **B** ○ stop contributing The Paleobiology Database
- **C** ○ try to create a database of living creature
- **D** ○ study more in the field rather than in the book

PASSAGE 3

Communication in science

A. Science plays an increasingly significant role in people's lives, making the faithful communication of scientific developments more important than ever. Yet such communication is fraught with challenges that can easily distort discussions, leading to unnecessary confusion and misunderstandings.

B. Some problems stem from the esoteric nature of current research and the associated difficulty of finding sufficiently faithful terminology Abstraction and complexity are not signs that a given scientific direction is wrong, as some commentators have suggested, but are instead a tribute to the success of human ingenuity in meeting the increasingly complex challenges that nature presents. They can, however, make communication more difficult. But many of the biggest challenges for science reporting arise because in areas of evolving research, scientists themselves often only partly understand the full implications of any particular advance or development. Since that dynamic applies to most of the scientific developments that directly affect people's lives global warming, cancer research, diet studies learning how to overcome it is critical to spurring a more informed scientific debate among the broader public.

C. Ambiguous word choices are the source of some misunderstandings. Scientists often employ colloquial terminology, which they then assign a specific meaning that is impossible to fathom without proper training. The term "relativity," for example, is intrinsically misleading. Many interpret the theory to mean that everything is relative and there are no absolutes. Yet although the measurements any observer makes depend on his coordinates and reference frame, the physical phenomena he measures have an invariant description that transcends that observer's particular coordinates. Einstein's theory of relativity is really about finding an invariant description of physical phenomena. True, Einstein agreed with the idea that his theory would have been better named "Invarianten theorie." But the term "relativity" was already entrenched at the time for him to change.

D. "The uncertainty principle" is another frequently abused term. It is sometimes interpreted as a limitation on observers and their ability to make measurements.

E. But it is not about intrinsic limitations on any one particular measurement; it is about the inability to precisely measure particular pairs of quantities simultaneously? The first interpretation is perhaps more engaging from a philosophical or political perspective. It's just not what the science is about.

F. Even the word "theory" can be a problem. Unlike most people, who use the word to describe a passing conjecture that they often regard as suspect, physicists have very specific ideas in mind when they talk about theories. For physicists, theories entail a definite physical framework embodied in a set of fundamental assumptions about the world that lead to a specific set of equations and predictions ones that are borne out by successful predictions. Theories aren't necessarily shown to be correct or complete immediately. Even Einstein took the better part of

a decade to develop the correct version of his theory of general relativity. But eventually both the ideas and the measurements settle down and theories are either proven correct, abandoned or absorbed into other, more encompassing theories.

G. "Global warming" is another example of problematic terminology. Climatologists predict more drastic fluctuations in temperature and rainfall not necessarily that every place will be warmer. The name sometimes subverts the debate, since it lets people argue that their winter was worse, so how could there be global warming? Clearly "global climate change" would have been a better name. But not all problems stem solely from poor word choices. Some stem from the intrinsically complex nature of much of modem science. Science sometimes transcends this limitation: remarkably, chemists were able to detail the precise chemical processes involved in the destruction of the ozone layer, making the evidence that chlorofluorocarbon gases (Freon, for example) were destroying the ozone layer indisputable.

H. A better understanding of the mathematical significance of results and less insistence on a simple story would help to clarify many scientific discussions. For several months, Harvard was tortured by empty debates over the relative intrinsic scientific abilities of men and women. One of the more amusing aspects of the discussion was that those who believed in the differences and those who didn't used the same evidence about gender-specific special ability. How could that be? The answer is that the data shows no substantial effects. Social factors might account for these tiny differences, which in any case have an unclear connection to scientific ability. Not much of a headline when phrased that way, is it? Each type of science has its own source of complexity and potential for miscommunication. Yet there are steps we can take to improve public understanding in all cases. The first would be to inculcate greater understanding and acceptance of indirect scientific evidence. The information from an unmanned space mission is no less legitimate than the information from one in which people are on board.

I. This doesn't mean never questioning an interpretation, but it also doesn't mean equating indirect evidence with blind belief, as people sometimes suggest. Second, we might need different standards for evaluating science with urgent policy implications than research with purely theoretical value. When scientists say they are not certain about their predictions, it doesn't necessarily mean they've found nothing substantial. It would be better if scientists were more open about the mathematical significance of their results and if the public didn't treat math as quite so scary; statistics and errors, which tell us the uncertainty in a measurement, give us the tools to evaluate new developments fairly.

J. But most important, people have to recognize that science can be complex. If we accept only simple stories, the description will necessarily be distorted. When advances are subtle or complicated, scientists should be willing to go the extra distance to give proper explanations and patient about the truth. Even so, some difficulties are unavoidable. Most developments reflect work in progress, so the story is complex because no one yet knows the big picture.

PART 3 — QUESTIONS

Questions 27-31

Choose the correct letter, A, B, c or D.

27 Why the faithful science communication Important?

- **A** ○ Science plays an increasingly significant role in people's lives.
- **B** ○ Science is fraught with challenges public are interested in.
- **C** ○ The nature of complexity in science communication leads to confusion.
- **D** ○ Scientific inventions are more important than ever before.

28 What is the reason that the author believe for the biggest challenges for science reporting

- **A** ○ phenomenon such as global warming, cancer research, diet studies are too complex
- **B** ○ Scientists themselves often only partly understand the Theory of Evolution
- **C** ○ Scientists do not totally comprehend the meaning of certain scientific evolution
- **D** ○ Scientists themselves often partly understand the esoteric communication nature

29 According to the 3rd paragraph, the reference to the term and example of "theory of relativity" is to demonstrate

- **A** ○ a theory of relativity is about an invariant physical phenomenon
- **B** ○ common people may be misled by the inaccurate choice of scientific phrase
- **C** ○ the term "relativity," is designed to be misleading public
- **D** ○ everything is relative and there is no absolutes existence

30 Which one Is a good example of appropriate word choice:

- **A** ○ Scientific theory for uncertainty principle
- **B** ○ phenomenon of Global warming
- **C** ○ the importance of ozone layer

D ◯ Freon's destructive process on environmental

31 What Is surprising finding of the Harvard debates In the passage?

A ◯ There are equal intrinsic scientific abilities of men and women.

B ◯ The proof applied by both sides seemed to be of no big difference.

C ◯ The scientific data usually shows no substantial figures to support a debated idea.

D ◯ Social factors might have a clear connection to scientific ability.

Questions 32-35

Do the following statements agree with the information given in Reading Passage 1?

write

TRUE if the statement is true

FALSE if the statement is false

NOT GIVEN if the information is not given in the passage

32 "Global warming" scientifically refers to greater fluctuations in temperature and rainfall rather than a universal temperature rise.

A ◯ YES

B ◯ NO

C ◯ NOT GIVEN

33 More media coverage of "global warming" would help public to recognize the phenomenon.

A ◯ YES

B ◯ NO

C ◯ NOT GIVEN

34 Harvard debates should focus more on female scientist and male scientists

A ◯ YES

B ○ NO

C ○ NOT GIVEN

35 Public understanding and acceptance of indirect scientific evidence in all cases would lead to confusion

A ○ YES

B ○ NO

C ○ NOT GIVEN

Questions 36-40

Complete the following summary of the paragraphs of Reading Passage, using no more than two words from the Reading Passage for each answer.

Science Communication is fraught with challenges that can easily distort discussions, leading to unnecessary confusion and misunderstandings. Firstly, ambiguous **36** _____ are the source of some misunderstandings. Common people without proper training do not understand clearly or deeply a specific scientific meaning via the **37** _____ scientists often employed. Besides, the measurements any **38** _____ makes can not be confined to describe in a(n) **39** _____ yet the phenomenon can be. What's more, even the word "theory" can be a problem. Theories aren't necessarily shown to be correct or complete immediately since scientists often evolved better versions of specific theories, a good example can be the theory of **40** _____ . Thus, most importantly people have to recognize that science can be complex.

Answer Key

#	Answer	Explanation
1	**vi**	Why did this particular important event the world-changing birth of industry – happen in Britain? And why did it happen at the end of the 18th century
2	**v**	He claims that there were about 20 different factors and all of them needed to be present before the revolution could happen. The chief conditions are to be found in history textbooks. For industry to 'take off', there needed to be the technology and power to drive factories, large urban populations to provide cheap labour easy transport to move goods around, an affluent middle-class willing to buy mass-produced objects, a market-driven economy, and a political system that allowed this to happen
3	**ix**	Most historians, however, are convinced that one or two missing factors are needed to solve the puzzle. The missing factors, he proposes, are to be found in every kitchen cupboard. Tea and beer, two of the nation's favorite drinks, drove the revolution
4	**iv**	Efforts to explain this sudden reduction in child deaths appeared to draw a blank
5	**viii**	Some research in the historical records revealed that there was a change in the incidence of waterborne disease at that time, the English were protected by the strong antibacterial agent in hops, which were added to make beer last. But in the late 17th century a tax was introduced on malt. The poor turned to water and gin, and in the 1720s the mortality rate began to rise again
6	**iii**	Waterborne diseases in the Japanese population were far fewer than those in Britain. Could it be the prevalence of tea in their culture? That was when Macfarlane thought about the role of tea in Britain
7	**vii**	While Britain was undergoing the Industrial Revolution, Macfarlane notes wryly, Japan was undergoing an industrious one
8	**NOT GIVEN**	Holland had everything except coal, while China also had many of these factors
9	**TRUE**	Tannin, the active ingredient in tea, and hops, used in making beer, both contain antiseptic properties. This -plus the fact that both are made with boiled water- helped prevent epidemics of waterborne diseases, such as dysentery, in densely populated urban areas

#	Answer	Explanation
10	**FALSE**	the fact his case has been strengthened by a favorable appraisal of his research by Roy Porter (distinguished medical historian)
11	**FALSE**	The only option left was food. But the height and weight statistics show a decline. So the food got worse. Efforts to explain this sudden reduction in child deaths appeared to draw a blank
12	**NOT GIVEN**	Tea and beer, two of the nation's favorite drinks, drove the revolution. Tannin, the active ingredient in tea, and hops, used in making beer, both contain antiseptic properties
13	**TRUE**	But in the late 17th century a tax was introduced on malt. The poor turned to water and gin, and in the 1720s the mortality rate began to rise again
14	**iii**	A new project aims to fill some of the gaps. The Paleobiology Database aspires to be an online repository of information about every fossil ever dug up. It is a huge undertaking that has been described as biodiversity's equivalent of the Human Genome Project. Its organizers hope that by recording the history of biodiversity they will gain an insight into how environmental changes have shaped life on Earth in the past and how they might do so in the future
15	**i**	Some experts believe it to be seriously flawed. They point out that a database is only as good as the data fed into it, and that even if all the current fossil finds were catalogued, they would provide an incomplete inventory of life because we are far from discovering every fossilised species
16	**ii**	Fans of the Paleobiology Database acknowledge that the fossil record will always be incomplete. But they see value in looking for global patterns that show relative changes in biodiversity
17	**vi**	Since it got up and running in 1998, scientists have entered almost 340,000 specimens, ranging from plants to whales to insects to dinosaurs to sea urchins. Overall totals are updated hourly at www.paleodb.org. Anyone can download data from the public part of the site and play with the numbers to their heart's content. Already, the database has thrown up some surprising results
18	**v**	Single species often end up with several names, he says, due to misidentification or poor communication between taxonomists in different countries
19	**iv**	And certain kinds of creatures—those with hard parts that lived in oceans, for example–are more likely to leave a record behind, while others, like jellyfish, will always remain a mystery

#	Answer	Explanation
20	**B**	Alroy has also used the database to reassess the accuracy of species names. His findings suggest that irregularities in classification inflate the overall number of species in the fossil record by between 32 and 44 per cent. Single species often end up with several names, he says, due to misidentification or poor communication between taxonomists in different countries
21	**D**	“There is a crisis. We’ve begun to measure it, and it’s very high,” Wilson says. “We need this kind of information in much more detail to protect all of biodiversity, not just the ones we know well.”
22	**C**	Indeed, a recent and thorough examination of the literature on marine bivalve fossils has convinced David Jablonsky from the University of Chicago and his colleagues that their diversity has increased steadily over the past 5 million years
23	**B / D**	The Paleobiology Database aspires to be an online repository of information about every fossil ever dug up But already the project is attracting harsh criticism. Some experts believe it to be seriously flawed Fans of the Paleobiology Database acknowledge that the fossil record will always be incomplete. But they see value in looking for global patterns that show relative changes in biodiversity
24	**B / D**	The Paleobiology Database aspires to be an online repository of information about every fossil ever dug up But already the project is attracting harsh criticism. Some experts believe it to be seriously flawed Fans of the Paleobiology Database acknowledge that the fossil record will always be incomplete. But they see value in looking for global patterns that show relative changes in biodiversity
25	**B**	And certain kinds of creatures—those with hard parts that lived in oceans, for example–are more likely to leave a record behind, while others, like jellyfish, will always remain a mystery
26	**C**	With an inventory of all living species, ecologists could start to put the current biodiversity crisis in historical perspective. Although creating such a list would be a task to rival even the Palaeobiology Database, it is exactly what the San Francisco-based ALL Species Foundation hopes to achieve in the next 25 years. The effort is essential, says Harvard biologist Edward o. Wilson, who is alarmed by current rates of extinction
27	**A**	Science plays an increasingly significant role in people’s lives, making the faithful communication of scientific developments more important than ever

#	Answer	Explanation
28	**C**	But many of the biggest challenges for science reporting arise because in areas of evolving research, scientists themselves often only partly understand the full implications of any particular advance or development
29	**B**	Ambiguous word choices are the source of some misunderstandings. Scientists often employ colloquial terminology, which they then assign a specific meaning that is impossible to fathom without proper training. The term “relativity,” for example, is intrinsically misleading
30	**D**	Science sometimes transcends this limitation: remarkably, chemists were able to detail the precise chemical processes involved in the destruction of the ozone layer, making the evidence that chlorofluorocarbon gases (Freon, for example) were destroying the ozone layer indisputable
31	**B**	One of the more amusing aspects of the discussion was that those who believed in the differences and those who didn’t used the same evidence about gender-specific special ability. How could that be? The answer is that the data shows no substantial effects
32	**YES**	Climatologists predict more drastic fluctuations in temperature and rainfall not necessarily that every place will be warmer
33	**NOT GIVEN**	“Global warming” is another example of problematic terminology. Climatologists predict more drastic fluctuations in temperature and rainfall not necessarily that every place will be warmer. The name sometimes subverts the debate, since it lets people argue that their winter was worse, so how could there be global warming
34	**NOT GIVEN**	For several months, Harvard was tortured by empty debates over the relative intrinsic scientific abilities of men and women
35	**NO**	Yet there are steps we can take to improve public understanding in all cases. The first would be to inculcate greater understanding and acceptance of indirect scientific evidence
36	**word choices**	Ambiguous word choices are the source of some misunderstandings
37	**colloquial terminology**	Scientists often employ colloquial terminology, which they then assign a specific meaning that is impossible to fathom without proper training

#	Answer	Explanation
38	**observer**	Yet although the measurements any observer makes depend on his coordinates and reference frame, the physical phenomena he measures have an invariant description that transcends that observer’s particular coordinates
39	**invariant description**	Yet although the measurements any observer makes depend on his coordinates and reference frame, the physical phenomena he measures have an invariant description that transcends that observer’s particular coordinates
40	**general relativity**	Theories aren’t necessarily shown to be correct or complete immediately. Even Einstein took the better part of a decade to develop the correct version of his theory of general relativity

Test 62

PASSAGE 1

Read the text below and answer questions 1-13.

Can We Hold Back the Flood?

A LAST winter's floods on the rivers of central Europe were among the worst since the Middle Ages, and as winter storms return, the spectre of floods is returning too. Just weeks ago, the river Rhone in south-east France burst its banks, driving 15,000 people from their homes, and worse could be on the way. Traditionally, river engineers have gone for Plan A: get rid of the water fast, draining it off the land and down to the sea in tall-sided rivers re-engineered as high-performance drains. But however big they dig city drains, however wide and straight they make the rivers, and however high they build the banks, the floods keep coming back to taunt them, from the Mississippi to the Danube. And when the floods come, they seem to be worse than ever.

B No wonder engineers are turning to Plan B: sap the water's destructive strength by dispersing it into fields, forgotten lakes, flood plains and aquifers. Back in the days when rivers took a more tortuous path to the sea, flood waters lost impetus and volume while meandering across flood plains and idling through wetlands and inland deltas. But today the water tends to have an unimpeded journey to the sea. And this means that when it rams in the uplands, the water comes down all at once. Worse, whenever we close off more flood plain, the river’s flow farther downstream becomes more violent and uncontrollable. Dykes are only as good as their weakest link - and the water will unerringly find it.

C Today, the river has lost 7 per cent of its original length and runs up to a third faster. When it rains hard in the Alps, the peak flows from several tributaries coincide in the main river, where once they arrived separately. And with four-fifths of the lower Rhine's flood plain barricaded off, the waters rise ever higher. The result is more frequent flooding that does ever-greater damage to the homes, offices and roads that sit on the flood plain. Much the same has happened in the US on the mighty Mississippi, which drains the world's second largest river catchment into the Gulf of Mexico.

D The European Union is trying to improve rain forecasts and more accurately model how intense rains swell rivers. That may help cities prepare, but it won't stop the floods. To do that, say hydrologists, you need a new approach to engineering not just Environment Agency - country £1 billion - puts it like this: "The focus is now on working with the forces of nature. Towering concrete walls are out, and new wetlands are in." To help keep London's upstream and reflooding 10 square k outside Oxford. Nearer to London it has spent £100 million creating new wetlands and a relief channel across 16 kilometres.

E The same is taking place on a much grander scale in Austria, in one of Europe's largest river restorations to date. Engineers are regenerating flood plains along 60 kilometres of the river

Drava as it exits the Alps. They are also widening the river bed and channelling it back into abandoned meanders, oxbow lakes and backwaters overhung with willows. The engineers calculate that the restored flood plain can now store up to 10 million cubic metres of flood waters and slow storm surges coming out of the Alps by more than an hour, protecting towns as far downstream as Slovenia and Croatia.

F "Rivers have to be allowed to take more space. They have to be turned from flood-chutes into flood-foilers," says Nienhuis. And the Dutch, for whom preventing floods is a matter of survival, have gone furthest. A nation built largely on drained marshes and seabed had the fright of its life in 1993 when the Rhine almost overwhelmed it. The same happened again in 1995, when a quarter of a million people were evacuated from the Netherlands. But a new breed of "soft engineers" wants our cities to become porous, and Berlin is theft governed by tough new rules to prevent its drains becoming overloaded after heavy rains. Harald Kraft, an architect working in the city, says: "We now see rainwater as giant Potsdamer Platz, a huge new commercial redevelopment by DaimlerChrysler in the heart of the city.

G Los Angeles has spent billions of dollars digging huge drains and concreting river beds to carry away the water from occasional intense storms. "In LA we receive half the water we need in rainfall, and we throw it away. Then we spend hundreds of millions to import water," says Andy Lipkis, an LA environmentalist who kick-started the idea of the porous city by showing it could work on one house. Lipkis, along with citizens groups like Friends of the Los Angeles River and Unpaved LA, want to beat the urban flood hazard and fill the taps by holding onto the city's flood water. And it's not just a pipe dream. The authorities this year launched a $100 million scheme to road-test the porous city in one flood-hit community in Sun Valley. The plan is to catch the rain that falls on thousands of driveways, parking lots and rooftops in the valley. Trees will soak up water from parking lots. Homes and public buildings will capture roof water to irrigate gardens and parks. And road drains will empty into old gravel pits and other leaky places that should recharge the city's underground water reserves. Result: less flooding and more water for the city. Plan B says every city should be porous, every river should have room to flood naturally and every coastline should be left to build its own defences. It sounds expensive and utopian, until you realise how much we spend trying to drain cities and protect our watery margins - and how bad we are at it.

PART 1 — QUESTIONS

Questions 1-6

The reading Passage has seven paragraphs A-G. Which paragraph contains the following information?

	A	B	C	D	E	F	G
1 A new approach carried out in the UK	○	○	○	○	○	○	○
2 Reasons why twisty path and dykes failed	○	○	○	○	○	○	○
3 Illustration of an alternative Plan in LA which seems much unrealistic	○	○	○	○	○	○	○
4 Traditional way of tackling flood	○	○	○	○	○	○	○
5 Effort made in Netherlands and Germany	○	○	○	○	○	○	○
6 One project on a river benefits three nations	○	○	○	○	○	○	○

Questions 7-11

Complete the following summary of the paragraphs of Reading Passage, using no more than two words from the Reading Passage for each answer.

Flood makes river shorter than it used to be, which means faster speed and more damage to constructions on flood plain. Not only European river poses such threat but the same things happens to the powerful **7** _____ in the US.

In Europe, one innovative approach carried out by UK's Environment Agency, for example a wetland instead of concrete walls is generated not far from the city of **8** _____ to protect it from flooding. In 1995, Rhine flooded again and thousands of people left the country of **9** _____. A league of engineers suggested that cities should be porous, **10** _____ set an good example for others. Another city devastated by heavy storms casually is **11** _____, though its government pours billions of dollars each year in order to solve the problem.

Questions 12-13

Choose TWO correct letter.

What TWO benefits will the new approach in the UK and Austria bring to US according to this passage?

12 **13** What TWO benefits will the new approach in the UK and Austria bring to US according to this passage?

- **A** ☐ We can prepare before flood comes
- **B** ☐ It may stop the flood involving the whole area
- **C** ☐ Decrease strong rainfalls around Alps simply by engineering constructions
- **D** ☐ Reserve water to protect downstream towns
- **E** ☐ Store tons of water in downstream area

PASSAGE 2

Read the text below and answer questions 14-27.

When the Tulip Bubble Burst

Tulips are spring-blooming perennials that grow from bulbs. Depending on the species, tulip plants can grow as short as 4 inches (10 cm) or as high as 28 inches (71 cm). The tulip's large flowers usually bloom on scapes or sub-scapose stems that lack bracts. Most tulips produce only one flower per stem, but a few species bear multiple flowers on their scapes (e.g. Tulipa turkestanica). The showy, generally cup or star-shaped tulip flower has three petals and three sepals, which are often termed tepals because they are nearly identical. These six tepals are often marked on the interior surface near the bases with darker colorings. Tulip flowers come in a wide variety of colors, except pure blue (several tulips with "blue" in the name have a faint violet hue)

A Long before anyone ever heard of Qualcomm, CMGI, Cisco Systems, or the other high-tech stocks that have soared during the current bull market, there was Semper Augustus. Both more prosaic and more sublime than any stock or bond, it was a tulip of extraordinary beauty, its midnight-blue petals topped by a band of pure white and accented with crimson flares. To denizens of 17th century Holland, little was as desirable.

B Around 1624, the Amsterdam man who owned the only dozen specimens was offered 3,000 guilders for one bulb. While there's no accurate way to render that in today's greenbacks, the sum was roughly equal to the annual income of a wealthy merchant. (A few years later, Rembrandt received about half that amount for painting The Night Watch.) Yet the bulb's owner, whose name is now lost to history, nixed the offer.

C Who was crazier, the tulip lover who refused to sell for a small fortune or the one who was willing to splurge. That's a question that springs to mind after reading Tulip mania: The Story of the World's Most Coveted Flower and the Extraordinary Passions It Aroused by British journalist Mike Dash. In recent years, as investors have intentionally forgotten everything they learned in Investing 101 in order to load up on unproved, unprofitable dot-com issues, tulip mania has been invoked frequently. In this concise, artfully written account, Dash tells the real history behind the buzzword and in doing so, offers a cautionary tale for our times.

D The Dutch were not the first to go gaga over the tulip. Long before the first tulip bloomed in Europe-in Bavaria, it turns out, in 1559-the flower had enchanted the Persians and bewitched the rulers of the Ottoman Empire. It was in Holland, however, that the passion for tulips found its most fertile ground, for reasons that had little to do with horticulture.

E Holland in the early 17th century was embarking on its Golden Age. Resources that had just a few years earlier gone toward fighting for independence from Spain now flowed into commerce. Amsterdam merchants were at the center of the lucrative East Indies trade, where a single voyage could yield profits of 400%. They displayed their success by erecting grand estates

surrounded by flower gardens. The Dutch population seemed tom by two contradictory impulses: a horror of living beyond one's means and the love of a long shot.

F Enter the tulip. "It is impossible to comprehend the tulip mania without understanding just how different tulips were from every other flower known to horticulturists in the 17th century," says Dash. "The colors they exhibited were more intense and more concentrated than those of ordinary plants." Despite the outlandish prices commanded by rare bulbs, ordinary tulips were sold by the pound. Around 1630, however, a new type of tulip fancier appeared, lured by tales of fat profits. These "florists," or professional tulip traders, sought out flower lovers and speculators alike. But if the supply of tulip buyers grew quickly, the supply of bulbs did not. The tulip was a conspirator in the supply squeeze: It takes seven years to grow one from seed. And while bulbs can produce two or three clones, or "offsets," annually, the mother bulb only lasts a few years.

G Bulb prices rose steadily throughout the 1630s, as ever more speculators into the market. Weavers and farmers mortgaged whatever they could to raise cash to begin trading. In 1633, a farmhouse in Hoorn changed hands for three rare bulbs. By 1636 any tulip-even bulbs recently considered garbage-could be sold off, often for hundreds of guilders. A futures market for bulbs existed, and tulip traders could be found conducting their business in hundreds of Dutch taverns. Tulip mania reached its peak during the winter of 1636-37, when some bulbs were changing hands ten times in a day. The zenith came early that winter, at an auction to benefit seven orphans whose only asset was 70 fine tulips left by then father. One, a rare Violetten Admirael van Enkhuizen bulb that was about to split in two, sold for 5,200 guilders, the all-time record. All told, the flowers brought in nearly 53,000 guilders.

H Soon after, the tulip market crashed utterly, spectacularly. It began in Haarlem, at a routine bulb auction when, for the first time, the greater fool refused to show up and pay. Within days, the panic had spread across the country. Despite the efforts of traders to prop up demand, the market for tulips evaporated. Flowers that had commanded 5,000 guilders a few weeks before now fetched one-hundredth that amount. Tulip mania is not without flaws. Dash dwells too long on the tulip's migration from Asia to Holland. But he does a service with this illuminating, accessible account of incredible financial folly.

I Tulip mania differed in one crucial aspect from the dot-com craze that grips our attention today: Even at its height, the Amsterdam Stock Exchange, well-established in 1630, wouldn't touch tulips. "The speculation in tulip bulbs always existed at the margins of Dutch economic life," Dash writes. After the market crashed, a compromise was brokered that let most traders settle then debts for a fraction of then liability. The overall fallout on the Dutch economy was negligible. Will we say the same when Wall Street's current obsession finally runs its course?

PART 2 — QUESTIONS

Questions 14-18

The reading Passage has seven paragraphs A-I.

Which paragraph contains the following information?

	A	B	C	D	E	F	G	H	I
14 Difference between bubble burst impacts by tulip and by high-tech shares	○	○	○	○	○	○	○	○	○
15 Spread of tulip before 17th century	○	○	○	○	○	○	○	○	○
16 Indication of money offered for rare bulb in 17th century	○	○	○	○	○	○	○	○	○
17 Tulip was treated as money in Holland	○	○	○	○	○	○	○	○	○
18 Comparison made between tulip and other plants	○	○	○	○	○	○	○	○	○

Questions 19-23

Do the following statements agree with the information given in Reading Passage 2?

19 In 1624, all the tulip collection belonged to a man in Amsterdam.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

20 Tulip was first planted in Holland according to this passage.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

21 Popularity of Tulip in Holland was much higher than any other countries in 17th century.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

22 Holland was the most wealthy country in the world in 17th century.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

23 From 1630, Amsterdam Stock Exchange started to regulate Tulips exchange market.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

Questions 24-27

Complete the following summary of the paragraphs of Reading Passage, using no more than two words from the Reading Passage for each answer.

Dutch concentrated on gaining independence by **24** _____ against Spain in the early 17th century; consequently spare resources entered the area of **25** _____. Prosperous traders demonstrated their status by building great **26** _____ and with gardens in surroundings. Attracted by the success of profit on tulip, traders kept looking for **27** _____ and speculator for sale.

PASSAGE 3

Read the text below and answer questions 28-40.

The Secrets of Persuasion

A Our mother may have told you the secret to getting what you ask for was to say please. The reality is rather more surprising. Adam Dudding talks to a psychologist who has made a life's work from the science of persuasion. Some scientists peer at things through high-powered microscopes. Others goad rats through mazes, or mix bubbling fluids in glass beakers. Robert Cialdini, for his part, does curious things with towels, and believes that by doing so he is discovering important insights into how society works.

B Cialdini's towel experiments (more of them later), are part of his research into how we persuade others to say yes. He wants to know why some people have a knack for bending the will of others, be it a telephone cold-caller talking to you about timeshares, or a parent whose children are compliant even without threats of extreme violence. While he's anxious not to be seen as the man who's written the bible for snake-oil salesmen, for decades the Arizona State University social psychology professor has been creating systems for the principles and methods of persuasion, and writing bestsellers about them. Some people seem to be born with the skills; Cialdini's claim is that by applying a little science, even those of US who aren't should be able to get our own way more often. "All my life I've been an easy mark for the blandishment of salespeople and fundraisers and I'd always wondered why they could get me to buy things I didn't want and give to causes I hadn't heard of," says Cialdini on the phone from London, where he is plugging his latest book.

C He found that laboratory experiments on the psychology of persuasion were telling only part of the story, so he began to research influence in the real world, enrolling in sales-training programmes: "I learn how to sell automobiles from a lot, how to sell insurance from an office, how to sell encyclopedias door to door." He concluded there were six general "principles of influence" and has since put them to the test under slightly more scientific conditions. Most recently, that has meant messing about with towels. Many hotels leave a little card in each bathroom asking guests to reuse towels and thus conserve water and electricity and reduce pollution. Cialdini and his colleagues wanted to test the relative effectiveness of different words on those cards. Would guests be motivated to co-operate simply because it would help save the planet, or were other factors more compelling? To test this, the researchers changed the card's message from an environmental one to the simple (and truthful) statement that the majority of guests at the hotel had reused their towel at least once. Guests given this message were 26% more likely to reuse their towels than those given the old message. In Cialdini's book "Yes! 50 Secrets from the Science of Persuasion", co-written with another social scientist and a business consultant, he explains that guests were responding to the persuasive force of "social proof', the idea that our decisions are strongly influenced by what we believe other people like US are doing.

D So much for towels. Cialdini has also learnt a lot from confectionery. Yes! cites the work of New Jersey behavioural scientist David Strohmetz, who wanted to see how restaurant patrons

would respond to a ridiculously small favour from their food server, in the form of an after-dinner chocolate for each diner. The secret, it seems, is in how you give the chocolate. When the chocolates arrived in a heap with the bill, tips went up a miserly 3% compared to when no chocolate was given. But when the chocolates were dropped individually in front of each diner, tips went up 14%. The scientific breakthrough, though, came when the waitress gave each diner one chocolate, headed away from the table then doubled back to give them one more each, as if such generosity had only just occurred to her. Tips went up 23%. This is "reciprocity" in action: we want to return favours done to US, often without bothering to calculate the relative value of what is being received and given.

E Geeling Ng, operations manager at Auckland's Soul Bar, says she's never heard of Kiwi waiting staff using such a cynical trick, not least because New Zealand tipping culture is so different from that of the US: "If you did that in New Zealand, as diners were leaving they'd say 'can we have some more?" ' But she certainly understands the general principle of reciprocity. The way to a diner's heart is "to give them something they're not expecting in the way of service. It might be something as small as leaving a mint on their plate, or it might be remembering that last time they were in they wanted their water with no ice and no lemon. "In America it would translate into an instant tip. In New Zealand it translates into a huge smile and thank you." And no doubt, return visits.

THE FIVE PRINCIPLES OF PERSUASION

F Reciprocity: People want to give back to those who have given to them. The trick here is to get in first. That's why charities put a crummy pen inside a mailout, and why smiling women in supermarkets hand out dollops of free food.

Scarcity: People want more of things they can have less of. Advertisers ruthlessly exploit scarcity ("limit four per customer", "sale must end soon"), and Cialdini suggests parents do too: "Kids want things that are less available, so say 'this is an unusual opportunity; you can only have this for a certain time'."

G Authority: We trust people who know what they're talking about. So inform people honestly of your credentials before you set out to influence them. "You'd be surprised how many people fail to do that," says Cialdini. "They feel it's impolite to talk about then expertise." In one study, therapists whose patients wouldn't do then exercises were advised to display then qualification certificates prominently. They did, and experienced an immediate leap in patient compliance.

H Commitment/consistency: We want to act in a way that is consistent with the commitments we have already made. Exploit this to get a higher sign-up rate when soliciting charitable donations. Ffrst ask workmates if they think they will sponsor you on your egg-and-spoon marathon. Later, return with the sponsorship form to those who said yes and remind them of their earlier commitment/

I Liking: We say yes more often to people we like. Obvious enough, but reasons for "liking" can be weird. In one study, people were sent survey forms and asked to return them to a named researcher. When the researcher gave a fake name resembling that of the subject (eg, Cynthia Johnson is sent a survey by "Cindy Johansen"), surveys were twice as likely to be completed.

We favour people who resemble US, even if the resemblance is as minor as the sound of their name.

J Social proof: We decide what to do by looking around to see what others just like US are doing. Useful for parents, says Cialdini. "Find groups of children who are behaving in a way that you would like your child to, because the child looks to the side, rather than at you." More perniciously, social proof is the force underpinning the competitive materialism of "keeping up with the Joneses"

PART 3 — QUESTIONS

Questions 28-31

Choose the correct letter, A, B, C or D.

28 The main purpose of Ciadini's research of writing is to

- **A** ○ explain the reason way researcher should investigate in person
- **B** ○ explore the secret that why some people become the famous sales person
- **C** ○ help people to sale products
- **D** ○ prove maybe there is a science in the psychology of persuasion

29 Which of statement is CORRECT according to Ciadini's research methodology

- **A** ○ he checked data in a lot of latest books
- **B** ○ he conducted this experiment in laboratory
- **C** ○ he interviewed and contact with many sales people
- **D** ○ he made lot phone calls collecting what he wants to know

30 Which of the followings is CORRECT according to towel experiment in the passage?

- **A** ○ Different hotel guests act in a different response
- **B** ○ Most guests act by idea of environment preservation
- **C** ○ more customers tend to cooperate as the message requires than simply act environmentally
- **D** ○ people tend to follow the hotel's original message more

31 Which of the followings is CORRECT according to the candy shop experiment in the passage?

- **A** ○ Presenting way affects diner's tips
- **B** ○ Regular customer gives tips more than irregulars
- **C** ○ People give tips only when offered chocolate

D ◯ Chocolate with bill got higher tips

Questions 32-35

Do the following statements agree with the information given in Reading Passage 3?

32 Robert Cialdini experienced "principles of influence" himself in realistic life.

A ◯ YES

B ◯ NO

C ◯ NOT GIVEN

33 Principle of persuasion has different types in different countries.

A ◯ YES

B ◯ NO

C ◯ NOT GIVEN

34 In New Zealand, people tend to give tips to attendants after being served a chocolate.

A ◯ YES

B ◯ NO

C ◯ NOT GIVEN

35 Elder generation of New Zealand is easily attracted by extra service of restaurants by principle of reciprocity.

A ◯ YES

B ◯ NO

C ◯ NOT GIVEN

Questions 36-40

Use the information in the passage to match the category (listed A-E) with correct description below.

NB You may use any letter more than once.

A. Reciprocity of scarcity

B. Authority

C. Commitment/consistency

D. Liking

E. Social proof

	A	B	C	D	E
36 Some expert may reveal qualification in front of clients.	○	○	○	○	○
37 Parents tend to say something that other kids are doing the same.	○	○	○	○	○
38 Advertisers ruthlessly exploit the limitation of chances	○	○	○	○	○
39 Use a familiar name in a survey.	○	○	○	○	○
40 Ask colleagues to offer a helping hand	○	○	○	○	○

Answer Key

#	Answer	Explanation
1	**D**	Nearer to London it has spent £100 million creating new wetlands and a relief channel across 16 kilometres
2	**B**	Back in the days when rivers took a more tortuous path to the sea, flood waters lost impetus and volume while meandering across flood plains and idling through wetlands and inland deltas. But today the water tends to have an unimpeded journey to the sea. And this means that when it rams in the uplands, the water comes down all at once. Worse, whenever we close off more flood plain, the river's flow farther downstream becomes more violent and uncontrollable. Dykes are only as good as their weakest link – and the water will unerringly find it
3	**G**	Plan B says every city should be porous, every river should have room to flood naturally and every coastline should be left to build its own defences. It sounds expensive and utopian, until you realise how much we spend trying to drain cities and protect our watery margins – and how bad we are at it
4	**A**	Traditionally, river engineers have gone for Plan A: get rid of the water fast, draining it off the land and down to the sea in tall-sided rivers re-engineered as high-performance drains
5	**F**	And the Dutch, for whom preventing floods is a matter of survival, have gone furthest. A nation built largely on drained marshes and seabed had the fright of its life in 1993 when the Rhine almost overwhelmed it. The same happened again in 1995, when a quarter of a million people were evacuated from the Netherlands. But a new breed of "soft engineers" wants our cities to become porous, and Berlin is theft governed by tough new rules to prevent its drains becoming overloaded after heavy rains
6	**E**	The same is taking place on a much grander scale in Austria, in one of Europe's largest river restorations to date. Engineers are regenerating flood plains along 60 kilometres of the river Drava as it exits the Alps. They are also widening the river bed and channelling it back into abandoned meanders, oxbow lakes and backwaters overhung with willows. The engineers calculate that the restored flood plain can now store up to 10 million cubic metres of flood waters and slow storm surges coming out of the Alps by more than an hour, protecting towns as far downstream as Slovenia and Croatia
7	**Mississippi**	Much the same has happened in the US on the mighty Mississippi, which drains the world's second largest river

#	Answer	Explanation
		catchment into the Gulf of Mexico
8	**London**	Nearer to London it has spent £100 million creating new wetlands and a relief channel across 16 kilometres
9	**The Netherlands**	The same happened again in 1995, when a quarter of a million people were evacuated from the Netherlands
10	**Berlin**	But a new breed of “soft engineers” wants our cities to become porous, and Berlin is theft governed by tough new rules to prevent its drains becoming overloaded after heavy rains
11	**Los Angeles/LA**	Los Angeles has spent billions of dollars digging huge drains and concreting river beds to carry away the water from occasional intense storms
12	**B / D**	That may help cities prepare, but it won’t stop the floods. To do that, say hydrologists, you need a new approach to engineering The engineers calculate that the restored flood plain can now store up to 10 million cubic metres of flood waters and slow storm surges coming out of the Alps by more than an hour, protecting towns as far downstream as Slovenia and Croatia
13	**B / D**	That may help cities prepare, but it won’t stop the floods. To do that, say hydrologists, you need a new approach to engineering The engineers calculate that the restored flood plain can now store up to 10 million cubic metres of flood waters and slow storm surges coming out of the Alps by more than an hour, protecting towns as far downstream as Slovenia and Croatia
14	**I**	Tulip mania differed in one crucial aspect from the dot-com craze that grips our attention today: Even at its height, the Amsterdam Stock Exchange, well-established in 1630, wouldn’t touch tulips. “The speculation in tulip bulbs always existed at the margins of Dutch economic life,” Dash writes. After the market crashed, a compromise was brokered that let most traders settle then debts for a fraction of then liability. The overall fallout on the Dutch economy was negligible. Will we say the same when Wall Street’s current obsession finally runs its course
15	**D**	Long before the first tulip bloomed in Europe-in Bavaria, it turns out, in 1559-the flower had enchanted the Persians and bewitched the rulers of the Ottoman Empire
16	**B**	Around 1624, the Amsterdam man who owned the only dozen specimens was offered 3,000 guilders for one bulb
17	**G**	In 1633, a farmhouse in Hoorn changed hands for three rare bulbs
18	**F**	“It is impossible to comprehend the tulip mania without understanding just how different tulips were from every other

#	Answer	Explanation
		flower known to horticulturists in the 17th century," says Dash. "The colors they exhibited were more intense and more concentrated than those of ordinary plants."
19	**TRUE**	Around 1624, the Amsterdam man who owned the only dozen specimens was offered 3,000 guilders for one bulb
20	**FALSE**	Long before the first tulip bloomed in Europe-in Bavaria, it turns out, in 1559-the flower had enchanted the Persians and bewitched the rulers of the Ottoman Empire
21	**TRUE**	It was in Holland, however, that the passion for tulips found its most fertile ground, for reasons that had little to do with horticulture
22	**NOT GIVEN**	Holland in the early 17th century was embarking on its Golden Age. Resources that had just a few years earlier gone toward fighting for independence from Spain now flowed into commerce
23	**FALSE**	Even at its height, the Amsterdam Stock Exchange, well-established in 1630, wouldn't touch tulips
24	**Fighting**	Resources that had just a few years earlier gone toward fighting for independence from Spain now flowed into commerce
25	**commerce**	Resources that had just a few years earlier gone toward fighting for independence from Spain now flowed into commerce
26	**estates**	They displayed their success by erecting grand estates surrounded by flower gardens
27	**flower lovers**	These "florists," or professional tulip traders, sought out flower lovers and speculators alike
28	**D**	for decades the Arizona State University social psychology professor has been creating systems for the principles and methods of persuasion, and writing bestsellers about them. Some people seem to be born with the skills; Cialdini's claim is that by applying a little science, even those of US who aren't should be able to get our own way more often
29	**C**	He found that laboratory experiments on the psychology of persuasion were telling only part of the story, so he began to research influence in the real world, enrolling in sales-training programmes: "I learn how to sell automobiles from a lot, how to sell insurance from an office, how to sell encyclopedias door to door."
30	**C**	Guests given this message were 26% more likely to reuse their towels than those given the old message

#	Answer	Explanation
31	**A**	The secret, it seems, is in how you give the chocolate. When the chocolates arrived in a heap with the bill, tips went up a miserly 3% compared to when no chocolate was given. But when the chocolates were dropped individually in front of each diner, tips went up 14%. The scientific breakthrough, though, came when the waitress gave each diner one chocolate, headed away from the table then doubled back to give them one more each, as if such generosity had only just occurred to her. Tips went up 23%
32	**YES**	“All my life I’ve been an easy mark for the blandishment of salespeople and fundraisers and I’d always wondered why they could get me to buy things I didn’t want and give to causes I hadn’t heard of,” says Cialdini on the phone from London, where he is plugging his latest book
33	**NOT GIVEN**	“In America it would translate into an instant tip. In New Zealand it translates into a huge smile and thank you.”
34	**NO**	“In America it would translate into an instant tip. In New Zealand it translates into a huge smile and thank you.”
35	**NOT GIVEN**	“In America it would translate into an instant tip. In New Zealand it translates into a huge smile and thank you.” And no doubt, return visits
36	**B**	In one study, therapists whose patients wouldn’t do then exercises were advised to display then qualification certificates prominently
37	**E**	Social proof: We decide what to do by looking around to see what others just like US are doing. Useful for parents, says Cialdini. “Find groups of children who are behaving in a way that you would like your child to, because the child looks to the side, rather than at you.”
38	**A**	Scarcity: People want more of things they can have less of. Advertisers ruthlessly exploit scarcity (“limit four per customer”, “sale must end soon”), and Cialdini suggests parents do too: “Kids want things that are less available, so say ‘this is an unusual opportunity; you can only have this for a certain time’.”
39	**D**	Liking: We say yes more often to people we like. Obvious enough, but reasons for “liking” can be weird. In one study, people were sent survey forms and asked to return them to a named researcher. When the researcher gave a fake name resembling that of the subject (eg, Cynthia Johnson is sent a survey by “Cindy Johansen”), surveys were twice as likely to be completed
40	**C**	Ffrst ask workmates if they think they will sponsor you on your egg-and-spoon marathon. Later, return with the sponsorship form

#	Answer	Explanation
		to those who said yes and remind them of their earlier commitment/

Test 63

PASSAGE 1

You should spend about 20 minutes on Questions 1-13, which are based on Reading Passage 1 below.

MENTAL GYMNASTICS

A THE working day has just started at the head office of Barclays Bank in London. Seventeen staff are helping themselves to a buffet breakfast as young psychologist Sebastian Bailey enters the room to begin the morning's framing session. But this is no ordinary training session. He's not here to sharpen their finance or management skills. He's here to exercise their brains.

B Today's workout, organised by a company called the Mind Gym in London, is entitled "having presence". What follows is an intense 90-minute session in which this rather abstract concept is gradually broken down into a concrete set of feelings, mental tricks and behaviours. At one point the bankers are instructed to shut then eyes and visualise themselves filling the room and then the building. They finish up by walking around the room acting out various levels of presence, from low-key to over the top.

C It's easy to poke fun. Yet similar mental workouts are happening in corporate seminar rooms around the globe. The Mind Gym alone offers some 70 different sessions, including ones on mental stamina, creativity for logical thinkers and "zoom learning". Other outfits draw more directly on the exercise analogy, offering "neurobics" courses with names like "brain sets" and "cerebral fitness". Then there are books with titles like Pumping Ions, full of brainteasers that claim to "flex your mind", and software packages offering memory and spatial awareness games.

D But whatever the style, the companies' sales pitch is invariably the same—follow our routines to shape and sculpt your brain or mind, just as you might tone and train your body. And, of course, they nearly all claim that their mental workouts draw on serious scientific research and thinking into how the brain works.

E One outfit, Brainergy of Cambridge, Massachusetts (motto: "Because your grey matter matters") puts it like this: "Studies have shown that mental exercise can cause changes in brain anatomy and brain chemistry which promote increased mental efficiency and clarity. The neuroscience is cutting-edge." And on its website, Mind Gym trades on a quote from Susan Greenfield, one of Britain's best known neuroscientists: "It's a bit like going to the gym, if you exercise your brain it will grow."

F Indeed, die Mind Gym originally planned to hold its sessions in a local health club, until its founders realised where the real money was to be made. Modem companies need flexible, bright thinkers and will seize on anything that claims to create them, especially if it looks like a quick fix backed by science. But are neurobic workouts really backed by science? And do we need them?

G Nor is there anything remotely high-tech about what Lawrence Katz, co-author of Keep Your Brain Alive, recommends. Katz, a neurobiologist at Duke University Medical School in North Carolina, argues that just as many of US fail to get enough physical exercise, so we also lack sufficient mental stimulation to keep our brain in trim. Sine we are busy with jobs, family and housework. But most of this activity is repetitive routine. And any leisure time is spent slumped in front of the TV.

H So, read a book upside down. Write or brush your teeth with your wrong hand. Feel your way around the room with your eyes shut. Sniff vanilla essence while listening intently to orchestral music. Anything, says Katz, to break your normal mental routine. It will help invigorate your brain, encouraging its cells to make new connections and pump out neuroteophins, substances that feed and sustain brain circuits.

I Well, up to a point it will. "What I'm really talking about is brain maintenance rather than bulking up your IQ," Katz adds. Neurobics, in other words, is about letting your brain fulfill its potential. It cannot create super-brains. Can it achieve even that much, though? Certainly the brain is an organ that can adapt to the demands placed on it. Tests on animal brain tissue, for example, have repeatedly shown that electrically stimulating the synapses that connect nerve cells thought to be crucial to learning and reasoning, makes them stronger and more responsive. Brain scans suggest we use a lot more of our grey matter when carrying out new or strange tasks than when we're doing well-rehearsed ones. Rats raised in bright cages with toys sprout more neural connections than rats raised in bare cages—suggesting perhaps that novelty and variety could be crucial to a developing brain. Katz, And neurologists have proved time and again that people who lose brain cells suddenly during a stroke often sprout new connections to compensate for the loss—especially if they undergo extensive therapy to overcome any paralysis.

J Guy Claxton, an educational psychologist at the University of Bristol, dismisses most of the neurological approaches as "neuro-babble". Nevertheless, there are specific mental skills we can learn, he contends. Desirable attributes such as creativity, mental flexibility, and even motivation, are not the fixed faculties that most of US think. They are thought habits that can be learned. The problem, says Claxton, is that most of US never get proper training in these skills. We develop our own private set of mental strategies for tackling tasks and never learn anything explicitly. Worse still, because any learned skill—even driving a car or brushing our teeth-quickly sinks out of consciousness, we can no longer see the very thought habits we're relying upon. Our mental tools become invisible to US.

K Claxton is the academic adviser to the Mind Gym. So not surprisingly, the company espouses his solution-that we must return our thought patterns to a conscious level, becoming aware of the details of how we usually think. Only then can we start to practise better thought patterns, until eventually these become our new habits. Switching metaphors, picture not gym classes, but tennis or football coaching.

L In practice, the training can seem quite mundane. For example, in one of the eight different creativity workouts offered by the Mind Gym—entitled "creativity for logical thinkers" one of the mental strategies taught is to make a sensible suggestion, then immediately pose its opposite.

So, asked to spend five minutes inventing a new pizza, a group soon comes up with no topping, sweet topping, cold topping, price based on time of day, flat-rate prices and so on.

M Bailey agrees that the trick is simple. But it is surprising how few such tricks people have to call upon when they are suddenly asked to be creative: "They tend to just label themselves as uncreative, not realising that there are techniques that every creative person employs." Bailey says the aim is to introduce people to half a dozen or so such strategies in a session so that what at first seems like a dauntingly abstract mental task becomes a set of concrete, learnable behaviours. He admits this is not a short cut to genius. Neurologically, some people do start with quicker circuits or greater handling capacity. However, with the right kind of training he thinks we can dramatically increase how efficiently we use it.

N It is hard to prove that the training itself is effective. How do you measure a change in an employee's creativity levels, or memory skills? But staff certainly report feeling that such classes have opened their eyes. So, neurological boosting or psychological training? At the moment you can pay your money and take your choice. Claxton for one believes there is no reason why schools and universities shouldn't spend more time teaching basic thinking skills, rather than trying to stuff heads with facts and hoping that effective thought habits are somehow absorbed by osmosis.

PART 1 — QUESTIONS

Questions 1-5

Do the following statements agree with the information given in Reading Passage 1?

YES if the statement is true

NO if the statement is false

NOT GIVEN if the information is not given in the passage

1 Mind Gym coach instructed employees to imagine that they are the building.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

2 Mind Gym uses the similar marketing theory that is used all round

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

3 Susan Greenfield is the founder of Mind Gym.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

4 All business and industries are using Mind Gym's session globally.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

5 According to Mind Gym, extensive scientific background supports their mental training sessions.

A ○ YES

B ○ NO

C ○ NOT GIVEN

Questions 6-13

Use the information in the passage to match the people (listed A-D) with opinions or deeds below.

NB You may use any letter more than once

A. Guy Claxton

B. Sebastian Bailey

C. Susan Greenfield

D. Lawrence Katz

	A	B	C	D
6 We do not have enough inspiration to keep our brain fit.	○	○	○	○
7 The more you exercise your brain like exercise in the gym, the more brain will grow.	○	○	○	○
8 Exercise can keep your brain health instead of improving someone's IQ.	○	○	○	○
9 It is valuable for schools to teach students about creative skills besides basic known knowledge.	○	○	○	○
10 We can develop new neuron connections when we lose old connections via certain treatment.	○	○	○	○
11 People usually mark themselves as not creative before figuring out there are approaches for each person.	○	○	○	○
12 An instructor in Mind Gym who guided the employees to exercise.	○	○	○	○

	A	B	C	D
13 Majority of people don't have appropriate skills-training for brain.	○	○	○	○

PASSAGE 2

You should spend about 20 minutes on Questions 14-26, which are based on Reading Passage 2 below.

Finding Our Way

A "Drive 200 yards, and then turn right," says the car's computer voice. You relax in the driver's seat, follow the directions and reach your destination without error. It's certainly nice to have the Global Positioning System (GPS) to direct you to within a few yards of your goal. Yet if the satellite service's digital maps become even slightly outdated, you can become lost. Then you have to rely on the ancient human skill of navigating in three-dimensional space. Luckily, your biological finder has an important advantage over GPS: it does not go awry if only one part of the guidance system goes wrong, because it works in various ways. You can ask questions of people on the sidewalk. Or follow a street that looks familiar. Or rely on a navigational rubric: "If I keep the East River on my left, I will eventually cross 34th Street." The human positioning system is flexible and capable of learning. Anyone who knows the way from point A to point B—and from A to C—can probably figure out how to get from B to c, too.

B But how does this complex cognitive system really work? Researchers are looking at several strategies people use to orient themselves in space: guidance, path integration and route following. We may use all three or combinations thereof. And as experts learn more about these navigational skills, they are making the case that our abilities may underlie our powers of memory and logical thinking. Grand Central, Please Imagine that you have arrived in a place you have never visited-New York City. You get off the train at Grand Central Terminal in midtown Manhattan. You have a few hours to explore before you must return for your ride home. You head uptown to see popular spots you have been told about: Rockefeller Center, Central Park, the Metropolitan Museum of Art. You meander in and out of shops along the way. Suddenly, it is time to get back to the station. But how?

C If you ask passersby for help, most likely you will receive information in many different forms. A person who orients herself by a prominent landmark would gesture southward: "Look down there. See the tall, broad MetLife Building? Head for that "the station is right below it." Neurologists call this navigational approach "guidance," meaning that a landmark visible from a distance serves as the marker for one's destination.

D Another city dweller might say: "What places do you remember passing? ... Okay. Go toward the end of Central Park, then walk down to St. Patrick's Cathedral. A few more blocks, and Grand Central will be off to your left." In this case, you are pointed toward the most recent place you recall, and you aim for it. Once there you head for the next notable place and so on, retracing your path. Your brain is adding together the individual legs of your trek into a cumulative progress report. Researchers call this strategy "path integration." Many animals rely primarily on path integration to get around, including insects, spiders, crabs and rodents. The desert ants of the genus Cataglyphis employ this method to return from foraging as far as 100 yards away. They note the general direction they came from and retrace then steps, using the polarization of sunlight to orient themselves even under overcast skies. On their way back they

are faithful to this inner homing vector. Even when a scientist picks up an ant and puts it in a totally different spot, the insect stubbornly proceeds in the originally determined direction until it has gone "back" all of the distance it wandered from its nest. Only then does the ant realize it has not succeeded, and it begins to walk in successively larger loops to find its way home.

E Whether it is trying to get back to the anthill or the train station, any animal using path integration must keep track of its own movements so it knows, while returning, which segments it has already completed. As you move, your brain gathers data from your environment—sights, sounds, smells, lighting, muscle contractions, a sense of time passing—to determine which way your body has gone. The church spire, the sizzling sausages on that vendor's grill, the open courtyard, and the train station—all represent snapshots of memorable junctures during your journey.

F In addition to guidance and path integration, we use a third method for finding our way. An office worker you approach for help on a Manhattan street comer might say: "Walk straight down Fifth, turn left on 47th, turn right on Park, go through the walkway under the Helmsley Building, then cross the street to the MetLife Building into Grand Central." This strategy, called route following, uses landmarks such as buildings and street names, plus directions-straight, turn, go through—for reaching intermediate points. Route following is more precise than guidance or path integration, but if you forget the details and take a wrong turn, the only way to recover is to backtrack until you reach a familiar spot, because you do not know the general direction or have a reference landmark for your goal. The route-following navigation strategy truly challenges the brain. We have to keep all the landmarks and intermediate directions in our head. It is the most detailed and therefore most reliable method, but it can be undone by routine memory lapses. With path integration, our cognitive memory is less burdened; it has to deal with only a few general instructions and the homing vector. Path integration works because it relies most fundamentally on our knowledge of our body's general direction of movement, and we always have access to these inputs. Nevertheless, people often choose to give route-following directions, in part because saying "Go straight that way!" just does not work in our complex, man-made surroundings.

G Road Map or Metaphor? On your next visit to Manhattan you will rely on your memory to get around. Most likely you will use guidance, path integration and route following in various combinations. But how exactly do these constructs deliver concrete directions? Do we humans have, as an image of the real world, a kind of road map in our heads—with symbols for cities, train stations and churches; thick lines for highways; narrow lines for local streets? Neurobiologists and cognitive psychologists do call the portion of our memory that controls navigation a "cognitive map." The map metaphor is obviously seductive: maps are the easiest way to present geographic information for convenient visual inspection. In many cultures, maps were developed before writing, and today they are used in almost every society. It is even possible that maps derive from a universal way in which our spatial-memory networks are wired.

H Yet the notion of a literal map in our heads may be misleading; a growing body of research implies that the cognitive map is mostly a metaphor. It may be more like a hierarchical structure of relationships. To get back to Grand Central, you first envision the large scale-that is, you visualize the general direction of the station. Within that system you then imagine the route to the last place you remember. After that, you observe your nearby surroundings to pick out a

recognizable storefront or street comer that will send you toward that place. In this hierarchical, or nested, scheme, positions and distances are relative, in contrast with a road map, where the same information is shown in a geometrically precise scale.

PART 2 — QUESTIONS

Questions 14-18

Use the information in the passage to match the category of each navigation method (listed A-C) with correct statement.

NB you may use any letter more than once

A. Guidance

B. Path integration

C. Route following

	A	B	C
14 Using basic direction from starting point and light intensity to move on.	○	○	○
15 Using combination of place and direction heading for destination.	○	○	○
16 Using an iconic building near your destination as orientation.	○	○	○
17 Using a retrace method from a known place if a mistake happens.	○	○	○
18 Using a passed spot as reference for a new integration.	○	○	○

Questions 19-21

Choose the correct letter, A, B, C or D.

19 What does the ant of Cataglyphis respond if it has been taken to another location according to the passage?

- **A** ○ Changes the orientation sensors improvingly
- **B** ○ Releases biological scent for help from others
- **C** ○ Continues to move by the original orientation
- **D** ○ Totally gets lost once disturbed

20 Which of the followings is true about "cognitive map" in this passage?

A ◯ There is not obvious difference contrast by real map

B ◯ It exists in our head and is always correct

C ◯ It only exists under some cultures

D ◯ It was managed by brain memory

21 Which of following description of way findings correctly reflects the function of cognitive map?

A ◯ It visualises a virtual route in a large scope

B ◯ It reproduces an exact details of every landmark

C ◯ Observation plays a more important role

D ◯ Store or supermarket is a must in file map

Questions 22-26

Do the following statements agree with the information given in Reading Passage 2?

TRUE if the statement is true

FALSE if the statement is false

NOT GIVEN if the information is not given in the passage

22 Biological navigation has a state of flexibility.

A ◯ TRUE

B ◯ FALSE

C ◯ NOT GIVEN

23 You will always receive good reaction when you ask direction.

A ◯ TRUE

B ◯ FALSE

C ◯ NOT GIVEN

24 When someone follows a route, he or she collects comprehensive perceptional information in mind on the way.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

25 Path integration requires more thought from brain compared with route-following.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

26 In a familiar surrounding, an exact map of where you are will automatically emerge in your head.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

PASSAGE 3

You should spend about 20 minutes on Questions 27-40, which are based on Reading Passage 3 below.

Mystery in Easter

A One of the world's most famous yet least visited archaeological sites, Easter Island is a small, hilly, now treeless island of volcanic origin. Located in the Pacific Ocean at 27 degrees south of the equator and some 2200 miles (3600 kilometers) off the coast of Chile, it is considered to be the world's most remote inhabited island. The island is, technically speaking, a single massive volcano rising over ten thousand feet from the Pacific Ocean floor. The island received its most well-known current name, Easter Island, from the Dutch sea captain Jacob Roggeveen who became the first European to visit Easter Sunday, April 5,1722.

27

B In the early 1950s, the Norwegian explorer Thor Heyerdahl popularized the idea that the island had been originally settled by advanced societies of Indians from the coast of South America. Extensive archaeological, ethnographic and linguistic research has conclusively shown this hypothesis to be inaccurate. It is now recognized that the original inhabitants of Easter Island are of Polynesian stock (DNA extracts from skeletons have confirmed this, that they most probably came from the Marquesas or Society islands, and that they arrived as early as 318 AD (carbon dating of reeds from a grave confirms this). At the time of their arrival, much of the island was forested, was teeming with land birds, and was perhaps the most productive breeding site for seabirds in the Polynesia region. Because of the plentiful bird, fish and plant ' food sources, the human population grew and gave rise to a rich religious and artistic culture.

C That culture's most famous features are its enormous stone statues called moai, at least 288 of which once stood upon massive stone platforms called ahu. There are some 250 of these ahu platforms spaced approximately one half mile apart and creating an almost unbroken line around the perimeter of the island. Another 600 moai statues, in various stages of completion, are scattered around the island, either in quarries or along ancient roads between the quarries and the coastal areas where the statues were most often erected. Nearly all the moai are carved from the tough stone of the Rano Raraku volcano. The average statue is 14 feet and 6 inches tall and weighs 14 tons. Some moai were as large as 33 feet and weighed more than 80 tons. Depending upon the size of the statues, it has been estimated that between 50 and 150 people were needed to drag them across the countryside on sleds and rollers made from the island's trees.

28

D Scholars are unable to definitively explain the function and use of the moai statues. It is assumed that their carving and erection derived from an idea rooted in similar practices found

elsewhere in Polynesia but which evolved in a unique way on Easter Island. Archaeological and iconographic analysis indicates that the statue cult was based on an ideology of male, lineage-based authority incorporating anthropomorphic symbolism. The statues were thus symbols of authority and power, both religious and political. But they were not only symbols. To the people who erected and used them, they were actual repositories of sacred spirit. Carved stone and wooden objects in ancient Polynesian religions, when properly fashioned and ritually prepared, were believed to be charged by a magical spiritual essence called mana. The ahu platforms of Easter Island were the sanctuaries of the people, and the moai statues were the ritually charged sacred objects of those sanctuaries.

29

E Besides its more well-known name, Easter Island is also known as Te-Pito-O-Te-Henua, meaning 'The Navel of the World', and as Mata-Ki-Te-Rani, meaning ' Eyes Looking at Heaven '. These ancient name and a host of mythological details ignored by mainstream archaeologists, point to the possibility that the remote island may once have been a geodetic marker and the site of an astronomical observatory of a long forgotten civilization. In his book. Heaven's Mirror, Graham Hancock suggests that Easter Island may once have been a significant scientific outpost of this antediluvian civilization and that its location had extreme importance in a planet-spanning, mathematically precise grid of sacred sites. Two other alternative scholars, Christopher Knight and Robert Lomas, have extensively studied the location and possible function of these geodetic markers. In their fascinating book, Uriel's Machine, they suggest that one purpose of the geodetic markers was as part of global network of sophisticated astronomical observatories dedicated to predicting and preparing for future commentary impacts and crystal displacement cataclysms.

F In the latter years of the 20th century and the first years of the 21st century various writers and scientists have advanced theories regarding the rapid decline of Easter Island's magnificent civilization around the time of the first European contact. Principal among these theories, and now shown to be inaccurate, is that postulated by Jared Diamond in his book Collapse: How Societies Choose to or Survive. Basically these theories state that a few centuries after Easter Island's initial colonization the resource needs of the growing population had begun to outpace the island's capacity to renew itself ecologically. By the 1400s the forests had been entirely cut, the rich ground cover had eroded away, the springs had dried up, and the vast flocks of birds coming to roost on the island had disappeared. With no logs to build canoes for offshore fishing, with depleted bird and wildlife food sources, and with declining crop yields because of the erosion of good soil, the nutritional intake of the people plummeted. First famine, then cannibalism, set in. Because the island could no longer feed the chiefs, bureaucrats and priests who kept the complex society running, the resulting chaos triggered a social and cultural collapse. By 1700 the population dropped to between one-quarter and one-tenth of its former number, and many of the statues were toppled during supposed "clan wars " of the 1600 and 1700s.

30

G The faulty notions presented in these theories began with the racist assumptions of Thor Heyerdahl and have been perpetuated by writers, such as Jared Diamond, who do not have sufficient archaeological and historical understanding of the actual events which occurred on Easter Island. The real truth regarding the tremendous social devastation which occurred on Easter Island is that it was a direct consequence of the inhumane behavior of many of the first European visitors, particularly the slavers who raped and murdered the islanders, introduced small pox and other diseases, and brutally removed the natives to mainland South America.

PART 3 — QUESTIONS

Questions 27-30

The reading passage has seven paragraphs, A-G.

Choose the correct heading for paragraphs B, D, E and G from the list below.

i. **The famous moai**

ii. **The status represented symbols of combined purposes**

iii. **The ancient spots which indicates scientific application**

iv. **The story of the name**

v. **Early immigrants, rise and prosperity**

vi. **The geology of Easter Island**

vii. **The begin of Thor Heyerdahl's discovery**

viii. **The countering explaination to the misconceptions politaically manipulated**

ix. **Symbols of authority and power**

x. **The Navel of the World**

xi. **The norweigian Invaders'legacy**

Questions 31-36

Do the following statements agree with the information given in Reading Passage 3?

TRUE if the statement is true

FALSE if the statement is false

NOT GIVEN if the information is not given in the passage

31 The first inhabitants of Easter Island are Polynesian, from the Marquesas or Society islands.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

32 Construction of some moai statues on the island was not finished.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

33 The Moai can be found not only on Easter Island but also elsewhere in Polynesia.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

34 Most archeologists recognised the religious and astronomical functions for an ancient society

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

35 The structures on Easter Island work as an astronomical outpost for extraterrestrial visitors.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

36 the theory that depleted natural resources leading to the fail of Easter Island actual has a distorted perspective

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

Questions 37-40

Complete the following summary of the paragraphs of Reading Passage, using NO MORE THAN THREE WORDS from the Reading Passage for each answer.

Many theories speculated that Easter Island's fall around the era of the initial European contact. Some say the resources are depleted by a **37** _____; The erroneous theories began with a root of the **38** _____ advanced by some scholars. Early writers did not have adequate **39** _____ understandings to comprehend the true result of **40** _____ nature of events on the island. The social devastation was in fact a direct of the first European settlers.

Answer Key

#	Answer	Explanation
1	**NO**	At one point the bankers are instructed to shut then eyes and visualise themselves filling the room and then the building
2	**YES**	But whatever the style, the companies' sales pitch is invariably the same—follow our routines to shape and sculpt your brain or mind, just as you might tone and train your body
3	**NO**	And on its website, Mind Gym trades on a quote from Susan Greenfield, one of Britain's best known neuroscientists: "It's a bit like going to the gym, if you exercise your brain it will grow."
4	**NO**	Yet similar mental workouts are happening in corporate seminar rooms around the globe. The Mind Gym alone offers some 70 different sessions, including ones on mental stamina, creativity for logical thinkers and "zoom learning". Other outfits draw more directly on the exercise analogy, offering "neurobics" courses with names like "brain sets" and "cerebral fitness"
5	**NOT GIVEN**	And on its website, Mind Gym trades on a quote from Susan Greenfield, one of Britain's best known neuroscientists: "It's a bit like going to the gym, if you exercise your brain it will grow."
6	**D**	Katz, a neurobiologist at Duke University Medical School in North Carolina, argues that just as many of US fail to get enough physical exercise, so we also lack sufficient mental stimulation to keep our brain in trim
7	**C**	And on its website, Mind Gym trades on a quote from Susan Greenfield, one of Britain's best known neuroscientists: "It's a bit like going to the gym, if you exercise your brain it will grow."
8	**D**	"What I'm really talking about is brain maintenance rather than bulking up your IQ," Katz adds
9	**A**	Claxton for one believes there is no reason why schools and universities shouldn't spend more time teaching basic thinking skills, rather than trying to stuff heads with facts and hoping that effective thought habits are somehow absorbed by osmosis
10	**D**	Katz, And neurologists have proved time and again that people who lose brain cells suddenly during a stroke often sprout new connections to compensate for the loss—especially if they undergo extensive therapy to overcome any paralysis

#	Answer	Explanation
11	**B**	“They tend to just label themselves as uncreative, not realising that there are techniques that every creative person employs.”
12	**B**	young psychologist Sebastian Bailey enters the room to begin the morning’s framing session. But this is no ordinary training session. He’s not here to sharpen their finance or management skills. He’s here to exercise their brains Today’s workout, organised by a company called the Mind Gym in London
13	**A**	The problem, says Claxton, is that most of US never get proper training in these skills
14	**B**	Many animals rely primarily on path integration to get around, including insects, spiders, crabs and rodents. The desert ants of the genus Cataglyphis employ this method to return from foraging as far as 100 yards away. They note the general direction they came from and retrace then steps, using the polarization of sunlight to orient themselves even under overcast skies
15	**C**	This strategy, called route following, uses landmarks such as buildings and street names, plus directions-straight, turn, go through—for reaching intermediate points
16	**A**	A person who orients herself by a prominent landmark would gesture southward: “Look down there. See the tall, broad MetLife Building? Head for that “the station is right below it.” Neurologists call this navigational approach “guidance,” meaning that a landmark visible from a distance serves as the marker for one’s destination
17	**C**	Route following is more precise than guidance or path integration, but if you forget the details and take a wrong turn, the only way to recover is to backtrack until you reach a familiar spot, because you do not know the general direction or have a reference landmark for your goal
18	**B**	In this case, you are pointed toward the most recent place you recall, and you aim for it. Once there you head for the next notable place and so on, retracing your path. Your brain is adding together the individual legs of your trek into a cumulative progress report. Researchers call this strategy “path integration.”
19	**C**	Even when a scientist picks up an ant and puts it in a totally different spot, the insect stubbornly proceeds in the originally determined direction until it has gone “back” all of the distance it wandered from its nest
20	**D**	Neurobiologists and cognitive psychologists do call the portion of our memory that controls navigation a “cognitive map.”

#	Answer	Explanation
21	**A**	To get back to Grand Central, you first envision the large scale- that is, you visualize the general direction of the station. Within that system you then imagine the route to the last place you remember
22	**TRUE**	The human positioning system is flexible and capable of learning
23	**NOT GIVEN**	If you ask passersby for help, most likely you will receive information in many different forms
24	**TRUE**	As you move, your brain gathers data from your environment—sights, sounds, smells, lighting, muscle contractions, a sense of time passing—to determine which way your body has gone
25	**FALSE**	The route-following navigation strategy truly challenges the brain. We have to keep all the landmarks and intermediate directions in our head. It is the most detailed and therefore most reliable method, but it can be undone by routine memory lapses. With path integration, our cognitive memory is less burdened; it has to deal with only a few general instructions and the homing vector
26	**FALSE**	Yet the notion of a literal map in our heads may be misleading; a growing body of research implies that the cognitive map is mostly a metaphor
27	**v**	It is now recognized that the original inhabitants of Easter Island are of Polynesian stock (DNA extracts from skeletons have confirmed this, that they most probably came from the Marquesas or Society islands, and that they arrived as early as 318 AD (carbon dating of reeds from a grave confirms this). At the time of their arrival, much of the island was forested, was teeming with land birds, and was perhaps the most productive breeding site for seabirds in the Polynesia region. Because of the plentiful bird, fish and plant ‘ food sources, the human population grew and gave rise to a rich religious and artistic culture
28	**ii**	The statues were thus symbols of authority and power, both religious and political. But they were not only symbols. To the people who erected and used them, they were actual repositories of sacred spirit
29	**iii**	These ancient name and a host of mythological details ignored by mainstream archaeologists, point to the possibility that the remote island may once have been a geodetic marker and the site of an astronomical observatory of a long forgotten civilization
30	**viii**	The faulty notions presented in these theories began with the racist assumptions of Thor Heyerdahl and have been perpetuated by writers, such as Jared Diamond, who do not have sufficient archaeological and historical understanding of the actual events

#	Answer	Explanation
		which occurred on Easter Island. The real truth regarding the tremendous social devastation which occurred on Easter Island is that it was a direct consequence of the inhumane behavior of many of the first European visitors, particularly the slavers who raped and murdered the islanders, introduced small pox and other diseases, and brutally removed the natives to mainland South America
31	**TRUE**	It is now recognized that the original inhabitants of Easter Island are of Polynesian stock (DNA extracts from skeletons have confirmed this, that they most probably came from the Marquesas or Society islands, and that they arrived as early as 318 AD (carbon dating of reeds from a grave confirms this)
32	**TRUE**	Another 600 moai statues, in various stages of completion, are scattered around the island, either in quarries or along ancient roads between the quarries and the coastal areas where the statues were most often erected
33	**FALSE**	It is assumed that their carving and erection derived from an idea rooted in similar practices found elsewhere in Polynesia but which evolved in a unique way on Easter Island
34	**FALSE**	These ancient name and a host of mythological details ignored by mainstream archaeologists, point to the possibility that the remote island may once have been a geodetic marker and the site of an astronomical observatory of a long forgotten civilization
35	**NOT GIVEN**	In his book. Heaven's Mirror, Graham Hancock suggests that Easter Island may once have been a significant scientific outpost of this antediluvian civilization and that its location had extreme importance in a planet-spanning, mathematically precise grid of sacred sites
36	**TRUE**	The faulty notions presented in these theories began with the racist assumptions of Thor Heyerdahl and have been perpetuated by writers, such as Jared Diamond, who do not have sufficient archaeological and historical understanding of the actual events which occurred on Easter Island
37	**growing population**	Basically these theories state that a few centuries after Easter Island's initial colonization the resource needs of the growing population had begun to outpace the island's capacity to renew itself ecologically
38	**racist assumptions**	The faulty notions presented in these theories began with the racist assumptions of Thor Heyerdahl and have been perpetuated by writers, such as Jared Diamond, who do not have sufficient archaeological and historical understanding of the actual events which occurred on Easter Island

#	Answer	Explanation
39	**archeological and historical**	The faulty notions presented in these theories began with the racist assumptions of Thor Heyerdahl and have been perpetuated by writers, such as Jared Diamond, who do not have sufficient archaeological and historical understanding of the actual events which occurred on Easter Island
40	**inhumane behavior**	The real truth regarding the tremendous social devastation which occurred on Easter Island is that it was a direct consequence of the inhumane behavior of many of the first European visitors, particularly the slavers who raped and murdered the islanders, introduced small pox and other diseases, and brutally removed the natives to mainland South America

Test 64

PASSAGE 1

Read the text below and answer questions 1-13.

The Mozart Effect

A Music has been used for centuries to heal the body. In the Ebers Papyrs (one of the earliest medical documents, circa 1500 B.C.), it was recorded that physicians chanted to heal the sick (Castleman, 1994). In various cultures, we have observed singing as part of healing rituals. In the world of Western medicine, however, using music in medicine lost popularity until the introduction of the radio. Researchers then started to notice that listening to music could have significant physical effects. Therapists noticed music could help calm anxiety and researchers saw that listening to music could cause a drop in blood pressure. In addition to these two areas, music has been used with cancer chemotherapy to reduce nausea, during surgery to reduce stress hormone production, during childbirth, and in stroke recovery (Castleman, 1994 and Westley, 1998). It has been shown to decrease pain as well as enhance the effectiveness of the immune system. In Japan, compilations of music are used as medication, of sorts. For example, if you want to cure a headache or migraine, the album suggested Mendelssohn's "Spring Song," Dvorak's "Humoresque," or part of George Gershwin's "An American in Paris" (Campbell, 1998). Music is also being used to assist in learning, in a phenomenon called the Mozart Effect.

B Frances H. Rauscher, Ph.D., first demonstrated the correlation between music and learning in an experiment in 1993. His experiments indicated that a 10 minute dose of Mozart could temporarily boost intelligence. Groups of students were given intelligence tests after listening to silence, relaxation tapes, or Mozart's Sonata for Two Pianos in D Major for a short time. He found that after silence, the average IQ score was 110, and after the relaxation tape, scores rose a point. After listening to Mozart, however, the scores jumped to 119 (Westley, 1998). Even students who did not like the music still had an increased score on the IQ test. Rauscher hypothesized that "listening to complex, non-repetitive music, like Mozart, may simulate neural pathways that are important in thinking" (Castleman, 1994).

C The same experiment was repeated on rats by Rauscher and Hong Hua Li from Stanford. Rats also demonstrated enhancement in their intelligence performance. These new studies indicate that rats that were exposed to Mozart showed "increased gene expression of BDNF (a neural growth factor), CREB (a learning and memory compound), and Synapsin I(a synaptic growth protein)" in the brain's hippocampus, compared with rats in the control group, which heard only white noise (e.g. the whooshing sound of a radio tuned between stations)

D How exactly does the Mozart affect work? Researchers are still trying to determine the actual mechanisms for the formation of these enhanced learning pathways. Neuroscientists suspect that music can actually help build and strengthen connections between neurons in the cerebral cortex in a process similar to what occurs in brain development despite its type. When a baby is born, certain connections have already been made - like connections for heartbeat and

breathing. As new information is learned and motor skills develop, new neural connections are formed. Neurons that are not used will eventually die while those used repeatedly will form strong connections. Although a large number of these neural connections require experience, they also must occur within a certain time frame. For example, a child born with cataracts cannot develop connections within the visual cortex. If the cataracts are removed by surgery right away, the child's vision develops normally. However, after the age of 2, if the cataracts are removed, the child will remain blind because those pathways cannot establish themselves.

E Music seems to work in the same way. In October of 1997, researchers at the University of Konstanz in Germany found that music actually rewires neural circuits (Begley, 1996). Although some of these circuits are formed for physical skills needed to play an instrument, just listening to music strengthens connection used in higher-order thinking. Listening to music can then be thought of as "exercise" for the brain, improving concentration and enhancing intuition.

F If you're a little skeptical about the claims made by supporters of the Mozart Effect, you're not alone. Many people accredit the advanced learning of some children who take music lessons to other personality traits, such as motivation and persistence, which is required in all types of learning. There have also been claims of that influencing the results of some experiments.

G Furthermore, many people are critical of the role the media had in turning an isolated study into a trend for parents and music educators. After Mozart Effect was published to the public, the sales of Mozart CDs stayed on the top of the hit list for three weeks. In an article by Michael Linton, he wrote that the research that began this phenomenon (the study by researchers at the University of California Irvine) showed only a temporary boost in IQ, which was not significant enough to even last throughout the course of the experiment. Using music to influence intelligence was used in Confucian civilization and Plato alluded to Pythagorean music when he described is ideal state in The Republic. In both of these examples, music did not have caused any overwhelming changes, and the theory eventually died out. Linton also asks, "If Mozart's Music were able to improve health, why was Mozart himself so frequently sick? If listening to Mozart's music increases intelligence and encourages spirituality, why aren't the world's smartest and most spiritual people Mozart specialists?" Linton raises an interesting point, if the Mozart Effect causes such significant changes, why isn't there more documented evidence?

H The "trendiness" of the Mozart Effect may have died out somewhat, but there are still strong supporters (and opponents) of the claims made in 1993. Since that initial experiment, there has not been a surge of supporting evidence. However, many parents, after playing classical music while pregnant or when theft children are young, will swear by the Mozart Effect. A classmate of mine once told me that listening to classical music while studying will help with memorization. If we approach this controversy from a scientific aspect, although there has been some evidence that music does increase brain activity, actual improvements in learning and memory have not been adequately demonstrated.

PART 1 — QUESTIONS

Questions 1-5

Which paragraph contains the following information?

	A	B	C	D	E	F	G	H
1 Music influences brain development of baby.	○	○	○	○	○	○	○	○
2 Popularity of public to the introduction of Mozart Effect	○	○	○	○	○	○	○	○
3 Description of the pioneer experiment of a person	○	○	○	○	○	○	○	○
4 Music is helpful as a healing method in some places	○	○	○	○	○	○	○	○
5 Learning needs other qualities though	○	○	○	○	○	○	○	○

Questions 6-8

Complete the summary below.

Choose NO MORE THAN THREE WORDS from the passage for each answer.

In the experiment carried out by Frances Rauscher, participants were immersed in the music for a **6** _____ period of time before they were tested. Rauscher suggested that enhancement of their performance is related to the **7** _____ nature of Mozart's music. After that, another parallel experiment was also conducted on **8** _____.

Questions 9-13

Do the following statements agree with the information given in Reading Passage 1?

TRUE if the statement is true

FALSE if the statement is false

NOT GIVEN if the information is not given in the passage

9 Music has the power to improve people's brain performance according to the passage.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

10 All neural connections are built up after a baby's born instead of the time he or she had born.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

11 There is no one who questions Mozart Effect so far.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

12 Michael Linton carried out further experiment on Mozart's life to support his viewpoint

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

13 Not sufficient evidence supports Mozart Effect from the very first experiment till now.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

PASSAGE 2

Read the text below and answer questions 14-26.

London Swaying Footbridge

A In September 1996 a competition was organized by the Financial Times in association with the London Borough of Southwark to design a new footbridge across the Thames. The competition attracted over 200 entries and was won by a team comprising Arup (engineers), Foster and Partners (architects) and the sculptor Sir Anthony Caro.

B The bridge opened to the public on 10 June 2000. Up to 100,000 people crossed it that day with up to 2000 people on the bridge at any one time. At first, the bridge was still. Then it began to sway just slightly. Then, almost from one moment to the next, when large groups of people were crossing, the wobble intensified. This movement became sufficiently large for people to stop walking to retain their balance and sometimes to hold onto the hand rails for support. It was decided immediately to limit the number of people on the bridge, but even so the deck movement was sufficient to be uncomfortable and to raise concern for public safety so that on 12 June the bridge was closed until the problem could be solved.

C The embarrassed engineers found the videotape that day which showed the center span swaying about 3 inches side to side every second. The engineers first thought that winds might be exerting excessive force on the many large flags and banners bedecking the bridge for its gala premiere. What's more, they also discovered that the pedestrians also played a key role. Human activities, such as walking, running, jumping, swaying, etc. could cause horizontal force which in turn could cause excessive dynamic vibration in the lateral direction in the bridge. As the structure began moving, pedestrians adjusted their gait to the same lateral rhythm as the bridge. The adjusted footsteps magnified the motion - just like when four people all stand up in a small boat at the same time. As more pedestrians locked into the same rhythm, the increasing oscillations led to the dramatic swaying captured on film.

D In order to design a method of reducing the movements, the force exerted by the pedestrians had to be quantified and related to the motion of the bridge. Although there are some descriptions of this phenomenon in existing literature, none of these actually quantifies the force. So there was no quantitative analytical way to design the bridge against this effect. An immediate research program was launched by the bridge's engineering designers Ove Arup, supported by a number of universities and research organizations.

E The tests at the University of Southampton involved a person walking 'on the spot' on a small shake table. The tests at Imperial College involved persons walking along a specially built, 7.2m-long platform which could be driven laterally at different frequencies (n and amplitudes. Each type of test had its limitations. The Imperial College tests were only able to capture 7-8 footsteps, and the 'walking on the spot' tests, although monitoring many footsteps, could not investigate normal forward walking. Neither test could investigate any influence of other people in a crowd on the behavior of the individual being tested.

F The results of the laboratory tests provided information which enabled the initial design of a retro- fit to be progressed. However, the limitations of these tests was clear and it was felt that the only way to replicate properly the precise conditions of the Millennium Bridge was to carry out crowd tests on the bridge deck itself. These tests done by the Arup engineers could incorporate factors not possible in the laboratory tests. The first of these was carried out with 100 people in July 2000. The results of these tests were used to refine the load model for the pedestrians. A second series of crowd tests was carried out on the bridge in December 2000. The purpose of these tests was to further validate the design assumptions and to load test a prototype damper installation. The test was carried out with 275 people.

G Unless the usage of the bridge was to be greatly restricted, only two generic options to improve its performance were considered feasible. The first was to increase the stiffness of the bridge to move all its lateral natural frequencies out of the range that could be excited by the lateral footfall forces, and the second was to increase the damping of the bridge to reduce the resonant response.

PART 2 — QUESTIONS

Questions 14-17

Choose FOUR letters, A-H.

14 **15** **16** **17** Which FOUR of the following situation were witnessed on the opening ceremony of the bridge?

- **A** ☐ The frequency of oscillation increased after some time.
- **B** ☐ All the engineers went to see the ceremony that day.
- **C** ☐ The design of the bridge astonished the people.
- **D** ☐ Unexpected sideway movement of the bridge occurred.
- **E** ☐ Pedesfrians had difficulty in walking on the deck.
- **F** ☐ The bridge fell down when people tried to retain their balance.
- **G** ☐ Vibration could be detected on the deck by the pedestrians.
- **H** ☐ It was raining when the ceremony began.

Questions 18-22

Complete the following summary of the paragraphs of Reading Passage 2 using NO MORE THAN THREE WORDS from the Reading Passage for each answer.

After the opening ceremony, the embarrassed engineers tried to find out the reason of the bridge's wobbling. Judged from the videotape, they thought that **18** _____ and **19** _____ might create excessive force on the bridge. The distribution of **20** _____ resulted from human activities could cause **21** _____ throughout the structure. This swaying prompted people to start adjusting the way they walk, which in turn reinforced the **22** _____.

Questions 23-26

Complete the table below.

Choose NO MORE THAN THREE WORDS from Reading Passage 2 for each answer.

Universities / People	Activity
Test at **23** _____	Limited ability to have 7-8 footsteps
'walking on the spot' at Southampton	Not enough data on **24** _____
Crowd test conducted by **25** _____	Aim to verify **26** _____

PASSAGE 3

Read the text below and answer questions 27-40.

Book review on Musiccophilia

Norman M. Weinberger reviews the latest work of Oliver Sacks

A Music and the brain are both endlessly fascinating subjects, and as a neuroscientist specialising in auditory learning and memory, I find them especially intriguing. So I had high expectations of Musicophilia, the latest offering from neurologist and prolific author Oliver Sacks. And I confess to feeling a little guilty reporting that my reactions to the book are mixed.

B Sacks himself is the best part of Musicophilia. He richly documents his own life in the book and reveals highly personal experiences. The photograph of him on the cover of the book-which shows him wearing headphones, eyes closed, clearly enchanted as he listens to Alfred Brendel perform Beethoven's Pathetique Sonata-makes a positive impression that is home out by the contents of the book. Sacks's voice throughout is steady and erudite but never pontifical. He is neither self-conscious nor self-promoting.

C The preface gives a good idea of what the book will deliver. In it Sacks explains that he wants to convey the insights gleaned from the "enormous and rapidly growing body of work on the neural underpinnings of musical perception and imagery, and the complex and often bizarre disorders to which these are prone." He also stresses the importance of "the simple art of observation" and "the richness of the human context." He wants to combine "observation and description with the latest in technology," he says, and to imaginatively enter into the experience of his patients and subjects. The reader can see that Sacks, who has been practicing neurology for 40 years, is tom between the ' old-fashioned path o observation and the new fangled, high-tech approach: He knows that he needs to take heed of the latter, but his heart lies with the former.

D The book consists mainly of detailed descriptions of cases, most of them involving patients whom Sacks has seen in his practice. Brief discussions of contemporary neuroscientific reports are sprinkled liberally throughout the text. Part, "Haunted by Music," begins with the strange case of Tony Cicoria, a nonmusical, middle-aged surgeon who was consumed by a love of music after being hit by lightning. He suddenly began to crave listening to piano music, which he had never cared for in the past. He started to play the piano and then to compose music, which arose spontaneously in his mind in a "torrent" of notes. How could this happen? Was the cause psychological? (He had had a near-death experience when the lightning struck him.) Or was it the direct result of a change in the auditory regions of his cerebral cortex? Electroencephalography (EEG) showed his brain waves to be normal in the mid-1990s, just after his, trauma and subsequent "conversion" to music. There are now more sensitive tests, but Cicoria, has declined to undergo them; he does not want to delve into the causes of his musicality. What a shame!

E Part II, “A Range of Musicality,” covers a wider variety of topics, but unfortunately, some of the chapters offer little or nothing that is new. For example, chapter 13, which is five pages long, merely notes that the blind often have better hearing than the sighted. The most interesting chapters are those that present the strangest cases. Chapter 8 is about “amusia,” an inability to hear sounds as music, and “dysharmonia,” a highly specific impairment of the ability to hear harmony, with the ability to understand melody left intact. Such specific “dissociations” are found throughout the cases Sacks recounts.

F To Sacks’s credit, part III, “Memory, Movement and Music,” brings US into the underappreciated realm of music therapy. Chapter 16 explains how “melodic intonation therapy” is being used to help expressive aphasic patients (those unable to express their thoughts verbally following a stroke or other cerebral incident) once again become capable of fluent speech. In chapter 20, Sacks demonstrates the near-miraculous power of music to animate Parkinson’s patients and other people with severe movement disorders, even those who are frozen into odd postures. Scientists cannot yet explain how music achieves this effect

G To readers who are unfamiliar with neuroscience and music behavior, Musicophilia may be something of a revelation. But the book will not satisfy those seeking the causes and implications of the phenomena Sacks describes. For one thing, Sacks appears to be more at ease discussing patients than discussing experiments. And he tends to be rather uncritical in accepting scientific findings and theories.

H It’s true that the causes of music-brain oddities remain poorly understood. However, Sacks could have done more to draw out some of the implications of the careful observations that he and other neurologists have made and of the treatments that have been successful. For example, he might have noted that the many specific dissociations among components of music comprehension, such as loss of the ability to perceive harmony but not melody, indicate that there is no music center in the brain. Because many people who read the book are likely to believe in the brain localisation of all mental functions, this was a missed educational opportunity.

I Another conclusion one could draw is that there seem to be no “cures” for neurological problems involving music. A drug can alleviate a symptom in one patient and aggravate it in another, or can have both positive and negative effects in the same patient. Treatments mentioned seem to be almost exclusively antiepileptic medications, which “damp down” the excitability of the brain in general; their effectiveness varies widely.

J Finally, in many of the cases described here the patient with music-brain symptoms is reported to have “normal” EEG results. Although Sacks recognises the existence of new technologies, among them far more sensitive ways to analyze brain waves than the standard neurological EEG test, he does not call for their use. In fact, although he exhibits the greatest compassion for patients, he conveys no sense of urgency about the pursuit of new avenues in the diagnosis and treatment of music-brain disorders. This absence echoes the book’s preface, in which Sacks expresses fear that “the simple art of observation may be lost” if we rely too much on new technologies. He does call for both approaches, though, and we can only hope that the neurological community will respond.

PART 3 — QUESTIONS

Questions 27-30

Choose the correct letter A, B, C or D.

27 Why does the writer have a mixed feeling about the book?

- **A** ○ The guilty feeling made him so.
- **B** ○ The writer expected it to be better than it was.
- **C** ○ Sacks failed to include his personal stories in the book.
- **D** ○ This is the only book written by Sacks.

28 What is the best part of the book?

- **A** ○ the photo of Sacks listening to music
- **B** ○ the tone of voice of the book
- **C** ○ the autobiographical description in the book
- **D** ○ the description of Sacks 's wealth

29 In the preface, what did Sacks try to achieve?

- **A** ○ make a herald introduction of the research work and technique applied
- **B** ○ give detailed description of various musical disorders
- **C** ○ explain how people understand music
- **D** ○ explain why he needs to do away with simple observation

30 What is disappointing about Tony Cicoria's case?

- **A** ○ He refuses to have further tests.
- **B** ○ He can't determine the cause of his sudden musicality.
- **C** ○ He nearly died because of the lightening.
- **D** ○ His brain waves were too normal to show anything.

Questions 31-36

Do the following statements agree with the views of the writer in Reading Passage 3?

YES if the statement agrees with the views of the writer

NO if the statement contradicts with the views of the writer

NOT GIVEN if it is impossible to say what the writer thinks about this

31 It is difficult to give a well-reputable writer a less than totally favorable review.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

32 Beethoven's Pathetique Sonata is a good treatment for musical disorders.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

33 Sacks believes technological methods is of little importance compared with traditional observation when studying his patients.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

34 It is difficult to understand why music therapy is undervalued

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

35 Sacks held little skepticism when borrowing other theories and findings in describing reasons and notion for phenomena he depicts in the book.

A ○ YES

B ○ NO

C ○ NOT GIVEN

36 Sacks is in a rush to use new testing methods to do treatment for patients.

A ○ YES

B ○ NO

C ○ NOT GIVEN

Questions 37-40

Complete each sentence with the correct ending, A-F, below.

• The content covered dissociations in understanding between harmony and melody **37** _____

• The study of treating musical disorders **38** _____

• The EEG scans of Sacks's patients **39** _____

• Sacks believes testing based on new technologies **40** _____

A. **show no music-brain disorders.**

B. **indicates that medication can have varied results,**

C. **is key for the neurological community to unravel the mysteries.**

D. **should not be used in Isolation.**

E. **indicate that not everyone can receive good education.**

F. **show a misconception that there is function centre localized in the brain**

Answer Key

#	Answer	Explanation
1	**D**	Neuroscientists suspect that music can actually help build and strengthen connections between neurons in the cerebral cortex in a process similar to what occurs in brain development despite its type. When a baby is born, certain connections have already been made – like connections for heartbeat and breathing
2	**G**	After Mozart Effect was published to the public, the sales of Mozart CDs stayed on the top of the hit list for three weeks
3	**B**	Frances H. Rauscher, Ph.D., first demonstrated the correlation between music and learning in an experiment in 1993. His experiments indicated that a 10 minute dose of Mozart could temporarily boost intelligence. Groups of students were given intelligence tests after listening to silence, relaxation tapes, or Mozart's Sonata for Two Pianos in D Major for a short time
4	**A**	In Japan, compilations of music are used as medication, of sorts
5	**F**	Many people accredit the advanced learning of some children who take music lessons to other personality traits, such as motivation and persistence, which is required in all types of learning
6	**short**	Groups of students were given intelligence tests after listening to silence, relaxation tapes, or Mozart's Sonata for Two Pianos in D Major for a short time
7	**complex,non-repetitive / complex and non-repetitive**	Rauscher hypothesized that "listening to complex, non-repetitive music, like Mozart, may simulate neural pathways that are important in thinking"
8	**rats**	The same experiment was repeated on rats by Rauscher and Hong Hua Li from Stanford
9	**TRUE**	Although some of these circuits are formed for physical skills needed to play an instrument, just listening to music strengthens connection used in higher-order thinking. Listening to music can then be thought of as "exercise" for the brain, improving concentration and enhancing intuition
10	**FALSE**	When a baby is born, certain connections have already been made – like connections for heartbeat and breathing
11	**FALSE**	If you're a little skeptical about the claims made by supporters of the Mozart Effect, you're not alone

#	Answer	Explanation
12	**NOT GIVEN**	Linton also asks, “If Mozart’s Music were able to improve health, why was Mozart himself so frequently sick? If listening to Mozart’s music increases intelligence and encourages spirituality, why aren’t the world’s smartest and most spiritual people Mozart specialists?”
13	**TRUE**	Since that initial experiment, there has not been a surge of supporting evidence
14	**A / D / E / G**	At first, the bridge was still. Then it began to sway just slightly. Then, almost from one moment to the next, when large groups of people were crossing, the wobble intensified. This movement became sufficiently large for people to stop walking to retain their balance and sometimes to hold onto the hand rails for support. It was decided immediately to limit the number of people on the bridge, but even so the deck movement was sufficient to be uncomfortable and to raise concern for public safety so that on 12 June the bridge was closed until the problem could be solved
15	**A / D / E / G**	At first, the bridge was still. Then it began to sway just slightly. Then, almost from one moment to the next, when large groups of people were crossing, the wobble intensified. This movement became sufficiently large for people to stop walking to retain their balance and sometimes to hold onto the hand rails for support. It was decided immediately to limit the number of people on the bridge, but even so the deck movement was sufficient to be uncomfortable and to raise concern for public safety so that on 12 June the bridge was closed until the problem could be solved
16	**A / D / E / G**	At first, the bridge was still. Then it began to sway just slightly. Then, almost from one moment to the next, when large groups of people were crossing, the wobble intensified. This movement became sufficiently large for people to stop walking to retain their balance and sometimes to hold onto the hand rails for support. It was decided immediately to limit the number of people on the bridge, but even so the deck movement was sufficient to be uncomfortable and to raise concern for public safety so that on 12 June the bridge was closed until the problem could be solved
17	**A / D / E / G**	At first, the bridge was still. Then it began to sway just slightly. Then, almost from one moment to the next, when large groups of people were crossing, the wobble intensified. This movement became sufficiently large for people to stop walking to retain their balance and sometimes to hold onto the hand rails for support. It was decided immediately to limit the number of people on the bridge, but even so the deck movement was sufficient to be uncomfortable and to raise concern for public safety so that on 12 June the bridge was closed until the problem could be solved

#	Answer	Explanation
18	**winds**	The engineers first thought that winds might be exerting excessive force on the many large flags and banners bedecking the bridge for its gala premiere
19	**(the) pedestrians**	The engineers first thought that winds might be exerting excessive force on the many large flags and banners bedecking the bridge for its gala premiere. What's more, they also discovered that the pedestrians also played a key role
20	**horizontal forces**	Human activities, such as walking, running, jumping, swaying, etc. could cause horizontal force which in turn could cause excessive dynamic vibration in the lateral direction in the bridge
21	**(excessive) (dynamic) vibration**	Human activities, such as walking, running, jumping, swaying, etc. could cause horizontal force which in turn could cause excessive dynamic vibration in the lateral direction in the bridge
22	**motion**	The adjusted footsteps magnified the motion – just like when four people all stand up in a small boat at the same time
23	**(The) Imperial College**	The Imperial College tests were only able to capture 7-8 footsteps, and the 'walking on the spot' tests, although monitoring many footsteps, could not investigate normal forward walking
24	**normal forward walking**	and the 'walking on the spot' tests, although monitoring many footsteps, could not investigate normal forward walking
25	**(the) Arup engineers**	However, the limitations of these tests was clear and it was felt that the only way to replicate properly the precise conditions of the Millennium Bridge was to carry out crowd tests on the bridge deck itself. These tests done by the Arup engineers could incorporate factors not possible in the laboratory tests
26	**(the) design assumptions**	The purpose of these tests was to further validate the design assumptions and to load test a prototype damper installation
27	**B**	So I had high expectations of Musicophilia, the latest offering from neurologist and prolific author Oliver Sacks. And I confess to feeling a little guilty reporting that my reactions to the book are mixed
28	**C**	Sacks himself is the best part of Musicophilia. He richly documents his own life in the book and reveals highly personal experiences
29	**A**	In it Sacks explains that he wants to convey the insights gleaned from the "enormous and rapidly growing body of work on the neural underpinnings of musical perception and imagery, and the complex and often bizarre disorders to which these are prone." He also stresses the importance of "the simple art of observation"

#	Answer	Explanation
		and “the richness of the human context.” He wants to combine “observation and description with the latest in technology,” he says, and to imaginatively enter into the experience of his patients and subjects
30	**A**	There are now more sensitive tests, but Cicoria, has declined to undergo them; he does not want to delve into the causes of his musicality. What a shame
31	**YES**	And I confess to feeling a little guilty reporting that my reactions to the book are mixed
32	**NOT GIVEN**	The photograph of him on the cover of the book-which shows him wearing headphones, eyes closed, clearly enchanted as he listens to Alfred Brendel perform Beethoven’s Pathetique Sonata-makes a positive impression that is home out by the contents of the book
33	**NO**	He wants to combine “observation and description with the latest in technology,” he says, and to imaginatively enter into the experience of his patients and subjects
34	**NOT GIVEN**	To Sacks’s credit, part III, “Memory, Movement and Music,” brings US into the underappreciated realm of music therapy
35	**YES**	And he tends to be rather uncritical in accepting scientific findings and theories
36	**NO**	In fact, although he exhibits the greatest compassion for patients, he conveys no sense of urgency about the pursuit of new avenues in the diagnosis and treatment of music-brain disorders
37	**F**	For example, he might have noted that the many specific dissociations among components of music comprehension, such as loss of the ability to perceive harmony but not melody, indicate that there is no music center in the brain. Because many people who read the book are likely to believe in the brain localisation of all mental functions, this was a missed educational opportunity
38	**B**	A drug can alleviate a symptom in one patient and aggravate it in another, or can have both positive and negative effects in the same patient. Treatments mentioned seem to be almost exclusively antiepileptic medications, which “damp down” the excitability of the brain in general; their effectiveness varies widely
39	**A**	Finally, in many of the cases described here the patient with music-brain symptoms is reported to have “normal” EEG results
40	**D**	This absence echoes the book’s preface, in which Sacks expresses fear that “the simple art of observation may be lost” if we rely too much on new technologies. He does call for both

#	Answer	Explanation
		approaches, though, and we can only hope that the neurological community will respond

Test 65

PASSAGE 1

Read the text below and answer questions 1-13.

The coming back of the “Extinct” Grass in Britain

A. It's Britain's dodo, called interrupted brome because of its gappy seed-head, this unprepossessing grass was found nowhere else in the world. Sharp-eyed Victorian botanists were the first to notice it, and by the 1920s the odd-looking grass had been found across much of southern England. Yet its decline was just as dramatic. By 1972 it had vanished from its last toehold-two hay fields at Pampisford, near Cambridge. Even the seeds stored at the Cambridge University Botanic Garden as an insurance policy were dead, having been mistakenly kept at room temperature. Botanists mourned: a unique living entity was gone forever.

B. Yet reports of its demise proved premature. Interrupted brome has come back from the dead, and not through any fancy genetic engineering. Thanks to one green-fingered botanist, interrupted brome is alive and well and living as a pot plant. Britain's dodo is about to become a phoenix, as conservationists set about relaunching its career in the wild.

C. At first, Philip Smith was unaware that the scrawny pots of grass on his bench were all that remained of a uniquely British species. But when news of the "extinction" of Bromus interruptus finally reached him, he decided to astonish his colleagues. He seized his opportunity at a meeting of the Botanical Society of the British Isles in Manchester in 1979, where he was booked to talk about his research on the evolution of the brome grasses. It was sad, he said, that interrupted brome had become extinct, as there were so many interesting questions botanists could have investigated. Then he whipped out two enormous pots of it. The extinct grass was very much alive.

D. It turned out that Smith had collected seeds from the brome's last refuge at Pampisford in 1963, shortly before the species disappeared from the wild altogether. Ever since then, Smith had grown the grass on, year after year. So in the end the hapless grass survived not through some high-powered conservation scheme or fancy genetic manipulation, but simply because one man was interested in it. As Smith points out, interrupted brome isn't particularly attractive and has no commercial value. But to a plant taxonomist, that's not what makes a plant interesting.

E. The brome's future, at least in cultivation, now seems assured. Seeds from Smith's plants have been securely stored in the state-of-the-art Millennium Seed Bank at Wakehurst Place in Sussex. And living plants thrive at the botanic gardens at Kew, Edinburgh and Cambridge. This year, "bulking up" is under way to make sure there are plenty of plants in all the gardens, and sackfuls of seeds are being stockpiled at strategic sites throughout the country.

F. The brome's relaunch into the British countryside is next on the agenda. English Nature has included interrupted brome in its Species Recovery Programme, and it is on track to be

reintroduced into the agricultural landscape, if friendly farmers can be found. Alas, the grass is neither pretty nor useful-in fact, it is undeniably a weed, and a weed of a crop that nobody grows these days, at that. The brome was probably never common enough to irritate farmers, but no one would value it today for its productivity or its nutritious qualities. As a grass, it leaves agriculturalists cold.

G. So where did it come from? Smith's research into the taxonomy of the brome grasses suggests that interruptus almost certainly mutated from another weedy grass, soft brome, hordeaceus. So close is the relationship that interrupted brome was originally deemed to be a mere variety of soft brome by the great Victorian taxonomist Professor Hackel. But in 1895, George Claridge Druce, a 45-year-old Oxford pharmacist with a shop on the High Street, decided that it deserved species status, and convinced the botanical world. Druce was by then well on his way to fame as an Oxford don, mayor of the city, and a fellow of the Royal Society. A poor boy from Northamptonshire and a self-educated man, Druce became the leading field botanist of his generation. When Druce described a species, botanists took note.

H. The brome's parentage may be clear, but the timing of its birth is more obscure. According to agricultural historian Joan Thirsk, sainfoin and its friends made their first modest appearance in Britain in the early 1600s. Seeds brought in from the Continent were sown in pastures to feed horses and other livestock. But in those early days, only a few enthusiasts-mostly gentlemen keen to pamper theft best horses—took to the new crops.

I. Although the credit for the "discovery" of interrupted brome goes to a Miss A. M. Barnard, who collected the first specimens at Odsey, Bedfordshire, in 1849. The grass had probably lurked undetected in the English countryside for at least a hundred years. Smith thinks the botanical dodo probably evolved in the late 17th or early 18th century, once sainfoin became established.

J. Like many once-common arable weeds, such as the corncockle, interrupted brome seeds cannot survive long in the soil. Each spring, the brome relied on farmers to resow its seeds; in the days before weedkillers and sophisticated seed sieves, an ample supply would have contaminated stocks of crop seed. But fragile seeds are not the brome's only problem: this species is also reluctant to release its seeds as they ripen. Show it a ploughed field today and this grass will struggle to survive, says Smith. It will be difficult to establish in today's "improved" agricultural landscape, inhabited by notoriously vigorous competitors.

PART 1 — QUESTIONS

Questions 1-7

Do the following statements agree with the information given in Reading Passage 1

TRUE if the statement is true

FALSE if the statement is false

NOT GIVEN if the information is not given in the passage

1 The name for interrupted brome is very special as its head shaped like a sharp eye

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

2 Interrupted brome thought to become extinct because there were no live seed even in a labs condition.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

3 Philip Smith comes from University of Cambridge.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

4 Reborn of the interrupted brome is attributed more to scientific meaning than seemingly aesthetic or commercial ones

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

5 English nature will operate to recover interrupted brome on the success of survival in Kew.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

6 Interrupted Brome grow poorly in some competing modern agricultural environment with other plants

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

7 Media publicity plays a significant role to make interrupted brome continue to exist.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

Questions 8-13

Use the information in the passage to match the people (listed A-F) with opinions or deeds below.

NB: you may use any letter more than once

A. George Claridge Druce

B. Nathaniel Fiennes

C. Professor Hackel

D. A. M. Barnard

E. Philip Smith

F. Joan Thirsk

	A	B	C	D	E	F
8 reestablished the British unique plants	○	○	○	○	○	○
9 identified the interrupted brome as just to its parent brome	○	○	○	○	○	○
10 gave an independent taxonomy place to interrupted brome	○	○	○	○	○	○
11 discovered and picked the first sample of interrupted brome	○	○	○	○	○	○
12 recorded the first 'show up' of sainfoin plants in Britain	○	○	○	○	○	○
13 collected the last seeds just before its extinction	○	○	○	○	○	○

PASSAGE 2

Read the text below and answer questions 14-26.

CHILDREN'S LITERATURE

A. Stories and poems aimed at children have an exceedingly long history: lullabies, for example, were sung in Roman times, and a few nursery games and rhymes are almost as ancient. Yet so far as written-down literature is concerned, while there were stories in print before 1700 that children often seized on when they had the chance, such as translations of Aesop's fables, fairy-stories and popular ballads and romances, these were not aimed at young people in particular. Since the only genuinely child-oriented literature at this time would have been a few instructional works to help with reading and general knowledge, plus the odd Puritanical tract as an aid to morality, the only course for keen child readers was to read adult literature. This still occurs today, especially with adult thrillers or romances that include more exciting, graphic detail than is normally found in the literature for younger readers.

B. By the middle of the 18th century there were enough eager child readers, and enough parents glad to cater to this interest, for publishers to specialize in children's books whose first aim was pleasure rather than education or morality. In Britain, a London merchant named Thomas Boreham produced Cajanus, The Swedish Giant in 1742, while the more famous John Newbery published A Little Pretty Pocket Book in 1744. Its contents - rhymes, stories, children's games plus a free gift ('A ball and a pincushion') - in many ways anticipated the similar lucky-dip contents of children's annuals this century. It is a tribute to Newbery's flair that he hit upon a winning formula quite so quickly, to be pirated almost immediately in America.

C. Such pleasing levity was not to last. Influenced by Rousseau, whose (1762) decreed that all books for children save Robinson Crusoe were a dangerous diversion, contemporary critics saw to it that children's literature should be instructive and uplifting. Prominent among such voices was Mrs. Sarah Trimmer, whose magazine The Guardian of Education (1802) carried the first regular reviews of children's books. It was she who condemned fairy-tales for their violence and general absurdity; her own stories, Fabulous Histories (1786) described talking animals who were always models of sense and decorum.

D. So the moral story for children was always threatened from within, given the way children have of drawing out entertainment from the sternest moralist. But the greatest blow to the improving children's book was to come from an unlikely source indeed: early 19th-century interest in folklore. Both nursery rhymes, selected by James Orchard Halliwell for a folklore society in 1842, and collection of fairy-stories by the scholarly Grimm brothers, swiftly translated into English in 1823, soon rocket to popularity with the young, quickly leading to new editions, each one more child-centered than the last. From now on younger children could expect stories written for their particular interest and with the needs of their own limited experience of life kept well to the fore.

E. What eventually determined the reading of older children was often not the availability of special children's literature as such but access to books that contained characters, such as

young people or animals, with whom they could more easily empathize, or action, such as exploring or fighting, that made few demands on adult maturity or understanding.

F. The final apotheosis of literary childhood as something to be protected from unpleasant reality came with the arrival in the late 1930s of child-centered best-sellers intend on entertainment at its most escapist. In Britain novelist such as Enid Blyton and Richmal Crompton described children who were always free to have the most unlikely adventures, secure in the knowledge that nothing bad could ever happen to them in the end. The fact that war broke out again during her books' greatest popularity fails to register at all in the self-enclosed world inhabited by Enid Blyton's young characters. Reaction against such dream-worlds was inevitable after World War II, coinciding with the growth of paperback sales, children's libraries and a new spirit of moral and social concern. Urged on by committed publishers and progressive librarians, writers slowly began to explore new areas of interest while also shifting the settings of their plots from the middle-class world to which their chiefly adult patrons had always previously belonged.

G. Critical emphasis, during this development, has been divided. For some the most important task was to rid children's books of the social prejudice and exclusiveness no longer found acceptable. Others concentrated more on the positive achievements of contemporary children's literature. That writers of these works are now often recommended to the attentions of adult as well as child readers echoes the 19th-century belief that children's literature can be shared by the generations, rather than being a defensive barrier between childhood and the necessary growth towards adult understanding.

PART 2 — QUESTIONS

Questions 14-18

Complete the table below.

Choose NO MORE THAN TWO WORDS from Reading Passage 2 for each answer.

DATE	FEATURES	AIM	EXAMPLE
Before 1700	Not aimed at young children	Education and morality	Puritanical tract
By the middle of 18th century	Collection of rhymes, **14** _____, and games	Read for pleasure	A Little Pretty Pocket Book (exported to **15** _____)
Early 19th century	Growing interest in **16** _____	To be more children-centered	Nursery rhymes and **17** _____
Late 1930s	Stories of harm-free **18** _____	Entertainment	Enid Blyton and Richamal Crompton's novels

Questions 19-21

Look at the following people and the list of statements below.

Match each person with the correct statement.

A. Wrote criticisms of children's literature

B. Used animals to demonstrate the absurdity of fairy tales

C. Was not a writer originally

D. Translated a book into English

E. Didn't write in the English language

	A	B	C	D	E
19 Thomas Boreham	○	○	○	○	○
20 Mrs. Sarah trimmer	○	○	○	○	○

	A	B	C	D	E
21 Grimm Brothers	○	○	○	○	○

Questions 22-26

Do the following statements agree with the information given in Reading Passage 2?

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

22 Children didn't start to read books until 1700.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

23 Sarah Trimmer believed that children's books should set good examples.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

24 Parents were concerned about the violence in children's books.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

25 An interest in the folklore changed the direction of the development of children's books.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

26 Today children's book writers believe their works should appeal to both children and adults.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

PASSAGE 3

Read the text below and answer questions 27-40.

Beyond the Blue Line

A. Much of the thrill of venturing to the far side of the world rests on the romance of difference. So one feels certain sympathy for Captain James Cook on the day in 1778 that he ''discovered" Hawaii. Then on his third expedition to the Pacific, the British navigator had explored scores of islands across the breadth of the sea, from lush New Zealand to the lonely wastes of Easter Island. This latest voyage had taken him thousands of miles north from the Society Islands to an irchipelago so remote that even the old Polynesians back on Tahiti knew nothing about it. Imagine Cook's surprise, then, when the natives of Hawaii came paddling out in their canoes and greeted him in a familiar tongue, one he had heard on virtually every mote of inhabited land he had visited. Marveling at the ubiquity of this Pacific language and culture, he later wondered in his journal: "How shall we account for this Nation spreading itself so far over this vast ocean?"

B. That question, and others that flow from it, has tantalized inquiring minds for centuries: Who were these amazing seafarers? Where did they come from, starting more than 3,000 years ago? And how could a Neolithic people with simple canoes and no navigation gear manage to find, let alone colonize, hundreds of far-flung island specks scattered across an ocean that spans nearly a third of the globe? Answers have been slow in coming. But now a startling archaeological find on the island of Efate, in the Pacific nation of Vanuatu, has revealed an ancient seafaring people, the distant ancestors of today's Polynesians, taking their first steps into the unknown. The discoveries there have also opened a window into the shadowy world of those early voyagers.

C. ''What we have is a first- or second-generation site containing the graves of some of the Pacific's first explorers," says Spriggs, professor of archaeology at the Australian National University and co-leader of an international team excavating the site. It came to light only by luck. A backhoe operator, digging up topsoil on the grounds of a derelict coconut plantation, scraped open a grave—the first of dozens in a burial ground some 3,000 years old. It is the oldest cemetery ever found in the Pacific islands, and it harbors the bones of an ancient people archaeologists call the Lapita, a label that derives from a beach in New Caledonia where a landmark cache of their pottery was found in the 1950s.

D. They were daring blue-water adventurers who oved the sea not just as explorers but also as pioneers, bringing along everything they would need to build new lives—their families and livestock, taro seedlings and stone tools. Within the span of a few centuries the Lapita stretched the boundaries of their world from the jungle-clad volcanoes of Papua New Guinea to the loneliest coral outliers of Tonga, at least 2,000 miles eastward in the Pacific. Along the way they explored millions of square miles of unknown sea, discovering and colonizing scores of tropical islands never before seen by human eyes: Vanuatu, New Caledonia, Fiji, Samoa.

It was their descendants, centuries later, who became the great Polynesian navigators we all tend to think of: the Tahitians and Hawaiians, the New Zealand Maori, and the curious people who erected those statues on Easter Island. But it was the Lapita who laid the foundation—who bequeathed to the islands the language, customs, and cultures that their more famous descendants carried around the Pacific.

E. While the Lapita left a glorious legacy, they also left precious few clues about themselves. A particularly intriguing clue comes from chemical tests on the teeth of several skeletons. Then as now, the food and water you consume as a child deposits oxygen, carbon, strontium, and other elements in your still-forming adult teeth. The isotope signatures of these elements vary subtly from place to place, so that if you grow up in, say, Buffalo, New York, then spend your adult life in California, tests on the isotopes in your teeth will always reveal your eastern roots.

Isotope analysis indicates that several of the Lapita buried on Efate didn't spend their childhoods here but came from somewhere else. And while isotopes can't pinpoint their precise island of origin, this much is clear: At some point in their lives, these people left the villages of their birth and made a voyage by seagoing canoe, never to return. DNA teased from these ancient bones may also help answer one of the most puzzling questions in Pacific anthropology: Did all Pacific islanders spring from one source or many? Was there only one outward migration from a single point in Asia, or several from different points? "This represents the best opportunity we've had yet," says Spriggs, "to find out who the Lapita actually were, where they came from, and who their closest descendants are today."

F. There is one stubborn question for which archaeology has yet to provide any answers: How did the Lapita accomplish the ancient equivalent of a moon landing, many times over? No one has found one of their canoes or any rigging, which could reveal how the canoes were sailed. Nor do the oral histories and traditions of later Polynesians offer any insights.

"All we can say for certain is that the Lapita had canoes that were capable of ocean voyages, and they had the ability to sail them," says Geoff Irwin, a professor of archaeology at the University of Auckland and an avid yachtsman. Those sailing skills, he says, were developed and passed down over thousands of years by earlier mariners who worked their way through the archipelagoes of the western Pacific making short crossings to islands within sight of each other. The real adventure didn't begin, however, until their Lapita descendants neared the end of the Solomons chain, for this was the edge of the world. The nearest landfall, the Santa Cruz Islands, is almost 230 miles away, and for at least 150 of those miles the Lapita sailors would have been out of sight of land, with empty horizons on every side.

G. The Lapita's thrust into the Pacific was eastward, against the prevailing trade winds, Irwin notes. Those nagging headwinds, he argues, may have been the key to their success. 'They could sail out for days into the unknown and reconnoiter, secure in the knowledge that if they didn't find anything, they could turn about and catch a swift ride home on the trade winds. It's what made the whole thing work." Once out there, skilled seafarers would detect abundant leads to follow to land: seabirds and turtles, coconuts and twigs carried out to sea by the tides, and the afternoon pileup of clouds on the horizon that often betokens an island in the distance.

All this presupposes one essential detail, says Atholl Anderson, professor of prehistory at the Australian National University and, like Irwin, a keen yachtsman: that the Lapita had mastered the advanced art of tacking into the wind. "And there's no proof that they could do any such thing," Anderson says. "There has been this assumption that they must have done so, and people have built canoes to re-create those early voyages based on that assumption. But nobody has any idea what their canoes looked like or how they were rigged."

H. However they did it, the Lapita spread themselves a third of the way across the Pacific, then called it quits for reasons known only to them. Ahead lay the vast emptiness of the central Pacific, and perhaps they were too thinly stretched to venture farther. They probably never numbered more than a few thousand in total, and in their rapid migration eastward they encountered hundreds of islands—more than 300 in Fiji alone. Supplied with such an embarrassment of riches, they could settle down and enjoy what for a time were Earth's last Edens.

I. Rather than give all the credit to human skill and daring, Anderson invokes the winds of chance. El Nino, the same climate disruption that affects the Pacific today, may have helped scatter the first settlers to the ends of the ocean, Anderson suggests. Climate data obtained from slow-growing corals around the Pacific and from lake-bed sediments in the Andes of South America point to a series of unusually frequent El Ninos around the time of the Lapita expansion, and again between 1,600 and 1,200 years ago, when the second wave of pioneer navigators made their voyages farther east, to the remotest comers of the Pacific. By reversing the regular east-to-west flow of the trade winds for weeks at a time, these "super El Ninos" might have sped the Pacific's ancient mariners on long, unplanned voyages far over the horizon. The volley of El Ninos that coincided with the second wave of voyages could have been key to launching Polynesians across the wide expanse of open water between Tonga, where the Lapita stopped, and the distant archipelagoes of eastern Polynesia. "Once they crossed that gap, they could island hop throughout the region, and from the Marquesas it's mostly downwind to Hawaii," Anderson says. It took another 400 years for mariners to reach Easter Island, which lies in the opposite direction—normally upwind. "Once again this was during a period of frequent El Nino activity."

PART 3 — QUESTIONS

Questions 27-31

Complete the summary with the list of words A-L below.

The question, arisen from Captain Cook's expedition to Hawaii, and others derived from it, has fascinated researchers for a long time. However, a surprising archaeological find on Efate began to provide valuable information about the **27** _____ . On the excavating site, a **28** _____ containing **29** _____ of Lapita was uncovered Later on, various researches and tests have been done to study the ancient people - Lapita and their **30** _____ . How could they manage to spread themselves so far over the vast ocean? All that is certain is that they were good at canoeing. And perhaps they could take well advantage of the trade wind But there is no **31** _____ of it.

A. **bones** B. **co-leader** C. **descendents** D. **international team**

E. **inquiring minds** F. **proof** G. **ancestors** H. **early seafarers**

I. **pottery** J. **assumption** K. **horizons** L. **grave**

Questions 32-35

Choose the correct letter, A, B, C or D.

32 The chemical tests indicate that

A ○ the elements in one’s teeth varied from childhood to adulthood.

B ○ the isotope signatures of the elements remain the same in different places,

C ○ the result of the study is not fascinating.

D ○ these chemicals can’t conceal one’s origin.

33 The isotope analysis from the Lapita

A ○ exactly locates their birth island.

B ○ reveals that the Lapita found the new place via straits,

C ○ helps researchers to find out answers about the islanders.

D ○ leaves more new questions for anthropologists to answer.

34 According paragraph F, the offspring of Lapita

A ○ were capable of voyages to land that is not accessible to view.

B ○ were able to have the farthest voyage of 230 miles,

C ○ worked their way through the archipelagoes of the western Pacific.

D ○ fully explored the horizons.

35 Once out exploring the sea, the sailors

A ○ always found the trade winds unsuitable for sailing.

B ○ could return home with various clues.

C ○ sometimes would overshoot their home port and sail off into eternity.

D ○ would sail in one direction.

Questions 36-40

Do the following statements agree with the information given in Reading Passage 3?

TRUE if the statement is true

FALSE if the statement is false

NOT GIVEN if the information is not given in the passage

36 The Lapita could canoe in the prevailing wind.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

37 It was difficult for the sailors to find ways back, once they were out.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

38 The reason why the Lapita stopped canoeing farther is still unknown.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

39 The majority of the Lapita dwelled on Fiji.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

40 The navigators could take advantage of El Nino during their forth voyages.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

Answer Key

#	Answer	Explanation
1	**FALSE**	called interrupted brome because of its gappy seed-head, this unprepossessing grass was found nowhere else in the world. Sharp-eyed Victorian botanists were the first to notice it
2	**TRUE**	Even the seeds stored at the Cambridge University Botanic Garden as an insurance policy were dead, having been mistakenly kept at room temperature. Botanists mourned: a unique living entity was gone forever
3	**NOT GIVEN**	At first, Philip Smith was unaware that the scrawny pots of grass on his bench were all that remained of a uniquely British species
4	**TRUE**	As Smith points out, interrupted brome isn't particularly attractive and has no commercial value. But to a plant taxonomist, that's not what makes a plant interesting
5	**FALSE**	English Nature has included interrupted brome in its Species Recovery Programme, and it is on track to be reintroduced into the agricultural landscape, if friendly farmers can be found
6	**TRUE**	It will be difficult to establish in today's "improved" agricultural landscape, inhabited by notoriously vigorous competitors
7	**NOT GIVEN**	So in the end the hapless grass survived not through some high-powered conservation scheme or fancy genetic manipulation, but simply because one man was interested in it
8	**E**	It turned out that Smith had collected seeds from the brome's last refuge at Pampisford in 1963, shortly before the species disappeared from the wild altogether. Ever since then, Smith had grown the grass on, year after year. So in the end the hapless grass survived not through some high-powered conservation scheme or fancy genetic manipulation, but simply because one man was interested in it
9	**C**	So close is the relationship that interrupted brome was originally deemed to be a mere variety of soft brome by the great Victorian taxonomist Professor Hackel
10	**A**	But in 1895, George Claridge Druce, a 45-year-old Oxford pharmacist with a shop on the High Street, decided that it deserved species status, and convinced the botanical world

#	Answer	Explanation
11	**D**	Although the credit for the “discovery” of interrupted brome goes to a Miss A. M. Barnard, who collected the first specimens at Odsey, Bedfordshire, in 1849
12	**F**	According to agricultural historian Joan Thirsk, sainfoin and its friends made their first modest appearance in Britain in the early 1600s
13	**A**	It turned out that Smith had collected seeds from the brome’s last refuge at Pampisford in 1963, shortly before the species disappeared from the wild altogether
14	**stories**	Its contents – rhymes, stories, children’s games plus a free gift (‘A ball and a pincushion’) – in many ways anticipated the similar lucky-dip contents of children’s annuals this century
15	**America**	the more famous John Newbery published A Little Pretty Pocket Book in 1744. Its contents rhymes, stories, children’s games plus a free gift (‘A ball and a pincushion’) in many ways anticipated the similar lucky-dip contents of children’s annuals this century. It is a tribute to Newbery’s flair that he hit upon a winning formula quite so quickly, to be pirated almost immediately in America
16	**folklore**	But the greatest blow to the improving children’s book was to come from an unlikely source indeed: early 19th-century interest in folklore
17	**fairy-stories**	Both nursery rhymes, selected by James Orchard Halliwell for a folklore society in 1842, and collection of fairy-stories by the scholarly Grimm brothers, swiftly translated into English in 1823, soon rocket to popularity with the young, quickly leading to new editions, each one more child-centered than the last
18	**adventure**	In Britain novelist such as Enid Blyton and Richmal Crompton described children who were always free to have the most unlikely adventures, secure in the knowledge that nothing bad could ever happen to them in the end
19	**C**	In Britain, a London merchant named Thomas Boreham produced Cajanus, The Swedish Giant in 1742
20	**A**	Prominent among such voices was Mrs. Sarah Trimmer, whose magazine The Guardian of Education (1802) carried the first regular reviews of children’s books
21	**E**	collection of fairy-stories by the scholarly Grimm brothers, swiftly translated into English in 1823
22	**FALSE**	while there were stories in print before 1700 that children often seized on when they had the chance, such as translations of

#	Answer	Explanation
		Aesop's fables, fairy-stories and popular ballads and romances, these were not aimed at young people in particular
23	**TRUE**	Prominent among such voices was Mrs. Sarah Trimmer, whose magazine The Guardian of Education (1802) carried the first regular reviews of children's books. It was she who condemned fairy-tales for their violence and general absurdity; her own stories, Fabulous Histories (1786) described talking animals who were always models of sense and decorum
24	**NOT GIVEN**	It was she who condemned fairy-tales for their violence and general absurdity; her own stories, Fabulous Histories (1786) described talking animals who were always models of sense and decorum
25	**TRUE**	But the greatest blow to the improving children's book was to come from an unlikely source indeed: early 19th-century interest in folklore. Both nursery rhymes, selected by James Orchard Halliwell for a folklore society in 1842, and collection of fairy-stories by the scholarly Grimm brothers, swiftly translated into English in 1823, soon rocket to popularity with the young, quickly leading to new editions, each one more child-centered than the last
26	**TRUE**	That writers of these works are now often recommended to the attentions of adult as well as child readers echoes the 19th-century belief that children's literature can be shared by the generations, rather than being a defensive barrier between childhood and the necessary growth towards adult understanding
27	**B**	"What we have is a first- or second-generation site containing the graves of some of the Pacific's first explorers," says Spriggs, professor of archaeology at the Australian National University and co-leader of an international team excavating the site
28	**L**	A backhoe operator, digging up topsoil on the grounds of a derelict coconut plantation, scraped open a grave—the first of dozens in a burial ground some 3,000 years old. It is the oldest cemetery ever found in the Pacific islands, and it harbors the bones of an ancient people archaeologists call the Lapita, a label that derives from a beach in New Caledonia where a landmark cache of their pottery was found in the 1950s
29	**A**	It is the oldest cemetery ever found in the Pacific islands, and it harbors the bones of an ancient people archaeologists call the Lapita
30	**C**	"This represents the best opportunity we've had yet," says Spriggs, "to find out who the Lapita actually were, where they came from, and who their closest descendants are today."

#	Answer	Explanation
31	**F**	“And there’s no proof that they could do any such thing,” Anderson says
32	**D**	The isotope signatures of these elements vary subtly from place to place, so that if you grow up in, say, Buffalo, New York, then spend your adult life in California, tests on the isotopes in your teeth will always reveal your eastern roots
33	**C**	“This represents the best opportunity we’ve had yet,” says Spriggs, “to find out who the Lapita actually were, where they came from, and who their closest descendants are today.”
34	**A**	The nearest landfall, the Santa Cruz Islands, is almost 230 miles away, and for at least 150 of those miles the Lapita sailors would have been out of sight of land, with empty horizons on every side
35	**B**	‘They could sail out for days into the unknown and reconnoiter, secure in the knowledge that if they didn’t find anything, they could turn about and catch a swift ride home on the trade winds. It’s what made the whole thing work.” Once out there, skilled seafarers would detect abundant leads to follow to land: seabirds and turtles, coconuts and twigs carried out to sea by the tides, and the afternoon pileup of clouds on the horizon that often betokens an island in the distance
36	**TRUE**	The Lapita’s thrust into the Pacific was eastward, against the prevailing trade winds, Irwin notes. Those nagging headwinds, he argues, may have been the key to their success. ‘They could sail out for days into the unknown and reconnoiter, secure in the knowledge that if they didn’t find anything, they could turn about and catch a swift ride home on the trade winds
37	**FALSE**	‘They could sail out for days into the unknown and reconnoiter, secure in the knowledge that if they didn’t find anything, they could turn about and catch a swift ride home on the trade winds
38	**TRUE**	However they did it, the Lapita spread themselves a third of the way across the Pacific, then called it quits for reasons known only to them
39	**FALSE**	Ahead lay the vast emptiness of the central Pacific, and perhaps they were too thinly stretched to venture farther
40	**NOT GIVEN**	Climate data obtained from slow-growing corals around the Pacific and from lake-bed sediments in the Andes of South America point to a series of unusually frequent El Ninos around the time of the Lapita expansion, and again between 1,600 and 1,200 years ago, when the second wave of pioneer navigators made their voyages farther east, to the remotest comers of the Pacific

Test 66

PASSAGE 1

Read the text below and answer questions 1-13.

World Ecotourism in the Developing Countries

A The Ecotourism Society defines ecotourism as "a responsible travel to natural areas which conserves the environment and improves the welfare of local people". It is recognised as being particularly conducive to enriching and enhancing the standing of tourism, on the basis that this form of tourism respects the natural heritage and local populations and are in keeping with the carrying capacity of the sites.

Cuba

B Cuba is undoubtedly an obvious site for ecotourism, with its picturesque beaches, underwater beauty, countryside landscapes, and ecological reserves. An educated population and improved infrastructure of roads and communications adds to the mix. In the Caribbean region, Cuba is now the second most popular tourist destination.

Ecotourism is also seen as an environmental education opportunity to heighten both visitors' and residents' awareness of environmental and conservation issues, and even to inspire conservation action.

Ecotourism has also been credited with promoting peace, by providing opportunities for educational and cultural exchange. Tourists' safety and health are guaranteed.

Raul Castro, brother of the Cuban president, started this initiative to rescue the Cuban tradition of herbal medicine and provide natural medicines for its healthcare system. The school at Las Terrazas Eco-Tourism Community teaches herbal healthcare and children learn not only how to use medicinal herbs, but also to grow them in the school garden for teas, tinctures, ointments and creams.

In Cuba, ecotourism has the potential to alleviate poverty by bringing money into the economy and creating jobs. In addition to the environmental impacts of these efforts, the area works on developing community employment opportunities for locals, in conjunction with ecotourism.

South America

C In terms of South America, it might be the place which shows the shortcoming of ecotourism. Histoplasma capsulatum (see chapter "Histoplasmosis and HIV"), a dimorphic fungus, is the most common endemic mycosis in the United States, and is associated with exposure to bat or bird droppings. Most recently, outbreaks have been reported in healthy travelers who returned from Central and South America after engaging in recreational activities associated with spelunking, adventure tourism, and ecotourism. It is quite often to see tourists neglected sanitation while travelling. After engaging in high-risk activities, boots should be hosed off and

clothing placed in airtight plastic bags for laundering. HIV-infected travelers should avoid risky behaviors or environments, such as exploring caves, particularly those that contain bat droppings.

D Nowhere is the keen eye and intimate knowledge of ecotourism is more amidst this fantastic biodiversity, as we explore remote realms rich in wildlife rather than a nature adventure. A sustainable tour is significant for ecotourism, one in which we can grow hand in hand with nature and our community, respecting everything that makes US privileged Travelers get great joy from every step that take forward on this endless but exciting journey towards sustainability. The primary threats to South America's tropical forests are deforestation caused by agricultural expansion, cattle ranching, logging, oil extraction and spills, mining, illegal coca farming, and colonization initiatives. Deforestation has shrunk territories belonging to indigenous peoples and wiped out more than 90% of the population. Many are taking leading roles in sustainable tourism even as they introduce protected regions to more travelers.

East Africa

E In East Africa, significantly reducing such illegal hunting and allowing wildlife populations to recover would allow the generation of significant economic benefits through trophy hunting and potentially ecotourism. "Illegal hunting is an extremely inefficient use of wildlife resources because it fails to capture the value of wildlife achievable through alternative forms of use such as trophy hunting and ecotourism," said Peter Lindsey, author of the new study. Most residents believed that ecotourism could solve this circumstance. They have passion for focal community empowerment, loves photography and writes to laud current focal conservation efforts, create environmental awareness and promote ecotourism.

Indonesia

F In Indonesia, ecotourism started to become an important concept from 1995, in order to strengthen the domestic travelling movement; the focal government targeting the right markets is a prerequisite for successful ecotourism. The market segment for Indonesian ecotourism consists of: (i) "The silent generation", 55-64 year-old people who are wealthy enough, generally well-educated and have no dependent children, and can travel for four weeks; (ii) "The baby boom generation", junior successful executives aged 35-54 years, who are likely to be travelling with their family and children (spending 2-3 weeks on travel) — travelling for them is a stress reliever; and (iii) the "X generation", aged 18-29 years, who love to do ecotours as backpackers — they are generally students who can travel for 3-12 months with monthly expenditure of US$300-500. It is suggested that promotion of Indonesian ecotourism products should aim to reach these various cohorts of tourists. The country welcomes diverse levels of travelers.

G On the other hand, ecotourism provide as many services as traditional tourism. Nestled between Mexico, Guatemala and the Caribbean Sea is the country of Belize. It is the wonderful place for Hamanasi honeymoon, bottle of champagne upon arrival, three meals daily, a private service on one night of your stay and a choice of adventures depending on the length of your stay. It also offers six-night and seven-night honeymoon packages. A variety of specially tailored tours, including the Brimstone Hill Fortress, and a trip to a neighboring island Guided

tours include rainforest, volcano and off-road plantation tours. Gregory Pereira, an extremely knowledgeable and outgoing hiking and tour guide, says the following about his tours: "All of our tours on StKitts include transportation by specially modified Land Rovers, a picnic of island pastries and focal fruit, fresh tropical juices, CSR, a qualified island guide and a full liability insurance coverage for participants.

H Kodai is an ultimate splendor spot for those who love being close to mother nature. They say every bird must sing it's own throat while we say every traveller should find his own way out of variegated and unblemished paths of deep valleys and steep mountains. The cheese factory here exports great quantity of cheese to various countries across the globe. It is located in the center of forest Many travelers are attracted by the delicious cheese. The ecotourism is very famous this different eating experience.

PART 1 — QUESTIONS

Questions 1-5

Use the information in the passage to match the place (listed A-D) with opinions or deeds below. Write the appropriate letters A-D in your answer.

NB You may use any letter more than once.

A. Cuba

B. East Africa

C. South America

D. Indonesia

	A	B	C	D
1 a place to improve local education as to help tourists	○	○	○	○
2 a place suitable for both rich and poor travelers	○	○	○	○
3 a place where could be easily get fungus	○	○	○	○
4 a place taking a method to stop unlawful poaching	○	○	○	○
5 a place where the healthcare system is developed	○	○	○	○

Questions 6-9

Use the information in the passage to match the companies (listed A-D) with opinions or deeds below. Write the appropriate letters A, B, C or D in your answer.

A. eating the local fruits at the same time

B. find job opportunities in community

C. which is situated on the heart of jungle

D. with private and comfortable service

	A	B	C	D
6 Visiting the cheese factory	○	○	○	○

	A	B	C	D
7 Enjoying the honeymoon	○	○	○	○
8 Having the picnic while	○	○	○	○
9 The residents in Cuba could	○	○	○	○

Questions 10-13

Complete the following summary of the paragraphs of Reading Passage, using no more than two words from the Reading Passage for each answer.

Ecotourism is not a nature **10** _____ but a **11** _____ tour. The reason why South America promotes ecotourism is due to the destruction of **12** _____. In addition, East Africa also encourages this kind of tourism for cutting the **13** _____ in order to save wild animals.

PASSAGE 2

Read the text below and answer questions 14-27.

Memory and age

A Aging, it is now clear, is part of an ongoing maturation process that all our organs go through. "In a sense, aging is keyed to the level of vigor of the body and the continuous interaction between levels of body activity and levels of mental activity," reports Arnold B. Scheibel, M.D., whose very academic title reflects how once far-flung domains now converge on the mind and the brain. Scheibel is professor of anatomy, cell biology, psychiatry, and behavioral sciences at the University of California at Los Angeles, and director of the university's Brain Research Institute. Experimental evidence has backed up popular assumptions that the aging mind undergoes decay analogous to that of the aging body. Younger monkeys, chimps, and lower animals consistently outperform then older colleagues on memory tests. In humans, psychologists concluded, memory and other mental functions deteriorate over time because of inevitable organic changes m the brain as neurons die off. Mental decline after young adulthood appeared inevitable.

B Equipped with imaging techniques that capture the brain in action, Stanley Rapoport, Ph.D., at the National Institutes of Health, measured the flow of blood in the brains of old and young people as they went through the task of matching photos of faces. Since blood flow reflects neuronal activity, Rapoport could compare which networks of neurons were being used by different subjects. "Even when the reaction times of older and younger subjects were the same, the neural networks they used were significantly different. The older subjects were using different internal strategies to accomplish the same result in the same time," Rapoport says. Either the task required greater effort on the part of the older subjects or the work of neurons originally involved in tasks of that type had been taken over by other neurons, creating different networks.

C At the Georgia Institute of Technology, psychologist Timothy Salthouse, Ph.D., compared a group of very fast and accurate typists of college age with another group in their 60s. Since reaction time is faster in younger people and most people's fingers grow less nimble with age, younger typists might be expected to tap right along while the older ones fumble. But both typed 60 words a minute. The older typists it turned out, achieved their speed with cunning little strategies that made them far more efficient than their younger counterparts: They made fewer finger movements, saving a fraction of a second here and there. They also read ahead in the text. The neural networks involved in typing appear to have been reshaped to compensate for losses in motor skills or other age changes.

D "When a rat is kept in isolation without playmates or objects to interact with, the animal's brain shrinks, but if we put that rat with 11 other rats in a large cage and give them an assortment of wheels, ladders, and other toys, we can show—after four days— significant differences in its brain," says Diamond, professor of integrative biology. Proliferating dendrites first appear in the visual association areas. After a month in the enriched environment, the whole cerebral cortex has expanded, as has its blood supply. Even in the enriched environment,

rats get bored unless the toys are varied. "Animals are just like we are. They need stimulation," says Diamond.

One of the most profoundly important mental functions is memory - notorious for its failure with age. So important is memory that the Charles A. Dana Foundation recently spent $8.4 million to set up a consortium of leading medical centers to measure memory loss and aging through brain-imaging technology, neurochemical experiments, and cognitive and psychological tests. One thing, however, is already fairly clear—many aspects of memory are not a function of age at all but of education. Memory exists in more than one form, what we call knowledge-facts—is what psychologists such as Harry p. Bahrick, Ph.D., of Ohio Wesleyan University calls semantic memory. Events, conversations, and occurrences in time and space, on the other hand, make up episodic or event memory, which is triggered by cues from the context. If you were around in 1963 you don't need to be reminded of the circumstances surrounding the moment you heard that JFK had been assassinated. That event is etched into your episodic memory.

E When you forget a less vivid item, like buying a roll of paper towels at the supermarket, you may blame it on your aging memory. It's true that episodic memory begins to decline when most people are in their 50s, but it's never perfect at any age. "Every memory begins as an event," says Bahrick. "Through repetition, certain events leave behind a residue of knowledge, or semantic memory. On a specific day in the past, somebody taught you that two and two are four, but you've been over that information so often you don't remember where you learned it. What started as an episodic memory has become a permanent part of your knowledge base." You remember the content, not the context. Our language knowledge, our knowledge of the world and of people, is largely that permanent or semipermanent residue.

F Probing the longevity of knowledge, Bahrick tested 1,000 high school graduates to see how well they recalled their algebra. Some had completed the course as recently as a month before, others as long as 50 years earlier. He also determined how long each person had studied algebra, the grade received, and how much the skill was used over the course of adulthood. Surprisingly, a person's grasp of algebra at the time of testing did not depend on how long ago he'd taken the course—the determining factor was the duration of instruction. Those who had spent only a few months learning algebra forgot most of it within two or three years.

G In another study, Bahrick discovered that people who had taken several courses in Spanish, spread out over a couple of years, could recall, decades later, 60 percent or more of the vocabulary they learned. Those who took just one course retained only a trace after three years. "This long-term residue of knowledge remains stable over the decades, independent of the age of the person and the age of the memory. No serious deficit appears until people get to their 50s and 60s, probably due to the degenerative processes of aging rather than a cognitive loss."

H "You could say metamemory is a byproduct of going to school," says psychologist Robert Kail, Ph.D, of Purdue University, who studies children from birth to 20 years, the time of life when mental development is most rapid. "The question-and-answer process, especially exam-taking, helps children learn-and also teaches them how then memory works This may be one reason why, according to a broad range of studies in people over 60, the better educated a person is, the more likely they are to perform better in life and on psychological tests. A group of adult novice chess players were compared with a group of child experts at the game. In tests

of then ability to remember a random series of numbers, the adults, as expected, outscored the children. But when asked to remember the patterns of chess pieces arranged on a board, the children won. "Because they'd played a lot of chess, their knowledge of chess was better organized than that of the adults, and then existing knowledge of chess served as a framework for new memory," explains Kail.

I Specialized knowledge is a mental resource that only improves with time. Crystallized intelligence about one's occupation apparently does not decline at all until at least age 75, and if there is no disease or dementia, may remain even longer, special knowledge is often organized by a process called "chunking." If procedure A and procedure B are always done together, for example, the mind may merge them into a single command. When you apply yourself to a specific interest-say, cooking—you build increasingly elaborate knowledge structures that let you do more and do it better. This ability, which is tied to experience, is the essence of expertise. Vocabulary is one such specialized form of accrued knowledge. Research clearly shows that vocabulary improves with time. Retired professionals, especially teachers and journalists, consistently score higher on tests of vocabulary and general information than college students, who are supposed to be in their mental prime.

PART 2 — QUESTIONS

Questions 14-17

Choose the correct letter, A, B, C or D.

14 What does the experiment of typist show in the passage?

- **A** ○ Old people reading ability is superior
- **B** ○ Losses of age is irreversible
- **C** ○ Seasoned tactics made elders more efficient
- **D** ○ Old people performed poorly in driving test

15 Which is correct about rat experiment?

- **A** ○ Different toys have different effect for rats
- **B** ○ Rat's brain weight increased in both cages
- **C** ○ Isolated rat's brain grows new connections
- **D** ○ Boring and complicated surroundings affect brain development

16 What can be concluded in chess game of children group?

- **A** ○ They won game with adults.
- **B** ○ Then organization of chess knowledge is better
- **C** ○ Then image memory is better than adults
- **D** ○ They used different part of brain when playing chess

17 What is author's purpose of using "vocabulary study" at the end of passage?

- **A** ○ Certain people are sensitive to vocabularies while others aren't
- **B** ○ Teachers and professionals won by then experience
- **C** ○ Vocabulary memory as a crystallized intelligence is hard to decline
- **D** ○ Old people use their special zone of brain when study

Questions 18-23

Complete the following summary of the paragraphs of Reading Passage, using no more than two words from the Reading Passage for each answer.

It's long been known that as one significant mental function, **18** _____ deteriorates with age. Charles A. Dana foundation invested millions of dollars to test memory decline. They used advanced technology, neurochemical experiments and ran several cognitive and **19** _____ experiments. Bahrick called one form "**20** _____", which describes factual knowledge. Another one called "**21** _____" contains events in time and space format. He conducted two experiments toward to knowledge memory's longevity, he asked 1000 candidates some knowledge of **22** _____, some could even remember it decades ago. Second research of Spanish course found that multiple courses participants could remember more than half of **23** _____ they learned after decades, whereas single course taker only remembered as short as 3 years.

Questions 24-27

Use the information in the passage to match the people (listed A-F) with opinions or deeds below. Write the appropriate letters A-F in your answer.

A. Harry p. Bahrick

B. Arnold B. Scheibel

C. Marion Diamond

D. Timothy Salthouse

E. Stanley Rapport

F. Robert Kail

	A	B	C	D	E	F
24 Examined both young and old's blood circulation of brain while testing.	○	○	○	○	○	○
25 Aging is a significant link between physical and mental activity.	○	○	○	○	○	○

	A	B	C	D	E	F
26 Some semantic memory of a event would not fade away after repetition.	○	○	○	○	○	○
27 Rat's brain developed when put in a diverse environment.	○	○	○	○	○	○

PASSAGE 3

Read the text below and answer questions 28-40.

The secret of the Yawn

A When a scientist began to study yawning in the 1980s, it was difficult to convince some of his research students of the merits of "yawning science." Although it may appear quirky, his decision to study yawning was a logical extension to human beings of my research in developmental neuroscience, reported in such papers as "Wing-flapping during Development and Evolution." As a neurobehavioral problem, there is not much difference between the wing-flapping of birds and the face- and body-flapping of human yawners.

B Yawning is an ancient, primitive act. Humans do it even before they are born, opening wide in the womb. Some snakes unhinge then jaws to do it. One species of penguins yawns as part of mating. Only now are researchers beginning to understand why we yawn, when we yawn and why we yawn back. A professor of cognitive neuroscience at Drexel University in Philadelphia, Steven Platek, studies the act of contagious yawning, something done only by people and other primates.

C In his first experiment, he used a psychological test to rank people on then empathic feelings. He found that participants who did not score high on compassion did not yawn back. "We literally had people saying, 'Why am I looking at people yawning?'" Professor Platek said. "It just had no effect."

D For his second experiment, he put 10 students in an magnetic resonance imaging machine as they watched video tapes of people yawning. When the students watched the videos, the part of the brain which reacted was the part scientists believe controls empathy - the posterior cingulate, in the brain's middle rear. "I don't know if it's necessarily that nice people yawn more, but I think it's a good indicator of a state of mind," said Professor Platek. "It's also a good indicator if you're empathizing with me and paying attention."

E His third experiment is studying yawning in those with brain disorders, such as autism and schizophrenia, in which victims have difficulty connecting emotionally with others. A psychology professor at the University of Maryland, Robert Provine, is one of the few other researchers into yawning. He found the basic yawn lasts about six seconds and they come in bouts with an interval of about 68 seconds. Men and women yawn or half-yawn equally often, but men are significantly less likely to cover then mouths which may indicate complex distinction in genders. "A watched yawner never yawns," Professor Provine said. However, the physical root of yawning remains a mystery. Some researchers say it's coordinated within the lypothal of the brain, the area that also controls breathing.

F Yawning and stretching also share properties and may be performed together as parts of a global motor complex. But they do not always co-occur people usually yawn when we stretch, but we don't always stretch when we yawn, especially before bedtime. Studies by J. I. P, G. H. A. Visser and H. F. Prechtl in the early 1980s, charting movement in the developing fetus using

ultrasound, observed not just yawning but a link between yawning and stretching as early as the end of the first prenatal trimester.

G The most extraordinary demonstration of the yawn-stretch linkage occurs in many people paralyzed on one side of their body because of brain damage caused by a stroke. The prominent British neurologist Sir Francis Walshe noted in 1923 that when these hemiplegics yawn, they are startled and mystified to observe that then otherwise paralyzed arm rises and flexes automatically in what neurologists term an "associated response." Yawning apparently activates undamaged, unconsciously controlled connections between the brain and the cord motor system innervating the paralyzed limb. It is not known whether the associated response is a positive prognosis for recovery, nor whether yawning is therapeutic for reinnervation or prevention of muscular atrophy.

H Clinical neurology offers other surprises. Some patients with "locked-in" syndrome, who are almost totally deprived of the ability to move voluntarily, can yawn normally. The neural circuits for spontaneous yawning must exist in the brain stem near other respiratory and vasomotor centers, because yawning is performed by anencephalic who possess only the medulla oblongata. The multiplicity of stimuli of contagious yawning, by contrast, implicates many higher brain regions.

PART 3 — QUESTIONS

Questions 28-32

Complete the Summary paragraph described below. Write the correct answer with NO MORE THAN THREE WORDS AND/OR A NUMBER.

A psychology professor drew a conclusion after observation that it takes about she seconds to complete an average yawning which needs **28** _____ before a following yawning comes. It is almost at the same frequency that male and female yawn or half, yet behavior accompanied with yawning showing a **29** _____ in genders. Some parts within the brain may affect the movement which also have something to do with **30** _____. Another finding also finds there is a link between yawn and **31** _____ before a baby was born, which two can be automatically co-operating even among people whose **32** _____ is damaged.

Questions 33-37

Read paragraph A-H. Which paragraph contains the following information?

Write the correct letter A-H for question 33-37

NB: You may use any letter more than once.

	A	B	C	D	E	F	G	H
33 The rate for yawning shows some regular pattern.	○	○	○	○	○	○	○	○
34 Yawning is an inherent ability that appears in both animals and humans.	○	○	○	○	○	○	○	○
35 Stretching and yawning are not always going together.	○	○	○	○	○	○	○	○
36 Yawning may suggest people are having positive notice or response in communicating.	○	○	○	○	○	○	○	○
37 Some superior areas in brain may deal with the infectious feature of yawning	○	○	○	○	○	○	○	○

Questions 38-40

Do the following statements agree with the information given in Reading Passage 3?

Write:

TRUE if the statement is true

FALSE if the statement is false

NOT GIVEN if the information is not given in the passage

38 Several students in Platek's experiment did not comprehend why their tutor ask them to yawn back.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

39 Some results from certain experiment indicate the link between yawning and compassion.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

40 Yawning can show an affirmative impact on the recovery from brain damage brought by a stroke.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

Answer Key

#	Answer	Explanation
1	A	Ecotourism is also seen as an environmental education opportunity to heighten both visitors' and residents' awareness of environmental and conservation issues, and even to inspire conservation action
2	D	The market segment for Indonesian ecotourism consists of: (i) "The silent generation", 55-64 year-old people who are wealthy enough, generally well-educated and have no dependent children, and can travel for four weeks; (ii) "The baby boom generation", junior successful executives aged 35-54 years, who are likely to be travelling with their family and children (spending 2-3 weeks on travel) — travelling for them is a stress reliever; and (iii) the "X generation", aged 18-29 years, who love to do ecotours as backpackers — they are generally students who can travel for 3-12 months with monthly expenditure of US$300-500. It is suggested that promotion of Indonesian ecotourism products should aim to reach these various cohorts of tourists. The country welcomes diverse levels of travelers
3	C	Histoplasma capsulatum (see chapter "Histoplasmosis and HIV"), a dimorphic fungus, is the most common endemic mycosis in the United States, and is associated with exposure to bat or bird droppings. Most recently, outbreaks have been reported in healthy travelers who returned from Central and South America after engaging in recreational activities associated with spelunking, adventure tourism, and ecotourism
4	B	In East Africa, significantly reducing such illegal hunting and allowing wildlife populations to recover would allow the generation of significant economic benefits through trophy hunting and potentially ecotourism
5	A	Raul Castro, brother of the Cuban president, started this initiative to rescue the Cuban tradition of herbal medicine and provide natural medicines for its healthcare system
6	C	The cheese factory here exports great quantity of cheese to various countries across the globe. It is located in the center of forest
7	D	It is the wonderful place for Hamanasi honeymoon, bottle of champagne upon arrival, three meals daily, a private service on one night of your stay and a choice of adventures depending on the length of your stay

#	Answer	Explanation
8	**A**	“All of our tours on StKitts include transportation by specially modified Land Rovers, a picnic of island pastries and focal fruit, fresh tropical juices, CSR, a qualified island guide and a full liability insurance coverage for participants
9	**B**	In addition to the environmental impacts of these efforts, the area works on developing community employment opportunities for locals, in conjunction with ecotourism
10	**adventure**	Nowhere is the keen eye and intimate knowledge of ecotourism is more amidst this fantastic biodiversity, as we explore remote realms rich in wildlife rather than a nature adventure
11	**sustainable**	A sustainable tour is significant for ecotourism, one in which we can grow hand in hand with nature and our community, respecting everything that makes US privileged
12	**tropical forests**	The primary threats to South America’s tropical forests are deforestation caused by agricultural expansion, cattle ranching, logging, oil extraction and spills, mining, illegal coca farming, and colonization initiatives
13	**illegal hunting**	In East Africa, significantly reducing such illegal hunting and allowing wildlife populations to recover would allow the generation of significant economic benefits through trophy hunting and potentially ecotourism
14	**C**	The older typists it turned out, achieved their speed with cunning little strategies that made them far more efficient than their younger counterparts: They made fewer finger movements, saving a fraction of a second here and there
15	**D**	“When a rat is kept in isolation without playmates or objects to interact with, the animal’s brain shrinks, but if we put that rat with 11 other rats in a large cage and give them an assortment of wheels, ladders, and other toys, we can show—after four days—significant differences in its brain,” says Diamond, professor of integrative biology
16	**B**	“Because they’d played a lot of chess, their knowledge of chess was better organized than that of the adults, and then existing knowledge of chess served as a framework for new memory,” explains Kail
17	**C**	Crystallized intelligence about one’s occupation apparently does not decline at all until at least age 75, and if there is no disease or dementia, may remain even longer, special knowledge is often organized by a process called “chunking.” If procedure A and procedure B are always done together, for example, the mind may merge them into a single command. When you apply yourself to a

#	Answer	Explanation
		specific interest-say, cooking—you build increasingly elaborate knowledge structures that let you do more and do it better. This ability, which is tied to experience, is the essence of expertise. Vocabulary is one such specialized form of accrued knowledge. Research clearly shows that vocabulary improves with time
18	**memory**	One of the most profoundly important mental functions is memory-notorious for its failure with age
19	**psychological**	So important is memory that the Charles A. Dana Foundation recently spent $8.4 million to set up a consortium of leading medical centers to measure memory loss and aging through brain-imaging technology, neurochemical experiments, and cognitive and psychological tests
20	**semantic memory**	Memory exists in more than one form, what we call knowledge-facts—is what psychologists such as Harry p. Bahrick, Ph.D., of Ohio Wesleyan University calls semantic memory
21	**episodic memory**	Events, conversations, and occurrences in time and space, on the other hand, make up episodic or event memory, which is triggered by cues from the context
22	**algebra**	Probing the longevity of knowledge, Bahrick tested 1,000 high school graduates to see how well they recalled their algebra
23	**vocabulary**	In another study, Bahrick discovered that people who had taken several courses in Spanish, spread out over a couple of years, could recall, decades later, 60 percent or more of the vocabulary they learned
24	**E**	Equipped with imaging techniques that capture the brain in action, Stanley Rapoport, Ph.D., at the National Institutes of Health, measured the flow of blood in the brains of old and young people as they went through the task of matching photos of faces
25	**B**	“In a sense, aging is keyed to the level of vigor of the body and the continuous interaction between levels of body activity and levels of mental activity,” reports Arnold B. Scheibel, M.D
26	**A**	“Every memory begins as an event,” says Bahrick. “Through repetition, certain events leave behind a residue of knowledge, or semantic memory. On a specific day in the past, somebody taught you that two and two are four, but you’ve been over that information so often you don’t remember where you learned it. What started as an episodic memory has become a permanent part of your knowledge base.”
27	**C**	“When a rat is kept in isolation without playmates or objects to interact with, the animal’s brain shrinks, but if we put that rat with 11 other rats in a large cage and give them an assortment of

#	Answer	Explanation
		wheels, ladders, and other toys, we can show—after four days—significant differences in its brain," says Diamond, professor of integrative biology
28	**68 seconds/sixty-eight seconds**	He found the basic yawn lasts about six seconds and they come in bouts with an interval of about 68 seconds
29	**(complex) distinction**	Men and women yawn or half-yawn equally often, but men are significantly less likely to cover then mouths which may indicate complex distinction in genders
30	**breathing**	Some researchers say it's coordinated within the lypothal of the brain, the area that also controls breathing
31	**stretch/stretching**	Studies by J. I. P, G. H. A. Visser and H. F. Prechtl in the early 1980s, charting movement in the developing fetus using ultrasound, observed not just yawning but a link between yawning and stretching as early as the end of the first prenatal trimester
32	**brain**	The most extraordinary demonstration of the yawn-stretch linkage occurs in many people paralyzed on one side of their body because of brain damage caused by a stroke
33	**E**	He found the basic yawn lasts about six seconds and they come in bouts with an interval of about 68 seconds
34	**B**	Yawning is an ancient, primitive act. Humans do it even before they are born, opening wide in the womb. Some snakes unhinge then jaws to do it. One species of penguins yawns as part of mating
35	**F**	But they do not always co-occur people usually yawn when we stretch, but we don't always stretch when we yawn, especially before bedtime
36	**D**	"It's also a good indicator if you're empathizing with me and paying attention."
37	**H**	The multiplicity of stimuli of contagious yawning, by contrast, implicates many higher brain regions
38	**NOT GIVEN**	"We literally had people saying, 'Why am I looking at people yawning?'" Professor Platek said
39	**TRUE**	In his first experiment, he used a psychological test to rank people on then empathic feelings. He found that participants who did not score high on compassion did not yawn back
40	**FALSE**	It is not known whether the associated response is a positive prognosis for recovery, nor whether yawning is therapeutic for reinnervation or prevention of muscular atrophy

Test 67

PASSAGE 1

Consecutive and Simultaneous Translation

A. When people are faced with a foreign-language barrier, the usual way round it is to find someone to interpret or translate for them. The term 'translation', is the neutral term used for all tasks where the meaning or expressions in one language (the source language) is turned into the meaning of another (the 'target' language), whether the medium is spoken, written, or signed. In specific professional contexts, however, a distinction is drawn between people who work with the spoken or signed language (interpreters), and those who work with the written language (translators). There are certain tasks that blur this distinction, as when source speeches turned into target writing. But usually the two roles are seen as quite distinct, and it is unusual to find one person who is equally happy with both occupations. Some writers on translation, indeed, consider the interpreting task to be more suitable for extrovert personalities, and the translating task for introverts

B. Interpreting is today widely known from its use in international political life. When senior ministers from different language backgrounds meet, the television record invariably shows a pair of interpreters hovering in the background. At major conferences, such as the United Nations General Assembly, the presence of headphones is a clear indication that a major linguistic exercise is taking place. In everyday circumstances, too, interpreters are frequently needed, especially in cosmopolitan societies formed by new reiterations of immigrants and Gastarbeiter. Often, the business of law courts, hospitals, local health clinics, classrooms, or industrial tribunals cannot be carried on without the presence of an interpreter. Given the importance and frequency of this task, therefore, it is remarkable that so little study has been made of what actually happens when interpreting takes place, and of how successful an exercise it is.

C. There are two main kinds of oral translation consecutive and. In consecutive translation the translating starts after the original speech or some part of it has been completed. Here the interpreter's strategy and the final results depend, to a great extent on the length of the segment to be translated. If the segment is just a sentence or two the interpreter closely follows the original speech. As often as not, however, the interpreter is expected to translate a long speech which has lasted for scores of minutes or even longer. In this case he has to remember a great number of messages; and keep them in mind until he begins his translation. To make this possible the interpreter has to take notes of the original messages, various systems of notation having been suggested for the purpose. The study of, and practice in, such notation is the integral part of the interpreter's training as are special exercises to develop his memory.

D. Doubtless the recency of developments in the field partly explains this neglect. One procedure, consecutive interpreting, is very old — and presumably dates from the Tower of Babel! Here, the interpreter translates after the speaker has finished speaking. This approach is widely practiced in informal situations, as well as in committees and small conferences. In larger

and more formal settings, however, it has been generally replaced by simultaneous interpreting — a recent development that arose from the availability of modem audiological equipment and the advent of increased international interaction following the Second World War.

E. Of the two procedures, it is the second that has attracted most interest, because of the complexity of the task and the remarkable skills required. In no other context of human communication is anyone routinely required to listen and speak at the same time, preserving an exact semantic correspondence between the two modes. Moreover, there is invariably a delay of a few words between the stimulus and the response, because of the time it takes to assimilate what is being said in the source language and to translate it into an acceptable form in the target language. This ‘ear-voice span' is usually about 2 or 3 seconds, but it may be as much as 10 seconds or so, if the text is complex. The brain has to remember what has just been said, attend to what is currently being said, and anticipate the construction of what is about to be said. As you start a sentence you are taking a leap in the dark, you are mortgaging your grammatical future; the original sentence may suddenly be turned in such a way that your translation of its end cannot easily be reconciled with your translation of its start. Great is called for

F. How it is all done is not at all clear. That it is done at all is a source of some wonder, given the often lengthy periods of interpreting required, the confined environment of an interpreting booth, the presence of background noise, and the awareness that major decisions may depend upon the accuracy of the work. Other consideration such as cultural background also makes it aim to pay full attention to the backgrounds of the authors and the recipients, and to take into account differences between source and target language.

G. Research projects have now begun to look at these factors - to determine, for example, how far successful interpreting is affected by poor listening conditions, or the speed at which the source language is spoken. It seems that an input speed of between 100 and 120 words per minute is a comfortable rate for interpreting, with an upper limit of around 200 w.p.m. But even small increases in speed can dramatically affect the accuracy of output. In one controlled study, when speeds were gradually increased in a series of stages from 95 to 164 w.p.m., the ear-voice span also increased with each stage, and the amount correctly interpreted showed a clear decline. Also, as the translating load increases, not only are there more errors of commission (mistranslations, cases of vagueness replacing precision), there are also more errors of omission, as words and segments of meaning are filtered out. These are important findings, given the need for accuracy in international communication. What is needed is a more detailed identification of the problem areas, and of the strategies speakers, listeners, and interpreters use to solve them. There is urgent need to expand what has so far been one of the most neglected fields of communication research.

PART 1 — QUESTIONS

Questions 1-5

Choose the correct letter, A, B, c or D.

1 In which way does author state translation at the beginning of the passage?

- **A** ○ abstract and concrete meaning
- **B** ○ general and specific meaning
- **C** ○ several examples of translation's meaning
- **D** ○ different meaning in various profession

2 Application of headphone in a UN conference tells US that:

- **A** ○ TV show is being conducted
- **B** ○ radio program is on the air
- **C** ○ two sides are debating
- **D** ○ language practice is in the process

3 In the passage, what is author's purpose of citing Tower of Babel

- **A** ○ interpreting secret is stored in the Tower
- **B** ○ interpreter emerged exactly from time of Tower of Babel
- **C** ○ consecutive interpreting has a long history
- **D** ○ consecutive interpreting should be abandoned

4 About simultaneous interpreting, which of the following is TRUE!

- **A** ○ it is an old and disposable interpretation method
- **B** ○ it doesn't need outstanding professional ability
- **C** ○ it relies on professional equipment
- **D** ○ it takes less than two seconds ear-voice span

5 In consecutive translation, if the section is longer than expected, what would an interpreter most probably do?

- **A** ○ he or she has to remember some parts ahead
- **B** ○ he or she has to break them down first
- **C** ○ he or she has to respond as quickly as possible
- **D** ○ he or she has to remember all parts ahead

Questions 6-9

Complete the following summary of the paragraphs of Reading Passage, using no more than two words and/or two numbers from the Reading Passage for each answer.

The cycle from ear to voice normally lasts about **6** _____, which depends on sophistication of paper, for example, it could go up to **7** _____ sometimes. When expert took close research on affecting elements, they found appropriate speaking speed is somehow among **8** _____ w.p.m. In a specific experiment, the accuracy of interpretation dropped while the ear-voice span speed increased between 95 to 164 w.p.m. However, the maximum of speed was about **9** _____ w.p.m.

Questions 10-13

Choose FOUR correct letters

10 **11** **12** **13** Which FOUR of the followings are the factors that affect interpreting?

- **A** ☐ mastery in structure and grammar of sentence in the script
- **B** ☐ speed of incoming sound source
- **C** ☐ noisy of background
- **D** ☐ emotional states of interpreter
- **E** ☐ culture of different backgrounds
- **F** ☐ understanding the significance of being precise
- **G** ☐ upper volume limit of speakers

PASSAGE 2

Water Filter

A. An ingenious invention is set to bring clean water to the third world, and while the science may be cutting edge, the materials are extremely down to earth. A handful of clay yesterday's coffee grounds and some cow manure are the ingredients that could bring clean, safe drinking water to much of the third world.

B. The simple new technology, developed by ANU materials scientist Mr. Tony Flynn, allows water filters to be made from commonly available materials and fired on the ground using cow manure as the source of heat, without the need for a kiln. The filters have been tested and shown to remove common pathogens (disease-producing organisms) including E-coli. Unlike other water filtering devices, the filters are simple and inexpensive to make. “They are very simple to explain and demonstrate and can be made by anyone, anywhere,” says Mr. Flynn. “They don’t require any western technology. All you need is terracotta clay, a compliant cow and a match.”

C. The production of the filters is extremely simple. Take a handful of dry, crushed clay, mix it with a handful of organic material, such as used tea leaves, coffee grounds or rice hulls, add enough water to make a stiff biscuit-like mixture and form a cylindrical pot that has one end closed, then dry it in the sun. According to Mr. Flynn, used coffee grounds have given the best results to date. Next, surround the pots with straw; put them in a mound of cow manure, light the straw and then top up the burning manure as required. In less than 60 minutes the filters are finished. The walls of the finished pot should be about as thick as an adult's index. The properties of cow manure are vital as the fuel can reach a temperature of 700 degrees in half an hour and will be up to 950 degrees after another 20 to 30 minutes. The manure makes a good fuel because it is very high in organic material that bums readily and quickly; the manure has to be dry and is best used exactly as found in the field, there is no need to break it up or process it any further.

D. "A potter's din is an expensive item and can could take up to four or five hours to get upto 800 degrees. It needs expensive or scarce fuel, such as gas or wood to heat it and experience to run it. With no technology, no insulation and nothing other than a pile of cow manure and a match, none of these restrictions apply," Mr. Flynn says.

E. It is also helpful that, like terracotta clay and organic material, cow dung is freely available across the developing world. “A cow is a natural fuel factory. My understanding is that cow dung as a fuel would be pretty much the same wherever you would find it." Just as using manure as a fuel for domestic uses is not a new idea, the porosity of clay is something that potters have known about for years, and something that as a former ceramics lecturer in the ANU School of Art, Mr. Flynn is well aware of. The difference is that rather than viewing the porous nature of the material as a problem — after all not many people want a pot that won't hold water — his filters capitalize on this property.

F. Other commercial ceramic filters do exist, but, even if available, with prices starting at US$5 each, they are often outside the budgets of most people in the developing world. The filtration process is simple, but effective. The basic principle is that there are passages through the filter that are wide enough for water droplets to pass through, but too narrow for pathogens. Tests with the deadly E-coli bacterium have seen the filters remove 96.4 to 99.8 per cent of the pathogen — well within safe levels. Using only one filter it takes two hours to filter a litre of water. The use of organic material, which burns away after firing, helps produce the structure in which pathogens will become trapped. It overcomes the potential problems of finer clays that may not let water through and also means that cracks are soon halted. And like clay and cow dung, it is universally available.

G. The invention was born out of a World Vision project involving the Manatuto community in East Timor The charity wanted to help set up a small industry manufacturing water filters, but initial research found the local clay to be too fine — a problem solved by the addition of organic material. While the AF problems of producing a working ceramic filter in East Timor were overcome, the solution was kiln-based and particular to that community's materials and couldn't be applied elsewhere. Manure firing, with no requirement for a kiln, has made this zero technology approach available anywhere it is needed. With all the components being widely available, Mr. Flynn says there is no reason the technology couldn't be applied throughout the developing world, and with no plans to patent his idea, there will be no legal obstacles to it being adopted in any community that needs it. “Everyone has a right to clean water, these filters have the potential to enable anyone in the world to drink water safely,” says Mr. Flynn.

PART 2 — QUESTIONS

Questions 14-19

Complete the flow chart, using NO MORE THAN TWO WORDS AND/OR A NUMBER from the Reading Passage for each answer.

Guide to Making Water Filters

Step one: combination of **14** _____ and organic material, with sufficient **15** _____ to create a thick mixture -> sun dried

Step two: pack **16** _____ around the cylinders -> place them in **17** _____ which is as burning fuel for firing (maximum temperature: **18** _____) -> filter being baked in under **19** _____

Questions 20-23

Do the following statements agree with the information given in the Reading Passage 2. Write

TRUE if the statement is true

FALSE if the statement is false

NOT GIVEN if the information is not given in the passage

20 It takes half an hour for the manure to reach 950 degrees.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

21 Clay was initially found to be unsuitable for pot making.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

22 Coffee grounds are twice as effective as other materials.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

23 E-coli is the most difficult bacteria to combat.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

Questions 24-26

Choose the correct letter, A, B, c or D.

24 When making the pot, the thickness of the wall

A ○ is large enough to let the pathogens to pass.

B ○ varied according to the temperature of the fuel,

C ○ should be the same as an adult's forefinger.

D ○ is not mentioned by Mr. Flynn.

25 what is true about the charity, it

A ○ failed in searching the appropriate materials.

B ○ successfully manufacture a kiln based ceramic filter to be sold worldwide

C ○ found that the local clay are good enough.

D ○ intended to help build a local filter production factory.

26 Mr. Flynn's design is purposely not being patented

A ○ because he hopes it can be freely used around the world.

B ○ because he doesn't think the technology is perfect enough,

C ○ because there are some legal obstacles.

D ○ because the design has already been applied thoroughly.

PASSAGE 3

Music: Language We All Speak

Section A: Music is one of the human specie's relatively few universal abilities. Without formal training, any individual, from Stone Age tribesman to suburban teenager has the ability to recognize music and, in some fashion, to make it. Why this should be so is a mystery. After all, music isn't necessary for getting through the day, and if it aids in reproduction, it does so only in highly indirect ways. Language, by contrast, is also everywhere- but for reasons that are more obvious. With language, you and the members of your tribe can organize a migration across Africa, build reed boats and cross the seas, and communicate at night even when you can't see each other. Modem culture, in all its technological extravagance, springs directly from the human talent for manipulating symbols and syntax. Scientists have always been intrigued by the connection between music and language. Yet over the years, words and melody have acquired a vastly different status in the lab and the seminar room. While language has long been considered essential to unlocking the mechanisms of human intelligence, music is generally treated as an evolutionary frippery - mere"auditory cheesecake," as the Harvard cognitive scientist Steven Pinker puts it.

Section B: But thanks to a decade-long wave of neuroscience research, that tune is changing. A flurry of recent publications suggests that language and music may equally be able to tell US who we are and where we're from - not just emotionally, but biologically. In July, the journal Nature Neuroscience devoted a special issue to the topic. And in an article in the August 6 issue of the Journal of Neuroscience, David Schwartz, Catherine Howe, and Dale Purves of Duke University argued that the sounds of music and the sounds of language are intricately connected. To grasp the originality of this idea, it's necessary to realize two things about how music has traditionally been understood. First, musicologists have long emphasized that while each culture stamps a special identity onto its music; music itself has some universal qualities. For example, in virtually all cultures sound is divided into some or all of the 12 intervals that make up the chromatic scale - that is, the scale represented by the keys on a piano. For centuries, observers have attributed this preference for certain combinations of tones to the mathematical properties of sound itself. Some 2,500 years ago, Pythagoras was the first to note a direct relationship between the harmoniousness of a tone combination and the physical dimensions of the object that produced it. For example, a plucked string will always play an octave lower than a similar string half its size, and a fifth lower than a similar string two-thirds its length. This link between simple ratios and harmony has influenced music theory ever since.

Section C: This music-is-moth idea is often accompanied by the notion that music formally speaking at least, exists apart from the world in which it was created. Writing recently in The New York Review of Books, pianist and critic Charles Rosen discussed the long-standing notion that while painting and sculpture reproduce at least some aspects of the natural world, and writing describes thoughts and feelings we are all familiar with, music is entirely abstracted from the world in which we live. Neither idea is right, according to David Schwartz and his colleagues. Human musical preferences are fundamentally shaped not by elegant algorithms or ratios but by the messy sounds of real life, and of speech in particular -which in turn is shaped

by our evolutionary heritage." The explanation of music, like the explanation of any product of the mind, must be rooted in biology, not in numbers per se," says Schwartz. Schwartz, Howe, and Purves analyzed a vast selection of speech sounds from a variety of languages to reveal the underlying patterns common to all utterances. In order to focus only on the raw sound, they discarded all theories about speech and meaning and sliced sentences into random bites. Using a database of over 100,000 brief segments of speech, they noted which frequency had the greatest emphasis in each sound. The resulting set of frequencies, they discovered, corresponded closely to the chromatic scale. In short, the building blocks of music are to be found in speech. Far from being abstract, music presents a strange analog to the patterns created by the sounds of speech. "Music, like the visual arts, is rooted in our experience of the natural world," says Schwartz. " It emulates our sound environment in the way that visual arts emulate the visual environment. " In music we hear the echo of our basic sound-making instrument- the vocal tract. The explanation for human music is simple; still than Pythagoras's mathematical equations. We like the sounds that are familiar to us-specifically, we like sounds that remind us of us. This brings up some chicken-or-egg evolutionary questions. It may be that music imitates speech directly, the researchers say, in which case it would seem that language evolved first. It's also conceivable that music came first and language is in effect an Imitation of song - that in everyday speech we hit the musical notes we especially like. Alternately, it may be that music imitates the general products of the human sound-making system, which just happens to be mostly speech. "We can't know this," says Schwartz. "What we do know is that they both come from the same system, and it is this that shapes our preferences."

Section D: Schwartz's study also casts light on the long-running question of whether animals understand or appreciate music. Despite the apparent abundance of "music" in the natural world- birdsong, whalesong, wolf howls, synchronized chimpanzee hooting previous studies have found that many laboratory animals don't show a great affinity for the human variety of music making. Marc Hauser and Josh McDermott of Harvard argued in the July issue of Nature Neuroscience that animals don't create or perceive music the way we do. The act that laboratory monkeys can show recognition of human tunes is evidence, they say, of shared general features of the auditory system, not any specific chimpanzee musical ability. As for birds, those most musical beasts, they generally recognize their own tunes - a narrow repertoire - but don't generate novel melodies like we do. There are no avian Mozarts. But what's been played to the animals, Schwartz notes, is human music. If animals evolve preferences for sound as we do - based upon the soundscape in which they live -then their "music" would be fundamentally different from ours. In the same way our scales derive from human utterances, a cat's idea of a good tune would derive from yowls and meows. To demonstrate that animals don't appreciate sounds the way we do, we'd need evidence that they don't respond to "music" constructed from their own sound environment.

Section E: No matter how the connection between language and music is parsed, what is apparent is that our sense of music, even our love for it, is as deeply rooted in our biology and in our brains as language is. This is most obvious with babies, says Sandra Trehub at the University of Toronto, who also published a paper in the Nature Neuroscience special issue. For babies, music and speech are on a continuum. Mothers use musical speech to "regulate infants' emotional states." Trehub says. Regardless of what language they speak, the voice all mothers use with babies is the same: "something between speech and song." This kind of

communication "puts the baby in a trance-like state, which may proceed to sleep or extended periods of rapture." So if the babies of the world could understand the latest research on language and music, they probably wouldn't be very surprised. The upshot, says Trehub, is that music may be even more of a necessity than we realize.

PART 3 — QUESTIONS

Questions 27-31

Reading Passage 3 has five sections A-E.

Choose the correct heading for each section from the of headings below.

i. Animal sometimes make music.

ii. Recent research on music

iii. Culture embedded in music

iv. Historical theories review

v. Communication in music with animals

vi. Contrast between music and language

vii. Questions on a biological link with human and music

viii. Music is good for babies.

	i	ii	iii	iv	v	vi	vii	viii
27 Section A	○	○	○	○	○	○	○	○
28 Section B	○	○	○	○	○	○	○	○
29 Section C	○	○	○	○	○	○	○	○
30 Section D	○	○	○	○	○	○	○	○
31 Section E	○	○	○	○	○	○	○	○

Questions 32-38

Look at the following people and list of statements below.

Match each person with the correct statement.

A. Music exists outside of the world in which it is created.

B. Music has a common feature though cultural influences affect

c. Humans need music.

D. Music priority connects to the disordered sound around.

E. Discovery of mathematical musical foundation.

F. Music is not treated equally well compared with language

G. Humans and monkeys have similar traits in perceiving sound.

	A	B	c	D	E	F	G
32 Steven Pinker	○	○	○	○	○	○	○
33 Musicologists	○	○	○	○	○	○	○
34 Greek philosopher Pythagoras	○	○	○	○	○	○	○
35 Schwartz, Howe, and Purves	○	○	○	○	○	○	○
36 Marc Hauser and Josh McDermott	○	○	○	○	○	○	○
37 Charles Rosen	○	○	○	○	○	○	○
38 Sandra Trehub	○	○	○	○	○	○	○

Questions 39-40

Choose the correct letter A, B, c or D

39 Why was the study of animal's music uncertain?

- **A** ○ A Animals don't have the same auditory system as humans.
- **B** ○ B Experiments on animal's music are limited,
- **C** ○ C tunes are impossible for animal to make up.
- **D** ○ D Animals don't have spontaneous ability for the tests.

40 What is the main subject of this passage?

- **A** ○ A Language and psychology.
- **B** ○ B Music formation,

C ○ C Role of music in human society.

D ○ D Music experiments for animals.

Answer Key

#	Answer	Explanation
1	**B**	The term ‘translation’, is the neutral term used for all tasks where the meaning or expressions in one language (the source language) is turned into the meaning of another (the ‘target’ language), whether the medium is spoken, written, or signed. In specific professional contexts, however, a distinction is drawn between people who work with the spoken or signed language (interpreters), and those who work with the written language (translators)
2	**D**	At major conferences, such as the United Nations General Assembly, the presence of headphones is a clear indication that a major linguistic exercise is taking place
3	**C**	One procedure, consecutive interpreting, is very old — and presumably dates from the Tower of Babel
4	**C**	In larger and more formal settings, however, it has been generally replaced by simultaneous interpreting — a recent development that arose from the availability of modem audiological equipment and the advent of increased international interaction following the Second World War
5	**A**	As often as not, however, the interpreter is expected to translate a long speech which has lasted for scores of minutes or even longer. In this case he has to remember a great number of messages; and keep them in mind until he begins his translation
6	**2 or 3 seconds/2-3 seconds**	This ‘ear-voice span’ is usually about 2 or 3 seconds, but it may be as much as 10 seconds or so, if the text is complex
7	**10 seconds**	This ‘ear-voice span’ is usually about 2 or 3 seconds, but it may be as much as 10 seconds or so, if the text is complex
8	**100 and 120/100-120**	It seems that an input speed of between 100 and 120 words per minute is a comfortable rate for interpreting, with an upper limit of around 200 w.p.m
9	**200**	It seems that an input speed of between 100 and 120 words per minute is a comfortable rate for interpreting, with an upper limit of around 200 w.p.m
10	**B / C / E / F**	the presence of background noise, and the awareness that major decisions may depend upon the accuracy of the work. Other consideration such as cultural background also makes it aim to pay full attention to the backgrounds of the authors and the

#	Answer	Explanation
		recipients, and to take into account differences between source and target language Research projects have now begun to look at these factors – to determine, for example, how far successful interpreting is affected by poor listening conditions, or the speed at which the source language is spoken
11	**B / C / E / F**	the presence of background noise, and the awareness that major decisions may depend upon the accuracy of the work. Other consideration such as cultural background also makes it aim to pay full attention to the backgrounds of the authors and the recipients, and to take into account differences between source and target language Research projects have now begun to look at these factors – to determine, for example, how far successful interpreting is affected by poor listening conditions, or the speed at which the source language is spoken
12	**B / C / E / F**	the presence of background noise, and the awareness that major decisions may depend upon the accuracy of the work. Other consideration such as cultural background also makes it aim to pay full attention to the backgrounds of the authors and the recipients, and to take into account differences between source and target language Research projects have now begun to look at these factors – to determine, for example, how far successful interpreting is affected by poor listening conditions, or the speed at which the source language is spoken
13	**B / C / E / F**	the presence of background noise, and the awareness that major decisions may depend upon the accuracy of the work. Other consideration such as cultural background also makes it aim to pay full attention to the backgrounds of the authors and the recipients, and to take into account differences between source and target language Research projects have now begun to look at these factors – to determine, for example, how far successful interpreting is affected by poor listening conditions, or the speed at which the source language is spoken
14	**(dry) clay / (crushed) clay**	Take a handful of dry, crushed clay, mix it with a handful of organic material, such as used tea leaves, coffee grounds or rice hulls, add enough water to make a stiff biscuit-like mixture
15	**water**	Take a handful of dry, crushed clay, mix it with a handful of organic material, such as used tea leaves, coffee grounds or rice hulls, add enough water to make a stiff biscuit-like mixture and form a cylindrical pot that has one end closed, then dry it in the sun
16	**straw**	Next, surround the pots with straw; put them in a mound of cow manure, light the straw and then top up the burning manure as required

#	Answer	Explanation
17	**cow manure**	Next, surround the pots with straw; put them in a mound of cow manure, light the straw and then top up the burning manure as required
18	**950 degrees**	The properties of cow manure are vital as the fuel can reach a temperature of 700 degrees in half an hour and will be up to 950 degrees after another 20 to 30 minutes
19	**60 minutes**	In less than 60 minutes the filters are finished
20	**FALSE**	The properties of cow manure are vital as the fuel can reach a temperature of 700 degrees in half an hour and will be up to 950 degrees after another 20 to 30 minutes
21	**TRUE**	The charity wanted to help set up a small industry manufacturing water filters, but initial research found the local clay to be too fine — a problem solved by the addition of organic material
22	**NOT GIVEN**	According to Mr. Flynn, used coffee grounds have given the best results to date
23	**NOT GIVEN**	Tests with the deadly E-coli bacterium have seen the filters remove 96.4 to 99.8 per cent of the pathogen — well within safe levels
24	**C**	The walls of the finished pot should be about as thick as an adult's index
25	**D**	The charity wanted to help set up a small industry manufacturing water filters
26	**A**	With all the components being widely available, Mr. Flynn says there is no reason the technology couldn't be applied throughout the developing world, and with no plans to patent his idea, there will be no legal obstacles to it being adopted in any community that needs it
27	**vi**	While language has long been considered essential to unlocking the mechanisms of human intelligence, music is generally treated as an evolutionary frippery – mere"auditory cheesecake," as the Harvard cognitive scientist Steven Pinker puts it
28	**iv**	To grasp the originality of this idea, it's necessary to realize two things about how music has traditionally been understood. First, musicologists have long emphasized that while each culture stamps a special identity onto its music; music itself has some universal qualities. For example, in virtually all cultures sound is divided into some or all of the 12 intervals that make up the chromatic scale – that is, the scale represented by the keys on a piano. For centuries, observers have attributed this preference for certain combinations of tones to the mathematical properties of

#	Answer	Explanation
		sound itself. Some 2,500 years ago, Pythagoras was the first to note a direct relationship between the harmoniousness of a tone combination and the physical dimensions of the object that produced it. For example, a plucked string will always play an octave lower than a similar string half its size, and a fifth lower than a similar string two-thirds its length. This link between simple ratios and harmony has influenced music theory ever since
29	**ii**	Schwartz, Howe, and Purves analyzed a vast selection of speech sounds from a variety of languages to reveal the underlying patterns common to all utterances. In order to focus only on the raw sound, they discarded all theories about speech and meaning and sliced sentences into random bites. Using a database of over 100,000 brief segments of speech, they noted which frequency had the greatest emphasis in each sound. The resulting set of frequencies, they discovered, corresponded closely to the chromatic scale
30	**i**	Despite the apparent abundance of “music” in the natural world-birdsong, whalesong, wolf howls, synchronized chimpanzee hooting previous studies have found that many laboratory animals don’t show a great affinity for the human variety of music making
31	**vii**	No matter how the connection between language and music is parsed, what is apparent is that our sense of music, even our love for it, is as deeply rooted in our biology and in our brains as language is
32	**F**	While language has long been considered essential to unlocking the mechanisms of human intelligence, music is generally treated as an evolutionary frippery – mere”auditory cheesecake,” as the Harvard cognitive scientist Steven Pinker puts it
33	**B**	First, musicologists have long emphasized that while each culture stamps a special identity onto its music; music itself has some universal qualities
34	**E**	Some 2,500 years ago, Pythagoras was the first to note a direct relationship between the harmoniousness of a tone combination and the physical dimensions of the object that produced it
35	**D**	Human musical preferences are fundamentally shaped not by elegant algorithms or ratios but by the messy sounds of real life, and of speech in particular -which in turn is shaped by our evolutionary heritage
36	**G**	The act that laboratory monkeys can show recognition of human tunes is evidence, they say, of shared general features of the auditory system, not any specific chimpanzee musical ability

#	Answer	Explanation
37	**A**	Writing recently in The New York Review of Books, pianist and critic Charles Rosen discussed the long-standing notion that while painting and sculpture reproduce at least some aspects of the natural world, and writing describes thoughts and feelings we are all familiar with, music is entirely abstracted from the world in which we live
38	**C**	The upshot, says Trehub, is that music may be even more of a necessity than we realize
39	**B**	But what's been played to the animals, Schwartz notes, is human music. If animals evolve preferences for sound as we do – based upon the soundscape in which they live -then their "music" would be fundamentally different from ours. In the same way our scales derive from human utterances, a cat's idea of a good tune would derive from yowls and meows. To demonstrate that animals don't appreciate sounds the way we do, we'd need evidence that they don't respond to "music" constructed from their own sound environment
40	**C**	Music is one of the human specie's relatively few universal abilities. Without formal training, any individual, from Stone Age tribesman to suburban teenager has the ability to recognize music and, in some fashion, to make it

Test 68

PASSAGE 1

Read the text below and answer questions 1-13.

Voyage of going: beyond the blue line 2

A. One feels a certain sympathy for Captain James Cook on the day in 1778 that he "discovered" Hawaii. Then on his third expedition to the Pacific, the British navigator had explored scores of islands across the breadth of the sea, from lush New Zealand to the lonely wastes of Easter Island This latest voyage had taken him thousands of miles north from the Society Islands to an archipelago so remote that even the ok! Polynesians back on Tahiti knew nothing about it. Imagine Cook's surprise, then, when the natives of Hawaii came paddling out in their canoes and greeted him in a familiar tongue, one he had heard on virtually every mote of inhabited land he had visited Marveling at the ubiquity of this Pacific language and culture, he later wondered in his journal: "How shall we account for this Nation spreading it self so far over this Vast ocean?"

B. Answers have been slow in coming. But now a startling archaeological find on the island of Efate, in the Pacific nation of Vanuatu, has revealed an ancient seafaring people, the distant ancestors of today's Polynesians, taking their first steps into the unknown. The discoveries there have also opened a window into the shadowy work! of those early voyagers. At the same time, other pieces of this human puzzle are turning up in unlikely places. Climate data gleaned from slow-growing corals around the Pacific and from sediments in alpine lakes in South America may help explain how, more than a thousand years later, a second wave of seafarers beat their way across the entire Pacific.

C. What we have is a first- or second-generation site containing the graves of some of the Pacific's first explorers," says Spriggs, professor of archaeology at the Australian National University and co-leader of an international team excavating the site. It came to light only by luck A backhoe operator, digging up topsoil on the grounds of a derelict coconut plantation, scraped open a grave—the first of dozens in a burial ground some 3,000 years old It is the oldest cemetery ever found in the Pacific islands, and it harbors the bones of an ancient people archaeologists call the Lapita, a label that derives from a beach in New Caledonia where a landmark cache of their pottery was found in the 1950s. They were daring blue-water adventurers who roved the sea not just as expbrers but also as pioneers, bringing abng everything they would need to build new lives—their families and livestock, taro seedlings and stone tools.

D. Within the span of a few centuries the Lapita stretched the boundaries of their world from the jungle-clad vokanoes of Papua New Guinea to the bneliest coral outliers of Tonga, at feast 2,000 miles eastward in the Pacific. Abng the way they expbred millions of square miles of unknown sea, discovering and cobnizing scores of tropical islands never before seen by human eyes: Vanuatu, New Caledonia, Fiji, Samoa.

E. What little is known or surmised about them has been pieced together from fragments of pottery, animal bones, obsidian flakes, and such oblique sources as comparative linguistics and geochemistry. Although their voyages can be traced back to the northern islands of Papua New Guinea, their language variants of which are still spoken across the Pacific came from Taiwan. And their peculiar style of pottery decoration, created by pressing a carved stamp into the clay, probably had its roots in the northern Philippines. With the discovery of the Lapita cemetery on Efate, the volume of data available to researchers has expanded dramatically. The bones of at feast 62 individuals have been uncovered so far including old men, young women, even babies —and more skeletons are known to be in the ground Archaeobgists were also thrilled to discover six complete Lapita pots. It's an important find, Spriggs says, for it conclusively identifies the remains as Lapita. "It would be hard for anyone to argue that these aren't Lapita when you have human bones enshrined inside what is unmistakably a Lapita urn."

F. Several lines of evidence also undergird Spriggs's conclusion that this was a community of pioneers making their first voyages into the remote reaches of Oceania. For one thing, the radiocarbon dating of bones and charcoal places them early in the Lapita expansion. For another, the chemical makeup of the obsidian flakes littering the site indicates that the rock wasn't local; instead it was imported from a large island in Papua New Guinea's Bismarck Archipelago, the springboard for the Lapita's thrust into the Pacific. A particularly intriguing clue comes from chemical tests on the teeth of several skeletons. DNA teased from these ancient bones may also help answer one of the most puzzling questions in Pacific anthropobgy: Did all Pacific islanders spring from one source or many? Was there only one outward migration from a single point in Asia, or several from different points? "This represents the best opportunity we've had yet," says Spriggs, "to find out who the Lapita actually were, where they came from, and who their cbsest descendants are today.

G. "There is one stubborn question for which archaeobgy has yet to provide any answers: How did the Lapita accomplish the ancient equivalent of a moon landing, many times over? No one has found one of their canoes or any rigging, which could reveal how the canoes were sailed Nor do the oral histories and traditions of later Polynesians offer any insights, for they segue into myth long before they reach as far back in time as the Lapita." All we can say for certain is that the Lapita had canoes that were capable of ocean voyages, and they had the ability to sail them," says Geoff Irwin, a professor of archaeology at the University of Auckland and an avid yachtsman. Those sailing skills, he says, were developed and passed down over thousands of years by earlier mariners who worked their way through the archipelagoes of the western Pacific making short crossings to islands within sight of each other. Reaching Fiji, as they did a century or so later, meant crossing more than 500 miles of ocean, pressing on day after day into the great blue void of the Pacific. What gave them the courage to launch out on such a risky voyage?

H. The Lapita's thrust into the Pacific was eastward, against the prevailing trade winds, Irwin notes. Those nagging headwinds, he argues, may have been the key to their success. "They could sail out for days into the unknown and reconnoiter, secure in the knowledge that if they didn't find anything, they could turn about and catch a swift ride home on the trade winds. It's what made the whole thing work." Once out there, skilled seafarers would detect abundant leads to follow to land: seabirds and turtles, coconuts and twigs carried out to sea by the tides,

and the afternoon pileup of clouds on the horizon that often betokens an island in the distance. Some islands may have broadcast their presence with far less subtlety than a cloud bank. Some of the most violent eruptions anywhere on the planet during the past 10,000 years occurred in Melanesia, which sits nervously in one of the most explosive volcanic regions on Earth. Even less spectacular eruptions would have sent plumes of smoke bilbwing into the stratosphere and rained ash for hundreds of miles. It's possible that the Lapita saw these signs of distant islands and later sailed off in their direction, knowing they would find land For returning explorers, successful or not, the geography of their own archipelagoes provided a safety net to keep them from overshooting their home ports and sailing off into eternity.

I. However they did it, the Lapita spread themselves a third of the way across the Pacific, then called it quits for reasons known only to them. Ahead lay the vast emptiness of the central Pacific, and perhaps they were too thinly stretched to venture farther. They probably never numbered more than a few thousand in total, and in their rapid migration eastward they encountered hundreds of islands more than 300 in Fiji alone. Still, more than a millennium would pass before the Lapita's descendants, a people we now call the Polynesians, struck out in search of new territory.

PART 1 — QUESTIONS

Questions 1-7

Do the following statements agree with the information given in Reading Passage 1?

YES if the statement is true

NO if the statement is false

NOT GIVEN if the information is not given in the passage

1 Captain cook once expected the Hawaii might speak another language of people from other pacific islands.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

2 Captain cook depicted number of cultural aspects of Polynesians in his journal.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

3 Professor Spriggs and his research team went to the Efate to try to find the site of ancient cemetery.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

4 The Lapita completed a journey of around 2,000 miles in a period less than a centenary.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

5 The Lapita were the first inhabitants in many pacific islands.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

6 The unknown pots discovered in Efate had once been used for cooking.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

7 The um buried in Efate site was plain as it was without any decoration.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

Questions 8-10

Complete the following summary of the paragraphs of Reading Passage, using no more than one word from the Reading Passage for each answer.

Scientific Evident found in Efate site

Tests show the human remains and the charcoal found in the buried um are from the start of the Lapita period. Yet the **8** _____ covering many of the Efate site did not come from that area.

Then examinations carried out on the **9** _____ discovered at Efate site reveal that not everyone buried there was a native living in the area. In fact, DNA could identify the Lapita's nearest **10** _____ present-days.

Questions 11-13

Answer the questions below.

Choose NO MORE THAN THREE WORDS from the passage for each answer.

11 What did the Lapita travel in when they crossed the oceans? _____

12 In Irwins's view, what would the Latipa have relied on to bring them fast back to the base?

_____

13 Which sea creatures would have been an indication to the Lapita of where to find land ?

_____

PASSAGE 2

Read the text below and answer questions 14-27.

European Heat Wave

A. IT WAS the summer, scientists now realise, when felt. We knew that summer 2003 was remarkable: global warming at last made itself unmistakably Britain experienced its record high temperature and continental Europe saw forest fires raging out of control, great rivers drying of a trickle and thousands of heat-related deaths. But just how remarkable is only now becoming clean.

B. The three months of June, July and August were the warmest ever recorded in western and central Europe, with record national highs in Portugal, Germany and Switzerland as well as Britain. And they were the warmest by a very long way Over a great rectangular block of the earth stretching from west of Paris to northern Italy, taking in Switzerland and southern Germany, the average temperature for the summer months was 3.78°c above the long-term norm, said the Climatic Research Unit (CRU) of the University of East Anglia in Norwich, which is one of the world's lending institutions for the monitoring and analysis of temperature records.

C. That excess might not seem a lot until you are aware of the context - but then you realise it is enormous. There is nothing like this in previous data, anywhere. It is considered so exceptional that Professor Phil Jones, the CRU's (Erector, is prepared to say openly - in a way few scientists have done before - that the 2003 extreme may be directly attributed, not to natural climate variability, but to global warming caused by human actions.

D. Meteorologists have hitherto contented themselves with the formula that recent high temperatures are consistent with predictions" of climate change. For the great block of the map - that stretching between 35-50N and 0-20E - the CRU has reliable temperature records dating back to 1781. Using as a baseline the average summer temperature recorded between 1961 andl990, departures from the temperature norm, or "anomalies': over the area as a whole can easily be plotted. As the graph shows, such is the variability of our climate that over the past 200 years, there have been at least half a dozen anomalies, in terms of excess temperature - the peaks on the graph denoting very hot years - approaching, or even exceeding, 20 °c. But there has been nothing remotely like 2003, when the anomaly is nearly four degrees.

E. "This is quite remarkable," Professor Jones told The Independent. "It's very unusual in a statistical sense. If this series had a normal statistical distribution, you wouldn't get this number. There turn period “how often it could be expected to recur” would be something like one in a thou-sand years. If we look at an excess above the average of nearly four degrees, then perhaps nearly three degrees of that is natural variability, because we’ve seen that in past summers. But the final degree of it is likely to be due to global warming, caused by human actions.

F. The summer of 2003 has, in a sense, been one that climate scientists have long been expecting. Until now, the warming has been manifesting itself mainly in winters that have been

less cold than in summers that have been much hotter. Last week, the United Nations predicted that winters were warming so quickly that winter sports would die out in Europe's lower-level ski resorts. But sooner or later the unprecedented hot summer was bound to come, and this year it did.

G. One of the most dramatic features of the summer was the hot nights, especially in the first half of August. In Paris, the temperature never dropped below 230°c (73.40T) at all between 7 and 14August, and the city recorded its warmest-ever night on 11-12 August, when the mercury did not drop below 25.50°c (77.90°F). Germany recorded its warmest-ever night at Weinbiet in the Rhine valley with a lowest figure of 27.60°c (80.60T) on 13 August, and similar record-breaking night-time temperatures were recorded in Switzerland and Italy.

H. The 15,000 excess deaths in France during August, compared with previous years, have been related to the high night-time temperatures. The number gradually increased during the first 12days of the month, peaking at about 2,000 per day on the night of 12-13 August, then fell off dramatically after 14 August when the minimum temperatures fell by about 50C. The elderly were most affected, with a 70 per cent increase in mortality rate in those aged 75-94.

I. For Britain, the year as a whole is likely to be the warmest ever recorded, but despite the high temperature record on 10 August, the summer itself - defined as the June, July and August period - still comes behind 1976 and 1995, when there were longer periods of intense heat. At the moment, the year is on course to be the third-hottest ever in the global temperature record, which goes back to 1856, behind 1998 and 2002 but when all the records for October, November and December are collated, it might move into second place, Professor Jones said. The 10 hottest years in the record have all now occurred since 1990. Professor Jones is in no doubt about the astonishing nature of European summer of 2003.'The temperatures recorded were out of all proportion to the previous record," he said. "It was the warmest summer in the past 500 years and probably way beyond that It was enormously exceptional."

J. His colleagues at the University of East Anglia's Tyndall Centre for Climate Change Research are now planning a special study of it. "It was a summer that has not: been experienced before, either in terms of the temperature extremes that were reached, or the range and diversity of the impacts of the extreme heat," said the centre's executive director, Professor Mike Hulme. "It will certainly have left its mark on a number of countries, as to how they think and plan for climate change in the future, much as the 2000 floods have revolutionised the way the Government is thinking about flooding in the UK. "The 2003 heat wave will have similar repercussions across Europe."

PART 2 — QUESTIONS

Questions 14-19

Do the following statements agree with the information given in Reading Passage 2?

TRUE if the statement is true

FALSE if the statement is false

NOT GIVEN if the information is not given in the passage

14 The average summer temperature in 2003 is approximately four degrees higher than that of the past.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

15 Jones believes the temperature statistic is within the normal range.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

16 Human factor is one of the reasons that caused hot summer.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

17 In large city, people usually measure temperature twice a day.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

18 Global warming has obvious effect of warmer winter instead of hotter summer before 2003.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

19 New ski resorts are to be built on a high-altitude spot.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

Questions 20-21

Answer the questions below using NO MORE THAN THREE WORDS AND/OR NUMBERS from the passage for each answer.

20 What are the two hottest years in Britain besides 2003? _____

21 What will affect UK government policies besides climate change according to Hulme ? _____

Questions 22-26

Complete the summary below using NO MORE THAN TWO WORDS AND/OR NUMBERS from the passage.

In the summer of 2003, thousands of extra death occurred in the country of **22** _____. Moreover, world-widely, the third record of hottest summer date from **23** _____, after the year of **24** _____. According to Jones, all the 10 hottest years happened from **25** _____. However, summer of 2003 was at the peak of previous **26** _____ years, perhaps even more.

Questions 27-27

Choose the correct letter A, B, c or D

27 Which one can be best served as the title of this passage in the following options?

A ○ Global Warming effect

B ○ Global Warming in Europe

C ○ The Effects of hot temperature

D ○ Hottest summer in Europe

PASSAGE 3

Read the text below and answer questions 28-40.

the concept of childhood in the western countries

The history of childhood has been a topic of interest in social history since the highly influential 1960 book Centuries of Childhood, written by French historian Aries. He argued that "childhood" is a concept created by modern society.

A. One of the most hotly debated issues in the history of childhood has been whether childhood is itself a recent invention. The historian Philippe Aries argued that in Western Europe during the Middle Ages (up to about the end of the fifteenth century) children were regarded as miniature adults, with all the intellect and personality that this implies. He scrutinized medieval pictures and diaries, and found no distinction between children and adults as they shared similar leisure activities and often the same type of work. Aries, however, pointed out that this is not to suggest that children were neglected, forsaken or despised. The idea of childhood is not to be confused with affection for children; it corresponds to an awareness of the particular nature of childhood, that particular nature which distinguishes the child from the adult, even the young adult.

B. There is a long tradition of the children of the poor playing a functional role in contributing to the family income by working either inside or outside the home. In this sense children are seen as 'useful. Back in the Middle Ages, children as young as 5 or 6 did important chores for their parents and, from the sixteenth century, were often encouraged (or forced) to leave the family by the age of 9 or 10 to work as servants for wealthier families or to be apprenticed to a trade.

C. With industrialization in the eighteenth and nineteenth centuries, a new demand for child labour was created, and many children were forced to work for long hours, in mines, workshops and factories. Social reformers began to question whether labouring long hours from an early age would harm children's growing bodies. They began to recognize the potential of carrying out systematic studies to monitor how far these early deprivations might be affecting children's development.

D. Gradually, the concerns of the reformers began to impact on the working conditions of children. In Britain, the Factory Act of 1833 signified the beginning of legal protection of children from exploitation and was linked to the rise of schools for factory children. The worst forms of child exploitation were gradually eliminated, partly through factory reform but also through the influence of trade unions and economic changes during the nineteenth century which made some forms of child labour redundant. Childhood was increasingly seen as a time for play and education for all children, not just for a privileged minority. Initiating children into work as 'useful' children became less of a priority. As the age for starting full-time work was delayed, so childhood was increasingly understood as a more extended phase of dependency, development and learning. Even so, work continued to play a significant, if less central role in children's lives throughout the later nineteenth and twentieth century. And the 'useful child' has become a controversial image during the first decade of the twenty-first century especially in

the context of global concern about large numbers of the world's children engaged in child labour.

E. The Factory Act of 1833 established half-time schools which allowed children to work and attend school. But in the 1840s, a large proportion of children never went to school, and if they did, they left by the age of 10 or 11. The situation was very different by the end of the nineteenth century in Britain. The school became central to images of 'a normal' childhood .

F. Attending school was no longer a privilege and all children were expected to spend a significant part of their day in a classroom. By going to school, children's lives were now separated from domestic life at home and from the adult world of work. School became an institution dedicated to shaping the minds, behaviour and morals of the young. Education dominated the management of children's waking hours, not just through the hours spent in classrooms but through 'home' work, the growth of 'after school' activities and the importance attached to 'parental involvement.

G. Industrialization, urbanization and mass schooling also set new challenges for those responsible for protecting children's welfare, and promoting their learning. Increasingly, children were being treated as a group with distinctive needs and they were organized into groups according to their age. For example, teachers needed to know what to expect of children in their classrooms, what kinds of instruction were appropriate for different age groups and how best to assess children's progress. They also wanted tools that could enable them to sort and select children according to their abilities and potential.

PART 3 — QUESTIONS

Questions 28-34

Do the following statements agree with the information given in Reading Passage 3?

TRUE if the statement is true

FALSE if the statement is false

NOT GIVEN if the information is not given in the passage

28 Aries pointed out that children did different types of work as adults during the Middle Age.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

29 During the Middle Age, going to work necessarily means children were unloved indicated by Aries.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

30 Scientists think that overworked labour damages the health of young children

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

31 the rise of trade union majorly contributed to the protection children from exploitation in 19th century

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

32 By the aid of half-time schools, most children went to school in the mid of 19 century.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

33 In 20 century almost all children need to go to school in full time schedule.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

34 Nowadays, children’s needs were much differentiated and categorised based on how old they are

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

Questions 35-40

Answer the questions below.

Choose NO MORE THAN THREE WORDS from the passage for each answer.

35 What is the controversial topic arises with the French historian Philippe Aries's concept? _____

36 What image for children did Aries believed to be like in Western Europe during the Middle Ages? _____

37 What historical event generated the need for great amount child labour to work long time in 18 and 19 century? _____

38 What legal format initiated the protection of children from exploitation in 19th centenary? _____

39 What the activities were more and more regarded as being preferable for almost all children time in 19th centenary? _____

40 Where has been the central area for children to spend largely of their day as people's expectation in modern society? _____

Answer Key

#	Answer	Explanation
1	**YES**	Imagine Cook’s surprise, then, when the natives of Hawaii came paddling out in their canoes and greeted him in a familiar tongue, one he had heard on virtually every mote of inhabited land he had visited
2	**NO**	Marveling at the ubiquity of this Pacific language and culture, he later wondered in his journal: “How shall we account for this Nation spreading it self so far over this Vast ocean?”
3	**NO**	It came to light only by luck A backhoe operator, digging up topsoil on the grounds of a derelict coconut plantation, scraped open a grave—the first of dozens in a burial ground some 3,000 years old
4	**NOT GIVEN**	Within the span of a few centuries the Lapita stretched the boundaries of their world from the jungle-clad vokanoes of Papua New Guinea to the bneliest coral outliers of Tonga, at feast 2,000 miles eastward in the Pacific
5	**YES**	Abng the way they expbred millions of square miles of unknown sea, discovering and cobnizing scores of tropical islands never before seen by human eyes: Vanuatu, New Caledonia, Fiji, Samoa
6	**NOT GIVEN**	Archaeobgists were also thrilled to discover six complete Lapita pots. It’s an important find, Spriggs says, for it conclusively identifies the remains as Lapita. “It would be hard for anyone to argue that these aren’t Lapita when you have human bones enshrined inside what is unmistakably a Lapita urn.”
7	**NO**	And their peculiar style of pottery decoration, created by pressing a carved stamp into the clay, probably had its roots in the northern Philippines. With the discovery of the Lapita cemetery on Efate, the volume of data available to researchers has expanded dramatically. The bones of at feast 62 individuals have been uncovered so far including old men, young women, even babies—and more skeletons are known to be in the ground Archaeobgists were also thrilled to discover six complete Lapita pots. It’s an important find, Spriggs says, for it conclusively identifies the remains as Lapita. “It would be hard for anyone to argue that these aren’t Lapita when you have human bones enshrined inside what is unmistakably a Lapita urn.”
8	**rock**	For another, the chemical makeup of the obsidian flakes littering the site indicates that the rock wasn’t local; instead it was imported from a large island in Papua New Guinea’s Bismarck

#	Answer	Explanation
		Archipelago, the springboard for the Lapita's thrust into the Pacific
9	**teeth**	A particularly intriguing clue comes from chemical tests on the teeth of several skeletons
10	**descendants**	"This represents the best opportunity we've had yet," says Spriggs, "to find out who the Lapita actually were, where they came from, and who their cbsest descendants are today
11	**canoes**	All we can say for certain is that the Lapita had canoes that were capable of ocean voyages, and they had the ability to sail them
12	**(the) trade winds**	"They could sail out for days into the unknown and reconnoiter, secure in the knowledge that if they didn't find anything, they could turn about and catch a swift ride home on the trade winds
13	**seabirds and turtles / seabirds,turtles**	Once out there, skilled seafarers would detect abundant leads to follow to land: seabirds and turtles, coconuts and twigs carried out to sea by the tides, and the afternoon pileup of clouds on the horizon that often betokens an island in the distance
14	**TRUE**	the average temperature for the summer months was 3.78°c above the long-term norm
15	**FALSE**	"This is quite remarkable," Professor Jones told The Independent. "It's very unusual in a statistical sense. If this series had a normal statistical distribution, you wouldn't get this number
16	**TRUE**	But the final degree of it is likely to be due to global warming, caused by human actions
17	**NOT GIVEN**	In Paris, the temperature never dropped below 230°c (73.40T) at all between 7 and 14August, and the city recorded its warmest-ever night on 11-12 August, when the mercury did not drop below 25.50°c (77.90°F)
18	**TRUE**	Until now, the warming has been manifesting itself mainly in winters that have been less cold than in summers that have been much hotter
19	**NOT GIVEN**	Last week, the United Nations predicted that winters were warming so quickly that winter sports would die out in Europe's lower-level ski resorts
20	**1976 and 1995 / 1976,1995**	For Britain, the year as a whole is likely to be the warmest ever recorded, but despite the high temperature record on 10 August, the summer itself – defined as the June, July and August period – still comes behind 1976 and 1995, when there were longer periods of intense heat

#	Answer	Explanation
21	**(the) 2000 floods**	much as the 2000 floods have revolutionised the way the Government is thinking about flooding in the UK
22	**France**	The 15,000 excess deaths in France during August, compared with previous years, have been related to the high night-time temperatures
23	**1856**	At the moment, the year is on course to be the third-hottest ever in the global temperature record, which goes back to 1856, behind 1998 and 2002
24	**1988 and 2002**	At the moment, the year is on course to be the third-hottest ever in the global temperature record, which goes back to 1856, behind 1998 and 2002
25	**1990**	The 10 hottest years in the record have all now occurred since 1990
26	**500**	“It was the warmest summer in the past 500 years and probably way beyond that
27	**D**	The three months of June, July and August were the warmest ever recorded in western and central Europe, with record national highs in Portugal, Germany and Switzerland as well as Britain
28	**FALSE**	He scrutinized medieval pictures and diaries, and found no distinction between children and adults as they shared similar leisure activities and often the same type of work
29	**FALSE**	Aries, however, pointed out that this is not to suggest that children were neglected, forsaken or despised. The idea of childhood is not to be confused with affection for children; it corresponds to an awareness of the particular nature of childhood, that particular nature which distinguishes the child from the adult, even the young adult
30	**TRUE**	Social reformers began to question whether labouring long hours from an early age would harm children’s growing bodies. They began to recognize the potential of carrying out systematic studies to monitor how far these early deprivations might be affecting children’s development
31	**NOT GIVEN**	The worst forms of child exploitation were gradually eliminated, partly through factory reform but also through the influence of trade unions and economic changes during the nineteenth century which made some forms of child labour redundant
32	**FALSE**	The Factory Act of 1833 established half-time schools which allowed children to work and attend school. But in the 1840s, a large proportion of children never went to school, and if they did, they left by the age of 10 or 11

#	Answer	Explanation
33	**NOT GIVEN**	Even so, work continued to play a significant, if less central role in children's lives throughout the later nineteenth and twentieth century
34	**TRUE**	Increasingly, children were being treated as a group with distinctive needs and they were organized into groups according to their age
35	**history of childhood**	The history of childhood has been a topic of interest in social history since the highly influential 1960 book Centuries of Childhood, written by French historian Aries
36	**(as) miniature adults**	The historian Philippe Aries argued that in Western Europe during the Middle Ages (up to about the end of the fifteenth century) children were regarded as miniature adults, with all the intellect and personality that this implies
37	**(with) (the) industrialization**	With industrialization in the eighteenth and nineteenth centuries, a new demand for child labour was created, and many children were forced to work for long hours, in mines, workshops and factories
38	**(The) factory Act**	the Factory Act of 1833 signified the beginning of legal protection of children from exploitation
39	**play and education**	Childhood was increasingly seen as a time for play and education for all children, not just for a privileged minority
40	**(in) (a) classroom**	Attending school was no longer a privilege and all children were expected to spend a significant part of their day in a classroom

Test 69

PASSAGE 1

You should spend about 20 minutes on Questions 1-14, which are based on Reading Passage 1 below.

Have Teenagers Always Existed

A. Our ancestor. Homo erectus, may not have had culture or even language, but did they have teenagers? That question has been contested in the past few years, with some anthropologists claiming evidence of an adolescent phase in human fossil. This is not merely an academic debate. Humans today are the only animals on Earth to have a teenage phase, yet we have very little idea why. Establishing exactly when adolescence first evolved and finding out what sorts of changes in our bodies and lifestyles it was associated with could help US understand its purpose. Why do we, uniquely' have a growth spurt so late in life?

B. Until recently, the dominant explanation was that physical growth is delayed by our need to grow large brains and to learn all the behavior patterns associated with humanity - speaking, social interaction and so on. While such behaviour is still developing, humans cannot easily fend for themselves, so it is best to stay small and look youthful. That way your parents and other members of the social group are motivated to continue looking after you. What's more, studies of mammals show a strong relationship between brain size and the rate of development, with larger-brained animals taking longer to reach adulthood. Humans are at the far end of this spectrum. If this theory is correct, and the development of large brains accounts for the teenage growth spurt, the origin of adolescence should have been with the evolution of our* own species (Homo sapiens) and Neanderthals, starting almost 200,000 years ago. The trouble is, some of the fossil evidence seems to tell a different story.

C. The human fossil record is extremely sparse, and the number of fossilised children minuscule. Nevertheless, in the past few years anthropologists have begun to look at what can be learned of lives of our ancestors from these youngsters, of the most studied is the famous Turkana boy, an almost complete skeleton of Homo erectus f 1.6 million years ago found in Kenya in 1984. Accurately assessing how old someone is from their skeleton is a tricky business. Even with a modern human, you can only make a rough estimate based on the developmental stage of teeth and bones and the skeleton's general size.

D. You need as many developmental markers as possible to get an estimate of age. The Turkana's teeth made him 10 or 11 years old. The features of his skeleton put him at 13, but he as tall as a modem 15-year-old. Susan Anton of New York University points to research by Margaret Clegg who studied a collection of 18th- century 19th- century skeletons whose ages at death were known. When she tried to age the skeletons Without checking the records, she found similar discrepancies to those of the Turkana boy. One 10-year-old boy, for example, had a dental age of 9, the skeleton of a 6-year-old but was tall enough to be 11. 'The Turkana kid still has a rounded skull, and needs more growth to reach the adult shape/ Anton adds. She thinks

that Homo erectus already developed modern human patterns growth, with a late, if not quite so extreme, adolescent spurt. She believes Turkana boy was just about to enter it.

E. If Anton is right, that theory contradicts the orthodox idea linking late growth with development of a large brain. Anthropologist Steven Leigh from the University of Illinois goes further. He believes the idea of adolescence as catch-up growth does not explain why the growth rate increases so dramatically. He says that many apes have growth spurts in particular body regions that are associated with reaching maturity, and this makes sense because by timing the short but crucial spells of maturation to coincide with the seasons when food is plentiful, they minimise the risk of being without adequate food supplies while growing. What makes humans unique is that the whole skeleton is involved. For Leigh, this is the key.

F. According to his theory, adolescence evolved as an integral part of efficient upright locomotion, as well as to accommodate more complex brains. Fossil evidence suggests that our ancestors first walked on two legs six million years ago. If proficient walking was important for survival, perhaps the teenage growth spurt has very ancient origins. While many anthropologists will consider Leigh's theory a step too far, he is not the only one with new ideas about the evolution of teenagers.

G. Another approach, which has produced a surprising result, relies on the minute analysis of tooth growth. Every nine days or so the growing teeth of both apes and humans acquire ridges on their enamel surface. These are like rings in a tree trunk: the number of them tells you how long the crown of a tooth took to form. Across mammals' the rate at which teeth develop is closely related to how fast the brain grows and the age you mature. Teeth are good indicators of life history because thefr growth is less related to the environment and nutrition than is the growth of the skeleton.

H. A more decisive piece of evidence came last year, when researchers in France and Spain published their findings from a study of Neanderthal teeth. Neanderthals had much faster tooth growth than erectus who went before them, and hence, possibly, a shorter childhood. Lead researcher Fernando Ramirez-Rozzi thinks Neanderthals died young-about 25 years old - primarily because of the cold, harsh environment they had to endure in glacial Europe. They evolved to grow up quicker than their immediate ancestors. Neanderthals and Homo erectus probably had to reach adulthood fairly quickly, without delaying for an adolescent growth spurt. So it still looks as though we are the original teenagers.

PART 1 — QUESTIONS

Questions 1-4

Choose the correct letter, A, B, C or D.

1 In the first paragraph, why does the writer say 'This is not merely an academic debated'?

- **A** ○ Anthropologists' theories need to be backed up by practical research.
- **B** ○ There have been some important misunderstandings among anthropologists.
- **C** ○ The attitudes of anthropologists towards adolescence are changing.
- **D** ○ The work of anthropologists could inform our understanding of modem adolescence.

2 What was Susan Anton's opinion of the Turkana boy?

- **A** ○ He would have experienced an adolescent phase had he lived.
- **B** ○ His skull showed he had already reached adulthood
- **C** ○ His skeleton and teeth could not be compared to those from a more modem age.
- **D** ○ He must have grown much faster than others alive at the time.

3 What point does Steven Leigh make?

- **A** ○ Different parts of the human skeleton develop at different speeds.
- **B** ○ The growth period of many apes is confined to times when there is enough food.
- **C** ○ Humans have different rates of development from each other depending on living conditions.
- **D** ○ The growth phase in most apes lasts longer if more food is available.

4 What can we learn from a mammal's teeth?

- **A** ○ A poor diet will cause them to grow more slowly.
- **B** ○ They are a better indication of lifestyle than a skeleton
- **C** ○ Their growing period is difficult to predict accurately.

D ◯ Their speed of growth is directly related to the body's speed of development.

Questions 5-10

Do the following statements agree with the claims of the writer in Reading Passage 1?

Write

YES if the statement agrees with the claims of the writer

NO if the statement contradicts the claims of the writer

NOT GIVEN if it is impossible to say what the writer thinks about this

5 It is difficult for anthropologists to do research on human fossil because they are so rare.

A ◯ YES

B ◯ NO

C ◯ NOT GIVEN

6 Modem methods mean it is possible to predict the age of a skeleton with accuracy.

A ◯ YES

B ◯ NO

C ◯ NOT GIVEN

7 Susan Anton's conclusion about the Turkana boy reinforces an established idea.

A ◯ YES

B ◯ NO

C ◯ NOT GIVEN

8 Steen Leigh's ideas are likely to be met with disbelief by many anthropologists.

A ◯ YES

B ◯ NO

C ◯ NOT GIVEN

9 Researchers in France and Spain developed a unique method of analyzing teeth.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

10 There has been too little research comparing the brains of Homo erectus and Neanderthals.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

Questions 11-14

Complete each sentence with the correct ending, A-G, below.

• Until recently, delayed growth in humans until adolescence was felt to be due to **11** _____

• In her research, Margaret Clegg discovered **12** _____

• Steven Leigh thought the existence of adolescence is connected to **13** _____

• Research on Neanderthals suggests that they has short lives because of **14** _____

A. **inconsistencies between height, skeleton and dental evidence.**
B. **the fact that human beings walk on two legs,**
C. **the way teeth grew.**
D. **a need to be dependent on others foe survival.**
E. **difficult climatic conditions.**
F. **increased quantities of food**
G. **the existence of much larger brains than preciously**

PASSAGE 2

You should spend about 20 minutes on Questions 15—27, which are based on Reading Passage 2 below.

Numeracy: can animals tell numbers?

A. Prime among basic numerical faculties is the ability to distinguish between a larger and a smaller number, says psychologist Elizabeth Brannon. Humans can do this with ease - providing the ratio is big enough - but do other animals share this ability? In one experiment, rhesus monkeys and university students examined two sets of geometrical objects that appeared briefly on a computer monitor. They had to decide which set contained more objects. Both groups performed successfully but, importantly, Brannon's team found that monkeys, like humans, make more errors when two sets of objects are close in number. The students' performance ends up looking just like a monkey's. It's practically identical, 'she says.

B. Humans and monkeys are mammals, in the animal family known as primates. These are not the only animals whose numerical capacities rely on ratio, however. The same seems to apply to some amphibians. Psychologist Claudia Uller's team tempted salamanders with two sets of fruit flies held in clear tubes. In a series of trials, the researchers noted which tube the salamanders scampered towards, reasoning that if they had a capacity to recognise number, they would head for the larger number. The salamanders successfully discriminated between tubes containing 8 and 16 flies respectively, but not between 3 and 4, 4 and 6, or 8 and 12. So it seems that for the salamanders to discriminate between two numbers, the larger must be at least twice as big as the smaller. However, they could differentiate between 2 and 3 flies just as well as between 1 and 2 flies, suggesting they recognise small numbers in a different way from larger numbers.

C. Further support for this theory comes from studies of mosquitofish, which instinctively join the biggest shoal they can. A team at the University of Padova found that while mosquitofish can tell the difference between a group containing 3 shoal-mates and a group containing 4, they did not show a preference between groups of 4 and 5. The team also found that mosquitofish can discriminate between numbers up to 16, but only if the ratio between the fish in each shoal was greater than 2:1. This indicates that the fish, like salamanders, possess both the approximate and precise number systems found in more intelligent animals such as infant humans and other primates.

D. While these findings are highly suggestive, some critics argue that the animals might be relying on other factors to complete the tasks, without considering the number itself. 'Any study that's claiming an animal is capable of representing number should also be controlling for other factors, ' says Brannon. Experiments have confirmed that primates can indeed perform numerical feats without extra clues, but what about the more primitive animals?

E. To consider this possibility, the mosquitofish tests were repeated, this time using varying geometrical shapes in place of fish. The team arranged these shapes so that they had the same overall surface area and luminance even though they contained a different number of objects.

Across hundreds of trials on 14 different fish, the team found they consistently discriminated 2 objects from 3. The team is now testing whether mosquitofish can also distinguish 3 geometric objects from 4.

F. Even more primitive organisms may share this ability. Entomologist Jurgen Tautz sent a group of bees down a corridor, at the end of which lay two chambers - one which contained sugar water, which they like, while the other was empty. To test the bees' numeracy, the team marked each chamber with a different number of geometrical shapes - between 2 and 6. The bees quickly learned to match the number of shapes with the correct chamber. Like the salamanders and fish, there was a limit to the bees' mathematical prowess - they could differentiate up to 4 shapes, but failed with 5 or 6 shapes.

G. These studies still do not show whether animals learn to count through training, or whether they are born with the skills already intact. If the latter is true, it would suggest there was a strong evolutionary advantage to a mathematical mind. Proof that this may be the case has emerged from an experiment testing the mathematical ability of three- and four-day-old chicks. Like mosquitofish, chicks prefer to be around as many of their siblings as possible, so they will always head towards a larger number of their kin. If chicks spend their first few days surrounded by certain objects, they become attached to these objects as if they were family. Researchers placed each chick in the middle of a platform and showed it two groups of balls of paper. Next, they hid the two piles behind screens, changed the quantities and revealed them to the chick. This forced the chick to perform simple computations to decide which side now contained the biggest number of its "brothers". Without any prior coaching, the chicks scuttled to the larger quantity at a rate well above chance. They were doing some very simple arithmetic, claim the researchers.

H. Why these skills evolved is not hard to imagine, since it would help almost any animal forage for food. Animals on the prowl for sustenance must constantly decide which tree has the most fruit, or which patch of flowers will contain the most nectar. There are also other, less obvious, advantages of numeracy. In one compelling example, researchers in America found that female coots appear to calculate how many eggs they have laid - and add any in the nest laid by an intruder - before making any decisions about adding to them. Exactly how ancient these skills are is difficult to determine, however. Only by studying the numerical abilities of more and more creatures using standardised procedures can we hope to understand the basic preconditions for the evolution of number.

PART 2 — QUESTIONS

Questions 15-21

Choose NO MORE THAN THREE WORDS from the passage for each answer.

Answer the table below.

Subjects	Experiments	Results
Mammals and birds		
rhesus monkeys and humans	looked at two sets of geometrical objects on computer screen	performance of two groups is almost **15** _____
chicks	chose between two sets of **16** _____ which are altered	chicks can do calculations in order to choose larger group
coots	behaviour of female birds was observed	bird seems to have ability to **17** _____ eggs
Amphibians, fish and insects		
Salamanders	offered clear tubes containing different quantities of **18** _____	salamanders distinguish between numbers over four if bigger number is at least two times larger
19 _____	shown real shoals and later artificial ones of geometrical shapes; these are used to check influence of total **20** _____ and brightness	subjects know difference between two and three and possibly three and four, but not between four and five
bees	had to learn where **21** _____ was stored	could soon choose correct place

Questions 22-27

Do the following statements agree with the information given in Reading Passage 2?

Write

TRUE if the statement true

FALSE if the statement false

NOT GIVEN if the information not given in the passage

22 Primates are better at identifying the larger of two numbers if one is much bigger than the other.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

23 Jurgen Tautz trained the insects in his experiment to recognise the shapes of individual numbers.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

24 The research involving young chicks took place over two separate days.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

25 The experiment with chicks suggests that some numerical ability exists in newborn animals.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

26 Researchers have experimented by altering quantities of nectar or fruit available to certain wild animals.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

27 When assessing the number of eggs in their nest, coots take into account those of other birds.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

PASSAGE 3

You should spend about 20 minutes on Questions 28-40, which are based on Reading Passage 3 below.

Elephant communication

A. A postdoctoral fellow at Stanford University, O'Connell-Rodwell has come to Namibia's premiere wildlife sanctuary to explore the mysterious and complex world of elephant communication. She and her colleagues are part of a scientific revolution that began nearly two decades ago with the stunning revelation that elephants communicate over long distances using low-frequency sounds, also called infrasounds, that are too deep to be heard by most humans.

B. As might be expected, the African elephant's ability to sense seismic sound may begin in the ears. The hammer bone of the elephant's inner ear is proportionally very large for a mammal, but typical for animals that use vibrational signals. It may therefore be a sign that elephants can communicate with seismic sounds. Also, the elephant and its relative the manatee are unique among mammals in having reverted to a reptilian-like cochlear structure in the inner ear. The cochlea of reptiles facilitates a keen sensitivity to idbrations and may do the same in elephants.

C. But other aspects of elephant anatomy also support that ability. First, its enormous body, which allows it to generate low-frequency sounds almost as powerful as those of a jet takeoff, provides an ideal frame for receiving ground vibrations and conducting them to the inner ear. Second, the elephant's toe bones rest on a fatty pad that might help focus vibrations from the ground into the bone. Finally, the elephant's enormous brain lies in the cranial cavity behind the eyes in line with the auditory canal. The front of the skull is riddled with sinus cavities that may function as resonating chambers for vibrations from the ground.

D. How the elephants sense these vibrations is still unknown, but O'Connell-Rodwell who just earned a graduate degree in entomology at the University of Hawaii at Manoa, suspects the pachyderms are "listening" with their trunks and feet. The trunk may be the most versatile appendage in nature. Its uses include drinking, bathing, smelling, feeding and scratching. Both trunk and feet contain two kinds of pressure-sensitive nerve endings—one that detects infrasonic vibrations and another that responds to vibrations with slightly higher frequencies. For O'Connell-Rodwell, the future of the research is boundless and unpredictable: "Our work is really at the interface of geophysics, neurophysiology and ecology," she says. "We're asking questions that no one has really dealt with before."

E. Scientists have long known that seismic communication is common in small animals, including spiders, scorpions, insects and a number of vertebrate species such as white-lipped frogs, blind mole rats, kangaroo rats and golden moles. They also have found evidence of seismic sensitivity in elephant seals—2-ton marine mammals that are not related to elephants. But O'Connell-Rodwell was the first to suggest that a large land animal also is sending and receiving seismic messages. O'Connell-Rodwell noticed something about the freezing behavior of Etosha's six-ton bulls that reminded her of the tiny insects back in her lab. "I did my masters

thesis on seismic communication in planthoppers," she says. "I'd put a male planthopper on a stem and play back a female call, and the male would do the same thing the elephants were doing: He would freeze, then press down on his legs, go forward a little bit, then freeze again. It was just so fascinating to me, and it's what got me to think, maybe there's something else going on other than acoustic communication."

F. Scientists have determined that an elephant's ability to communicate over long distances is essential for its survival, particularly in a place like Etosha, where more than 2,400 savanna elephants range over an area larger than New Jersey. The difficulty of finding a mate in this vast wilderness is compounded by ... elephant reproductive biology. Females breed only when nestrus a period of sexual arousal that occurs every two years and lasts just a few days. "Females in estrus make these very low, long calls that bulls home in on, because it's such a rare event," O'Connell-Rodwell says. These powerful estrus calls carry more than two miles in the air and may be accompanied by long-distance seismic signals, she adds. Breeding herds also use low-frequency vocalizations to warn of predators. Adult bulls and cows have no enemies, except for humans, but young elephants are susceptible to attacks by lions and hyenas. When a predator appears, older members of the herd emit intense warning calls that prompt the rest of the herd to clump together for protection, then flee. In 1994, O'Connell-Rodwell recorded the dramatic cries of a breeding herd threatened by lions at Mushara. "The elephants got really scared, and the matriarch made these very powerful warning calls, and then the herd took off screaming and trumpeting," she recalls. "Since then, every time we've played that particular call at the water hole, we get the same response the elephants take off."

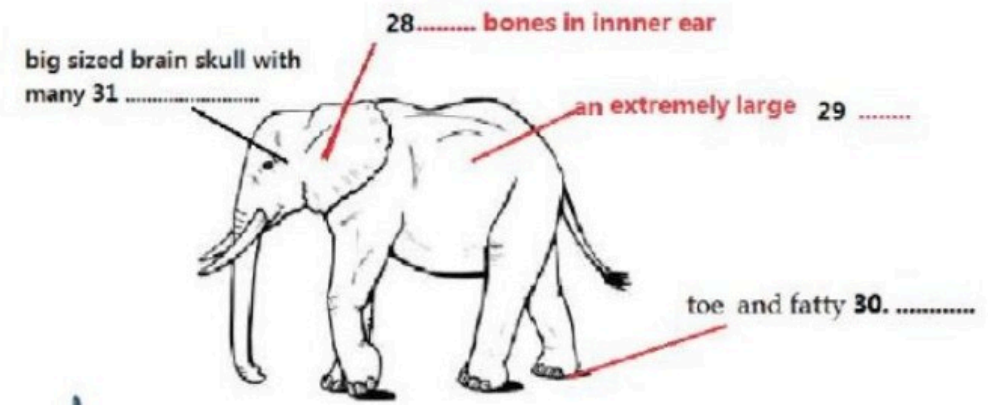
G. Reacting to a warning call played hi the air is one thing, but could the elephants detect calls transmitted only through the ground? To find out, the research team in 2002 devised an experiment using electronic equipment that allowed them to send signals through the ground at Mushara. The results of our 2002 study showed US that elephants do indeed detect warning calls played through the ground," O'Connell-Rodwell observes. "We expected them to clump up into tight groups and leave the area, and that's in fact what they did. But since we only played back one type of call, we couldn't really say whether they were interpreting it correctly. Maybe they thought it was a vehicle or something strange instead of a predator warning."

H. An experiment last year was designed to solve that problem by using three different recordings—the 1994 warning call from Mushara, an anti-predator call recorded by scientist Joyce Poole in Kenya and an artificial warble tone. Although still analyzing data from this experiment, O'Connell-Rodwell is able to make a few preliminary observations: "The data I've seen so far suggest that the elephants were responding like I had expected, when the '94 warning call was played back, they tended to clump together and leave the water hole sooner. But what's really interesting is that the unfamiliar anti-predator call from Kenya also caused them to clump up, get nervous and aggressively rumble—but they didn't necessarily leave. I didn't think it was going to be that clear cut.

PART 3 — QUESTIONS

Questions 28-31

Complete the following summary of the paragraphs of Reading Passage, using no more than two words from the Reading Passage for each answer.



28 _____

29 _____

30 _____

31 _____

Questions 32-38

Complete the following summary of the paragraphs of Reading Passage, using no more three words or a number from the Reading Passage for each answer.

How the elephants sense these sound vibrations is still unknown, but O'Connell-Rodwell, a fresh graduate in entomology at the University of Hawaii, proposes that the elephants are "listening" with their **32** _____, by two kinds of nerve endings—that responds to vibrations with both **33** _____ frequency and slightly higher frequencies, o'Connell-Rodwell work is at the combination of geophysics, neurophysiology and **34** _____ and it also was the first to indicate that a large land animal also is sending and receiving **35** _____. O'Connell-Rodwell noticed the freezing behavior by putting a male planthopper communicative approach other than **36** _____.

Scientists have determined that an elephant's ability to communicate over long distances is essential, especially, when elephant herds are finding a **37** _____, or are

warning of predators. Finally, the results of our 2002 study showed US that elephants can detect warning calls played through the **38** _____."

Questions 39-40

Choose the correct letter, A, B, C or D.

39 According the passage, it is determined that an elephant need to communicate over long distances for its survival

- **A** ○ When a threatening predator appears.
- **B** ○ When young elephants meet humans.
- **C** ○ When older members of the herd want to flee from the group.
- **D** ○ when a male elephant is in estrus.

40 what is the author's attitude toward the experiment by using three different recordings in the paragraph

- **A** ○ the outcome is definitely out of the original expectation
- **B** ○ the data can not be very clearly obtained
- **C** ○ the result can be somewhat undecided or inaccurate
- **D** ○ the result can be unfamiliar to the public

Answer Key

#	Answer	Explanation
1	**A**	This is not merely an academic debate. Humans today are the only animals on Earth to have a teenage phase, yet we have very little idea why. Establishing exactly when adolescence first evolved and finding out what sorts of changes in our bodies and lifestyles it was associated with could help US understand its purpose
2	**C**	When she tried to age the skeletons Without checking the records, she found similar discrepancies to those of the Turkana boy
3	**B**	He says that many apes have growth spurts in particular body regions that are associated with reaching maturity, and this makes sense because by timing the short but crucial spells of maturation to coincide with the seasons when food is plentiful, they minimise the risk of being without adequate food supplies while growing
4	**D**	Across mammals' the rate at which teeth develop is closely related to how fast the brain grows and the age you mature
5	**YES**	The human fossil record is extremely sparse, and the number of fossilised children minuscule. Nevertheless, in the past few years anthropologists have begun to look at what can be learned of lives of our ancestors from these youngsters
6	**NO**	Accurately assessing how old someone is from their skeleton is a tricky business. Even with a modern human, you can only make a rough estimate based on the developmental stage of teeth and bones and the skeleton's general size
7	**NO**	If Anton is right, that theory contradicts the orthodox idea linking late growth with development of a large brain
8	**YES**	While many anthropologists will consider Leigh's theory a step too far, he is not the only one with new ideas about the evolution of teenagers
9	**NOT GIVEN**	A more decisive piece of evidence came last year, when researchers in France and Spain published their findings from a study of Neanderthal teeth
10	**NOT GIVEN**	Neanderthals had much faster tooth growth than erectus who went before them, and hence, possibly, a shorter childhood

#	Answer	Explanation
11	**G**	Until recently, the dominant explanation was that physical growth is delayed by our need to grow large brains and to learn all the behavior patterns associated with humanity – speaking, social interaction and so on
12	**A**	When she tried to age the skeletons Without checking the records, she found similar discrepancies to those of the Turkana boy. One 10-year-old boy, for example, had a dental age of 9, the skeleton of a 6-year-old but was tall enough to be 11
13	**B**	According to his theory, adolescence evolved as an integral part of efficient upright locomotion, as well as to accommodate more complex brains
14	**E**	Lead researcher Fernando Ramirez-Rozzi thinks Neanderthals died young-about 25 years old – primarily because of the cold, harsh environment they had to endure in glacial Europe
15	**indentical**	The students' performance ends up looking just like a monkey's. It's practically identical, 'she says
16	**balls of paper**	Researchers placed each chick in the middle of a platform and showed it two groups of balls of paper
17	**count/calculate**	In one compelling example, researchers in America found that female coots appear to calculate how many eggs they have laid – and add any in the nest laid by an intruder – before making any decisions about adding to them
18	**fruit flies**	Psychologist Claudia Uller's team tempted salamanders with two sets of fruit flies held in clear tubes
19	**mosquitofish**	Further support for this theory comes from studies of mosquitofish, which instinctively join the biggest shoal they can
20	**surface area**	The team arranged these shapes so that they had the same overall surface area and luminance even though they contained a different number of objects
21	**sugar water**	Entomologist Jurgen Tautz sent a group of bees down a corridor, at the end of which lay two chambers – one which contained sugar water, which they like, while the other was empty
22	**TRUE**	Both groups performed successfully but, importantly, Brannon's team found that monkeys, like humans, make more errors when two sets of objects are close in number

#	Answer	Explanation
23	**FALSE**	To test the bees' numeracy, the team marked each chamber with a different number of geometrical shapes – between 2 and 6
24	**NOT GIVEN**	Proof that this may be the case has emerged from an experiment testing the mathematical ability of three- and four-day-old chicks
25	**TRUE**	These studies still do not show whether animals learn to count through training, or whether they are born with the skills already intact. If the latter is true, it would suggest there was a strong evolutionary advantage to a mathematical mind. Proof that this may be the case has emerged from an experiment testing the mathematical ability of three- and four-day-old chicks
26	**NOT GIVEN**	Animals on the prowl for sustenance must constantly decide which tree has the most fruit, or which patch of flowers will contain the most nectar
27	**TRUE**	female coots appear to calculate how many eggs they have laid – and add any in the nest laid by an intruder – before making any decisions about adding to them
28	**hammer**	The hammer bone of the elephant's inner ear is proportionally very large for a mammal, but typical for animals that use vibrational signals
29	**body**	First, its enormous body, which allows it to generate low-frequency sounds almost as powerful as those of a jet takeoff, provides an ideal frame for receiving ground vibrations and conducting them to the inner ear
30	**pad**	Second, the elephant's toe bones rest on a fatty pad that might help focus vibrations from the ground into the bone
31	**cavities/ sinus cavities**	The front of the skull is riddled with sinus cavities that may function as resonating chambers for vibrations from the ground
32	**trunks and feet**	How the elephants sense these vibrations is still unknown, but O'Connell-Rodwell who just earned a graduate degree in entomology at the University of Hawaii at Manoa, suspects the pachyderms are "listening" with then trunks and feet
33	**infrasonic**	Both trunk and feet contain two kinds of pressure-sensitive nerve endings—one that detects infrasonic vibrations and another that responds to vibrations with slightly higher frequencies

#	Answer	Explanation
34	**ecology**	“Our work is really at the interface of geophysics, neurophysiology and ecology,”
35	**seismic messages**	But O’Connell-Rodwell was the first to suggest that a large land animal also is sending and receiving seismic messages
36	**acoustic communication/acoustic communications**	It was just so fascinating to me, and it’s what got me to think, maybe there’s something else going on other than acoustic communication
37	**mate**	The difficulty of finding a mate in this vast wilderness is compounded by elephant reproductive biology
38	**ground**	The results of our 2002 study showed US that elephants do indeed detect warning calls played through the ground
39	**A**	Breeding herds also use low-frequency vocalizations to warn of predators. Adult bulls and cows have no enemies, except for humans, but young elephants are susceptible to attacks by lions and hyenas. When a predator appears, older members of the herd emit intense warning calls that prompt the rest of the herd to clump together for protection, then flee
40	**C**	Although still analyzing data from this experiment, O’Connell-Rodwell is able to make a few preliminary observations

Test 70

PASSAGE 1

Read the text below and answer questions 1-13.

Ambergris

A Ambergris was used to perfume cosmetics in the days of ancient Mesopotamia and almost every civilization on the earth has a brush with ambergris. Before 1,000 AD, the Chinese names ambergris as lung sien hiang, "dragon's spittle perfume," as they think that it was produced from the drooling of dragons sleeping on rocks at the edge of a sea. The Arabs knew ambergris as anbar, believing that it is produced from springs near seas. It also gets its name from here. For centuries, this substance has also been used as a flavouring for food.

B During the Middle Ages, Europeans used ambergris as a remedy for headaches, colds, epilepsy, and other ailments. In the 1851 whaling novel Moby-Dick, Herman Melville claimed that ambergris was “largely used in perfumery.” But nobody ever knew where it really came from. Experts were still guessing its origin thousands of years later, until the long ages of guesswork ended in the 1720's, when Nantucket whalers found gobs of the costly material inside the stomachs of sperm whales. Industrial whaling quickly burgeoned. By 20th century ambergris is mainly recovered from inside the carcasses of sperm whales.

C Through countless ages, people have found pieces of ambergris on sandy beaches. It was named grey amber to distinguish it from golden amber, another rare treasure. Both of them were among the most sought-after substances in the world, almost as valuable as gold. (Ambergris sells for roughly $20 a gram, slightly less than gold at $30 a gram.) Amber floats in salt water, and in old times the origin of both these substances was mysterious. But it turned out that amber and ambergris have little in common. Amber is a fossilized resin from trees that was quite familiar to Europeans long before the discovery of the New World, and prized as jewelry. Although considered a gem, amber is a hard, transparent, wholly-organic material derived from the resin of extinct species of trees, mainly pines.

D To the earliest Western chroniclers, ambergris was variously thought to come from the same bituminous sea founts as amber, from the sperm of fishes or whales, from the droppings of strange sea birds (probably because of confusion over the included beaks of squid) or from the large hives of bees living near the sea. Marco Polo was the first Western chronicler who correctly attributed ambergris to sperm whales and its vomit.

E As sperm whales navigate in the oceans, they often dive down to 2 km or more below the sea level to prey on squid, most famously the Giant Squid. It’s commonly accepted that ambergris forms in the whale’s gut or intestines as the creature attempts to "deal" with squid beaks. Sperm whales are rather partial to squid, but seemingly struggle to digest the hard, sharp, parrot-like beaks. It is thought their stomach juices become hyper-active trying to process the irritants, and eventually hard, resinous lumps are formed around the beaks, and then expelled

from their innards by vomiting. When a whale initially vomits up ambergris, it is soft and has a terrible smell. Some marine biologists compare it to the unpleasant smell of cow dung. But after floating on the salty ocean for about a decade, the substance hardens with air and sun into a smooth, waxy, usually rounded piece of nostril heaven. The dung smell is gone, replaced by a sweet, smooth, musky and pleasant earthy aroma.

F Since ambergris is derived from animals, naturally a question of ethics arises, and in the case of ambergris, it is very important to consider. Sperm whales are an endangered species, whose populations started to decline as far back as the 19th century due to the high demand for their highly emollient oil, and today their stocks still have not recovered. During the 1970's, the Save the Whales movement brought the plight of whales to international recognition. Many people now believe that whales are "saved". This couldn't be further from the truth. All around the world, whaling still exists. Many countries continue to hunt whales, in spite of international treaties to protect them. Many marine researchers are concerned that even the trade in naturally found ambergris can be harmful by creating further incentives to hunt whales for this valuable substance.

G One of the forms ambergris is used today is as a valuable fixative in perfumes to enhance and prolong the scent. But nowadays, since ambergris is rare and expensive, and big fragrance suppliers that make most of the fragrances on the market today do not deal in it for reasons of cost, availability and murky legal issues, most perfumeries prefer to add a chemical derivative which mimics the properties of ambergris. As a fragrance consumer, you can assume that there is no natural ambergris in your perfume bottle, unless the company advertises this fact and unless you own vintage fragrances created before the 1980s. If you are wondering if you have been wearing a perfume with this legendary ingredient, you may want to review your scent collection. Here are a few of some of the top ambergris containing perfumes: Givenchy Amarige, Chanel No. 5, and Gucci Guilty.

PART 1 — QUESTIONS

Questions 1-6

Classify the following information as referring to

A. ambergris only

B. amber only

C. both ambergris and amber

D. neither ambergris nor amber

A. ambergris only

B. amber only

C. both ambergris and amber

D. neither ambergris nor amber

	A	B	C	D
1 being expensive	○	○	○	○
2 adds flavor to food	○	○	○	○
3 used as currency	○	○	○	○
4 being see-through	○	○	○	○
5 referred to by Herman Melville	○	○	○	○
6 produces sweet smell	○	○	○	○

Questions 7-9

Complete the sentences below with NO MORE THAN ONE WORD from the passage.

- Sperm whales can't digest the **7** _____ of the squids.
- Sperm whales drive the irritants out of their intestines by **8** _____

- The vomit of sperm whale gradually **9** _____ on contact of air before having pleasant smell.

Questions 10-13

Do the following statements agree with the information given in Reading Passage 1?

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

10 Most ambergris comes from the dead whales today.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

11 Ambergris is becoming more expensive than before.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

12 Ambergris is still the most frequently used ingredient in perfume production today.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

13 New uses of ambergris have been discovered recently.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

PASSAGE 2

You should spend about 20 minutes on Questions 14-26, which are based on Reading Passage 2 below.

global warming: Prevent poles from melting

A Such is our dependence on fossil fuels, and such the volume of carbon dioxide we have already released into the atmosphere, that most climate scientists agree that significant global warming is now inevitable - the best we can hope to do is keep it at a reasonable level, and even that going to be an uphill task. At present, the only serious option on the table for doing this is cutting back on our carbon emissions, but a few countries are making major strides in this regard, the majority are having great difficulty even stemming the rate of increase, let alone reversing Consequently, an increasing number of scientists are beginning to explore the alternatives. They under the banner of geoengineering - generally defined as the intentional large-scale manipulation of the environment.

B Geoengineering has been shown to work, at least on a small, localised scale, for decades. May Day parades in Moscow have taken place under clear blue skies, aircraft having deposited dry ice, silver iodide (m $1) and cement powder to disperse clouds. Many of the schemes now suggested look to do the opposite, and reduce the amount of sunlight reaching the planet. One scheme focuses on achieving a general cooling of the Earth and involves the concept of releasing aerosol sprays into the stratosphere above the Arctic to create clouds of sulphur dioxide, which would, in turn, lead to a global dimming. The idea is modelled on historical volcanic explosions, such as that of Mount Pinatubo in the Philippines in 1991; which led to a short-term cooling of global temperatures by 0.5°c. The aerosols could be delivered by artillery, high-flying aircraft or balloons.

C Instead of concentrating on global cooling, other schemes look specifically at reversing the melting at the poles. One idea is to bolster an ice cap by spraying it with water. Using pumps to carry water from below the sea ice, the spray would come out as snow or ice particles, producing thicker sea ice with a higher albedo (the ratio of sunlight reflected from a surface) to reflect summer radiation. Scientists have also scrutinised whether it is possible to block iceflow in Greenland with cables which have been reinforced, preventing icebergs from moving into the sea. Veil Albert Kallio, a Finnish scientist, says that such an idea is impractical, because the force of the ice would ultimately snap the cables and rapidly release a large quantity of frozen ice into the sea. However, Kallio believes that the sort of cables used in suspension bridges could potentially be used to divert, rather than halt, the southward movement of ice from Spitsbergen. It would stop the ice moving south, and local currents would see them float northwards' he says.

D A number of geoengineering ideas are currently being examined in the Russian Arctic. These include planting millions of birch trees: the thinking, according to Kallio, is that their white bark would increase the amount of reflected sunlight. The loss of their leaves in winter would also enable the snow to reflect radiation. In contrast, the native evergreen pines tend to shade the snow and absorb radiation. Using ice-breaking vessels to deliberately break up and scatter

coastal sea ice in both Arctic and Antarctic waters in their respective autumns, and diverting Russian rivers to increase cold-water flow to ice-forming areas, could also be used to slow down warming, Kallio says. You would need the wind to blow the right way, but in the right conditions, by letting ice float free and head north, you would enhance ice growth.'

E But will such ideas ever be implemented? The major counter-arguments to geoengineering schemes are, first, that they are a 'cop-out' that allow US to continue living the way we do, rather than reducing carbon emissions; and, second, even if they do work, would the side-effects outweigh the advantages? Then there's the daunting prospect of upkeep and repair of any scheme as well as the consequences of a technical failure. 'I think all of US agree that if we were to end geoengineering on a given day, then the planet would return to its pre-engineered condition very rapidly, and probably within 10 to 20 years' says Dr Phil Rasch, chief scientist for climate change at the US-based Pacific Northwest National Laboratory. That's certainly something to worry about. I would consider geoengineering as a strategy to employ only we manage the conversion to a non-fossil- fuel economy. 'The risk with geoengineering projects is that you can "overshoot",' says Dr Dan hunt, from the University of Bristol. 'You may bring global temperatures back to pre-industrial levels, but the risk is that the poles will still be warmer than they should be and the tropics be cooler than before industrialization.'

F The main reason why geoengineering is countenanced by the mainstream scientific community is that most researchers have little faith in the of politicians to agree - and then bring in the necessary carbon cuts. Even leading conservation organisations believe the subject worth exploring. As Dr Martin Sommerkorn, a climate change advisor says.' But human-induced climate change has brought humanity to a position where it important not to exclude thinking thoroughly about this topic and its possibilities despite the potential drawbacks. If, over the coming years, the science US about an ever-increased climate sensitivity of the planet and this isn't unrealistic - then we may be best served by not having to start our thinking from scratch.

PART 2 — QUESTIONS

Questions 14-18

Which paragraph contains the following information?

Write the correct letter, A-F. You may use any letter more than once.

	A	B	C	D	E	F
14 the existence of geoengineering projects distracting from the real task of changing the way we live	○	○	○	○	○	○
15 circumstances in which geoengineering has demonstrated success	○	○	○	○	○	○
16 Frustrating maintenance problems associated with geoengineering projects	○	○	○	○	○	○
17 support for geoengineering being due to a lack of confidence in governments	○	○	○	○	○	○
18 more success in fighting climate change in some parts of the world than others	○	○	○	○	○	○

Questions 19-23

Complete the summary below.

Choose NO MORE THAN TWO WORDS from the passage for each answer.

Geoengineering projects

A range of geoengineering ideas has been put forward, which aim either to prevent the melting of the ice caps or to stop the general rise in global temperatures. One scheme to discourage the melting of ice and snow involves introducing **19** _____ to the Arctic because of their colour. The build-up of ice could be encouraged by dispersing ice along the coasts using special ships and changing the direction of some **20** _____ but this scheme is dependent on certain weather conditions. Another way of increasing the amount of ice involves using **21** _____ to bring water to the surface. A scheme to stop ice moving would apply **22** _____ but this method is more likely to be successful in preventing the ice from travelling in one direction rather than

stopping it altogether. A suggestion for cooling global temperatures is based on what has happened in the past after **23** _____ and it involves creating clouds of gas.

Questions 24-26

Look at the following people (Questions 24-26) and the list of opinions below.

Match each person with the correct opinion, A-E.

A. The problems of geoengineering shouldn't mean that ideas are not seriously considered.

B. Some geoengineering projects are more likely to succeed than others,

C. Geoengineering only offers a short-term relief.

D. A positive outcome of geoengineering may have a negative consequence elsewhere.

E. Most geoengineering projects aren't clear in what they are aiming at.

	A	B	C	D	E
24 Phil Rasch	○	○	○	○	○
25 DanLunt	○	○	○	○	○
26 Martin Sommerkorn	○	○	○	○	○

PASSAGE 3

Read the text below and answer questions 27-40.

Sunset for the Oil Business

The world is about to run out of oil. Or perhaps not. It depends whom you believe...

A Members of the Department Analysis Centre (ODAC) recently met in London and presented technical data that support their grim forecast that the world is perilously close to running out of oil. Leading lights of this moment, including the geologists Colin Campbell, rejected rival views presented by American geological survey and the international energy agency that contradicted their findings. Dr. Campbell even decried the amazing display of ignorance, denial and obfuscation by government, industry and academics on this topic.

B So is the oil really running out? The answer is easy: Yes. Nobody seriously disputes the notion that oil is, for all practical purposes, a non-renewable resource that will run out some day, be that years or decades away. The harder question is determining when precisely oil will begin to get scarce. And answering that question involves scaling Hubbert's peak.

C M. King Hubbert, a Shell geologist of legendary status among depletion experts, forecast in 1956 that oil production in the United States would peak in the early 1970s and then slowly decline, in something resembling a bell-shaped curve. At the time, his forecast was controversial, and many rubbished it. After 1970, however, empirical evidence proved him correct: oil production in America did indeed peak and has been in decline ever since.

D Dr Hubbert's analysis drew on the observation that oil production in a new area typically rises quickly at first, as the easiest and cheapest reserves are tapped. Over time, reservoirs age and go into decline, and so lifting oil becomes more expensive. Oil from that area then becomes less competitive in relation to other fuels, or to oil from other areas. As a result, production slows down and usually tapers off and declines. That, he argued, made for a bell-shaped curve.

E His successful prediction has emboldened a new generation of geologists to apply his methodology on a global scale. Chief among them are the experts at ODAC, who worry that the global peak in production will come in the next decade. Dr Campbell used to argue that the peak should have come already; he now thinks it is just round the comer. A heavyweight has now joined this gloomy chorus. Kenneth Deffeyes of Princeton University argues in a lively new book ("The View from Hubbert's Peak") that global oil production could peak as soon as 2004.

F That sharply contradicts mainstream thinking. America's Geological Survey prepared an exhaustive study of oil depletion last year (in part to rebut Dr Campbell's arguments) that put the peak of production some decades off. The IEA has just weighed in with its new "World Energy Outlook", which foresees enough oil to comfortably meet demand to 2020 from remaining reserves. René Dahan, one of ExxonMobil's top managers, goes further: with an assurance characteristic of the world's largest energy company, he insists that the world will be awash in oil for another 70 years.

G Who is right? In making sense of these wildly opposing views, it is useful to look back at the pitiful history of oil forecasting. Doomsters have been predicting dry wells since the 1970s, but so far the oil is still gushing. Nearly all the predictions for 2000 made after the 1970s oil shocks were far too pessimistic. America's Department of Energy thought that oil would reach $150 a barrel (at 2000 prices); even Exxon predicted a price of $100.

H Michael Lynch of DRI-WEFA, an economic consultancy, is one of the few oil forecasters who has got things generally right. In a new paper, Dr Lynch analyses those historical forecasts. He finds evidence of both bias and recurring errors, which suggests that methodological mistakes (rather than just poor data) were the problem. In particular, he faults forecasters who used Hubbert-style analysis for relying on fixed estimates of how much "ultimately recoverable" oil there really is below ground, in the industry's jargon: that figure, he insists, is actually a dynamic one, as improvements in infrastructure, knowledge and technology raise the amount of oil which is recoverable.

I That points to what will probably determine whether the pessimists or the optimists are right: technological innovation. The first camp tends to be dismissive of claims of forthcoming technological revolutions in such areas as deep-water drilling and enhanced recovery. Dr Deffeyes captures this end-of-technology mindset well. He argues that because the industry has already spent billions on technology development, it makes it difficult to ask today for new technology, as most of the wheels have already been invented.

J Yet techno-optimists argue that the technological revolution in oil has only just begun. Average recovery rates (how much of the known oil in a reservoir can actually be brought to the surface) are still only around 30-35%. Industry optimists believe that new techniques on the drawing board today could lift that figure to 50-60% within a decade.

K Given the industry's astonishing track record of innovation, it may be foolish to bet against it. That is the result of adversity: the nationalisations of the 1970s forced Big Oil to develop reserves in expensive, inaccessible places such as the North Sea and Alaska, undermining Dr Hubbert's assumption that cheap reserves are developed first. The resulting upstream investments have driven down the cost of finding and developing wells over the last two decades from over $20 a barrel to around $6 a barrel. The cost of producing oil has fallen by half, to under $4 a barrel.

L Such miracles will not come cheap, however, since much of the world's oil is now produced in ageing fields that are rapidly declining. The IEA concludes that global oil production need not peak in the next two decades if the necessary investments are made. So how much is necessary? If oil companies are to replace the output lost at those ageing fields and meet the world's ever-rising demand for oil, the agency reckons they must invest $1 trillion in non-OPEC countries over the next decade alone. That's quite a figure.

PART 3 — QUESTIONS

Questions 27-31

Do the following statements agree with the claims of the writer in Reading Passage 3?

YES if the statement agrees with the information

NO if the statement contradicts the information

NOT GIVEN if there is no information on this

27 Hubbert has a high-profile reputation amongst ODAC members.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

28 Oil is likely to last longer than some other energy sources.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

29 The majority of geologists believe that oil will start to run out some time this decade.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

30 Over 50 percent of the oil we know about is currently being recovered.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

31 History has shown that some of Hubbet's principles were mistaken.

A ○ YES

B ○ NO

C ○ NOT GIVEN

Questions 32-35

Complete the notes below

Choose ONE WORD ONLY from the passage for each answer.

Many people believed Hubbert's theory was **32** _____ when it was originally presented.

When an oilfield is **33** _____, it is easy to rise.

The recovery of the oil gets more **34** _____ as the reservoir gets older

The oilfield can't be as **35** _____ as other area.

Questions 36-40

Look at the following statements (questions 36-40) and the of people below.

Match each statement with correct person, A-E.

NB: You may use any letter more than once.

A. Colin Campbell

B. M. King Hubbert

C. Kenneth Deffeyes

D. Rene Dahan

E. Michael Lynch

	A	B	C	D	E
36 has found fault in geological research procedure	○	○	○	○	○

	A	B	C	D	E
37 has provided the longest-range forecast regarding oil supply	○	○	○	○	○
38 has convinced others that oil production will follow a particular model	○	○	○	○	○
39 has accused fellow scientists of refusing to see the truth	○	○	○	○	○
40 has expressed doubt over whether improved methods of extracting oil are possible.	○	○	○	○	○

Answer Key

#	Answer	Explanation
1	**C**	Both of them were among the most sought-after substances in the world, almost as valuable as gold
2	**A**	For centuries, this substance has also been used as a flavouring for food
3	**D**	Both of them were among the most sought-after substances in the world, almost as valuable as gold. (Ambergris sells for roughly $20 a gram, slightly less than gold at $30 a gram.)
4	**B**	Although considered a gem, amber is a hard, transparent, wholly-organic material derived from the resin of extinct species of trees, mainly pines
5	**A**	In the 1851 whaling novel Moby-Dick, Herman Melville claimed that ambergris was “largely used in perfumery.”
6	**A**	The dung smell is gone, replaced by a sweet, smooth, musky and pleasant earthy aroma
7	**beaks**	Sperm whales are rather partial to squid, but seemingly struggle to digest the hard, sharp, parrot-like beaks
8	**vomiting**	It is thought their stomach juices become hyper-active trying to process the irritants, and eventually hard, resinous lumps are formed around the beaks, and then expelled from their innards by vomiting
9	**hardens**	But after floating on the salty ocean for about a decade, the substance hardens with air and sun into a smooth, waxy, usually rounded piece of nostril heaven
10	**TRUE**	By 20th century ambergris is mainly recovered from inside the carcasses of sperm whales
11	**NOT GIVEN**	(Ambergris sells for roughly $20 a gram, slightly less than gold at $30 a gram.)
12	**FALSE**	But nowadays, since ambergris is rare and expensive, and big fragrance suppliers that make most of the fragrances on the market today do not deal in it for reasons of cost, availability and murky legal issues, most perfumeries prefer to add a chemical derivative which mimics the properties of ambergris
13	**NOT GIVEN**	One of the forms ambergris is used today is as a valuable fixative in perfumes to enhance and prolong the scent

#	Answer	Explanation
14	**E**	The major counter-arguments to geoengineering schemes are, first, that they are a 'cop-out' that allow US to continue living the way we do, rather than reducing carbon emissions
15	**B**	Geoengineering has been shown to work, at least on a small, localised scale, for decades. May Day parades in Moscow have taken place under clear blue skies, aircraft having deposited dry ice, silver iodide (m $1) and cement powder to disperse clouds
16	**E**	Then there's the daunting prospect of upkeep and repair of any scheme as well as the consequences of a technical failure
17	**F**	The main reason why geoengineering is countenanced by the mainstream scientific community is that most researchers have little faith in the of politicians to agree – and then bring in the necessary carbon cuts
18	**A**	a few countries are making major strides in this regard, the majority are having great difficulty even stemming the rate of increase, let alone reversing
19	**birch trees**	A number of geoengineering ideas are currently being examined in the Russian Arctic. These include planting millions of birch trees: the thinking, according to Kallio, is that their white bark would increase the amount of reflected sunlight
20	**Russian rivers**	Using ice-breaking vessels to deliberately break up and scatter coastal sea ice in both Arctic and Antarctic waters in their respective autumns, and diverting Russian rivers to increase cold-water flow to ice-forming areas, could also be used to slow down warming, Kallio says
21	**pumps**	Using pumps to carry water from below the sea ice, the spray would come out as snow or ice particles, producing thicker sea ice with a higher albedo (the ratio of sunlight reflected from a surface) to reflect summer radiation
22	**cables**	However, Kallio believes that the sort of cables used in suspension bridges could potentially be used to divert, rather than halt, the southward movement of ice from Spitsbergen
23	**volcanic explosions**	The idea is modelled on historical volcanic explosions, such as that of Mount Pinatubo in the Philippines in 1991; which led to a short-term cooling of global temperatures by 0.5°c
24	**C**	'I think all of US agree that if we were to end geoengineering on a given day, then the planet would return to its pre-engineered condition very rapidly, and probably within 10 to 20 years' says Dr Phil Rasch, chief scientist for climate change at the US-based Pacific Northwest National Laboratory

#	Answer	Explanation
25	**D**	'The risk with geoengineering projects is that you can "overshoot",' says Dr Dan hunt, from the University of Bristol. 'You may bring global temperatures back to pre-industrial levels, but the risk is that the poles will still be warmer than they should be and the tropics be cooler than before industrialization.'
26	**A**	As Dr Martin Sommerkorn, a climate change advisor says.' But human-induced climate change has brought humanity to a position where it important not to exclude thinking thoroughly about this topic and its possibilities despite the potential drawbacks
27	**YES**	M. King Hubbert, a Shell geologist of legendary status among depletion experts His successful prediction has emboldened a new generation of geologists to apply his methodology on a global scale. Chief among them are the experts at ODAC
28	**NOT GIVEN**	Nobody seriously disputes the notion that oil is, for all practical purposes, a non-renewable resource that will run out some day, be that years or decades away
29	**NO**	That sharply contradicts mainstream thinking. America's Geological Survey prepared an exhaustive study of oil depletion last year (in part to rebut Dr Campbell's arguments) that put the peak of production some decades off
30	**NO**	Average recovery rates (how much of the known oil in a reservoir can actually be brought to the surface) are still only around 30-35%
31	**YES**	That is the result of adversity: the nationalisations of the 1970s forced Big Oil to develop reserves in expensive, inaccessible places such as the North Sea and Alaska, undermining Dr Hubbert's assumption that cheap reserves are developed first
32	**controverial**	At the time, his forecast was controversial, and many rubbished it
33	**tapped/new**	Dr Hubbert's analysis drew on the observation that oil production in a new area typically rises quickly at first, as the easiest and cheapest reserves are tapped
34	**expensive**	Over time, reservoirs age and go into decline, and so lifting oil becomes more expensive
35	**competitive**	Oil from that area then becomes less competitive in relation to other fuels, or to oil from other areas
36	**E**	He finds evidence of both bias and recurring errors, which suggests that methodological mistakes (rather than just poor data) were the problem. In particular, he faults forecasters who used Hubbert-style analysis for relying on fixed estimates of how

#	Answer	Explanation
		much “ultimately recoverable” oil there really is below ground, in the industry’s jargon: that figure, he insists, is actually a dynamic one, as improvements in infrastructure, knowledge and technology raise the amount of oil which is recoverable
37	**D**	René Dahan, one of ExxonMobil’s top managers, goes further: with an assurance characteristic of the world’s largest energy company, he insists that the world will be awash in oil for another 70 years
38	**B**	His successful prediction has emboldened a new generation of geologists to apply his methodology on a global scale
39	**A**	Dr. Campbell even decried the amazing display of ignorance, denial and obfuscation by government, industry and academics on this topic
40	**C**	Dr Deffeyes captures this end-of-technology mindset well. He argues that because the industry has already spent billions on technology development, it makes it difficult to ask today for new technology, as most of the wheels have already been invented

Test 71

PASSAGE 1

Build a Medieval Castle

A. Michel Guyot, owner and restorer of Saint Fargeau castle in France, first had the idea of building a 13th-century style fortress following the discovery that the 15th-century red bricks of his castle obscured the stone walls of a much older stronghold. His dream was to build a castle just as it would have been in the Middle Ages, an idea which some found mildly amusing and others dismissed as outright folly. However, Maryline Martin project director - was inspired by the exciting potential for the venture to regenerate the region. It took several months to bring together and mobilise all the various different partners: architects, archaeologists and financial backers. A site in the heart of Guédelon forest was found: a site which offered not only all the resources required for building a castle a stone quarry, an oak forest and a water supply - but in sufficient quantities to satisfy the demands of this gigantic site. The first team started work and on June 20th 1997 the first stone was laid.

B. Unlike any other present-day building site, Michel Guyot's purpose is clear, he warmly welcomes members of the public to participate. The workers' role is to demonstrate and explain, to a wide audience, the skills of our forefathers. Stone quarrying, the building of vaulted ceilings, the blacksmith's work and the raising of roof timbers are just some of the activities which visitors can witness during a visit to Guédelon. The workers are always on hand to talk about their craft and the progress of the castle. Each year 60,000 children visit Guédelon with their schools. The site is an excellent educational resource, bringing to life the history of the Middle Ages. Guided tours are tailored to the school curriculum and according to age groups: activity trails for primary school children and interactive guided tours for secondary school children. Pupils of all ages have the opportunity to follow in the footsteps of medieval stonemasons by taking part in a stonecarving workshop or discover the secrets of the medieval master-builders at the geometry workshop.

Workers in the Burgundy region of France are building a 13th century castle. They're not restoring an old castle. They're actually building a new old castle. See the builders are constructing it from scratch. The craftsmen have been working for nearly ten years now but they're not even halfway done yet. That's because they're using only medieval tools and techniques. The World's Gerry Hadden takes US to the site of what will be the Guedelon Castle. Another reason said by Jean Francois, a member of Guedelon stone cutter's guild, for eight hours a day he bangs on a 13th century chisel with a 13th century iron mallet.

D. The progress of construction has to give way to tourists side for their visits. The visitors from 2010, however unsightly they may be, are vital to the project. The initial funding came not from pillaging the local peasantry but from regional councils, the European Union and large companies. For the last 10 years, Guédelon, 100 miles southeast of Paris, has funded itself from its entrance fees. Last year it had a record 300,000 visitors, who paid almost €2.5m, making it the second most-visited site in Burgundy. The most-visited site was the Hospice de Beaune, a

beautiful 15th-century almshouse built 600 years before, or, if you prefer, 200 years "after", Guédelon.

E. limestone is found in the construction of various local buildings, from the great and prestigious edifice of Ratilly castle to the more modest poyaudines houses. This stone contains 30-40% iron oxide; this can make it extremely hard to extract and dress. Having studied the block in order to determine and anticipate the natural fault lines of the stone, the quarrymen first carve a series of rectilinear holes into the block. Iron wedges are then hammered into this line of holes. The shockwaves produced by the quarrymen's sledgehammers cause the stone to split along a straight line. The highest quality blocks are dressed to produce lintels, voussoirs, corbels, ashlars etc. The medium quality blocks are roughly shaped by the stonecutters and used on the uncoursed curtain walls, and as facing stones on the castle's inner walls. There are water-filled clay pits in the forest. Clay is taken from these pits, cleaned and pugged. It is then shaped in wooden moulds to form bricks. After the bricks have been left to air-dry, they are fired in a woodfired kiln for about 12 hours, at roughly 1000°c.

F. The mortar is the "glue" used to bind the castle's stones. It is made up of precise doses of lime, sand and water. The people working there wear the tunics, skirts and headgear that they might have worn then, but they wear these over jeans and shoes with reinforced toes. They mix their mortar primarily as they would have done then, using sand they dig themselves, but they are not allowed to use the extremely effective hot lime from medieval days, because of its toxicity, and so they add a modem chemical ingredient instead, to achieve the same effect. Workers in the Mid Age obviously were unaware of it and some died earlier by inhaling toxic gas. And so, we met many wonderful people who do not pretend to be anything but modem human beings practicing an old technique and finding out what it would have felt like, as much as possible, to do it with only the resources of an older time.

G. We also learned that even if there is a straight lintel across a doorway, you will usually find an arch of stones built into the wall differently. Because of the physics of an arch, which channels the weight above it down into whatever is supporting it at each side instead of pressing down in the middle, this helps to take a lot of the weight off of the lintel itself, whether it is free standing or buried in the wall against the impact of warfare. The arch is the strongest element for spanning space in stone architecture. This is why, in ancient ruins, you will often find the entire wall missing, and the arched windows and doorways still standing, in beautiful patterns against the sky.

PART 1 — QUESTIONS

Questions 1-4

Do the following statements agree with the information given in Reading Passage 1? Write

TRUE if the Statement is true

FALSE if the statement is false

NOT GIVEN if the information is not given in the passage

1 The French people would not abandon his idea in favor of realistic one.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

2 One aim of the castle is to show the ancestral achievement to public.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

3 Short lifespan of workers was due to overdue heating.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

4 stones were laid not in a straight line arrangement to avoid damaging or collapsing.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

Questions 5-10

Complete the following summary of the paragraphs of Reading Passage, using A-L from the following options for each answer.

Limestone Processing:

When **5** _____ found suitable block, they began to cut lines of **6** _____ into it. **7** _____ were used and knocked into and generated shockwaves to make stone **8** _____. Different qualities of blocks would be used in different place of castle. On the other hand, **9** _____ were shaped from clay in a mould and went through a process of **10** _____ for about 12 hours.

A. **metal vedge** B. **hammer handle** C. **lift** D. **Masons** E. **patterns**
F. **heating** G. **bricks** H. **wood** I. **experts** J. **split** K. **walls**
L. **holes**

Questions 11-13

Choose three correct letters, A-F.

11 **12** **13** Why does the castle building project last 10 years for just half progress?

- **A** ☐ They lack of enough funds
- **B** ☐ Guedelon castle needs a time-consuming design
- **C** ☐ Workers obeyed modem working hours
- **D** ☐ Their progress were delayed by unpredictable weather
- **E** ☐ Guedelon castle need to receive valuable visitors
- **F** ☐ They used old techniques and skills
- **G** ☐ Stone processing need more labour and time

PASSAGE 2

Smell and Memory: SMELLS LIKE YESTERDAY

Why does the scent of a fragrance or the mustiness of an old trunk trigger such powerful memories of childhood? New research has the answer, writes Alexandra Witze.

A. You probably pay more attention to a newspaper with your eyes than with your nose. But lift the paper to your nostrils and inhale. The smell of newsprint might carry you back to your childhood, when your parents perused the paper on Sunday mornings. Or maybe some other smell takes you back- the scent of your mother's perfume, the pungency of a driftwood campfire. Specific odours can spark a flood of reminiscences. Psychologists call it the "Proustian phenomeno" after French novelist Marcel Proust. Near the beginning of the masterpiece In Search of Lost Time, Proust's narrator dunks a madeleine cookie into a cup of tea and the scent and taste unleash a torrent of childhood memories for 3000 pages.

B. Now, this phenomenon is getting the scientific treatment. Neuroscientists Rachel Herz, a cognitive neuroscientist at Brown University in Providence, Rhode Island, have discovered, for instance, how sensory memories are shared across the brain, with different brain regions remembering the sights, smells, tastes and sounds of a particular experience. Meanwhile, psychologists have demonstrated that memories triggered by smells can be more emotional, as well as more detailed, than memories not related to smells. When you inhale, odour molecules set brain cells dancing within a region known as the imygdala (E), a part of the brain that helps control emotion. In contrast, the other senses, such as taste or touch, get routed through other parts of the brain before reaching the amygdala. The direct link between odours and the amygdala may help explain the emotional potency of smells. ″There is this unique connection between the sense of smell and the part of the brain that processes emotion," says Rachel Herz.

C. But the links don't stop there. Like an octopus reaching its tentacles outward, the memory of smells affects other brain regions as well. In recent experiments, neuroscientists at University College London (UCL) asked 15 volunteers to look at pictures while smelling unrelated odours. For instance, the subjects might see a photo of a duck paired with the scent of a rose, and then be asked to create a story linking the two. Brain scans taken at the time revealed that the volunteers′brains were particularly active in a region known as the factory cortex, which is known to be involved in processing smells. Five minutes later, the volunteers were shown the duck photo again, but without the rose smell. And in their brains, the olfactory cortex lit up again, the scientists reported recently. The fact that the olfactory cortex became active in the absence of the odour suggests that people's sensory memory of events is spread across different brain regions. Imagine going on a seaside holiday, says UCL team leader, Jay Gottfried. The sight of the waves becomes stored in one area, whereas the crash of the surf goes elsewhere, and the smell of seaweed in yet another place. There could be advantages to having memories spread around the brain. "You can reawaken that memory from any one of the sensory triggers," says Gottfried. "Maybe the smell of the sun lotion, or a particular sound from that day, or the sight of a rock formation." Or - in the case of an early hunter and gatherer (out

on a plain - the sight of a lion might be enough to trigger the urge to flee, rather than having to wait for the sound of its roar and the stench of its hide to kick in as well.

D. Remembered smells may also carry extra emotional baggage, says Herz. Her research suggests that memories triggered by odours are more emotional than memories triggered by other cues. In one recent study, Herz recruited five volunteers who had vivid memories associated with a particular perfume, such as opium for Women and Juniper Breeze from Bath and Body Works. She took images of the volunteers' brains as they sniffed that perfume and an unrelated perfume without knowing which was which. (They were also shown photos of each perfume bottle.) Smelling the specified perfume activated the volunteers brains the most, particularly in the amygdala, and in a region called the hippocampus which helps in memory formation. Herz published the work earlier this year in the journal Neuropsychologia.

E. But she couldn't be sure that the other senses wouldn't also elicit a strong response. So in another study Herz compared smells with sounds and pictures. She had 70 people describe an emotional memory involving three items - popcorn, fresh-cut grass and a campfire. Then they compared the items through sights, sounds and smells. For instance, a person might see a picture of a lawnmower, then sniff the scent of grass and finally listen to the lawnmower's sound. Memories triggered by smell were more evocative than memories triggered by either sights or sounds.

F. Odour-evoked memories may be not only more emotional, but more detailed as well. Working with colleague John Downes, psychologist Simon Chu of the University of Liverpool started researching odour and memory partly because of his grandmother's stories about Chinese culture. As generations gathered to share oral histories, they would pass a small pot of spice or incense around; later, when they wanted to remember the story in as much detail as possible, they would pass the same smell around again. "It's kind of fits with a lot of anecdotal evidence on how smells can be really good reminders of past experiences," Chu says. And scientific research seems to bear out the anecdotes. In one experiment, Chu and Downes asked 42 volunteers to tell a life story, then tested to see whether odours such as coffee and cinnamon could help them remember more detail in the story. They could.

G. Despite such studies, not everyone is convinced that Proust can be scientifically analysed. In the June issue of Chemical Senses, Chu and Downes exchanged critiques with renowned perfumer and chemist J. Stephan Jellinek. Jellinek chided the Liverpool researchers for, among other things, presenting the smells and asking the volunteers to think of memories, rather than seeing what memories were spontaneously evoked by the odours. But there's only so much science can do to test a phenomenon that's inherently different for each person, Chu says. Meanwhile, Jellinek has also been collecting anecdotal accounts of Proustian experiences, hoping to find some common links between the experiences. "I think there is a case to be made that surprise may be a major aspect of the Proust phenomenon," he says. "That's why people are so struck by these memories." No one knows whether Proust ever experienced such a transcendental moment. But his notions of memory, written as fiction nearly a century ago, continue to inspire scientists of today.

PART 2 — QUESTIONS

Questions 14-18

Use the information in the passage to match the people (listed A-C) with opinions or deeds below. Write the appropriate letters A-C.

NB you may use any letter more than once

A. Rachel Herz

B. Simon Chu

C. Jay Gottfried

	A	B	C
14 Found pattern of different sensory memories stored in various zones of a brain.	○	○	○
15 Smell brings detailed event under a smell of certain substance.	○	○	○
16 Connection of smell and certain zones of brain is different with that of other senses.	○	○	○
17 Diverse locations of stored information help US keep away the hazard.	○	○	○
18 There is no necessary correlation between smell and processing zone of brain.	○	○	○

Questions 19-22

Choose the correct letter, A, B, c or D.

19 In paragraph B, what do the experiments conducted by Herz and other scientists show?

A ○ Women are more easily addicted to opium medicine

B ○ Smell is superior to other senses in connection to the brain

C ○ Smell is more important than other senses

D ○ certain part of brain relates the emotion to the sense of smell

20 What does the second experiment conducted by Herz suggest?

- **A** ○ Result directly conflicts with the first one
- **B** ○ Result of her first experiment is correct
- **C** ○ Sights and sounds trigger memories at an equal level
- **D** ○ Lawnmower is a perfect example in the experiment

21 What is the outcome of experiment conducted by Chu and Downes?

- **A** ○ smell is the only functional under Chinese tradition
- **B** ○ half of volunteers told detailed stories
- **C** ○ smells of certain odours assist story tellers
- **D** ○ odours of cinnamon is stronger than that of coffee

22 What is the comment of Jellinek to Chu and Downers in the issue of Chemical Senses'.

- **A** ○ Jellinek accused their experiment of being unscientific
- **B** ○ Jellinek thought Liverpool is not a suitable place for experiment
- **C** ○ Jellinek suggested that there was no further clue of what specific memories aroused
- **D** ○ Jellinek stated that experiment could be remedied

Questions 23-26

Complete the following summary of the paragraphs of Reading Passage, using no more than three words from the Reading Passage for each answer.

In the experiments conducted by UCL, participants were asked to look at a picture with a scent of a flower, then in the next stage, everyone would have to **23** _____ for a connection. A method called **24** _____ suggested that specific area of brain named **25** _____ were quite active. Then in an another parallelled experiment about Chinese elders, storytellers could recall detailed anecdotes when smelling a bowl of **26** _____ or incense around.

PASSAGE 3

Memory Decoding

Try this memory test: Study each face and compose a vivid image for the person's first and last name. Rose Leo, for example, could be a rosebud and a lion. Fill in the blanks on the next page. The Examinations School at Oxford University is an austere building of oak-paneled rooms, large Gothic windows, and looming portraits of eminent dukes and earls. It is where generations of Oxford students have tested their memory on final exams, and it is where, last August, 34 contestants gathered at the World Memory Championships to be examined in an entirely different manner.

A. In timed trials, contestants were challenged to look at and then recite a two-page poem, memorize rows of 40-digit numbers, recall the names of 110 people after looking at their photographs, and perform seven other feats of extraordinary retention. Some tests took just a few minutes; others lasted hours. In the 14 years since the World Memory Championships was founded, no one has memorized the order of a shuffled deck of playing cards in less than 30 seconds. That nice round number has become the four-minute mile of competitive memory, a benchmark that the world's best "mental athletes," as some of them like to be called, are closing in on. Most contestants claim to have just average memories, and scientific testing confirms that they're not just being modest. Their feats are based on tricks that capitalize on how the human brain encodes information. Anyone can learn them.

B. Psychologists Elizabeth Valentine and John Wilding, authors of the monograph Superior Memory, recently teamed up with Eleanor Maguire, a neuroscientist at University College London to study eight people, including Karsten, who had finished near the top of the World Memory Championships. They wondered if the contestants' brains were different in some way. The researchers put the competitors and a group of control subjects into an MRI machine and asked them to perform several different memory tests while their brains were being scanned When it came to memorizing sequences of three-digit numbers, the difference between the memory contestants and the control subjects was, as expected, immense. However, when they were shown photographs of magnified snowflakes, images that the competitors had never tried to memorize before, the champions did no better than the control group. When the researchers analyzed the brain scans, they found that the memory champs were activating some brain regions that were different from those the control subjects were using. These regions, which included the right posterior hippocampus, are known to be involved in visual memory and spatial navigation.

C. It might seem odd that the memory contestants would use visual imagery and spatial navigation to remember numbers, but the activity makes sense when their techniques are revealed Cooke, a 23-year-old cognitive-science graduate student with a shoulder-length mop of curly hair, is a grand master of brain storage. He can memorize the order of 10 decks of playing cards in less than an hour or one deck of cards in less than a minute. He is closing in on the 30-second deck. In the Lamb and Flag, Cooke pulled out a deck of cards and shuffled it. He held up three cards—the 7 of spades, the queen of clubs, and the 10 of spades. He pointed at a

fireplace and said, "Destiny's Child is whacking Franz Schubert with handbags." The next three cards were the king of hearts, the king of spades, and the jack of clubs.

D. How did he do it? Cooke has already memorized a specific person, verb, and object that he associates with each card in the deck. For example, for the 7 of spades, the person (or, in this case, persons) is always the singing group Destiny's Child, the action is surviving a storm, and the image is a dinghy. The queen of clubs is always his friend Henrietta, the action is thwacking with a handbag, and the image is of wardrobes filled with designer clothes. When Cooke commits a deck to memory, he does it three cards at a time. Every three-card group forms a single image of a person doing something to an object. The first card in the triplet becomes the person, the second the verb, the third the object. He then places those images along a specific familiar route, such as the one he took through the Lamb and Flag. In competitions, he uses an imaginary route that he has designed to be as smooth and downhill as possible. When it comes time to recall, Cooke takes a mental walk along his route and translates the images into cards. That's why the MRIs of the memory contestants showed activation in the brain areas associated with visual imagery and spatial navigation.

E. The more resonant the images are, the more difficult they are to forget. But even meaningful information is hard to remember when there's a lot of it. That's why competitive memorizers place their images along an imaginary route. That technique, known as the loci method, reportedly originated in 477 B.C. with the Greek poet Simonides of Ceos. Simonides was the sob survivor of a roof collapse that killed all the other guests at a royal banquet The bodies were mangled beyond recognition, but Simonides was able to reconstruct the guest list by closing his eyes and recalling each individual around the dinner table. What he had discovered was that our brains are exceptionally good at remembering images and spatial information. Evolutionary psychologists have offered an explanation: Presumably our ancestors found it important to recall where they found their last meal or the way back to the cave. After Simonides' discovery the loci method became popular across ancient Greece as a trick for memorizing speeches and texts. Aristotle wrote about it, and later a number of treatises on the art of memory were published in Rome. Before printed books, the art of memory was considered a staple of classical education, on a par with grammar, logic, and rhetoric.

F. The most famous of the naturals was the Russian journalist S. V. Shereshevski, who could recall tong lists of numbers memorized decades earlier, as well as poems, strings of nonsense syllables, and just about anything else he was asked to remember. "The capacity of his memory had no distinct limits," wrote Alexander Luria, the Russian psychologist who studied Shereshevski from the 1920s to the 1950s. Shereshevski also had synesthesia, a rare condition in which the senses become intertwined. For example, every number may be associated with a color or every word with a taste. Synesthetic reactions evoke a response in more areas of the brain, making memory easier.

G. K. Anders Ericsson, a Swedish-born psychologist at Florida State University, thinks anyone can acquire Shereshevski's skills. He cites an experiment with s. R, an undergraduate who was paid to take a standard test of memory called the digit span for one hour a day, two or three days a week. When he started, he could hold, like most people, only about seven digits in his head at any given time (conveniently, the length of a phone number). Over two years, s. F. completed 250 hours of testing. By then, he had stretched his digit span from 7 to more than

80. The study of s. F. led Ericsson to believe that innately superior memory doesn't exist at all When he reviewed original case studies of naturals, he found that exceptional memorizers were using techniques —sometimes without realizing it and tots of practice. Often, exceptional memory was only for a single type of material, like digits. "If we took at some of these memory tasks, they're the kind of thing most people don't even waste one hour practicing, but if they wasted 50 hours, they'd be exceptional at it," Ericsson says. It would be remarkable, he adds, to find a "person who is exceptional across a number of tasks. I don't think that there's any compelling evidence that there are such people."

PART 3 — QUESTIONS

Questions 27-31

The reading Passage has seven paragraphs A-G.

Which paragraph contains the following information? Write the correct letter A-G.

	A	B	C	D	E	F	G
27 The reason why competence of super memory is significant in academic settings	○	○	○	○	○	○	○
28 Mention of a contest for extraordinary memory held in consecutive years	○	○	○	○	○	○	○
29 An demonstrative example of extraordinary person did an unusual recalling game	○	○	○	○	○	○	○
30 A belief that extraordinary memory can be gained though enough practice	○	○	○	○	○	○	○
31 A depiction of rare ability which assist the extraordinary memory reactions	○	○	○	○	○	○	○

Questions 32-36

Complete the following summary of the paragraphs of Reading Passage, using no more than three words from the Reading Passage for each answer.

Using visual imagery and spatial navigation to remember numbers are investigated and explained. A man called Ed Cooke in a pub, spoke a string of odd words when he held 7 of the spades (the first one of the any cards group) was remembered as he encoded it to a **32** _____ and the card deck to memory are set to be one time of an order of **33** _____; When it comes time to recall, Cooke took a **34** _____ along his way and interpreted the imaginary scene into cards. This superior memory skill can be traced back to Ancient Greece, the strategy was called **35** _____ which had been a major subject in ancient **36** _____.

Questions 37-38

Choose TWO correct letter, A-E

37 **38** 'According to World Memory Championships, what activities need good memory?

- **A** ☐ order for a large group of each digit
- **B** ☐ recall people's face
- **C** ☐ resemble a tong Greek poem
- **D** ☐ match name with pictures and features
- **E** ☐ recall what people ate and did yesterday

Questions 39-40

Choose TWO correct letter, A-E

39 **40** What is the result of Psychologists Elizabeth Valentine and John Wilding *s MRI Scan experiment find out?

- **A** ☐ the champions ' brains is different in some way from common people
- **B** ☐ difference in brain of champions' scan image to control subjects are shown when memorizing sequences of three-digit numbers
- **C** ☐ champions did much worse when they are asked to remember photographs
- **D** ☐ the memory-champs activated more brain regions than control subjects
- **E** ☐ there is some part in the brain coping with visual and spatial memory

Answer Key

#	Answer	Explanation
1	**NOT GIVEN**	His dream was to build a castle just as it would have been in the Middle Ages, an idea which some found mildly amusing and others dismissed as outright folly
2	**TRUE**	The workers' role is to demonstrate and explain, to a wide audience, the skills of our forefathers
3	**FALSE**	Workers in the Mid Age obviously were unaware of it and some died earlier by inhaling toxic gas
4	**TRUE**	We also learned that even if there is a straight lintel across a doorway, you will usually find an arch of stones built into the wall differently. Because of the physics of an arch, which channels the weight above it down into whatever is supporting it at each side instead of pressing down in the middle, this helps to take a lot of the weight off of the lintel itself, whether it is free standing or buried in the wall against the impact of warfare
5	**D**	Having studied the block in order to determine and anticipate the natural fault lines of the stone, the quarrymen first carve a series of rectilinear holes into the block
6	**L**	the quarrymen first carve a series of rectilinear holes into the block
7	**A**	Iron wedges are then hammered into this line of holes
8	**J**	The shockwaves produced by the quarrymen's sledgehammers cause the stone to split along a straight line
9	**G**	It is then shaped in wooden moulds to form bricks
10	**F**	After the bricks have been left to air-dry, they are fired in a woodfired kiln for about 12 hours, at roughly 1000°c
11	**C / E / F**	The craftsmen have been working for nearly ten years now but they're not even halfway done yet. That's because they're using only medieval tools and techniques. The World's Gerry Hadden takes US to the site of what will be the Guedelon Castle. Another reason said by Jean Francois, a member of Guedelon stone cutter's guild, for eight hours a day he bangs on a 13th century chisel with a 13th century iron mallet The progress of construction has to give way to tourists side for their visits
12	**C / E / F**	The craftsmen have been working for nearly ten years now but they're not even halfway done yet. That's because they're using

#	Answer	Explanation
		only medieval tools and techniques. The World's Gerry Hadden takes US to the site of what will be the Guedelon Castle. Another reason said by Jean Francois, a member of Guedelon stone cutter's guild, for eight hours a day he bangs on a 13th century chisel with a 13th century iron mallet The progress of construction has to give way to tourists side for their visits
13	**C / E / F**	The craftsmen have been working for nearly ten years now but they're not even halfway done yet. That's because they're using only medieval tools and techniques. The World's Gerry Hadden takes US to the site of what will be the Guedelon Castle. Another reason said by Jean Francois, a member of Guedelon stone cutter's guild, for eight hours a day he bangs on a 13th century chisel with a 13th century iron mallet The progress of construction has to give way to tourists side for their visits
14	**A**	Neuroscientists Rachel Herz, a cognitive neuroscientist at Brown University in Providence, Rhode Island, have discovered, for instance, how sensory memories are shared across the brain, with different brain regions remembering the sights, smells, tastes and sounds of a particular experience
15	**B**	In one experiment, Chu and Downes asked 42 volunteers to tell a life story, then tested to see whether odours such as coffee and cinnamon could help them remember more detail in the story. They could
16	**A**	"There is this unique connection between the sense of smell and the part of the brain that processes emotion," says Rachel Herz
17	**C**	There could be advantages to having memories spread around the brain. "You can reawaken that memory from any one of the sensory triggers," says Gottfried. "Maybe the smell of the sun lotion, or a particular sound from that day, or the sight of a rock formation." Or – in the case of an early hunter and gatherer (out on a plain – the sight of a lion might be enough to trigger the urge to flee, rather than having to wait for the sound of its roar and the stench of its hide to kick in as well
18	**C**	The fact that the olfactory cortex became active in the absence of the odour suggests that people's sensory memory of events is spread across different brain regions. Imagine going on a seaside holiday, says UCL team leader, Jay Gottfried
19	**D**	"There is this unique connection between the sense of smell and the part of the brain that processes emotion," says Rachel Herz
20	**B**	Memories triggered by smell were more evocative than memories triggered by either sights or sounds

#	Answer	Explanation
21	**C**	In one experiment, Chu and Downes asked 42 volunteers to tell a life story, then tested to see whether odours such as coffee and cinnamon could help them remember more detail in the story. They could
22	**C**	Jellinek chided the Liverpool researchers for, among other things, presenting the smells and asking the volunteers to think of memories, rather than seeing what memories were spontaneously evoked by the odours
23	**create a story**	For instance, the subjects might see a photo of a duck paired with the scent of a rose, and then be asked to create a story linking the two
24	**brain scans**	Brain scans taken at the time revealed that the volunteers'brains were particularly active in a region known as the factory cortex, which is known to be involved in processing smells
25	**(the) olfactory cortex**	And in their brains, the olfactory cortex lit up again, the scientists reported recently. The fact that the olfactory cortex became active in the absence of the odour suggests that people's sensory memory of events is spread across different brain regions
26	**spice**	As generations gathered to share oral histories, they would pass a small pot of spice or incense around; later, when they wanted to remember the story in as much detail as possible, they would pass the same smell around again
27	**E**	Before printed books, the art of memory was considered a staple of classical education, on a par with grammar, logic, and rhetoric
28	**A**	In the 14 years since the World Memory Championships was founded, no one has memorized the order of a shuffled deck of playing cards in less than 30 seconds
29	**C**	Cooke, a 23-year-old cognitive-science graduate student with a shoulder-length mop of curly hair, is a grand master of brain storage. He can memorize the order of 10 decks of playing cards in less than an hour or one deck of cards in less than a minute. He is closing in on the 30-second deck. In the Lamb and Flag, Cooke pulled out a deck of cards and shuffled it. He held up three cards —the 7 of spades, the queen of clubs, and the 10 of spades. He pointed at a fireplace and said, "Destiny's Child is whacking Franz Schubert with handbags."
30	**G**	"If we took at some of these memory tasks, they're the kind of thing most people don't even waste one hour practicing, but if they wasted 50 hours, they'd be exceptional at it," Ericsson says
31	**F**	Shereshevski also had synesthesia, a rare condition in which the senses become intertwined. For example, every number may be

#	Answer	Explanation
		associated with a color or every word with a taste. Synesthetic reactions evoke a response in more areas of the brain, making memory easier
32	**specific person**	Cooke has already memorized a specific person, verb, and object that he associates with each card in the deck
33	**three cards**	When Cooke commits a deck to memory, he does it three cards at a time
34	**mental walk**	When it comes time to recall, Cooke takes a mental walk along his route and translates the images into cards
35	**(the) loci method**	That technique, known as the loci method, reportedly originated in 477 B.C. with the Greek poet Simonides of Ceos
36	**education**	Before printed books, the art of memory was considered a staple of classical education, on a par with grammar, logic, and rhetoric
37	**A / D**	In timed trials, contestants were challenged to look at and then recite a two-page poem, memorize rows of 40-digit numbers, recall the names of 110 people after looking at their photographs, and perform seven other feats of extraordinary retention
38	**A / D**	In timed trials, contestants were challenged to look at and then recite a two-page poem, memorize rows of 40-digit numbers, recall the names of 110 people after looking at their photographs, and perform seven other feats of extraordinary retention
39	**B / E**	When it came to memorizing sequences of three-digit numbers, the difference between the memory contestants and the control subjects was, as expected, immense. However, when they were shown photographs of magnified snowflakes, images that the competitors had never tried to memorize before, the champions did no better than the control group. When the researchers analyzed the brain scans, they found that the memory champs were activating some brain regions that were different from those the control subjects were using. These regions, which included the right posterior hippocampus, are known to be involved in visual memory and spatial navigation
40	**B / E**	When it came to memorizing sequences of three-digit numbers, the difference between the memory contestants and the control subjects was, as expected, immense. However, when they were shown photographs of magnified snowflakes, images that the competitors had never tried to memorize before, the champions did no better than the control group. When the researchers analyzed the brain scans, they found that the memory champs were activating some brain regions that were different from those the control subjects were using. These regions, which included

#	Answer	Explanation
		the right posterior hippocampus, are known to be involved in visual memory and spatial navigation

Test 72

PASSAGE 1

Origin of Species & Continent Formation

A THE FACT THAT there was once a Pangean supercontinent, a Panthalassa Ocean, and a Tethys Ocean, has profound implications for the evolution of multicellular life on Earth. These considerations were unknown to the scientsts of the 19th century — making their scientific deductions even more remarkable. Quite independently of each other, Charles Darwin and his young contemporary Alfred Russel Wallace reached the conclusion that life had evolved by natural selection. Wallace later wrote in My Life of his own inspiration:

B Why do some species die and some live? The answer was clearly that on the whole the best fitted lived. From the effects of disease the most healthy escaped; from enemies the strongest, the swiftest or the most cunning from famine the best hunters then it suddenly flashed on me that this self-acting process would improve the race, bacause in every generation the inferior would inevitably be killed off and the superior would remain, that is, the fittest would survive.

C Both Darwin's and Wallace's ideas about natural selection had been influenced by the essays of Thomas Malthus in his Principles of Population. Their conclusions, however, had been the direct result of their personal observation of animals and plants in widely separated geographic locations: Darwin from his experiences during the voyage of the Beagle, and particularly during the ship's visit to the Galapagos Islands in the East Pacific in 1835; Wallace during his years of travel in the Amazon Basin and in the Indonesia-Australian Archipelago in the 1850s.

D Darwin had been documenting his ideas on natural selection for many years when he received a paper on this selfsame subject from Wallace, who asked for Darwin's opinion and help in getting it published. In July 1858, Charles Lyell and J. D Hooker, close friends of Darwin, pressed Darwin to present his conclusions so that he would not lose priority to and unknown naturalist. Presiding over the hastily called but now historic meeting of the Linnean Society in London, Lyell and Hooker explained to the distinguished members how "these two gentlemen" (who were absent: Wallace was abroad and Darwin chose not to attend), had "independently and unknown to one another, conceived the same very ingenious theory"

E Both Darwin and Wallace had realized that the anomalous distribution of species in particular regions had profound evolutionary significance. Subsequently, Darwin spent the rest of his days in almost total seclusion thinking and writing mainly about the origin of species. In constrast, Wallace applied himself to the science of biogeography, the study of the pattern and distribution of species, and its significance, resulting in the publication of a massive two-volume work the Geographical Distribution of Animals in 1876.

F Wallace was a gentle and modest man, but also persistent and quietly courageous. He spent years working in the most arduous possible climates and terrains, particularly in the Malay archipelago, he made patient and detailed zoological observations and collected huge number

of speciments for museums and collectors-which is how he made a living. One result of his work was the conclusion that there is a distinct faunal boundary, called "Wallace's line, " between an Asian realm of animals in Java, Borneo and the Philipiones and an Australian realm in New Guinea and Australia. In essence this boundary posed a difficult question: How on Earth did plants and animals with a clear affinity to the Northern Hemisphere meet with their Southern Hemispheric counterparts along such a distinct Malaysian demarcation zone? Wallace was uncertain about demarcation on one particular island- Celebes, a curiously shaped place that is midway between the two groups. Initially he assigned its flora-fauna to the Australian side of the line, but later he transferred it to the Asian side. Today we know the reason for his dilemma. 200MYA East and West Celebes were islands with their own natural history lying on opposite sides of the Tethys Ocean. They did not collide until about 15 MYA. The answer to the main question is that Wallace's Line categorizes Laurasia-derived flora-fauna (the Asian) and Gondwana-derived flora-fauna (the Australian), fauna that had evolved on opposing shares of the Tethys. The closure of the Tethys Ocean today is manifested by the ongoing collision of Australia/New Guinea with Indochina/Indonesia and the continuing closure of the Mediterranean Sea—a remnant of the Western Tethys Ocean.

G IN HIS ORIGIN OF CONTINENTS AND OCEANS, Wegener quoted at length from Wallace's Geographical Distribution of Animals. According to Wegener's reading, Wallace had identified three clear divisions of Australian animals, which supported his own theory of continental displacement. Wallace had shown that animals long established in southwestern Australia had an affinity with animals in South Africa, Madagascar, India, and Ceylon, but did not have an affinity with those in Asia. Wallace also showed that Australian marsupials and monotremes are clearly related to those in South America, the Moluccas, and various Pacific islands, and that none are found in neighboring Indonesia. From this and related data, Wegener concluded that the then broadly accepted "landbridge" theory could not account for this distribution of animals and that only his theory of continental drift could explain it.

H The theory that Wegener dismissed in preference to his own proposed that plants and animals had once migrated across now-submerged intercontinental landbridges. In 1885, one of Europe's leading geologists, Eduard Suess, theorized that as the rigid Earth cools, its upper crust shrinks and wrinkles like the withering skin of an aging apple. He suggested that the planet's seas and oceans now fill the wrinkles between once-contiguous plateaus.

I Today, we know that we live on a dynamic Earth with shifting, colliding and separating tectonic plates, not a "withering skin", and the main debate in the field of biogeography has shifted. The discussion now concerns "dispersalism" versus "vicarianism" runrestricted radiation of species on the one hand and the development of barriers to migration on the other. Dispersion is a short-term phenomenon—the daily or seasonal migration of species and their radiation to the limits of their natural environment on an extensive and continuous landmass. Vicarian evolution, however, depends upon the separation and isolation of a variety of species within the confines of natural barriers in the form of islands, lakes, or shallow seas—topographical features that take a long time to develop.

PART 1 — QUESTIONS

Questions 1-5

Use the information in the passage to match the people (listed A-E) with opinions or deeds below.

A. Suess

B. Wallace

C. Darwin and Wallace

D. Wegener

E. Lyell and Hooker

	A	B	C	D	E
1 urged Darwin to publish his scientific findings	○	○	○	○	○
2 Depicted physical feature of earth's crust.	○	○	○	○	○
3 believed in continental drift theory while rejecting another one	○	○	○	○	○
4 Published works about wildlife distribution in different region.	○	○	○	○	○
5 Evolution of species is based on selection by nature.	○	○	○	○	○

Questions 6-8

The reading Passage has nine paragraphs A -I.

Which paragraph contains the following information?

	A	B	C	D	E	F	G	H	I
6 Best adaptable animal survived on the planet.	○	○	○	○	○	○	○	○	○
7 Boundary called Wallace's line found between Asia and Australia.	○	○	○	○	○	○	○	○	○

	A	B	C	D	E	F	G	H	I
8 Animal relevance exists between Australia and Africa.	○	○	○	○	○	○	○	○	○

Questions 9-13

Complete the following summary of the paragraphs of Reading Passage, using no more than two words from the Reading Passage for each answer.

Wegener found that continental drift instead of "land bridge" theory could explain strange species' distribution phenomenon. In his theory, vegetation and wildlife **9** _____ intercontinentally. However, Eduard Suess compared the wrinkle of crust to the **10** _____ of an old apple. Now it is well known that we are living on the planet where there are **11** _____ in constant mobile states instead of what Suess described. Hot spot in biogeography are switched to concerns between two terms:" **12** _____" and "**13** _____".

PASSAGE 2

Chinese Yellow Citrus Ant for BIOLOGICAL CONTROL

A In 1476, the farmers of Berne in Switzerland decided, according to this story, there was only one way to rid their fields of the cutworms attacking their crops. They took the pests to court. The worms were tried, found guilty and excommunicated by the archbishop. In China, farmers had a more practical approach to pest control. Rather than rely on divine intervention, they put their faith in frogs, ducks and ants. Frogs and ducks were encouraged to map up the pests in the paddies and the occasional plague of locusts. But the notion of biological control began with an ant. More specifically, the story says, it started with the predatory yellow citrus ant is a type of weaver ant, which has been polishing off pests in the orange groves of southern China for at least 1700 years. The yellow citrus ant is a type of weaver ant, which binds leaves and twigs with silk to form a neat, tent-like nest. In the beginning, farmers made do with the odd ants' nest here and there. But it wasn't long before growing demand led to the development of a thriving trade in nests and a new type of agriculture—ant farming.

B For an insect that bites, the yellow citrus ant is remarkably popular. Even by ant standards, Oecophylla smaragdina is a fearsome predator. It's big, runs fast and has a powerful nip - painful to humans but lethal to many of the insects that plague the orange groves of Guangdong and Guangxi in southern China. And for at least 17 centuries. Chinese orange growers have harnessed these sixlegged killing machines to keep their fruit groves healthy and productive. The story explains that citrus - a fruits evolved in the Far East and the Chinese discovered the delights of their flesh early on. As the ancestral home of oranges, lemons and pomelos, China also has the greatest diversity of citrus pests. And the trees that produce the sweetest fruits, the mandarins—or kan-attract a host of planteating insects, from black ants and sap-sucking mealy bugs to leaf-devouring caterpillars. With so many enemies, fruit growers clearly had to have some way of protecting their orchards.

C The West did not discover the Chinese orange growers' secret weapon until the early 20th century. At the time, Florida was suffering an epidemic of: itrus canker and in 1915 Walter Swingle, a plant physiologist working for the US Department of Agriculture, was, the story says, sent to China in search of varieties of orange that were resistant to the disease. Swingle spent some time studying the citrus orchards around Guangzhou, and there he came across the story of the cultivated ant. These ants, he was told, were "grown" by the people of a small village nearby who sold them to the orange growers by the nestful.

D The earliest report of citrus ants at work among the orange trees appears in a book on tropical and subtropical botany written by His Han in AD 304. "The people of Chiao-Chih sell in their markets ants in bags of rush matting. The nests are like silk. The bags are all attached to twigs and leaves which, with the ants inside the nests, are for sale. The ants are reddish-yellow in colour, bigger than ordinary ants. In the south if the kan trees do not have this kind of ant, the fruits will all be damaged by many harmful insects, and not a single fruit will be perfect."

E Initially, farmers relied on nests which they collected from the wild or bought in the market — where trade in nests was brisk. 'It is said that in the south orange trees which are free of ants

will have wormy fruits. Therefore the people race to buy nests for their orange trees,' wrote Liu Hsun in Strange Things Noted in the South, written about AD 890. The business quickly became more sophisticate. From the 10th century, country people began to trap ants in artificial nests baited with fat. "Fruit growing families buy these ants from vendors who make a business of collecting and selling such creatures," wrote Chuang Chi-Yu in 1130. "They trap them by filling hogs' or sheep's bladders with fat and placing them with the cavities open next to the ants' nests. They wait until the ants have migrated into the bladders and take them away. This is known as 'rearing orange ants'." Farmers attached the bladders to their trees, and in time the ants spread to other trees and built new nests. By the 17th century, growers were building bamboo walkways between their trees to speed the colonization of their orchards. The ants ran along these narrow bridges from one tree to another and established nests "by the hundreds of thousands".

F Did it work? The orange growers clearly thought so. One authority, Chi Ta—Chun, writing in 1700, stressed how important it was to keep the fruit trees free of insect pests, especially caterpillars. "It is essential to eliminate them so that the trees are not injured. But hand labour is not nearly as efficient as ant power..." Swingle was just as impressed. Yet despite this reports, many Western biologists were skeptical. In the West, the idea of using one insect to destroy another was new and highly controversial. The first breakthrough had come in 1888, when the infant orange industry in California had been saved from extinction by the Australian vedalia beetle. This beetle was the only thing that had made any inroad into the explosion of cottony cushion scale that was threatening to destroy the state's citrus crops. But, as Swingle now knew, California's "first" was nothing of the sort. The Chinese had been expert in biocontrol for many centuries.

G The story goes on to say that the long tradition of ants in the Chinese orchards only began to waver in the 1950s and 1960s with the introduction of powerful organic chemical insecticides. Although most fruit growers switched to chemicals, a few hung onto their ants. Those who abandoned ants in favour of chemicals quickly became disillusioned. As costs soared and pests began to develop resistance to the chemicals, growers began to revive the old ant patrols. They had good reason to have faith in their insect workforce. Research in the early 1960s showed that as long as there were enough ants in the trees, they did an excellent job of dispatching some pests—mainly the larger insects—and had modest success against others. Trees with yellow ants produced almost 20 per cent more healthy leaves than those without. More recent trials have shown that these trees yield just as big a crop as those protected by expensive chemical sprays.

H One apparent drawback of using ants—and one of the main reasons for the early skepticism by Western scientists—was that citrus ants do nothing to control mealy bugs, waxy-coated scale insects which can do considerable damage to fruit frees. In fact, the ants protect mealy bugs in exchange for the sweet honeydew they secrete. The orange growers always denied this was a problem but Western scientists thought they knew better. Research in the 1980s suggests that the growers were right all along. Where mealy bugs proliferate under the ants' protection they are usually heavily parasitized and this limits the harm they can do. Orange growers who rely on carnivorous ants rather than poisonous chemicals maintain a better balance of species in their orchards. While the ants deal with the bigger insect pests, other

predatory species keep down the numbers of smaller pests such as scale insects and aphids. In the long run, ants do a lot less damage than chemicals-and they're certainly more effective than excommunication.

PART 2 — QUESTIONS

Questions 14-18

Use the information in the passage to match the year (listed A-G) with correct description below.

NB you may use any letter more than once

A. 1888

B. 1476

C. 1915

D. 1700

E. 1130

F. AD

G. 1950

	A	B	C	D	E	F	G
14 First record of ant against pests written.	○	○	○	○	○	○	○
15 WS studied ant intervention method in China.	○	○	○	○	○	○	○
16 First case of orange crops rescued by insect in western world.	○	○	○	○	○	○	○
17 Chinese farmers start to choose chemical method.	○	○	○	○	○	○	○
18 A book wrote mentioned ways to trap ants.	○	○	○	○	○	○	○

Questions 19-26

Do the following statements agree with the information given in Reading Passage 2?

19 China has the most citrus pests counted in types in the world.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

20 Swingle came to China in order to search an insect for the US government.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

21 Western people were impressed by Swingle's theory of pest prevention.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

22 Chinese farmers realised that price of pesticides became expensive.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

23 Some Chinese farmers start to abandon the use of pesticide.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

24 Trees without ants had grown more unhealthy leaves than those with.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

25 Yield of fields using ants is larger a crop than that using chemical pesticides.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

26 Chinese orange farmers proposed that ant protection doesn't work out of China.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

PASSAGE 3

You should spend about 20 minutes on Questions 27-40, which are based on Reading Passage 3 on the following pages.

Mechanisms of Linguistic Change

A The changes that have caused the most disagreement are those in pronunciation. We have various sources of evidence for the pronunciations of earlier times, such as the spellings, the treatment of words borrowed from other languages or borrowed by them, the descriptions of contemporary grammarians and spelling-reformers, and the modern pronunciations in all the languages and dialects concerned From the middle of the sixteenth century, there are in England writers who attempt to describe the position of the speech-organs for the production of English phonemes, and who invent what are in effect systems of phonetic symbols. These various kinds of evidence, combined with a knowledge of the mechanisms of speech-production, can often give US a very good idea of the pronunciation of an earlier age, though absolute certainty is never possible.

B When we study the pronunciation of a language over any period of a few generations or more, we find there are always large-scale regularities in the changes: for example, over a certain period of time, just about all the long [a:] vowels in a language may change into long [e:] vowels, or all the [b] consonants in a certain position (for example at the end of a word) may change into [p] consonants. Such regular changes are often called sound laws. There are no universal sound laws (even though sound laws often reflect universal tendencies), but simply particular sound laws for one given language (or dialect) at one given period.

C It is also possible that fashion plays a part in the process of change. It certainly plays a part in the spread of change: one person imitates another, and people with the most prestige are most likely to be imitated, so that a change that takes place in one social group may be imitated (more or less accurately) by speakers in another group. When a social group goes up or down in the world, its pronunciation may gain or lose prestige. It is said that, after the Russian Revolution of 1917, the upper-class pronunciation of Russian, which had formerly been considered desirable, became on the contrary an undesirable kind of accent to have, so that people tried to disguise it. Some of the changes in accepted English pronunciation in the seventeenth and eighteenth centuries have been shown to consist in the replacement of one style of pronunciation by another style already existing, and it is likely that such substitutions were a result of the great social changes of the period: the increased power and wealth of the middle classes, and their steady infiltration upwards into the ranks of the landed gentry, probably carried elements of middle-class pronunciation into upper-class speech.

D A less specific variant of the argument is that the imitation of children is imperfect: they copy their parents' speech, but never reproduce it exactly. This is true, but it is also true that such deviations from adult speech are usually corrected in later childhood. Perhaps it is more significant that even adults show a certain amount of random variation in their pronunciation of a given phoneme, even if the phonetic context is kept unchanged. This, however, cannot explain changes in pronunciation unless it can be shown that there is some systematic trend in the

failures of imitation: if they are merely random deviations they will cancel one another out and there will be no net change in the language.

E One such force which is often invoked is the principle of ease, or minimization of effort. The change from fussy to fuzzy would be an example of assimilation, which is a very common kind of change. Assimilation is the changing of a sound under the influence of a neighbouring one. For example, the word scant was once skamt, but the /m/ has been changed to /n/ under the influence of the following /t/. Greater efficiency has hereby been achieved, because /n/ and / Ư are articulated in the same place (with the tip of the tongue against the teeth-ridge), whereas /m/ is articulated elsewhere (with the two lips). So the place of articulation of the nasal consonant has been changed to conform with that of the following plosive. A more recent example of the same kind of thing is the common pronunciation of football as foopball.

F Assimilation is not the only way in which we change our pronunciation in order to increase efficiency. It is very common for consonants to be lost at the end of a word: in Middle English, word-final [-n] was often lost in unstressed syllables, so that baken 'to bake' changed from [ba:kon] to ['ba:ko],and later to [ba:k]. Consonant-clusters are often simplified. At one time there was a [t] in words like castle and Christmas, and an initial [k] in words like knight and know. Sometimes a whole syllable is dropped out when two successive syllables begin with the same consonant (haplology): a recent example is temporary, which in Britain is often pronounced as if it were tempory.

PART 3 — QUESTIONS

Questions 27-30

Complete the summary below.

Choose NO MORE THAN THREE WORDS from the passage for each answer.

The pronunciation of living language undergo changes throughout thousands of years. Large scale regular changes are usually called **27** _____. There are three reasons for these changes. Firstly, the influence of one language on another; when one person imitates another pronunciation (the most prestige's), the imitation always partly involving factor of **28** _____. Secondly, the imitations of children from adults' language sometimes are **29** _____, and may also contribute to this change if there are insignificant deviations though later they may be corrected. Finally, for those random variations in pronunciation, the deeper evidence lies in the **30** _____ or minimization of effort.

Questions 31-37

Do the following statements agree with the information given in Reading Passage 3?

31 it is impossible for modern people to find pronunciation of words in an earlier age

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

32 The great change of language in Russian history is related to the rising status and fortune of middle classes.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

33 All the children learn speeches from adults while they assume that certain language is difficult to imitate exactly.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

34 Pronunciation with causal inaccuracy will not exert big influence on language changes.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

35 The link of ‘mt’ can be influenced being pronounced as 'nt’

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

36 The [g] in gnat not being pronounced will not be spelt out in the future.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

37 The sound of 'temporary' cannot wholly present its spelling.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

Questions 38-40

Look at the following sentences and the list of statements below. Match each statement with the correct sentence, A-D.

A. Since the speakers can pronounce it with less effort

B. Assimilation of a sound under the influence of a neighbouring one

C. It is a trend for changes in pronunciation in a large scale in a given period

D. Because the speaker can pronounce [n] and [t] both in the same time

	A	B	C	D
38 As a consequence, ‘b’ will be pronounced as ‘p’	○	○	○	○
39 The pronunciation of [mt] changed to [nt]	○	○	○	○
40 The omit of 't' in the sound of Christmas	○	○	○	○

Answer Key

#	Answer	Explanation
1	**E**	In July 1858, Charles Lyell and J. D Hooker, close friends of Darwin, pressed Darwin to present his conclusions so that he would not lose priority to and unknown naturalist
2	**A**	In 1885, one of Europe's leading geologists, Eduard Suess, theorized that as the rigid Earth cools, its upper crust shrinks and wrinkles like the withering skin of an aging apple
3	**D**	From this and related data, Wegener concluded that the then broadly accepted "landbridge" theory could not account for this distribution of animals and that only his theory of continental drift could explain it
4	**B**	In constrast, Wallace applied himself to the science of biogeography, the study of the pattern and distribution of species, and its significance, resulting in the publication of a massive two-volume work the Geographical Distribution of Animals in 1876
5	**C**	Quite independently of each other, Charles Darwin and his young contemporary Alfred Russel Wallace reached the conclusion that life had evolved by natural selection
6	**B**	Why do some species die and some live? The answer was clearly that on the whole the best fitted lived
7	**F**	One result of his work was the conclusion that there is a distinct faunal boundary, called "Wallace's line, " between an Asian realm of animals in Java, Borneo and the Philipiones and an Australian realm in New Guinea and Australia
8	**G**	Wallace had shown that animals long established in southwestern Australia had an affinity with animals in South Africa, Madagascar, India, and Ceylon, but did not have an affinity with those in Asia
9	**migrated**	The theory that Wegener dismissed in preference to his own proposed that plants and animals had once migrated across now-submerged intercontinental landbridges
10	**withering skin**	In 1885, one of Europe's leading geologists, Eduard Suess, theorized that as the rigid Earth cools, its upper crust shrinks and wrinkles like the withering skin of an aging apple

#	Answer	Explanation
11	**(tectonic) plates**	Today, we know that we live on a dynamic Earth with shifting, colliding and separating tectonic plates, not a “withering skin”, and the main debate in the field of biogeography has shifted
12	**dispersalism**	The discussion now concerns “dispersalism” versus “vicarianism” runrestricted radiation of species on the one hand and the development of barriers to migration on the other
13	**vicarisanism**	The discussion now concerns “dispersalism” versus “vicarianism” runrestricted radiation of species on the one hand and the development of barriers to migration on the other
14	**F**	The earliest report of citrus ants at work among the orange trees appears in a book on tropical and subtropical botany written by His Han in AD 304
15	**C**	in 1915 Walter Swingle, a plant physiologist working for the US Department of Agriculture, was, the story says, sent to China in search of varieties of orange that were resistant to the disease. Swingle spent some time studying the citrus orchards around Guangzhou, and there he came across the story of the cultivated ant
16	**A**	The first breakthrough had come in 1888, when the infant orange industry in California had been saved from extinction by the Australian vedalia beetle
17	**G**	The story goes on to say that the long tradition of ants in the Chinese orchards only began to waver in the 1950s and 1960s with the introduction of powerful organic chemical insecticides. Although most fruit growers switched to chemicals, a few hung onto their ants
18	**F**	“Fruit growing families buy these ants from vendors who make a business of collecting and selling such creatures,” wrote Chuang Chi-Yu in 1130. “They trap them by filling hogs’ or sheep’s bladders with fat and placing them with the cavities open next to the ants’ nests. They wait until the ants have migrated into the bladders and take them away. This is known as ‘rearing orange ants’.”
19	**TRUE**	As the ancestral home of oranges, lemons and pomelos, China also has the greatest diversity of citrus pests
20	**FALSE**	At the time, Florida was suffering an epidemic of: itrus canker and in 1915 Walter Swingle, a plant physiologist working for the US Department of Agriculture, was, the story says, sent to China in search of varieties of orange that were resistant to the disease
21	**FALSE**	Swingle was just as impressed. Yet despite this reports, many Western biologists were skeptical. In the West, the idea of using

#	Answer	Explanation
		one insect to destroy another was new and highly controversial
22	**TRUE**	As costs soared and pests began to develop resistance to the chemicals, growers began to revive the old ant patrols
23	**TRUE**	As costs soared and pests began to develop resistance to the chemicals, growers began to revive the old ant patrols
24	**TRUE**	Trees with yellow ants produced almost 20 per cent more healthy leaves than those without
25	**FALSE**	More recent trials have shown that these trees yield just as big a crop as those protected by expensive chemical sprays
26	**NOT GIVEN**	The West did not discover the Chinese orange growers' secret weapon until the early 20th century
27	**sound laws**	Such regular changes are often called sound laws
28	**fashion**	It is also possible that fashion plays a part in the process of change. It certainly plays a part in the spread of change: one person imitates another, and people with the most prestige are most likely to be imitated, so that a change that takes place in one social group may be imitated (more or less accurately) by speakers in another group
29	**imperfect**	A less specific variant of the argument is that the imitation of children is imperfect: they copy their parents' speech, but never reproduce it exactly
30	**principle of ease**	One such force which is often invoked is the principle of ease, or minimization of effort
31	**FALSE**	These various kinds of evidence, combined with a knowledge of the mechanisms of speech-production, can often give US a very good idea of the pronunciation of an earlier age, though absolute certainty is never possible
32	**NOT GIVEN**	It is said that, after the Russian Revolution of 1917, the upper-class pronunciation of Russian, which had formerly been considered desirable, became on the contrary an undesirable kind of accent to have, so that people tried to disguise it
33	**NOT GIVEN**	A less specific variant of the argument is that the imitation of children is imperfect: they copy their parents' speech, but never reproduce it exactly
34	**TRUE**	This, however, cannot explain changes in pronunciation unless it can be shown that there is some systematic trend in the failures of imitation: if they are merely random deviations they will cancel one another out and there will be no net change in the language

#	Answer	Explanation
35	**TRUE**	For example, the word scant was once skamt, but the /m/ has been changed to /n/ under the influence of the following /t/
36	**NOT GIVEN**	At one time there was a [t] in words like castle and Christmas, and an initial [k] in words like knight and know
37	**TRUE**	Sometimes a whole syllable is dropped out when two successive syllables begin with the same consonant (haplology): a recent example is temporary, which in Britain is often pronounced as if it were tempory
38	**C**	When we study the pronunciation of a language over any period of a few generations or more, we find there are always large-scale regularities in the changes: for example, over a certain period of time, just about all the long [a:] vowels in a language may change into long [e:] vowels, or all the [b] consonants in a certain position (for example at the end of a word) may change into [p] consonants
39	**B**	Assimilation is the changing of a sound under the influence of a neighbouring one. For example, the word scant was once skamt, but the /m/ has been changed to /n/ under the influence of the following /t/
40	**A**	Assimilation is not the only way in which we change our pronunciation in order to increase efficiency At one time there was a [t] in words like castle and Christmas, and an initial [k] in words like knight and know

Test 73

PASSAGE 1

Read the text below and answer questions 1-13.

Museum Blockbuster

A Since the 1980s, the term "blockbuster" has become the fashionable word for special spectacular museum, art gallery or science centre exhibitions. These exhibitions have the ability to attract large crowds and often large corporate sponsors. Here is one of some existing definitions of blockbuster: Put by Elsen (1984), a blockbuster is a "... large scale loan exhibition that people who normally don't go to museums will stand in line for hours to see ..." James Rosenfield, writing in Direct Marketing in 1993, has described a successful blockbuster exhibition as a "... triumph of both curatorial and marketing skills ..." My own definition for blockbuster is "a popular, high profile exhibition on display for a limited period, that attracts the general public, who are prepared to both stand in line and pay a fee in order to partake in the exhibition." What both Elsen and Rosenfield omit in their descriptions of blockbusters, is that people are prepared to pay a fee to see a blockbuster, and that the term blockbuster can just as easily apply to a movie or a museum exhibition.

B Merely naming an exhibition or movie a blockbuster however, does not make it a blockbuster. The term can only apply when the item in question has had an overwhelmingly successful response from the public. However, in literature from both the UK and USA the other words that also start to appear in descriptions of blockbusters are "less scholarly", "non-elitist" and "popularist". Detractors argue that blockbusters are designed to appeal to the lowest common denominator, while others extol the virtues of encouraging scholars to cooperate on projects, and to provide exhibitions that cater for a broad selection of the community rather than an elite sector.

C Maintaining and increasing visitor levels is paramount in the new museology. This requires continued product development. Not only the creation or hiring of blockbuster exhibitions, but regular exhibition changes and innovations. In addition, the visiting publics have become customers rather than visitors, and the skills that are valued in museums, science centres and galleries to keep the new customers coming through the door have changed. High on the list of requirements are commercial, business, marketing and entrepreneurial skills. Curators are now administrators. Being a director of an art gallery no longer requires an Art Degree. As succinctly summarised in the Economist in 1994 "business nous and public relation skills" were essential requirements for a director, and the ability to compete with other museums to stage travelling exhibitions which draw huge crowds.

D The new museology has resulted in the convergence of museums, the heritage industry, and tourism, profit-making and pleasure-giving. This has given rise to much debate about the appropriateness of adapting the activities of institutions so that they more closely reflect the priorities of the market place and whether it is appropriate to see museums primarily as tourist

attractions. At many institutions you can now hold office functions in the display areas, or have dinner with the dinosaurs. Whatever commentators may think, managers of museums, art galleries and science centres worldwide are looking for artful ways to blend culture and commerce, and blockbuster exhibitions are at the top of the list. But while blockbusters are all part of the new museology, there is proof that you don't need a museum, science centre or art gallery to benefit from the drawing power of a blockbuster or to stage a blockbuster.

E But do blockbusters held in public institutions really create a surplus to fund other activities? If the bottom line is profit, then according to the accounting records of many major museums and galleries, blockbusters do make money. For some museums overseas, it may be the money that they need to update parts of their collections or to repair buildings that are in need of attention. For others in Australia, it may be the opportunity to illustrate that they are attempting to pay their way, by recovering part of their operating costs, or funding other operating activities with off-budget revenue. This makes the economic rationalists cheerful. However, not all exhibitions that are hailed to be blockbusters will be blockbusters, and some will not make money. It is also unlikely that the accounting systems of most institutions will recognise the real cost of either creating or hiring a blockbuster.

F Blockbusters require large capital expenditure, and draw on resources across all branches of an organisation; however, the costs don't end there. There is a Human Resource Management cost in addition to a measurable 'real' dollar cost. Receiving a touring exhibition involves large expenditure as well, and draws resources from across functional management structures in project management style. Everyone from a general labourer to a building servicing unit, the front of house, technical, promotion, education and administration staff, are required to perform additional tasks. Furthermore, as an increasing number of institutions in Australia try their hand at increasing visitor numbers, memberships (and therefore revenue), by staging blockbuster exhibitions, it may be less likely that blockbusters will continue to provide a surplus to subsidise other activities due to the competitive nature of the market. There are only so many consumer dollars to go around, and visitors will need to choose between blockbuster products.

G Unfortunately, when the bottom-line is the most important objective to the mounting of blockbuster exhibitions, this same objective can be hard to maintain. Creating, mounting or hiring blockbusters is exhausting for staff, with the real costs throughout an institution difficult to calculate. Although the direct aims may be financial, creating or hiring a blockbuster has many positive spin-offs; by raising their profile through a popular blockbuster exhibition, a museum will be seen in a more favorable light at budget time. Blockbusters mean crowds, and crowds are good for the local economy, providing increased employment for shops, hotels, restaurants, the transport industry and retailers. Blockbusters expose staff to the vagaries and pressures of the market place, and may lead to creative excellence. Either the success or failure of a blockbuster may highlight the need for managers and policy makers to rethink their strategies. However, the new museology and the apparent trend towards blockbusters make it likely that museums, art galleries and particularly science centres will be seen as part of the entertainment and tourism industry, rather than as cultural icons deserving of government and philanthropic support.

H Perhaps the best pathway to take is one that balances both blockbusters and regular exhibitions. However, this easy middle ground may only work if you have enough space, and

have alternate sources of funding to continue to support the regular less exciting fare. Perhaps the advice should be to make sure that your regular activities and exhibitions are more enticing, and find out what your local community wants from you. The question (trend) now at most museums and science centres, is "What blockbusters can we tour to overseas venues and will it be cost effective?"

PART 1 — QUESTIONS

Questions 1-4

Which paragraphs contains the following information?

NB You may use any letter more than once.

	A	B	C	D	E	F	G	H
1 A reason for changing the exhibition programs.	○	○	○	○	○	○	○	○
2 The time people have to wait in a queue in order to enjoy exhibitions.	○	○	○	○	○	○	○	○
3 Terms people used when referring to blockbuster	○	○	○	○	○	○	○	○
4 There was some controversy over confining target groups of blockbuster.	○	○	○	○	○	○	○	○

Questions 5-8

Complete the following summary of the paragraphs of Reading Passage, using no more than three words from the Reading Passage for each answer.

Instead of being visitors, people turned out to be **5** _____, who require the creation or hiring of blockbuster exhibitions as well as regular exhibition changes and innovations. Business nous and **6** _____ simply summarized in a magazine are not only important factors for directors, but also an ability to attract a crowd of audiences. **7** _____ has contributed to the linking of museums, the heritage industry, tourism, profit-making and pleasure-giving. There occurs some controversy over whether it is proper to consider museums mainly as **8** _____.

Questions 9-10

Choose TWO letters A-E.

The list below gives some advantages of blockbuster.

9 **10** Which TWO advantages are mentioned by the writer of the text?

- **A** ☐ To offer sufficient money to repair architectures.
- **B** ☐ To maintain and increase visitor levels.
- **C** ☐ Presenting the mixture in the culture and commerce of art galleries and science centres worldwide.
- **D** ☐ Being beneficial for the development of local business.
- **E** ☐ Being beneficial for the directors.

Questions 11-13

Choose THREE letters A-F.

The list below gives some disadvantages of blockbuster.

11 **12** **13** Which THREE disadvantages are mentioned by the writer of the text?

- **A** ☐ People felt hesitated to choose exhibitions.
- **B** ☐ Workers has become tired of workloads.
- **C** ☐ The content has become more entertaining rather than cultural.
- **D** ☐ General labourers are required to perform additional tasks
- **E** ☐ Huge amounts of capital invested in specialists.
- **F** ☐ Exposing staff to the fantasies and pressures of the market place.

PASSAGE 2

Read the text below and answer questions 14-27.

Stress of Workplace

A How busy is too busy? For some it means having to miss the occasional long lunch; for others it means missing lunch altogether. For a few, it is not being able to take a "sickie" once a month. Then there is a group of people for whom working every evening and weekend is normal, and frantic is the tempo of their lives. For most senior executives, workloads swing between extremely busy and frenzied. The vice-president of the management consultancy AT Kearney and its head of telecommunications for the Asia-Pacific region, Neil Plumridge, says his work weeks vary from a "manageable" 45 hours to 80 hours, but average 60 hours.

B Three warning signs alert Plumridge about his workload: sleep, scheduling and family. He knows he has too much on when he gets less than six hours of sleep for three consecutive nights; when he is constantly having to reschedule appointments; "and the third one is on the family side", says Plumridge, the father of a three-year-old daughter, and expecting a second child in October. "If I happen to miss a birthday or anniversary, I know things are out of control." Being "too busy" is highly subjective. But for any individual, the perception of being too busy over a prolonged period can start showing up as stress: disturbed sleep, and declining mental and physical health. National workers' compensation figures show stress causes the most lost time of any workplace injury. Employees suffering stress are off work an average of 16.6 weeks. The effects of stress are also expensive. Comcare, the Federal Government insurer, reports that in 2003-04, claims for psychological injury accounted for 7% of claims but almost 27% of claim costs. Experts say the key to dealing with stress is not to focus on relief - a game of golf or a massage - but to reassess workloads. Neil Plumridge says he makes it a priority to work out what has to change; that might mean allocating extra resources to a job, allowing more time or changing expectations. The decision may take several days. He also relies on the advice of colleagues, saying his peers coach each other with business problems. "Just a fresh pair of eyes over an issue can help," he says.

C Executive stress is not confined to big organisations. Vanessa Stoykov has been running her own advertising and public relations business for seven years, specialising in work for financial and professional services firms. Evolution Media has grown so fast that it debuted on the BRW Fast 100 list of fastest-growing small enterprises last year - just after Stoykov had her first child. Stoykov thrives on the mental stimulation of running her own business. "Like everyone, I have the occasional day when I think my head's going to blow off," she says. Because of the growth phase the business is in, Stoykov has to concentrate on short-term stress relief - weekends in the mountains, the occasional "mental health" day - rather than delegating more work. She says: "We're hiring more people, but you need to train them, teach them about the culture and the clients, so it's actually more work rather than less."

D Identify the causes: Jan Elsnera, Melbourne psychologist who specialises in executive coaching, says thriving on a demanding workload is typical of senior executives and other high-potential business people. She says there is no one-size-fits-all approach to stress: some

people work best with high-adrenalin periods followed by quieter patches, while others thrive under sustained pressure. "We could take urine and blood hormonal measures and pass a judgement of whether someone's physiologically stressed or not," she says. "But that's not going to give US an indicator of what their experience of stress is, and what the emotional and cognitive impacts of stress are going to be."

E Eisner's practice is informed by a movement known as positive psychology, a school of thought that argues "positive" experiences - feeling engaged, challenged, and that one is making a contribution to something meaningful - do not balance out negative ones such as stress; instead, they help people increase their resilience over time. Good stress, or positive experiences of being challenged and rewarded, is thus cumulative in the same way as bad stress. Eisner says many of the senior business people she coaches are relying more on regulating bad stress through methods such as meditation and yoga. She points to research showing that meditation can alter the biochemistry of the brain and actually help people "retrain" the way their brains and bodies react to stress. "Meditation and yoga enable you to shift the way that your brain reacts, so if you get proficient at it you're in control."

F The Australian vice-president of AT Kearney, Neil Plumridge, says: "Often stress is caused by our setting unrealistic expectations of ourselves. I'll promise a client I'll do something tomorrow, and then [promise] another client the same thing, when I really know it's not going to happen. I've put stress on myself when I could have said to the clients: 'Why don't I give that to you in 48 hours?' The client doesn't care." Overcommitting is something people experience as an individual problem. We explain it as the result of procrastination or Parkinson's law: that work expands to fill the time available. New research indicates that people may be hard-wired to do it.

G A study in the February issue of the Journal of Experimental Psychology shows that people always believe they will be less busy in the future than now. This is a misapprehension, according to the authors of the report, Professor Gal Zauberman, of the University of North Carolina, and Professor John Lynch, of Duke University. "On average, an individual will be just as busy two weeks or a month from now as he or she is today. But that is not how it appears to be in everyday life," they wrote. "People often make commitments long in advance that they would never make if the same commitments required immediate action. That is, they discount future time investments relatively steeply." Why do we perceive a greater "surplus" of time in the future than in the present? The researchers suggest that people underestimate completion times for tasks stretching into the future, and that they are bad at imagining future competition for their time.

PART 2 — QUESTIONS

Questions 14-18

Use the information in the passage to match the people (listed A-D) with opinions or deeds below.

NB you may use any letter more than once

A. Jan Elsnera

B. Vanessa Stoykov

C. Gal Zauberman

D. Neil Plumridge

	A	B	C	D
14 Work stress usually happens in the high level of a business.	○	○	○	○
15 More people's ideas involved would be beneficial for stress relief	○	○	○	○
16 Temporary holiday sometimes doesn't mean less work.	○	○	○	○
17 Stress leads to a wrong direction when trying to satisfy customers.	○	○	○	○
18 It is not correct that stress in the future will be eased more than now	○	○	○	○

Questions 19-21

Choose the correct letter, A, B, C or D.

19 Which of the following workplace stress is NOT mentioned according to Plumridge in the following options?

A ○ Not enough time spend on family

B ○ Unable to concentrate on work

C ○ Inadequate time of sleep

D ○ Alteration of appointment

20 Which of the following solution is NOT mentioned in helping reduce the work pressure according to Plumridge?

A ○ Allocate more personnel

B ○ Increase more time

C ○ Lower expectation

D ○ Do sports and massage

21 What is point of view of Jan Elsnera towards work stress?

A ○ Medical test can only reveal part of the data needed to cope with stress

B ○ Index some body samples will be abnormal in a stressful experience

C ○ Emotional and cognitive affection is superior to physical one

D ○ One well designed solution can release all stress

Questions 22-27

Complete the following summary of the paragraphs of Reading Passage, using no more than two words AND/OR A NUMBER from the Reading Passage for each answer.

Statistics from National worker's compensation indicate stress plays the most important role in **22** _____ which cause the time losses. Staffs take about **23** _____ for absence from work caused by stress. Not just time is our main concern but great expenses generated consequently. An official insurer wrote sometime that about **24** _____ of all claims were mental issues whereas nearly 27% costs in all claims. Sports such as **25** _____, as well as **26** _____ could be a treatment to release stress; However, specialists recommended another practical way out, analyse **27** _____ once again.

PASSAGE 3

Read the text below and answer questions 28-40.

Company Innovation

A IN A scruffy office in midtown Manhattan, a team of 30 artificial-intelligence programmers is trying to simulate the brains of an eminent sexologist, a well-known dietician, a celebrity fitness trainer and several other experts. Umagic Systems is a young firm, setting up websites that will allow clients to consult the virtual versions of these personalities. Subscribers will feed in details about themselves and their goals; Umagic's software will come up with the advice that the star expert would give. Although few people have lost money betting on the neuroses of the American consumer, Umagic's prospects are hard to gauge (in ten years' time, consulting a computer about your sex life might seem natural, or it might seem absurd). But the company and others like it are beginning to spook large American firms, because they see such half-barmy "innovative" ideas as the key to their own future success.

B Innovation has become the buzz-word of American management. Firms have found that most of the things that can be outsourced or re-engineered have been (worryingly, by their competitors as well). The stars of American business tend today to be innovators such as Dell, Amazon and Wal-Mart, which have produced ideas or products that have changed their industries.

C A new book by two consultants from Arthur D. Little records that, over the past 15 years, the top 20% of firms in an annual innovation poll by Fortune magazine have achieved double the shareholder returns of their peers. Much of today's merger boom is driven by a desperate search for new ideas. So is the fortune now spent on licensing and buying others' intellectual property. According to the Pasadena-based Patent & Licence Exchange, trading in intangible assets in the United States has risen from $15 billion in 1990 to $100 billion in 1998, with an increasing proportion of the rewards going to small firms and individuals.

D And therein lies the terror for big companies: that innovation seems to work best outside them. Several big established "ideas factories", including 3M, Procter & Gamble and Rubbermaid, have had dry spells recently. Gillette spent ten years and $1 billion developing its new Mach 3 razor; it took a British supermarket only a year or so to produce a reasonable imitation. "In the management of creativity, size is your enemy," argues Peter Chemin, who runs the Fox TV and film empire for News Corporation. One person managing 20 movies is never going to be as involved as one doing five movies. He has thus tried to break down the studio into smaller units—even at the risk of incurring higher costs.

E It is easier for ideas to thrive outside big firms these days. In the past, if a clever scientist had an idea he wanted to commercialise, he would take it first to a big company. Now, with plenty of cheap venture capital, he is more likely to set up on his own. Umagic has already raised $5m and is about to raise $25m more. Even in capital-intensive businesses such as pharmaceuticals, entrepreneurs can conduct early-stage research, selling out to the big firms when they reach

expensive, risky clinical trials. Around a third of drug firms' total revenue now comes from licensed-in technology.

F Some giants, including General Electric and Cisco, have been remarkably successful at snapping up and integrating scores of small companies. But many others worry about the prices they have to pay and the difficulty in hanging on to the talent that dreamt up the idea. Everybody would like to develop more ideas in-house. Procter & Gamble is now shifting its entire business focus from countries to products; one aim is to get innovations accepted across the company. Elsewhere, the search for innovation has led to a craze for "intrapreneurship"—devolving power and setting up internal ideas-factories and tracking stocks so that talented staff will not leave.

G Some people think that such restructuring is not enough. In a new book Clayton Christensen argues that many things which established firms do well, such as looking after their current customers, can hinder the sort of innovative behaviour needed to deal with disruptive technologies. Hence the fashion for cannibalisation—setting up businesses that will actually fight your existing ones. Bank One, for instance, has established Wingspan, an Internet bank that competes with its real branches (see article). Jack Welch's Internet initiative at General Electric is called "Destroyyourbusiness.com".

H Nobody could doubt that innovation matters. But need large firms be quite so pessimistic? A recent survey of the top 50 innovations in America, by Industry Week, a journal, suggested that ideas are as likely to come from big firms as from small ones. Another skeptical note is sounded by Amar Bhidé, a colleague of Mr Christensen's at the Harvard Business School and the author of another book on entrepreneurship. Rather than having to reinvent themselves, big companies, he believes, should concentrate on projects with high costs and low uncertainty, leaving those with low costs and high uncertainty to small entrepreneurs. As ideas mature and the risks and rewards become more quantifiable, big companies can adopt them.

I At Kimberly-Clark, Mr Sanders had to discredit the view that jobs working on new products were for "those who couldn't hack it in the real business." He has tried to change the culture not just by preaching fuzzy concepts but also by introducing hard incentives, such as increasing the rewards for those who come up with successful new ideas and, particularly, not punishing those whose experiments fail. The genesis of one of the firm's current hits, Depend, a more dignified incontinence garment, lay in a previous miss, Kotex Personals, a form of disposable underwear for menstruating women.

J Will all this creative destruction, cannibalisation and culture tweaking make big firms more creative? David Post, the founder of Umagic, is sceptical: "The only successful intrapreneurs are ones who leave and become entrepreneurs." He also recalls with glee the looks of total incomprehension when he tried to hawk his "virtual experts" idea three years ago to the idea labs of firms such as IBM though, as he cheerfully adds, "of course, they could have been right." Innovation unlike, apparently, sex, parenting and fitness is one area where a computer cannot tell you what to do.

PART 3 — QUESTIONS

Questions 28-33

Which paragraph contains the following information?

NB You may use any letter more than once.

	A	B	C	D	E	F	G	H	I	J
28 Approach to retain best employees	○	○	○	○	○	○	○	○	○	○
29 Safeguarding expenses on innovative idea	○	○	○	○	○	○	○	○	○	○
30 Integrating outside firms might produce certain counter effect	○	○	○	○	○	○	○	○	○	○
31 Example of three famous American companies' innovation	○	○	○	○	○	○	○	○	○	○
32 Example of one company changing its focus	○	○	○	○	○	○	○	○	○	○
33 Example of a company resolving financial difficulties itself	○	○	○	○	○	○	○	○	○	○

Questions 34-37

Do the following statements agree with the information given in Reading Passage 3?

34 Umagic is the most successful innovative company in this new field.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

35 Amazon and Wal-Mart exchanged their innovation experience.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

36 New idea holder had already been known to take it to small company in the past.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

37 IBM failed to understand Umagic's proposal of one new idea.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

Questions 38-40

Choose the correct letter, A, B, C or D.

38 What is author’s opinion on the effect of innovation in paragraph c?

A ○ It only works for big companies

B ○ Fortune magazine has huge influence globally

C ○ It is getting more important

D ○ Effect on American companies is more evident

39 What is Peter Chemin’s point of view on innovation?

A ○ Small company is more innovative than big one

B ○ Film industry need more innovation than other industries

C ○ We need to cut the cost when risks occur

D ○ New ideas are more likely going to big companies

40 What is author's opinion on innovation at the end of this passage?

A ○ Umagic success lies on the accidental "virtual experts"

B ○ Innovation is easy and straightforward

C ○ IBM sets a good example on innovation

D ○ The author's attitude is uncertain on innovation

Answer Key

#	Answer	Explanation
1	**C**	Maintaining and increasing visitor levels is paramount in the new museology. This requires continued product development. Not only the creation or hiring of blockbuster exhibitions, but regular exhibition changes and innovations
2	**A**	Put by Elsen (1984), a blockbuster is a " large scale loan exhibition that people who normally don't go to museums will stand in line for hours to see "
3	**B**	However, in literature from both the UK and USA the other words that also start to appear in descriptions of blockbusters are "less scholarly", "non-elitist" and "popularist"
4	**B**	Detractors argue that blockbusters are designed to appeal to the lowest common denominator, while others extol the virtues of encouraging scholars to cooperate on projects, and to provide exhibitions that cater for a broad selection of the community rather than an elite sector
5	**customers**	In addition, the visiting publics have become customers rather than visitors, and the skills that are valued in museums, science centres and galleries to keep the new customers coming through the door have changed
6	**public relation skills**	As succinctly summarised in the Economist in 1994 "business nous and public relation skills" were essential requirements for a director, and the ability to compete with other museums to stage travelling exhibitions which draw huge crowds
7	**(the) (new) museology**	The new museology has resulted in the convergence of museums, the heritage industry, and tourism, profit-making and pleasure-giving
8	**tourist attractions**	This has given rise to much debate about the appropriateness of adapting the activities of institutions so that they more closely reflect the priorities of the market place and whether it is appropriate to see museums primarily as tourist attractions
9	**A / D**	For some museums overseas, it may be the money that they need to update parts of their collections or to repair buildings that are in need of attention Blockbusters mean crowds, and crowds are good for the local economy, providing increased employment for shops, hotels, restaurants, the transport industry and retailers

#	Answer	Explanation
10	**A / D**	For some museums overseas, it may be the money that they need to update parts of their collections or to repair buildings that are in need of attention Blockbusters mean crowds, and crowds are good for the local economy, providing increased employment for shops, hotels, restaurants, the transport industry and retailers
11	**B / C / E**	Blockbusters require large capital expenditure, and draw on resources across all branches of an organisation; however, the costs don't end there Creating, mounting or hiring blockbusters is exhausting for staff, with the real costs throughout an institution difficult to calculate However, the new museology and the apparent trend towards blockbusters make it likely that museums, art galleries and particularly science centres will be seen as part of the entertainment and tourism industry, rather than as cultural icons deserving of government and philanthropic support
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13	**B / C / E**	Blockbusters require large capital expenditure, and draw on resources across all branches of an organisation; however, the costs don't end there Creating, mounting or hiring blockbusters is exhausting for staff, with the real costs throughout an institution difficult to calculate However, the new museology and the apparent trend towards blockbusters make it likely that museums, art galleries and particularly science centres will be seen as part of the entertainment and tourism industry, rather than as cultural icons deserving of government and philanthropic support
14	**A**	Jan Elsnera, Melbourne psychologist who specialises in executive coaching, says thriving on a demanding workload is typical of senior executives and other high-potential business people
15	**D**	He also relies on the advice of colleagues, saying his peers coach each other with business problems. "Just a fresh pair of eyes over an issue can help," he says

#	Answer	Explanation
16	**B**	Because of the growth phase the business is in, Stoykov has to concentrate on short-term stress relief – weekends in the mountains, the occasional "mental health" day – rather than delegating more work. She says: "We're hiring more people, but you need to train them, teach them about the culture and the clients, so it's actually more work rather than less."
17	**D**	The Australian vice-president of AT Kearney, Neil Plumridge, says: "Often stress is caused by our setting unrealistic expectations of ourselves. I'll promise a client I'll do something tomorrow, and then [promise] another client the same thing, when I really know it's not going to happen. I've put stress on myself when I could have said to the clients: 'Why don't I give that to you in 48 hours?' The client doesn't care."
18	**C**	A study in the February issue of the Journal of Experimental Psychology shows that people always believe they will be less busy in the future than now. This is a misapprehension, according to the authors of the report, Professor Gal Zauberman, of the University of North Carolina, and Professor John Lynch, of Duke University
19	**B**	Three warning signs alert Plumridge about his workload: sleep, scheduling and family. He knows he has too much on when he gets less than six hours of sleep for three consecutive nights; when he is constantly having to reschedule appointments; "and the third one is on the family side", says Plumridge, the father of a three-year-old daughter, and expecting a second child in October. "If I happen to miss a birthday or anniversary, I know things are out of control."
20	**D**	Neil Plumridge says he makes it a priority to work out what has to change; that might mean allocating extra resources to a job, allowing more time or changing expectations
21	**A**	"We could take urine and blood hormonal measures and pass a judgement of whether someone's physiologically stressed or not," she says. "But that's not going to give US an indicator of what their experience of stress is, and what the emotional and cognitive impacts of stress are going to be."
22	**workplace injury**	National workers' compensation figures show stress causes the most lost time of any workplace injury
23	**16.6 weeks**	Employees suffering stress are off work an average of 16.6 weeks
24	**7%/7 percent**	Comcare, the Federal Government insurer, reports that in 2003-04, claims for psychological injury accounted for 7% of claims but almost 27% of claim costs

#	Answer	Explanation
25	**golf**	Experts say the key to dealing with stress is not to focus on relief – a game of golf or a massage – but to reassess workloads
26	**massage**	Experts say the key to dealing with stress is not to focus on relief – a game of golf or a massage – but to reassess workloads
27	**workloads**	Experts say the key to dealing with stress is not to focus on relief – a game of golf or a massage – but to reassess workloads
28	**F**	Elsewhere, the search for innovation has led to a craze for "intrapreneurship"—devolving power and setting up internal ideas-factories and tracking stocks so that talented staff will not leave
29	**C**	So is the fortune now spent on licensing and buying others' intellectual property. According to the Pasadena-based Patent & Licence Exchange, trading in intangible assets in the United States has risen from $15 billion in 1990 to $100 billion in 1998, with an increasing proportion of the rewards going to small firms and individuals
30	**G**	Hence the fashion for cannibalisation—setting up businesses that will actually fight your existing ones
31	**B**	The stars of American business tend today to be innovators such as Dell, Amazon and Wal-Mart, which have produced ideas or products that have changed their industries
32	**F**	Procter & Gamble is now shifting its entire business focus from countries to products; one aim is to get innovations accepted across the company
33	**E**	Umagic has already raised $5m and is about to raise $25m more
34	**NOT GIVEN**	Although few people have lost money betting on the neuroses of the American consumer, Umagic's prospects are hard to gauge (in ten years' time, consulting a computer about your sex life might seem natural, or it might seem absurd)
35	**NOT GIVEN**	The stars of American business tend today to be innovators such as Dell, Amazon and Wal-Mart, which have produced ideas or products that have changed their industries
36	**FALSE**	In the past, if a clever scientist had an idea he wanted to commercialise, he would take it first to a big company
37	**TRUE**	He also recalls with glee the looks of total incomprehension when he tried to hawk his "virtual experts" idea three years ago to the idea labs of firms such as IBM though, as he cheerfully adds, "of course, they could have been right."

#	Answer	Explanation
38	**C**	Much of today’s merger boom is driven by a desperate search for new ideas. So is the fortune now spent on licensing and buying others’ intellectual property. According to the Pasadena-based Patent & Licence Exchange, trading in intangible assets in the United States has risen from $15 billion in 1990 to $100 billion in 1998, with an increasing proportion of the rewards going to small firms and individuals
39	**A**	“In the management of creativity, size is your enemy,” argues Peter Chemin, who runs the Fox TV and film empire for News Corporation. One person managing 20 movies is never going to be as involved as one doing five movies. He has thus tried to break down the studio into smaller units—even at the risk of incurring higher costs
40	**D**	Will all this creative destruction, cannibalisation and culture tweaking make big firms more creative? David Post, the founder of Umagic, is sceptical: “The only successful intrapreneurs are ones who leave and become entrepreneurs.” He also recalls with glee the looks of total incomprehension when he tried to hawk his “virtual experts” idea three years ago to the idea labs of firms such as IBM though, as he cheerfully adds, “of course, they could have been right.” Innovation unlike, apparently, sex, parenting and fitness is one area where a computer cannot tell you what to do

Test 74

PASSAGE 1

Read the text below and answer questions 1-13.

The Beginning of Football

A. Football as we now know it developed in Britain in the 19th century, but the game is far older than this. In fact, the term has historically been applied to games played on foot, as opposed to those played on horseback, so 'football' hasn't always involved kicking a ball. It has generally been played by men, though at the end of the 17th century, games were played between married and single women in a town in Scotland. The married women regularly won.

B. The very earliest form of football for which we have evidence is the 'tsu'chu', which was played in China and may date back 3,000 years. It was performed in front of the Emperor during festivities to mark his birthday. It involved kicking a leather ball through a 30-40cm opening into a small net fixed onto long bamboo canes - a feat that demanded great skill and excellent technique.

C. Another form of the game, also originating from the Far East, was the Japanese 'kemari' which dates from about the fifth century and is still played today. This is a type of circular football game, a more dignified and ceremonious experience requiring certain skills, but not competitive in the way the Chinese game was, nor is there the slightest sign of struggle for possession of the ball. The players had to pass the ball to each other, in a relatively small space, trying not to let it touch the ground.

1 _____

D. The Romans had a much livelier game, 'harpastum'. Each team member had his own specific tactical assignment took a noisy interest in the proceedings and the score. The role of the feet was so small as scarcely to be of consequence. The game remained popular for 700 or 800 years, but, although it was taken to England, it is doubtful whether it can be considered as a forerunner of contemporary football.

2 _____

E. The game that flourished in Britain from the 8th to the 19th centuries was substantially different from all the previously known forms - more disorganised, more violent, more spontaneous and usually played by an indefinite number of players. Frequently, the games took the form of a heated contest between whole villages. Kicking opponents was allowed, as in fact was almost everything else.

3

F. There was tremendous enthusiasm for football, even though the authorities repeatedly intervened to restrict it, as a public nuisance. In the 14th and 15th centuries, England, Scotland and France all made football punishable by law, because of the disorder that commonly accompanied it, or because the well-loved recreation prevented subjects from practising more useful military disciplines. None of these efforts had much effect.

4

G. The English passion for football was particularly strong in the 16th century, influenced by the popularity of the rather better organised Italian game of 'calcio'. English football was as rough as ever, but it found a prominent supporter in the school headmaster Richard Mulcaster. He pointed out that it had positive educational value and promoted health and strength. Mulcaster claimed that all that was needed was to refine it a little, limit the number of participants in each team and, more importantly, have a referee to oversee the game.

5

H. The game persisted in a disorganised form until the early 19th century, when a number of influential English schools developed thefr own adaptations. In some, including Rugby School, the ball could be touched with the hands or carried; opponents could be tripped up and even kicked. It was recognised in educational circles that, as a team game, football helped to develop such fine qualities as loyalty, selflessness, cooperation, subordination and deference to the team spirit. A 'games cult' developed in schools, and some form of football became an obligatory part of the curriculum.

6

I. In 1863, developments reached a climax. At Cambridge University, an initiative began to establish some uniform standards and rules that would be accepted by everyone, but there were essentially two camps: the minority Rugby School and some others - wished to continue with their own form of the game, in particular allowing players to carry the ball. In October of the same year, eleven London clubs and schools sent representatives to establish a set of fundamental rules to govern the matches played amongst them. This meeting marked the both of the Football Association.

7

J. The dispute concerning kicking and tripping opponents and carrying the ball was discussed thoroughly at this and subsequent meetings, until eventually, on 8 December, the die-hard exponents of the Rugby style withdrew, marking a final split between rugby and football. Within

eight years, the Football Association already had 50 member clubs, and the first football competition in the world was started - the FA Cup.

PART 1 — QUESTIONS

Questions 1-7

Choose the correct headings for paragraphs D-J from the list of headings below.

Write the correct number i-x.

i. **Limited success in suppressing the game**

ii. **Opposition to the role of football in schools**

iii. **A way of developing moral values**

iv. **Football matches between countries**

v. **A game that has survived**

vi. **Separation into two sports**

vii. **Proposals for minor improvements**

viii. **Attempts to standardise the game**

ix. **Probably not an early version of football**

x. **A chaotic activity with virtually no rules**

Questions 8-13

Complete each sentence with the correct ending A-I from the box below. Write the correct letter A-I.

• Tsu'chu **8** _____

• Kemari **9** _____

• Harpastum **10** _____

• From the 8th to the 19th centuries, football in the British Isles **11** _____

• In the past, the authorities legitimately despised the football and acted on the belief that football **12** _____

• When it was accepted in academic settings, football **13** _____

A. was seen as something to be encouraged in the young.

B. involved individual players having different responsibilities.

C. was influenced by a game from another country.

D. was a cooperative effort by all the players.

E. distracted people from more important activities.

F. was played by teams of a fixed size.

G. was less popular than it later became.

H. was often played by one community against another.

I. formed part of a celebration.

PASSAGE 2

Read the text below and answer questions 14-26.

A New Ice Age

A. William Curry is a serious, sober climate scientist, not an art critic. But he has spent a lot of time perusing Emanuel Gottlieb Leutze's famous painting "George Washington Crossing the Delaware," which depicts a boatload of colonial American soldiers making their way to attack English and Hessian troops the day after Christmas in 1776. "Most people think these other guys in the boat are rowing, but they are actually pushing the ice away," says Curry, tapping his finger on a reproduction of the painting. Sure enough, the lead oarsman is bashing the frozen river with his boot. "I grew up in Philadelphia. The place in this painting is 30 minutes away by car. I can tell you, this kind of thing just doesn't happen anymore."

B. But it may again soon. And ice-choked scenes, similar to those immortalized by the 16th-century Flemish painter Pieter Brueghel the Elder, may also return to Europe. His works, including the 1565 masterpiece "Hunters in the Snow," make the now-temperate European landscapes look more like Lapland. Such frigid settings were commonplace during a period dating roughly from 1300 to 1850 because much of North America and Europe was in the throes of a little ice age. And now there is mounting evidence that the chill could return. A growing number of scientists believe conditions are ripe for another prolonged cooldown, or small ice age. While no one is predicting a brutal ice sheet like the one that covered the Northern Hemisphere with glacier about 12,000 years ago, the next cooling trend could drop average temperatures 5 degrees Fahrenheit over much of the United States and 10 degrees in the Northeast, northern Europe, and northern Asia.

C. "It could happen in 10 years," says Tenence Joyce, who chairs the Woods Hole Physical Oceanography Department. "Once it does, it can take hundreds of years to reverse." And he is alarmed that Americans have yet to take the threat seriously.

D. A drop of 5 to 10 degrees entails much more than simply bumping up the thermostat and carrying on. Both economically and ecologically, such quick, persistent chilling could have devastating consequences. A 2002 report titled "Abrupt Climate Change: Inevitable Surprises," produced by the National Academy of Sciences, pegged the cost from agricultural losses alone at $100 billion to $250 billion while also predicting that damage to ecologies could be vast and incalculable. A grim sampler: disappearing forests, increased housing expenses, dwindling freshwater, lower crop fields and accelerated species extinctions.

E. Political changes since the last ice age could make survival far more difficult for the world's poor. During previous cooling periods, whole tribes simply picked up and moved south, but that option doesn't work in the modem, tense world of closed borders. "To the extent that abrupt climate change may cause rapid and extensive changes of fortune for those who live off the land, the inability to migrate may remove one of the major safety nets for distressed people," says the report.

F. But first things first. Isn't the earth actually warming? Indeed it is, says Joyce. In his cluttered office, full of soft light from the foggy Cape Cod morning, he explains how such warming could actually be the surprising culprit of the next mini-ice age. The paradox is a result of the appearance over the past 30 years in the North Atlantic of huge rivers of freshwater the equivalent of a 10-foot-thick layer mixed into the salty sea. No one is certain where the fresh torrents are coming from, but a prime suspect is meltin į Arctic ice, caused by a buildup of carbon dioxide in the atmosphere that traps solar energy.

G. The freshwater trend is major news in ocean-science circles. Bob Dickson, a British oceanographer who sounded an alarm at a February conference in Honolulu, has termed the drop in salinity and temperature in the Labrador Sea— a body of water between northeastern Canada and Greenland that adjoins the Atlantic-"arguably the largest full-depth changes observed in the modem instrumental oceanographic record." could cause a little ice age by subverting the northern trend penetration of Gulf Stream waters.

H. Normally, the Gulf Stream, laden with heat soaked up in the tropics, meanders up the east coasts of the United States and Canada. As it flows northward, the stream surrenders heat to the an. Because the prevailing North Atlantic winds blow eastward, a lot of the heat wafts to Europe. That's why many scientists believe winter temperatures on the Continent are as much as 36 degrees Fahrenheit warmer than those in North America at the same latitude. Frigid Boston, for example, lies at almost precisely the same latitude as balmy Rome. And some scientists say the heat also warms Americans and Canadians. "It's a real mistake to think of this solely as a European phenomenon," says Joyce.

I. Having given up its heat to the air, the now-cooler water becomes denser and sinks into the North Atlantic by a mile or more in a process oceanographers call thermohaline circulation. This massive column of cascading cold is the main engine powering a deepwater current called the Great Ocean Conveyor that snakes through all the world's oceans. But as the North Atlantic fills with freshwater, it grows less dense, making the waters carried northward by the Gulf Stream less able to sink. The new mass of relatively freshwater sits on top of the ocean like a big thermal blanket, threatening the thermohaline circulation. That in turn could make the Gulf Stream slow or veer southward. At some point, the whole system could simply shut down, and do so quickly. "There is increasing evidence that we are getting closer to a transition point, from which we can jump to a new state. Small changes, such as a couple of years of heavy precipitation or melting ice at high latitudes, could yield a big response," says Joyce.

J. "You have all this freshwater sitting at high latitudes, and it can literally take hundreds of years to get rid of it," Joyce says. So while the globe as a whole gets warmer by tiny fractions of 1 degree Fahrenheit annually, the North Atlantic region could, in a decade, get up to 10 degrees colder. What worries researchers at Woods Hole is that history is on the side of rapid shutdown. They know it has happened before.

PART 2 — QUESTIONS

Questions 14-16

Choose the correct letter, A, B, C or D.

14 The writer mentions the paintings in the first two paragraphs to illustrate

- **A** ○ that the two paintings are immortalized.
- **B** ○ people's different opinions.
- **C** ○ a possible climate change happened 12,000 years ago.
- **D** ○ the possibility of a small ice age in the future.

15 Why is it hard for the poor to survive the next cooling period?

- **A** ○ because people can't remove themselves from the major safety nets.
- **B** ○ because politicians are voting against the movement,
- **C** ○ because migration seems impossible for the reason of closed borders.
- **D** ○ because climate changes accelerate the process of moving southward.

16 Why is the winter temperature in continental Europe higher than that in North America?

- **A** ○ because heat is brought to Europe with the wind flow.
- **B** ○ because the eastward movement of freshwater continues,
- **C** ○ because Boston and Rome are at the same latitude.
- **D** ○ because the ice formation happens in North America.

Questions 17-21

Match each statement with the correct person A-D in the box below. Write the correct letter A, B, C or D.

NB: You may use any letter more than once.

A. Bob Dickson

B. Terrence Joyce

C. William Curry

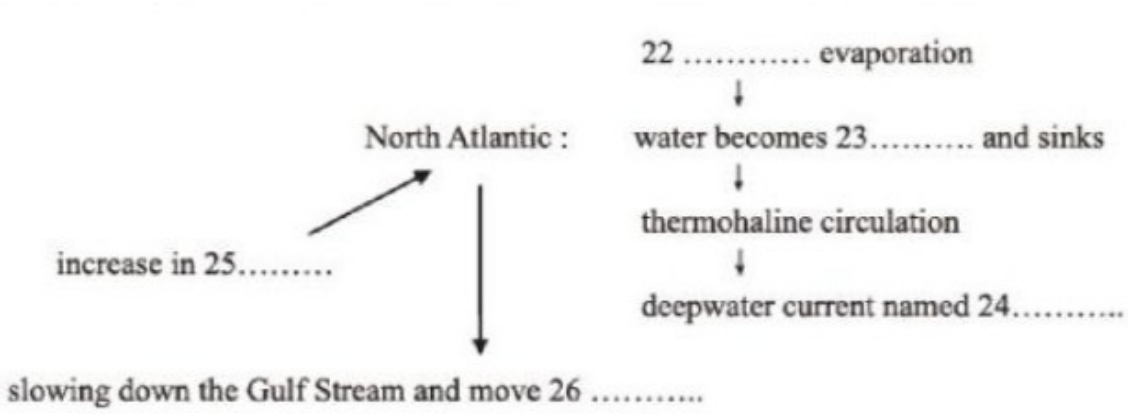
D. National Academy of Science

	A	B	C	D
17 A quick climate change wreaks great disruption.	○	○	○	○
18 Most Americans are not prepared for the next cooling period.	○	○	○	○
19 A case of a change of ocean water is mentioned in a conference.	○	○	○	○
20 Global warming urges the appearance of the ice age.	○	○	○	○
21 The temperature will not drop to the same degree as it used to be.	○	○	○	○

Questions 22-26

Complete the flow chart below.

Choose NO MORE THAN THREE WORDS from the passage for each answer.



22 _____

23 _____

24 _____

25 _____

PASSAGE 3

Read the text below and answer questions 27-40.

Soviet's New Working Week

27

A. "There are no fortresses that Bolsheviks cannot storm". With these words, Stalin expressed the dynamic self-confidence of the Soviet Union's Five Year Plan: weak and backward Russia was to turn overnight into a powerful modem industrial country. Between 1928 and 1932, production of coal, iron and steel increased at a fantastic rate, and new industrial cities sprang up, along with the world's biggest dam. Everyone's life was affected, as collectivised farming drove millions from the land to swell the industrial proletariat. Private enterprise disappeared in city and country, leaving the State supreme under the dictatorship of Stalin. Unlimited enthusiasm was the mood of the day, with the Communists believing that iron will and hard-working manpower alone would bring about a new world.

28

B. Enthusiasm spread to tune itself, in the desire to make the state a huge efficient machine, where not a moment would be wasted, especially in the workplace. Lenin had already been intrigued by the ideas of the American Frederick Winslow Taylor (1856-1915), whose time-motion studies had discovered ways of stream-lining effort so that every worker could produce the maximum. The Bolsheviks were also great admirers of Henry Ford's assembly line mass production and of his Fordson tractors that were imported by the thousands. The engineers who came with them to train their users helped spread what became a real cult of Ford. Emulating and surpassing such capitalist models formed part of the training of the new Soviet Man, a heroic figure whose unlimited capacity for work would benefit everyone in the dynamic new society. All this culminated in the Plan, which has been characterized as the triumph of the machine, where workers would become supremely efficient robot-like creatures.

C. Yet this was Communism whose goals had always included improving the lives of the proletariat. One major step in that direction was the sudden announcement in 1927 that reduced the working day from eight to seven hours. In January 1929, all Indus-tries were ordered to adopt the shorter day by the end of the Plan. Workers were also to have an extra hour off on the eve of Sundays and holidays. Typically though, the state took away more than it gave, for this was part of a scheme to increase production by establishing a three-shift system. This meant that the factories were open day and night and that many had to work at highly undesfrable hours.

29

D. Hardly had that policy been announced, though, than Yuri Larin, who had been a close associate of Lenin and architect of his radical economic policy, came up with an idea for even greater efficiency. Workers were free and plants were closed on Sundays. Why not abolish that wasted day by instituting a continuous work week so that the machines could operate to their full capacity every day of the week? When Larin presented his idea to the Congress of Soviets in May 1929, no one paid much attention. Soon after, though, he got the ear of Stalin, who approved. Suddenly, in June, the Soviet press was filled with articles praising the new scheme. In August, the Council of Peoples' Commissars ordered that the continuous work week be brought into immediate effect, during the height of enthusiasm for the Plan, whose goals the new schedule seemed guaranteed to forward.

30

E. The idea seemed simple enough, but turned out to be very complicated in practice. Obviously, the workers couldn't be made to work seven days a week, nor should their total work hours be increased. The Solution was ingenious: a new five-day week would have the workers on the job for four days, with the fifth day free; holidays would be reduced from ten to five, and the extra hour off on the eve of rest days would be abolished. Staggering the rest-days between groups of workers meant that each worker would spend the same number of hours on the job, but the factories would be working a full 360 days a year instead of 300. The 360 divided neatly into 72 five-day weeks. Workers in each establishment (at first factories, then stores and offices) were divided into five groups, each assigned a colour which appeared on the new Uninterrupted Work Week calendars distributed all over the country. Colour-coding was a valuable mnemonic device, since workers might have trouble remembering what their day off was going to be, for it would change every week. A glance at the colour on the calendar would reveal the free day, and allow workers to plan their activities. This system, however, did not apply to construction or seasonal occupations, which followed a six-day week, or to factories or mines which had to close regularly for maintenance: they also had a six-day week, whether interrupted (with the same day off for everyone) or continuous. In all cases, though, Sunday was treated like any other day.

31

F. Official propaganda touted the material and cultural benefits of the new scheme. Workers would get more rest; production and employment would increase (for more workers would be needed to keep the factories running continuously); the standard of living would improve. Leisure time would be more rationally employed, for cultural activities (theatre, clubs, sports) would no longer have to be crammed into a weekend, but could flourish every day, with their facilities far less crowded. Shopping would be easier for the same reasons. Ignorance and superstition, as represented by organized religion, would suffer a mortal blow, since 80 per cent of the workers would be on the job on any given Sunday. The only objection concerned the family, where normally more than one member was working: well, the Soviets insisted, the narrow family was far less important than the vast common good and besides, arrangements could be made for husband and wife to share a common schedule. In fact, the regime had long wanted to weaken or sideline the two greatest potential threats to its total dominance:

organised religion and the nuclear family. Religion succumbed, but the family, as even Stalin finally had to admit, proved much more resistant.

32

G. The continuous work week, hailed as a Utopia where time itself was conquered and the sluggish Sunday abolished forever, spread like an epidemic. According to official figures, 63 per cent of industrial workers were so employed by April 1930; in June, all industry was ordered to convert during the next year. The fad reached its peak in October when it affected 73 per cent of workers. In fact, many managers simply claimed that their factories had gone over to the new week, without actually applying it. Conforming to the demands of the Plan was important; practical matters could wait. By then, though, problems were becoming obvious. Most serious (though never officially admitted), the workers hated it. Coordination of family schedules was virtually impossible and usually ignored, so husbands and wives only saw each other before or after work; rest days were empty without any loved ones to share them - even friends were likely to be on a different schedule. Confusion reigned: the new plan was introduced haphazardly, with some factories operating five-, six- and seven-day weeks at the same time, and the workers often not getting their rest days at all.

33

H. The Soviet government might have ignored all that (It didn't depend on public approval), but the new week was far from having the vaunted effect on production. With the complicated rotation system, the work teams necessarily found themselves doing different kinds of work in successive weeks. Machines, no longer consistently in the hands of people who knew how to tend them, were often poorly maintained or even broken. Workers lost a sense of responsibility for the special tasks they had normally performed.

34

I. As a result, the new week started to lose ground. Stalin's speech of June 1931, which criticised the “depersonalised labor” its too hasty application had brought, marked the beginning of the end. In November, the government ordered the widespread adoption of the six-day week, which had its own calendar, with regular breaks on the 6th, 12th, 18th, 24th, and 30th, with Sunday usually as a working day. By July 1935, only 26 per cent of workers still followed the continuous schedule, and the six-day week was soon on its way out. Finally, in 1940, as part of the general reversion to more traditional methods, both the continuous five-day week and the novel six-day week were abandoned, and Sunday returned as the universal day of rest. A bold but typically ill-conceived experiment was at an end.

PART 3 — QUESTIONS

Questions 27-34

Choose the correct heading for each paragraph from the list of headings below.

Write the correct number I-XII.

i. **Benefits of the new scheme and its resistance**

ii. **Making use of the once wasted weekends**

iii. **Cutting work hours for better efficiency**

iv. **Optimism of the great future**

v. **Negative effects on production itself**

vi. **Soviet Union's five year plan**

vii. **The abolishment of the new work-week scheme**

viii. **The Ford model**

ix. **Reaction from factory workers and their families**

x. **The color-coding scheme**

xi. **Establishing a three-shift system**

xii. **Foreign inspiration**

Questions 35-37

Choose the correct letter A, B, C or D.

35 According to paragraph A, Soviet's five year plan was a success because

- **A** ○ Bolsheviks built a strong fortress.
- **B** ○ Russia was weak and backward,
- **C** ○ industrial production increased.
- **D** ○ Stalin was confident about Soviet's potential.

36 Daily working hours were cut from eight to seven to

- **A** ○ improve the lives of all people.

B ○ boost industrial productivity,

C ○ get rid of undesirable work hours.

D ○ change the already establish three-shift work system.

37 Many factory managers claimed to have complied with the demands of the new work week because

A ○ they were pressurized by the state to do so.

B ○ they believed there would not be any practical problems,

C ○ they were able to apply it.

D ○ workers hated the new plan.

Questions 38-40

Answer the questions below using NO MORE THAN TWO WORDS from the passage for each answer.

38 Whose idea of continuous work week did Stalin approve and helped to implement? _____

39 What method was used to help workers to remember the rotation of their off days? _____

40 What was the most resistant force to the new work week scheme? _____

Answer Key

#	Answer	Explanation
1	**ix**	The game remained popular for 700 or 800 years, but, although it was taken to England, it is doubtful whether it can be considered as a forerunner of contemporary football
2	**x**	The game that flourished in Britain from the 8th to the 19th centuries was substantially different from all the previously known forms – more disorganised, more violent, more spontaneous and usually played by an indefinite number of players. Frequently, the games took the form of a heated contest between whole villages. Kicking opponents was allowed, as in fact was almost everything else
3	**i**	There was tremendous enthusiasm for football, even though the authorities repeatedly intervened to restrict it, as a public nuisance. In the 14th and 15th centuries, England, Scotland and France all made football punishable by law, because of the disorder that commonly accompanied it, or because the well-loved recreation prevented subjects from practising more useful military disciplines. None of these efforts had much effect
4	**vii**	Mulcaster claimed that all that was needed was to refine it a little, limit the number of participants in each team and, more importantly, have a referee to oversee the game
5	**iii**	It was recognised in educational circles that, as a team game, football helped to develop such fine qualities as loyalty, selflessness, cooperation, subordination and deference to the team spirit
6	**viii**	At Cambridge University, an initiative began to establish some uniform standards and rules that would be accepted by everyone, but there were essentially two camps: the minority Rugby School and some others – wished to continue with their own form of the game, in particular allowing players to carry the ball. In October of the same year, eleven London clubs and schools sent representatives to establish a set of fundamental rules to govern the matches played amongst them
7	**vi**	The dispute concerning kicking and tripping opponents and carrying the ball was discussed thoroughly at this and subsequent meetings, until eventually, on 8 December, the die-hard exponents of the Rugby style withdrew, marking a final split between rugby and football

#	Answer	Explanation
8	**I**	The very earliest form of football for which we have evidence is the ‘tsu’chu’, which was played in China and may date back 3,000 years. It was performed in front of the Emperor during festivities to mark his birthday
9	**D**	This is a type of circular football game, a more dignified and ceremonious experience requiring certain skills, but not competitive in the way the Chinese game was, nor is there the slightest sign of struggle for possession of the ball. The players had to pass the ball to each other, in a relatively small space, trying not to let it touch the ground
10	**B**	The Romans had a much livelier game, ‘harpastum’. Each team member had his own specific tactical assignment took a noisy interest in the proceedings and the score
11	**H**	Frequently, the games took the form of a heated contest between whole villages
12	**E**	In the 14th and 15th centuries, England, Scotland and France all made football punishable by law, because of the disorder that commonly accompanied it, or because the well-loved recreation prevented subjects from practising more useful military disciplines
13	**A**	It was recognised in educational circles that, as a team game, football helped to develop such fine qualities as loyalty, selflessness, cooperation, subordination and deference to the team spirit. A ‘games cult’ developed in schools, and some form of football became an obligatory part of the curriculum
14	**D**	And ice-choked scenes, similar to those immortalized by the 16th-century Flemish painter Pieter Brueghel the Elder, may also return to Europe. His works, including the 1565 masterpiece “Hunters in the Snow,” make the now-temperate European landscapes look more like Lapland. Such frigid settings were commonplace during a period dating roughly from 1300 to 1850 because much of North America and Europe was in the throes of a little ice age. And now there is mounting evidence that the chill could return. A growing number of scientists believe conditions are ripe for another prolonged cooldown, or small ice age
15	**C**	During previous cooling periods, whole tribes simply picked up and moved south, but that option doesn’t work in the modem, tense world of closed borders
16	**A**	Because the prevailing North Atlantic winds blow eastward, a lot of the heat wafts to Europe. That’s why many scientists believe winter temperatures on the Continent are as much as 36 degrees

#	Answer	Explanation
		Fahrenheit warmer than those in North America at the same latitude
17	**D**	A 2002 report titled “Abrupt Climate Change: Inevitable Surprises,” produced by the National Academy of Sciences, pegged the cost from agricultural losses alone at $100 billion to $250 billion while also predicting that damage to ecologies could be vast and incalculable
18	**B**	And he is alarmed that Americans have yet to take the threat seriously
19	**A**	Bob Dickson, a British oceanographer who sounded an alarm at a February conference in Honolulu, has termed the drop in salinity and temperature in the Labrador Sea— a body of water between northeastern Canada and Greenland that adjoins the Atlantic-“arguably the largest full-depth changes observed in the modem instrumental oceanographic record.”
20	**B**	Isn’t the earth actually warming? Indeed it is, says Joyce. In his cluttered office, full of soft light from the foggy Cape Cod morning, he explains how such warming could actually be the surprising culprit of the next mini-ice age
21	**C**	While no one is predicting a brutal ice sheet like the one that covered the Northern Hemisphere with glacier about 12,000 years ago, the next cooling trend could drop average temperatures 5 degrees Fahrenheit over much of the United States and 10 degrees in the Northeast, northern Europe, and northern Asia
22	**heat**	Having given up its heat to the air, the now-cooler water becomes denser and sinks into the North Atlantic by a mile or more in a process oceanographers call thermohaline circulation
23	**denser**	Having given up its heat to the air, the now-cooler water becomes denser and sinks into the North Atlantic by a mile or more in a process oceanographers call thermohaline circulation
24	**Great ocean Conveyor**	This massive column of cascading cold is the main engine powering a deepwater current called the Great Ocean Conveyor that snakes through all the world’s oceans
25	**freshwater**	But as the North Atlantic fills with freshwater, it grows less dense, making the waters carried northward by the Gulf Stream less able to sink. The new mass of relatively freshwater sits on top of the ocean like a big thermal blanket, threatening the thermohaline circulation
26	**southward**	That in turn could make the Gulf Stream slow or veer southward

#	Answer	Explanation
27	**iv**	Unlimited enthusiasm was the mood of the day, with the Communists believing that iron will and hard-working manpower alone would bring about a new world
28	**xii**	Lenin had already been intrigued by the ideas of the American Frederick Winslow Taylor (1856-1915), whose time-motion studies had discovered ways of stream-lining effort so that every worker could produce the maximum. The Bolsheviks were also great admirers of Henry Ford's assembly line mass production and of his Fordson tractors that were imported by the thousands
29	**ii**	Workers were free and plants were closed on Sundays. Why not abolish that wasted day by instituting a continuous work week so that the machines could operate to their full capacity every day of the week
30	**x**	Workers in each establishment (at first factories, then stores and offices) were divided into five groups, each assigned a colour which appeared on the new Uninterrupted Work Week calendars distributed all over the country. Colour-coding was a valuable mnemonic device, since workers might have trouble remembering what their day off was going to be, for it would change every week. A glance at the colour on the calendar would reveal the free day, and allow workers to plan their activities
31	**i**	Official propaganda touted the material and cultural benefits of the new scheme Religion succumbed, but the family, as even Stalin finally had to admit, proved much more resistant
32	**ix**	Most serious (though never officially admitted), the workers hated it. Coordination of family schedules was virtually impossible and usually ignored, so husbands and wives only saw each other before or after work; rest days were empty without any loved ones to share them – even friends were likely to be on a different schedule
33	**v**	The Soviet government might have ignored all that (It didn't depend on public approval), but the new week was far from having the vaunted effect on production
34	**vii**	Finally, in 1940, as part of the general reversion to more traditional methods, both the continuous five-day week and the novel six-day week were abandoned, and Sunday returned as the universal day of rest. A bold but typically ill-conceived experiment was at an end
35	**C**	Between 1928 and 1932, production of coal, iron and steel increased at a fantastic rate, and new industrial cities sprang up, along with the world's biggest dam

#	Answer	Explanation
36	**B**	Typically though, the state took away more than it gave, for this was part of a scheme to increase production by establishing a three-shift system
37	**A**	In fact, many managers simply claimed that their factories had gone over to the new week, without actually applying it. Conforming to the demands of the Plan was important; practical matters could wait
38	**(Yuri) Larin**	Hardly had that policy been announced, though, than Yuri Larin, who had been a close associate of Lenin and architect of his radical economic policy, came up with an idea for even greater efficiency. Workers were free and plants were closed on Sundays. Why not abolish that wasted day by instituting a continuous work week so that the machines could operate to their full capacity every day of the week? When Larin presented his idea to the Congress of Soviets in May 1929, no one paid much attention. Soon after, though, he got the ear of Stalin, who approved
39	**colour-coding/color-coding / colour/color**	Colour-coding was a valuable mnemonic device, since workers might have trouble remembering what their day off was going to be, for it would change every week
40	**(the) family**	Religion succumbed, but the family, as even Stalin finally had to admit, proved much more resistant

Test 75

PASSAGE 1

You should spend about 20 minutes on Questions 1-13, which are based on Reading Passage 1 below.

Density and Crowding

1

A Of the great myriad of problems which man and the world face today, there are three significant fiends which stand above all others in importance: the unprecedented population growth throughout the world a net increase of 1,400,000 people per week and all of its associations and consequences; the increasing urbanization of these people, so that more and more of them are rushing into cities and urban areas of the world; and the tremendous explosion of communication and social contact throughout the world, so that every part of the world is now aware of every other part. All of these fiends are producing increased crowding and the perception of crowding.

2

B It is important to emphasize at the outset that crowding and density are not necessarily the same. Density is the number of individuals per unit area or unit space. It is a simple physical measurement. Crowding is a product of density, communication, contact, and activity. It implies a pressure, a force, and a psychological reaction. It may occur at widely different densities. The frontiersman may have felt crowded when someone built a homestead a mile away. The suburbanite may feel relatively uncrowded in a small house on a half-acre lot if it is surrounded by trees, bushes, and a hedgerow, even though he lives under much higher physical density than did the frontiersman. Hence, crowding is very much a psychological and ecological phenomenon, and not just a physical condition.

3

C A classic crowding study was done by Calhoun (1962), who put rats into a physical environment designed to accommodate 50 rats and provided enough food, water, and nesting materials for the number of rats in the environment. The rat population peaked at 80, providing a look at ramped living conditions. Although the rats experienced no resource limitations other than space restriction, a number of negative conditions developed: the two most dominant males took harems of several female rats and occupied more than their share of space, leaving other rats even more crowded; many females stopped building nests and abandoned their infant rats; the pregnancy rate declined; infant and adult mortality rates increased; more

aggressive and physical attacks occurred; sexual variation increased, including hypersexuality, inhibited sexuality, homosexuality, and bisexuality.

4

D Calhoun's results have led to other research on crowding's effects on human beings, and these research findings have suggested that high density is not the single cause of negative effects on humans. When crowding is defined only in terms of spatial density (the amount of space per person), the effects of crowding are variable. However, if crowding is defined in terms of social density, or the number of people who must interact, then crowding better predicts negative psychological and physical effects.

5

E There are several reasons why crowding makes US feel uncomfortable. One reason is related to stimulus overload - there are just too many stimuli competing for our attention. We cannot notice or respond to all of them. This feeling is typical of the harried mother, who has several children competing for her attention, while she is on the phone and the doorbell is ringing. This leaves her feeling confused, fatigued and yearning to withdraw from the situation. There are strong feelings of a lack of privacy - being unable to pay attention to what you want without being repeatedly interrupted or observed by others.

6

F Field studies done in a variety of settings illustrate that social density is associated with negative effects on human beings. In prison studies, males generally became more aggressive with increases in density. In male prison, inmate; living in conditions of higher densities were more likely to suffer from fight. Males rated themselves as more aggressive in small rooms (a situation of high spatial density), whilst the females rated themselves as more aggressive in large rooms (Stokols et al., 1973). These differences relate to the different personal space requirements of the genders. Besides, Baum and Greenberg found that high density leads to decreased attraction, both physical attraction and liking towards others and it appears to have gender differences in the impact that density has on attraction levels, with males experiencing a more extreme reaction. Also, the greater the density is, the less the helping behavior. One reason why the level of helping behavior may be reduced in crowded situations links to the concept of diffusion of responsibility. The more people that are present in a situation that requires help, the less often help is given. This may be due to the fact that people diffuse responsibility among themselves with no-one feeling that they ought to be the one to help.

7

G Facing all these problems, what are we going to do with them? The more control a person has over the crowded environment the less negatively they experience it, thus the perceived crowding is less (Schmidt and Keating). The ability to cope with crowding is also influenced by

the relationship the individual has with the other people in the situation. The high density will be interpreted less negatively if the individual experiences it with people he likes. One of the main coping strategies employed to limit the impact of high density is social withdrawal. This includes behaviors such as averting the gaze and using negative body language to attempt to block any potential intrusions.

PART 1 — QUESTIONS

Questions 1-7

Reading passage 1 has seven paragraphs, A-G

Choose the correct heading for paragraphs A -G from the list of headings below.

i. **Other experiments following Calhoun's experiment offering a clearer indication**

ii. **The effects of crowding on people in the social scope**

iii. **Psychological reaction to crowding**

iv. **Problems that result in crowding**

v. **Responsibility does not work**

vi. **What cause the upset feel of crowding**

vii. **Definitions of crowding and density**

viii. **Advice for crowded work environment**

ix. **Difference between male and females' attractiveness in a crowd**

x. **Nature and results of Calboun's experiment**

Questions 8-13

Complete the sentences below.

Choose NO MORE THAN TWO WORDS from the passage for each answer.

- Being disturbed repeatedly, the harried mother feels frustrated for the lack of **8** _____.
- Inmates in high density settings were more aggressive in **9** _____.
- The different result between male and female is associated with the varying need of **10** _____.
- Especially for male, Baum and Greenberg found that **11** _____ declined with high density.
- The idea of responsibility diffusion may explain a person's reluctant to **12** _____.

- Schmidt and Keating suggest that if more **13** _____ was present, there would be a reduction in crowding stress.

PASSAGE 2

You should spend about 20 minutes on Questions 14-27, which are based on Reading Passage 2 below.

The reconstruction of community in Talbot Park, Auckland

14

A An architecture of disguise is almost complete at Talbot Park in the heart of Auckland's Glen Innes. The place was once described as a state housing ghetto, rife with crime, vandalism and other social problems. But today after a $48 million urban renewal makeover, the site is home to 700 residents — 200 more than before — and has people regularly inquiring whether they can buy or rent there. "It doesn't look like social housing," Housing New Zealand housing services manager Dene Busby says of the tidy brick and weatherboard apartments and townhouses which would look just as much at home in "there is no reason why public housing should look cheap in my view," says Design Group architect Neil of the eight three-bedroom terrace houses his firm designed.

15

B Talbot Park is a triangle of government-owned land bounded by Apirana Ave, Pilkington Rd and Point England Rd. In the early 1960s it was developed for state housing built around a linear park that ran through the middle. Initially, there was a strong sense of a family-friendly community. Former residents recall how the Talbot Park reserve played a big part in their childhoods — a place where the kids in the block came together to play softball, cricket, tiggy, leapfrog and bullrush. Sometimes they'd play "Maoris against Pakehas" but without any animosity. "It was all just good fun", says Georgie Thompson in Ben Schrader's We Call it Home: A History of State Housing in New Zealand. "We had respect for our neighbours and addressed them by title Mr. and Mrs. so-and-so," she recalls.

16

C Quite what went wrong with Talbot Park is not clear. We call it Home Records that the community began to change in the late 1970s as more Pacific Islanders and Europeans moved in. The new arrivals didn't readily integrate with the community, a "them and us" mentality developed, and residents interacted with their neighbours less. What was clear was the buildings were deteriorating and becoming dilapidated, petty crime was on the rise and the reserve — focus of fond childhood memories — had become a wasteland and was considered unsafe.

17

D But it wasn't until 2002 that Housing New Zealand decided the properties needed upgrading. The master renewal plan didn't take advantage of the maximum accommodation density allowable (one unit per 100 sq metres) but did increase density to one emit per 180 sq m by refurbishing all 108 star flat units, removing the multis and building 111 new home. The Talbot strategy can be summed up as mix, match and manage. Mix up the housing with variety plans from a mix of architects, match house styles to what's built by the private sector, match tenants to the mix, and manage their occupancy. Inevitably cost comes into the equation." If you're going to build low cost homes, you've got to keep them simple and you can't afford a fancy bit on them. " says Michael Thompson of Architectus which designed the innovative three-level Atrium apartments lining two sides of a covered courtyard. At $300,000 per two bedroom unit, the building is more expensive but provides for independent disabled accommodation as well as offering solar hot water heating and rainwater collection for toilet cisterns and outside taps.

18

E The renewal project budget at $1.5 million which will provide park pathways, planting, playgrounds, drinking fountains, seating, skateboard rails, a half-size basketball hard court, and a pavilion. But if there was any doubt this is a low socio-economic area, the demographics for the surrounding Tamaki area are sobering. Of the 5000 households there, 55 per cent are state houses, 28 per cent privately owned (compared to about 65 per cent nationally) and 17 per cent are private rental. The area has a high concentration of households with incomes in the $5000 to $15,000 range and very few with an income over $70,000. That's in sharp contrast to the more affluent suburbs like Kohimarama and St John's that surround the area.

19

F "The design is for people with different culture background," says architect James Lunday of Common Ground which designed the 21 large family homes. "Architecturally we decided to be relatively conservative — nice house in its own garden with a bit of space and good indoor outdoor flow." There's a slight reflection of the whare and a Pacific fale, but not overplayed "The private sector is way behind in urban design and sustainable futures," says Bracey. "Redesigning sheets and parks is a big deal and very difficult to do. The private sector won't do it, because It's so hard."

20

G There's no doubt good urban design and good architecture play a significant part in the scheme. But probably more important is a new standard of social control. Housing New Zealand calls it "intensive tenancy management". Others view it as social engineering. "It's a model that we are looking at going forward," according to Housing New Zealand's central Auckland regional manager Graham Bodman. The focus is on frequent inspections, helping tenants to get to know each other and trying to create an environment of respect for neighbours, " says Bodman. That includes some strict rules — no loud parties after 10 pm, no dogs, no cats in the apartments, no washing hung over balcony rails and a requirement to mow lawns and keep the

property tidy. Housing New Zealand has also been active in organising morning teas and sheet barbecues for residents to meet their neighbours. "IVs all based on the intensification," says Community Renewal project manager Stuart Bracey. "We acknowledge if you are going to put more people living closer together, you have to actually help them to live closer together because it creates tension — especially for people that aren't used to it."

PART 2 — QUESTIONS

Questions 14-20

Reading Passage 2 has seven paragraphs, A-G.

Choose the correct heading for paragraphs, A-G from the list below.

i. **Financial hardship of community**

ii. **A good tendency of strengthening the supervision**

iii. **Details of plans for the community's makeover and upgrade**

iv. **Architecture suits families of various ethnic origins**

v. **Problems arise then the mentality of alienation developed later**

vi. **Introduction of a social housing community with unexpected high standard**

vii. **A practical design and need assist and cooperate in future**

viii. **closer relationship among neighbors in original site**

ix. **different need from a makeup of a low financial background should be considered**

x. **How to make the community feel safe**

xi. **a plan with details for house structure**

Questions 21-23

Use the information in the passage to match the people (listed A-E) with opinions or deeds below.

A. Michael Thompson

B. Graham Bodman

C. Stuart Bracey

D. James Lunday

E. Dene Busby

	A	B	C	D	E
21 Design should meet the need of mix-raced cultural background	○	○	○	○	○

	A	B	C	D	E
22 for better living environment, regulations and social control should be imperative	○	○	○	○	○
23 organising more community's activities helps strengthening relationship in community	○	○	○	○	○

Questions 24-27

Complete the following summary of the paragraphs of Reading Passage 2

Choose ONLY ONE WORD from the passage for each answer.

In the year 2002, the Talbot decided to raise housing standard, yet the plan was to build homes go much beyond the accommodation limit and people complain about the high living **24** _____. And as the variety plans were complemented under the designs of many **25** _____ together, made house styles go with the part designed by individuals, matched tenants from different culture. As for the finance, reconstruction program's major concern is to build a house within low **26** _____; finally, just as expert predicted residents will agree on builbing a relatively conventional house in its own **27** _____, which provides considerable space to move around.

PASSAGE 3

You should spend about 20 minutes on Questions 28-40, which are based on Reading Passage 3 below.

Video Game's Unexpected Benefits to Human Brain

A James Paul Gee, professor of education at the University of Wisconsin-Madison, played his first video game years ago when his six-year-old son Sam was playing Pajama Sam: No Need to Hide When It's Dark Outside. He wanted to play the game so he could support Sam's problem solving. Though Pajama Sam is not an "educational game", it is replete with the types of problems psychologists study when they study thinking and learning. When he saw how well the game held Sam's attention, he wondered what sort of beast a more mature video game might be.

B Video and computer games, like many other popular, entertaining and addicting kid's activities, are looked down upon by many parents as time-wasters, and worse, parents think that these games rot the brain. Violent video games are readily blamed by the media and some experts as the reason why some youth become violent or commit extreme anti-social behavior. Recent content analyses of video games show that as many as 89% of games contain some violent content, but there is no form of aggressive content for 70% of popular games. Many scientists and psychologists, like James Paul Gee, find that video games actually have many benefits - the main one being making kids smart. Video games may actually teach kids high-level thinking skills that they will need in the future.

C "Video games change your brain," according to University of Wisconsin psychologist Shawn Green. Video games change the brain's physical structure the same way as do learning to read, playing the piano, or navigating using a map. Much like exercise can build muscle, the powerful combination of concentration and rewarding surges of neurotransmitters like dopamine, which strengthens neural circuits, can build the player's brain.

D Video games give your child's brain a real workout. In many video games, the skills required to win involve abstract and high level thinking. These skills are not even taught at school. Some of the mental skills trained by video games include: following instructions, problem solving, logic, hand-eye coordination, fine motor and spatial skills. Research also suggests that people can learn iconic, spatial, and visual attention skills from video games. There have been even studies with adults showing that experience with video games is related to better surgical skills. Jacob Benjamin, doctor from Beth Israel Medical Center NY, found a direct link between skill at video gaming and skill at keyhole or laparoscopic surgery. Also, a reason given by experts as to why fighter pilots of today are more skillful is that this generation's pilots are being weaned on video games.

E The players learn to manage resources that are limited, and decide the best use of resources, the same way as in real life. In strategy games, for instance, while developing a city, an unexpected surprise like an enemy might emerge. This forces the player to be flexible and quickly change tactics. Sometimes the player does this almost every second of the game giving

the brain a real workout. According to researchers at the University of Rochester, led by Daphne Bavelier, a cognitive scientist, games simulating stressful events such as those found in battle or action games could be a training tool for real-world situations. The study suggests that playing action video games primes the brain to make quick decisions. Video games can be used to train soldiers and surgeons, according to the study. Steven Johnson, author of Everything Bad is Good For You: How Today's Popular Culture, says gamers must deal with immediate problems while keeping their long-term goals on their horizon. Young gamers force themselves to read to get instructions, follow storylines of games, and get information from the game texts.

F James Paul Gee, professor of education at the University of Wisconsin-Madison, says that playing a video game is similar to working through a science problem. Like students in a laboratory, gamers must come up with a hypothesis. For example, players in some games constantly try out combinations of weapons and powers to use to defeat an enemy. If one does not work, they change hypothesis and try the next one. Video games are goal-driven experiences, says Gee, which are fundamental to learning. Also, using math skills is important to win in many games that involve quantitative analysis like managing resources. In higher levels of a game, players usually fail the first time around, but they keep on trying until they succeed and move on to the next level.

G Many games are played online and involve cooperation with other online players in order to win. Video and computer games also help children gain self-confidence and many games are based on history, city building, and governance and so on. Such games indirectly teach children about aspects of life on earth.

H In an upcoming study in the journal Current Biology, authors Daphne Bavelier, Alexandre Pouget, and C. Shawn Green report that video games could provide a potent training regimen for speeding up reactions in many types of real-life situations. The researchers tested dozens of 18- to 25-year-olds who were not ordinarily video game players. They split the subjects into two groups. One group played 50 hours of the fast-paced action video games "Call of Duty 2" and "Unreal Tournament," and the other group played 50 hours of the slow-moving strategy game "The Sims 2." After this training period, all of the subjects were asked to make quick decisions in several tasks designed by the researchers. The action game players were up to 25 percent faster at coming to a conclusion and answered just as many questions correctly as their strategy game playing peers.

PART 3 — QUESTIONS

Questions 28-31

Choose the correct letter, A, B, C or D.

28 What is the main purpose of paragraph ONE?

- **A** ○ Introduction of professor James Paul Gee.
- **B** ○ Introduction of the video game: Pajamas Sam.
- **C** ○ Introduction of types of video games.
- **D** ○ Introduction of the background of this passage.

29 What does the author want to express in the second paragraph?

- **A** ○ Video games are widely considered harmful for children's brain.
- **B** ○ Most violent video games are the direct reason of juvenile delinquency,
- **C** ○ Even there is a certain proportion of violence in most video games; scientists and psychologists see its benefits of children's intellectual abilities.
- **D** ○ Many parents regard video games as time-wasters, which rot children's brain.

30 What is correctly mentioned in paragraph four?

- **A** ○ Some schools use video games to teach students abstract and high level thinking.
- **B** ○ Video games improves the brain ability in various aspects,
- **C** ○ Some surgeons have better skills because they play more video games.
- **D** ○ Skillful fighter pilots in this generation love to paly video games.

31 What is the expectation of the experiment the three researchers did?

- **A** ○ Gamers have to make the best use of the limited resource.
- **B** ○ Gamers with better math skills will win in the end.
- **C** ○ Strategy game players have better ability to make quick decisions.

D ○ Video games help increase the speed of players' reaction effectively.

Questions 32-35

Do the following statements agree with the information given in Reading Passage 3?

32 Most video games are popular because of their violent content.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

33 The action game players minimized the percentage of making mistakes in the experiment.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

34 It would be a good idea for schools to apply video games in their classrooms.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

35 Those people who are addicted to video games have lots of dopamine in their brains.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

Questions 36-40

Use the information in the passage to match the people (listed A-F) with opinions or deeds below.

A. The writer's opinion

B. James Paul Gee

C. Shawn Green

D. Daphne Bavelier

E. Steven Johnson

F. Jacob Benjamin

	A	B	C	D	E	F
36 Video games as other daily life skills alter the brain's physical structure.	○	○	○	○	○	○
37 Brain is ready to make decisions without hesitation when players are immersed in playing stressful games.	○	○	○	○	○	○
38 The purpose-motivated experience that video games offer plays an essential role in studying.	○	○	○	○	○	○
39 Players are good at tackling prompt issues with future intensions.	○	○	○	○	○	○
40 It helps children broaden their horizon in many aspects and gain self-confidence.	○	○	○	○	○	○

Answer Key

#	Answer	Explanation
1	**iv**	Of the great myriad of problems which man and the world face today, there are three significant fiends which stand above all others in importance: the unprecedented population growth throughout the world a net increase of 1,400,000 people per week and all of its associations and consequences; the increasing urbanization of these people, so that more and more of them are rushing into cities and urban areas of the world; and the tremendous explosion of communication and social contact throughout the world, so that every part of the world is now aware of every other part. All of these fiends are producing increased crowding and the perception of crowding
2	**vii**	Density is the number of individuals per unit area or unit space. It is a simple physical measurement. Crowding is a product of density, communication, contact, and activity
3	**x**	A classic crowding study was done by Calhoun (1962), who put rats into a physical environment designed to accommodate 50 rats and provided enough food, water, and nesting materials for the number of rats in the environment. The rat population peaked at 80, providing a look at ramped living conditions. Although the rats experienced no resource limitations other than space restriction, a number of negative conditions developed
4	**i**	Calhoun’s results have led to other research on crowding’s effects on human beings, and these research findings have suggested that high density is not the single cause of negative effects on humans
5	**vi**	There are several reasons why crowding makes US feel uncomfortable
6	**ii**	Field studies done in a variety of settings illustrate that social density is associated with negative effects on human beings
7	**viii**	Facing all these problems, what are we going to do with them? The more control a person has over the crowded environment the less negatively they experience it, thus the perceived crowding is less (Schmidt and Keating). The ability to cope with crowding is also influenced by the relationship the individual has with the other people in the situation. The high density will be interpreted less negatively if the individual experiences it with people he likes. One of the main coping strategies employed to limit the impact of high density is social withdrawal

#	Answer	Explanation
8	**privacy**	This feeling is typical of the harried mother, who has several children competing for her attention, while she is on the phone and the doorbell is ringing. This leaves her feeling confused, fatigued and yearning to withdraw from the situation. There are strong feelings of a lack of privacy – being unable to pay attention to what you want without being repeatedly interrupted or observed by others
9	**male prison**	In prison studies, males generally became more aggressive with increases in density. In male prison, inmate; living in conditions of higher densities were more likely to suffer from fight
10	**personal space**	These differences relate to the different personal space requirements of the genders
11	**attraction/attraction levels**	Besides, Baum and Greenberg found that high density leads to decreased attraction, both physical attraction and liking towards others and it appears to have gender differences in the impact that density has on attraction levels, with males experiencing a more extreme reaction
12	**help**	One reason why the level of helping behavior may be reduced in crowded situations links to the concept of diffusion of responsibility. The more people that are present in a situation that requires help, the less often help is given. This may be due to the fact that people diffuse responsibility among themselves with no-one feeling that they ought to be the one to help
13	**control**	The more control a person has over the crowded environment the less negatively they experience it, thus the perceived crowding is less (Schmidt and Keating)
14	**vi**	“It doesn’t look like social housing,” Housing New Zealand housing services manager Dene Busby says of the tidy brick and weatherboard apartments and townhouses which would look just as much at home in “there is no reason why public housing should look cheap in my view,” says Design Group architect Neil of the eight three-bedroom terrace houses his firm designed
15	**viii**	Initially, there was a strong sense of a family-friendly community. Former residents recall how the Talbot Park reserve played a big part in their childhoods — a place where the kids in the block came together to play softball, cricket, tiggy, leapfrog and bullrush. Sometimes they’d play “Maoris against Pakehas” but without any animosity. “It was all just good fun”, says Georgie Thompson in Ben Schrader’s We Call it Home: A History of State Housing in New Zealand. “We had respect for our neighbours and addressed them by title Mr. and Mrs. so-and-so,” she recalls

#	Answer	Explanation
16	**v**	The new arrivals didn't readily integrate with the community, a "them and us" mentality developed, and residents interacted with their neighbours less. What was clear was the buildings were deteriorating and becoming dilapidated, petty crime was on the rise and the reserve — focus of fond childhood memories — had become a wasteland and was considered unsafe
17	**iii**	But it wasn't until 2002 that Housing New Zealand decided the properties needed upgrading. The master renewal plan didn't take advantage of the maximum accommodation density allowable (one unit per 100 sq metres) but did increase density to one emit per 180 sq m by refurbishing all 108 star flat units, removing the multis and building 111 new home. The Talbot strategy can be summed up as mix, match and manage
18	**ix**	The renewal project budget at $1.5 million which will provide park pathways, planting, playgrounds, drinking fountains, seating, skateboard rails, a half-size basketball hard court, and a pavilion. But if there was any doubt this is a low socio-economic area, the demographics for the surrounding Tamaki area are sobering. Of the 5000 households there, 55 per cent are state houses, 28 per cent privately owned (compared to about 65 per cent nationally) and 17 per cent are private rental. The area has a high concentration of households with incomes in the $5000 to $15,000 range and very few with an income over $70,000
19	**vii**	"Architecturally we decided to be relatively conservative — nice house in its own garden with a bit of space and good indoor outdoor flow." There's a slight reflection of the whare and a Pacific fale, but not overplayed "The private sector is way behind in urban design and sustainable futures," says Bracey. "Redesigning sheets and parks is a big deal and very difficult to do. The private sector won't do it, because It's so hard."
20	**ii**	Housing New Zealand calls it "intensive tenancy management". Others view it as social engineering. "It's a model that we are looking at going forward," according to Housing New Zealand's central Auckland regional manager Graham Bodman. The focus is on frequent inspections, helping tenants to get to know each other and trying to create an environment of respect for neighbours, " says Bodman. That includes some strict rules — no loud parties after 10 pm, no dogs, no cats in the apartments, no washing hung over balcony rails and a requirement to mow lawns and keep the property tidy
21	**D**	"The design is for people with different culture background," says architect James Lunday of Common Ground which designed the 21 large family homes

#	Answer	Explanation
22	**B**	“It’s a model that we are looking at going forward,” according to Housing New Zealand’s central Auckland regional manager Graham Bodman. The focus is on frequent inspections, helping tenants to get to know each other and trying to create an environment of respect for neighbours, ” says Bodman. That includes some strict rules — no loud parties after 10 pm, no dogs, no cats in the apartments, no washing hung over balcony rails and a requirement to mow lawns and keep the property tidy
23	**C**	Housing New Zealand has also been active in organising morning teas and sheet barbecues for residents to meet their neighbours. “IVs all based on the intensification,” says Community Renewal project manager Stuart Bracey. “We acknowledge if you are going to put more people living closer together, you have to actually help them to live closer together because it creates tension — especially for people that aren’t used to it.”
24	**density**	The master renewal plan didn’t take advantage of the maximum accommodation density allowable (one unit per 100 sq metres) but did increase density to one emit per 180 sq m by refurbishing all 108 star flat units, removing the multis and building 111 new home
25	**architects**	Mix up the housing with variety plans from a mix of architects, match house styles to what’s built by the private sector, match tenants to the mix, and manage their occupancy
26	**budget**	The renewal project budget at $1.5 million which will provide park pathways, planting, playgrounds, drinking fountains, seating, skateboard rails, a half-size basketball hard court, and a pavilion
27	**garden**	“Architecturally we decided to be relatively conservative — nice house in its own garden with a bit of space and good indoor outdoor flow.”
28	**D**	James Paul Gee, professor of education at the University of Wisconsin-Madison, played his first video game years ago when his six-year-old son Sam was playing Pajama Sam: No Need to Hide When It’s Dark Outside. He wanted to play the game so he could support Sam’s problem solving. Though Pajama Sam is not an “educational game”, it is replete with the types of problems psychologists study when they study thinking and learning. When he saw how well the game held Sam’s attention, he wondered what sort of beast a more mature video game might be
29	**C**	Recent content analyses of video games show that as many as 89% of games contain some violent content, but there is no form of aggressive content for 70% of popular games. Many scientists and psychologists, like James Paul Gee, find that video games actually have many benefits – the main one being making kids

#	Answer	Explanation
		smart. Video games may actually teach kids high-level thinking skills that they will need in the future
30	**B**	Some of the mental skills trained by video games include: following instructions, problem solving, logic, hand-eye coordination, fine motor and spatial skills. Research also suggests that people can learn iconic, spatial, and visual attention skills from video games
31	**D**	In an upcoming study in the journal Current Biology, authors Daphne Bavelier, Alexandre Pouget, and C. Shawn Green report that video games could provide a potent training regimen for speeding up reactions in many types of real-life situations
32	**NOT GIVEN**	Recent content analyses of video games show that as many as 89% of games contain some violent content, but there is no form of aggressive content for 70% of popular games
33	**FALSE**	The action game players were up to 25 percent faster at coming to a conclusion and answered just as many questions correctly as their strategy game playing peers
34	**NOT GIVEN**	These skills are not even taught at school
35	**TRUE**	Much like exercise can build muscle, the powerful combination of concentration and rewarding surges of neurotransmitters like dopamine, which strengthens neural circuits, can build the player's brain
36	**C**	"Video games change your brain," according to University of Wisconsin psychologist Shawn Green. Video games change the brain's physical structure the same way as do learning to read, playing the piano, or navigating using a map
37	**D**	According to researchers at the University of Rochester, led by Daphne Bavelier, a cognitive scientist, games simulating stressful events such as those found in battle or action games could be a training tool for real-world situations. The study suggests that playing action video games primes the brain to make quick decisions
38	**B**	Video games are goal-driven experiences, says Gee, which are fundamental to learning
39	**E**	Steven Johnson, author of Everything Bad is Good For You: How Today's Popular Culture, says gamers must deal with immediate problems while keeping their long-term goals on their horizon
40	**A**	Video and computer games also help children gain self-confidence and many games are based on history, city building,

#	Answer	Explanation
		and governance and so on. Such games indirectly teach children about aspects of life on earth

Test 76

PASSAGE 1

Read the text below and answer questions 1-13.

Lie Detector

A However much we may abhor it, deception comes naturally to all living things. Birds do it by feigning injury to lead hungry predators away from nesting young. Spider crabs do it by disguise: adorning themselves with strips of kelp and other debris, they pretend to be something they are not-and so escape their enemies. Nature amply rewards successful deceivers by allowing them to survive long enough to mate and reproduce. So it may come as no surprise to learn that human beings-who, according to psychologist Gerald Jellison of the University of South California, are lied to about 200 times a day, roughly one untruth every five minutes—often deceive for exactly the same reasons: to save their own skins or to get something they can't get by other means.

B But knowing how to catch deceit can be just as important a survival skill as knowing how to tell a lie and get away with it. A person able to spot falsehood quickly is unlikely to be swindled by an unscrupulous business associate or hoodwinked by a devious spouse. Luckily, nature provides more than enough clues to trap dissemblers in then own tangled webs-if you know where to look. By closely observing facial expressions, body language and tone of voice, practically anyone can recognize the telltale signs of lying. Researchers are even programming computers-like those used on Lie Detector-to get at the truth by analyzing the same physical cues available to the naked eye and ear. "With the proper training, many people can learn to reliably detect lies," says Paul Ekman, professor of psychology at the University of California, San Francisco, who has spent the past 15 years studying the secret art of deception.

C In order to know what kind of lies work best, successful liars need to accurately assess other people's emotional states. Ekman's research shows that this same emotional intelligence is essential for good lie detectors, too. The emotional state to watch out for is stress, the conflict most liars feel between the truth and what they actually say and do.

D Even high-tech lie detectors don't detect lies as such; they merely detect the physical cues of emotions, which may or may not correspond to what the person being tested is saying. Polygraphs, for instance, measure respiration, heart rate and skin conductivity, which tend to increase when people are nervous as they usually are when lying. Nervous people typically perspire, and the salts contained in perspiration conduct electricity. That's why a sudden leap in skin conductivity indicates nervousness about getting caught, perhaps? -- which might, in turn, suggest that someone is being economical with the truth. On the other hand, it might also mean that the lights in the television studio are too hot-which is one reason polygraph tests are inadmissible in court. "Good lie detectors don't rely on a single sign," Ekman says, "but interpret clusters of verbal and nonverbal clues that suggest someone might be lying."

E Those clues are written all over the face. Because the musculature of the face is directly connected to the areas of the brain that process emotion, the countenance can be a window to the soul. Neurological studies even suggest that genuine emotions travel different pathways through the brain than insincere ones. If a patient paralyzed by stroke on one side of the face, for example, is asked to smile deliberately, only the mobile side of the mouth is raised. But tell that same person a funny joke, and the patient breaks into a full and spontaneous smile. Very few people-most notably, actors and politicians-are able to consciously control all of their facial expressions. Lies can often be caught when the liar's true feelings briefly leak through the mask of deception. "We don't think before we feel," Ekman says. "Expressions tend to show up on the face before we're even conscious of experiencing an emotion."

F One of the most difficult facial expressions to fake—or conceal, if it is genuinely felt—is sadness. When someone is truly sad, the forehead wrinkles with grief and the inner comers of the eyebrows are pulled up. Fewer than 15% of the people Ekman tested were able to produce this eyebrow movement voluntarily. By contrast, the lowering of the eyebrows associated with an angry scowl can be replicated at will by almost everybody. "If someone claims they are sad and the inner comers of their eyebrows don't go up," Ekman says, "the sadness is probably false."

G The smile, on the other hand, is one of the easiest facial expressions to counterfeit. It takes just two muscles-the zygomaticus major muscles that extend from the cheekbones to the comers of the lips-to produce a grin. But there's a catch. A genuine smile affects not only the comers of the lips but also the orbicularis oculi, the muscle around the eye that produces the distinctive "crow's-feet" associated with people who laugh a lot. A counterfeit grin can be unmasked if the lip comers go up, the eyes crinkle but the inner comers of the eyebrows are not lowered, a movement controlled by the orbicularis oculi that is difficult to fake. The absence of lowered eyebrows is one reason why false smiles look so strained and stiff.

PART 1 — QUESTIONS

Questions 1-5

Do the following statements agree with the information given in Reading Passage 1?

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if the information is not given in the passage

1 All living animals can lie.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

2 Some people tell lies for self-preservation.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

3 The fact of lying is more important than detecting one.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

4 Researchers are using equipment to study which part of the brain is responsible for telling lies.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

5 To be a good liar, one has to understand other people's emotions.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

Questions 6-9

Choose the correct letter. A, B, C or D.

6 How does a lie-detector work?

A ○ It analyzes one's verbal response to a question.

B ○ It records the changes in one's facial expression,

C ○ It illustrates the reasons about the emotional change when one is tested.

D ○ It monitors several physical reactions in the person undergoing the test.

7 Why couldn't lie detectors be used in a court of law?

A ○ because the nonverbal clues are misleading.

B ○ because there could be other causes of a certain change in the equipment,

C ○ because the lights are too hot.

D ○ because the statistic data on the lie detectors are not accurate.

8 The writer quotes from the paralyzed patients

A ○ to exemplify people's response to true feelings.

B ○ to show the pathways for patients to recover,

C ○ to demonstrate the paralyzed patient's ability to smile.

D ○ to emphasize that the patient is in a state of stroke.

9 According to the passage, politicians

A ○ can express themselves clearly.

B ○ are good at masking their emotions,

C ○ are conscious of the surroundings.

D ○ can think before action.

Questions 10-13

Classify the following facial traits as referring to

A Happiness

B Anger

C Sadness

	A	B	C
10 Lines formed above eyebrows	○	○	○
11 Movement from muscle that orbits the eye	○	○	○
12 Eyebrows down	○	○	○
13 Inner comer of eyebrows raised	○	○	○

PASSAGE 2

Read the text below and answer questions 14-26.

Leaf-Cutting Ants and Fungus

A The ants and then agriculture have been extensively studied over the years, but the recent research has uncovered intriguing new findings about the fungus they cultivate, how they domesticated it and how they cultivate it and preserve it from pathogens. For example, the fungus farms, which the ants were thought to keep free of pathogens, turn out to be vulnerable to a devastating mold, found nowhere else but in ants' nests. To keep the mold in check, the ants long ago made a discovery that would do credit to any pharmaceutical laboratory

B Leaf-cutting ants and then fungus farms are a marvel of nature and perhaps the best known example of symbiosis, the mutual dependence of two species. The ants' achievement is remarkable - the biologist Edward o. Wilson has called it "one of the major breakthroughs in animal evolution" — because it allows them to eat, courtesy of their mushroom's digestive powers, the otherwise poisoned harvest of tropical forests whose leaves are laden with terpenoids, alkaloids and other chemicals designed to sicken browsers.

C Fungus growing seems to have originated only once in evolution, because all gardening ants belong to a single tribe, the descendants of the first fungus farmer. There are more than 200 known species of the attine ant tribe, divided into 12 groups, or genera. The leaf-cutters use fresh vegetation; the other groups, known as the lower attines because their nests are smaller and their techniques more primitive, feed their gardens with detritus like dead leaves, insects and feces.

D The leaf-cutters' fungus was indeed descended from a single strain, propagated clonally, or just by budding, for at least 23 million years. But the lower attine ants used different varieties of the fungus, and in one case a quite separate species, the four biologists discovered. The pure strain of fungus grown by the leaf-cutters, it seemed to Mr. Currie, resembled the monocultures of various human crops, that are very productive for a while and then succumb to some disastrous pathogen, such as the Irish potato blight. Monocultures, which lack the genetic diversity to respond to changing environmental threats, are sitting ducks for parasites. Mr. Currie felt there had to be a parasite in the ant-fungus system. But a century of ant research offered no support for the idea. Textbooks describe how leaf-cutter ants scrupulously weed their gardens of all foreign organisms. "People kept telling me, 'You know the ants keep then gardens free of parasites, don't you?'" Mr. Currie said of his efforts to find a hidden interloper.

E But after three years of sifting through attine ant gardens, Mr. Currie discovered they are far from free of infections. In last month's issue of the Proceedings of the National Academy of Sciences, he and two colleagues, Dr. Mueller and David Mairoch, isolated several alien organisms, particularly a family of parasitic molds called Escovopsis.

F Escovopsis turns out to be a highly virulent pathogen that can devastate a fungus garden in a couple of days. It blooms like a white cloud, with the garden dimly visible underneath. In a day

or two the whole garden is enveloped. "Other ants won't go near it and the ants associated with the garden just starve to death," Dr. Rehner said. "They just seem to give up, except for those that have rescued their larvae." The deadly mold then turns greenish-brown as it enters its spore-forming stage.

G Evidently the ants usually manage to keep Escovopsis and other parasites under control. But with any lapse in control, or if the ants are removed, Escovopsis will quickly burst forth. Although new leaf-cutter gardens start off free of Escovopsis, within two years some 60 percent become infected. The discovery of Escovopsis's role brings a new level of understanding to the evolution of the attine ants. "In the last decade, evolutionary biologists have been increasingly aware of the role of parasites as driving forces in evolution," Dr. Schultz said. There is now a possible reason to explain why the lower attine species keep changing the variety of fungus in their mushroom gardens, and occasionally domesticating new ones — to stay one step ahead of the relentless Escovopsis.

H Interestingly, Mr. Currie found that the leaf-cutters had in general fewer alien molds in their gardens than the lower attines, yet they had more Escovopsis infections. It seems that the price they pay for cultivating a pure variety of fungus is a higher risk from Escovopsis. But the leaf-cutters may have little alternative: they cultivate a special variety of fungus which, unlike those grown by the lower attines, produces nutritious swollen tips for the ants to eat.

I Discovery of a third partner in the ant-fungus symbiosis raises the question of how the attine ants, especially the leaf-cutters, keep this dangerous interloper under control. Amazingly enough, Mr. Currie has again provided the answer. "People have known for a hundred years that ants have a whitish growth on the cuticle," said Dr. Mueller, referring to the insects' body surface. "People would say this is like a cuticular wax. But Cameron was the first one in a hundred years to put these things under a microscope. He saw it was not inert wax. It is alive." Mr. Currie discovered a specialized patch on the ants' cuticle that harbors a particular kind of bacterium, one well known to the pharmaceutical industry, because it is the source of half the antibiotics used in medicine. From each of 22 species of attine ant studied, Mr. Cameron and colleagues isolated a species of Streptomyces bacterium, they reported in Nature in April. The Streptomyces does not have much effect on ordinary laboratory funguses. But it is a potent poisoner of Escovopsis, inhibiting its growth and suppressing spore formation. It also stimulates growth of the ants' mushroom fungus. The bacterium is carried by virgin queens when they leave to establish new nests, but is not found on male ants, playboys who take no responsibility in nest-making or gardening.

J Because both the leaf-cutters and the lower attines use Streptomyces, the bacterium may have been part of their symbiosis for almost as long as the Escovopsis mold. If so, some Alexander Fleming of an ant discovered antibiotics millions of years before people did. Even now, the ants are accomplishing two feats beyond the powers of human technology. The leaf-cutters are growing a monocultural crop year after year without disaster, and they are using an antibiotic apparently so wisely and prudently that, unlike people, they are not provoking antibiotic resistance in the target pathogen.

PART 2 — QUESTIONS

Questions 14-19

Use the information in the passage to match the options (listed A-C) with activities or features of ants below.

NB: you may use any letter more than once

A. Leaf-cutting ants

B. Lower attine ants

C. Both leaf-cutting and lower attine ants

	A	B	C
14 Build small nests and live with different foreign fungus.	○	○	○
15 Use toxic leaves to feed fungus o	○	○	○
16 Raise fungus which don't live with other foreingers.	○	○	○
17 Use substance to fight against escovopsis.	○	○	○
18 Use dead vegetable to feed fungus.	○	○	○
19 Are free of parasites explained previously.	○	○	○

Questions 20-24

The reading Passage has ten paragraphs A-J.

Which paragraph contains the following information?

	A	B	C	D	E	F	G	H	I	J
20 Dangerous outcome of Escovopsis.	○	○	○	○	○	○	○	○	○	○
21 Disadvantage of growing single fungus.	○	○	○	○	○	○	○	○	○	○

	A	B	C	D	E	F	G	H	I	J
22 Comparison of features of two different nests.	○	○	○	○	○	○	○	○	○	○
23 Two achievements made by ants earlier than human.	○	○	○	○	○	○	○	○	○	○
24 Advantage of growing new breed of fungus.	○	○	○	○	○	○	○	○	○	○

Questions 25-26

Choose the correct letter, A, B, C or D.

25 How does author think of Currie's opinion?

- **A** ○ his viewpoint was verified later.
- **B** ○ earlier study has sufficient evidence,
- **C** ○ no details mentioned in article.
- **D** ○ his opinion was proved to be wrong.

26 What did scientists find on the skin of ants under microscope?

- **A** ○ some white cloud mold embed in their skin
- **B** ○ that Wax is all over their skin,
- **C** ○ a substance which is useful to humans.
- **D** ○ a substance which suppresses growth of fungus.

PASSAGE 3

Read the text below and answer questions 27-40.

Save Endangered Language

"Obviously we must do some serious rethinking of our priorities, lest linguistics go down in history as the only science that presided obviously over the disappearance of 90 percent of the very field to which It is dedicated." - Michael Krauss, The World's Languages in Crisis

27

A Ten years ago Michael Krauss sent a shudder through the discipline of linguistics with his prediction that half the 6,000 or so languages spoken in the world would cease to be uttered within a century. Unless scientists and community leaders directed a worldwide effort to stabilize the decline of local languages, he warned, nine tenths of the linguistic diversity of humankind would probably be doomed to extinction. Krauss's prediction was little more than an educated guess, but other respected linguists had been clanging out similar alarms. Keneth L. Hale of the Massachusetts Institute of Technology noted in the same journal issue that eight languages on which he bad done fieldwork had since passed into extinction. A 1990 survey in Australia found that 70 of the 90 surviving Aboriginal languages were no longer used regularly by all age groups. The same was true for all but 20 of the 175 Native American languages spoken or remembered in the US., Krauss told a congressional panel in 1992.

28

B Many experts in the field mourn the loss of rare languages, for several reasons. To start, there is scientific self-interest; some of the most basic questions in linguistics have to do with the limits of human speech, which are far from fully explored. Many researchers would like to know which structural elements of grammar and vocabulary—if any—are truly universal and probably therefore hardwired into the human brain. Other scientists try to reconstruct ancient migration patterns by comparing borrowed words that appear in otherwise unrelated languages, in each of these cases, the wider the portfolio of languages you study, the more likely you are to get the right answers.

C Despite the near constant buzz in linguistics about endangered languages over the past 10 years, the field has accomplished depressingly little. "You would think that there would be some organized response to this dire situation' some attempt to determine which language can be saved and which should be documented before they disappear, says Sarah G. Thomason, a linguist at the University of Michigan at Ann Arbor. "But there isn't any such effort organized in the profession. It is only recently that it has become fashionable enough to work on endangered languages." Six years ago, recalls Douglas H. Whalen of Yale University, "when I asked linguists who was raising money to deal with these problems, I mostly got blank stares." So Whalen and a few other linguists founded the Endangered Languages Fund. In the five years to 2001 they

were able to collect only $80,000 for research grants. A similar foundation in England, directed by Nicholas Ostler, has raised just $8,000 since 1995.

29

D But there are encouraging signs that the field has turned a comer. The Volkswagen Foundation, a German charity, just issued its second round of grants totaling more than $2 million. It has created a multimedia archive at the Max Planck Institute for Psycholinguistics in the Netherlands that can house recordings, grammars, dictionaries and other data on endangered languages. To fill the archive, the foundation has dispatched field linguists to document Aweti (100 or so speakers in Brazil), Ega (about 300 speakers in Ivory Coast), Waima'a (a few hundred speakers in East Timor), and a dozen or so other languages unlikely to survive the century. The Ford Foundation has also edged into the arena. Its contributions helped to reinvigorate a master-apprentice program created in 1992 by Leanne Hinton of Berkeley and Native Americans worried about the imminent demise of about 50 indigenous languages in California. Fluent speakers receive $3,000 to teach a younger relative (who is also paid) their native tongue through 360 hours of shared activities, spread over six months. So far about 5 teams have completed the program, Hinton says, transmitting at least some knowledge of 25 languages. "It's too early to call this language revitalization," Hinton admits. "In California the death rate of elderly speakers will always be greater than the recruitment rate of young speakers. But at least we prolong the survival of the language." That will give linguists more time to record these tongues before they vanish.

30

E But the master-apprentice approach hasn't caught on outside the U.S., and Hinton's effort is a drop in the sea. At least 440 languages have been reduced to a mere handful of elders, according to the Ethnologue, a catalogue of languages produced by the Dallas-based group SIL International that comes closest to global coverage. For the vast majority of these languages, there is little or no record of their grammar, vocabulary, pronunciation or use in daily life. Even if a language has been fully documented, all that remains once it vanishes from active use is a fossil skeleton, a scattering of features that the scientist was lucky and astute enough to capture. Linguists may be able to sketch an outline of the forgotten language and fix its place on the evolutionary tree, but little more. "How did people start conversations and talk to babies? How did husbands and wives converse?" Hinton asks. "Those are the first things you want to learn when you want to revitalize the language."

31

F But there is as yet no discipline of "conservation linguistics," as there is for biology. Almost every strategy tried so far has succeeded in some places but failed in others, and there seems to be no way to predict with certainty what will work where. Twenty years ago in New Zealand, Maori speakers set up "language nests," in which preschoolers were immersed in the native language. Additional Maori-only classes were added as the children progressed through

elementary and secondary school. A similar approach was tried in Hawaii, with some success—the number of native speakers has stabilized at 1,000 or so, reports Joseph E. Grimes of SIL International, who is working on Oahu. Students can now get instruction in Hawaiian all the way through university.

32

G One factor that always seems to occur in the demise of a language is that the speakers begin to have collective doubts about the usefulness of language loyalty. Once they start regarding their own language as inferior to the majority language, people stop using it for all situations. Kids pick up on the attitude and prefer the dominant language. In many cases, people don't notice until they suddenly realize that their kids never speak the language, even at home. This is how Cornish and some dialects of Scottish Gaelic is still only rarely used for daily home life in Ireland, 80 years after the republic was founded with Irish as its first official language.

33

H Linguists agree that ultimately, the answer to the problem of language extinction is multilingualism. Even uneducated people can learn several languages, as long as they start as children. Indeed, most people in the world speak more than one tongue, and in places such as Cameroon (279 languages), Papua New Guinea (823) and India (387) it is common to speak three or four distinct languages and a dialect or two as well. Most Americans and Canadians, to the west of Quebec, have a gut reaction that anyone speaking another language in front of them is committing an immoral act. You get the same reaction in Australia and Russia. It is no coincidence that these are the areas where languages are disappearing the fastest. The first step in saving dying languages is to persuade the world's majorities to allow the minorities among them to speak with theft own voices.

PART 3 — QUESTIONS

Questions 27-33

The reading passage has eight paragraphs, A-H

Choose the correct heading for paragraphs A-H from the list below.

i. **data consistency needed for language**

ii. **consensus on an initiative recommendation for saving dying out languages**

iii. **positive gains for protection**

iv. **minimum requirement for saving a language**

v. **Potential threat to minority language**

vi. **a period when there was absent of real effort made.**

vii. **native language programs launched**

viii. **Lack in confidence in young speakers as a negative factor**

ix. **Practise in several developing countries**

x. **Value of minority language to linguists.**

xi. **government participation in language field**

Questions 34-38

Use the information in the passage to match the people (listed A-F) with opinions or deeds below.

A. Nicholas Ostler

B. Michael Krauss

C. Joseph E. Grimes

D. Sarah G. Thomason

E. Keneth L. Hale

F. Douglas H. Whalen

	A	B	C	D	E	F
34 Reported language conservation practice in Hawaii	○	○	○	○	○	○

	A	B	C	D	E	F
35 Predicted that many languages would disappear soon	○	○	○	○	○	○
36 Experienced process that languages die out personally	○	○	○	○	○	○
37 Raised language fund in England	○	○	○	○	○	○
38 Not enough effort on saving until recent work	○	○	○	○	○	○

Questions 39-40

Choose the correct letter, A, B, C or D.

39 What is real result of master-apprentice program sponsored by The Ford Foundation?

- **A** ○ Teach children how to speak
- **B** ○ Revive some endangered languages in California
- **C** ○ postpone the dying date for some endangered languages
- **D** ○ Increase communication between students

40 What should majority language speakers do according to the last paragraph?

- **A** ○ They should teach their children endangered language in free lessons
- **B** ○ They should learn at least four languages
- **C** ○ They should show their loyalty to a dying language
- **D** ○ They should be more tolerant to minority language speaker

Answer Key

#	Answer	Explanation
1	**TRUE**	However much we may abhor it, deception comes naturally to all living things
2	**TRUE**	So it may come as no surprise to learn that human beings-who, according to psychologist Gerald Jellison of the University of South California, are lied to about 200 times a day, roughly one untruth every five minutes—often deceive for exactly the same reasons: to save their own skins or to get something they can't get by other means
3	**FALSE**	But knowing how to catch deceit can be just as important a survival skill as knowing how to tell a lie and get away with it
4	**NOT GIVEN**	Neurological studies even suggest that genuine emotions travel different pathways through the brain than insincere ones
5	**TRUE**	In order to know what kind of lies work best, successful liars need to accurately assess other people's emotional states
6	**D**	Even high-tech lie detectors don't detect lies as such; they merely detect the physical cues of emotions, which may or may not correspond to what the person being tested is saying. Polygraphs, for instance, measure respiration, heart rate and skin conductivity, which tend to increase when people are nervous as they usually are when lying
7	**B**	That's why a sudden leap in skin conductivity indicates nervousness about getting caught, perhaps? — which might, in turn, suggest that someone is being economical with the truth. On the other hand, it might also mean that the lights in the television studio are too hot-which is one reason polygraph tests are inadmissible in court
8	**A**	Neurological studies even suggest that genuine emotions travel different pathways through the brain than insincere ones. If a patient paralyzed by stroke on one side of the face, for example, is asked to smile deliberately, only the mobile side of the mouth is raised. But tell that same person a funny joke, and the patient breaks into a full and spontaneous smile
9	**B**	Very few people-most notably, actors and politicians-are able to consciously control all of their facial expressions
10	**C**	When someone is truly sad, the forehead wrinkles with grief and the inner comers of the eyebrows are pulled up

#	Answer	Explanation
11	**A**	A genuine smile affects not only the comers of the lips but also the orbicularis oculi, the muscle around the eye that produces the distinctive “crow’s-feet” associated with people who laugh a lot
12	**B**	By contrast, the lowering of the eyebrows associated with an angry scowl can be replicated at will by almost everybody
13	**C**	When someone is truly sad, the forehead wrinkles with grief and the inner comers of the eyebrows are pulled up
14	**B**	the other groups, known as the lower attines because their nests are smaller and their techniques more primitive But the lower attine ants used different varieties of the fungus, and in one case a quite separate species, the four biologists discovered
15	**A**	Leaf-cutting ants and then fungus farms are a marvel of nature and perhaps the best known example of symbiosis, the mutual dependence of two species. The ants’ achievement is remarkable – the biologist Edward o. Wilson has called it “one of the major breakthroughs in animal evolution” — because it allows them to eat, courtesy of their mushroom’s digestive powers, the otherwise poisoned harvest of tropical forests whose leaves are laden with terpenoids, alkaloids and other chemicals designed to sicken browsers
16	**A**	Textbooks describe how leaf-cutter ants scrupulously weed their gardens of all foreign organisms
17	**C**	The Streptomyces does not have much effect on ordinary laboratory funguses. But it is a potent poisoner of Escovopsis, inhibiting its growth and suppressing spore formation Because both the leaf-cutters and the lower attines use Streptomyces, the bacterium may have been part of their symbiosis for almost as long as the Escovopsis mold
18	**B**	The leaf-cutters use fresh vegetation; the other groups, known as the lower attines because their nests are smaller and their techniques more primitive, feed their gardens with detritus like dead leaves, insects and feces
19	**A**	Textbooks describe how leaf-cutter ants scrupulously weed their gardens of all foreign organisms. “People kept telling me, ‘You know the ants keep then gardens free of parasites, don’t you?'” Mr. Currie said of his efforts to find a hidden interloper
20	**F**	Escovopsis turns out to be a highly virulent pathogen that can devastate a fungus garden in a couple of days. It blooms like a white cloud, with the garden dimly visible underneath. In a day or two the whole garden is enveloped. “Other ants won’t go near it

#	Answer	Explanation
		and the ants associated with the garden just starve to death," Dr. Rehner said
21	H	It seems that the price they pay for cultivating a pure variety of fungus is a higher risk from Escovopsis
22	C	The leaf-cutters use fresh vegetation; the other groups, known as the lower attines because their nests are smaller and their techniques more primitive, feed their gardens with detritus like dead leaves, insects and feces
23	J	Even now, the ants are accomplishing two feats beyond the powers of human technology. The leaf-cutters are growing a monocultural crop year after year without disaster, and they are using an antibiotic apparently so wisely and prudently that, unlike people, they are not provoking antibiotic resistance in the target pathogen
24	G	There is now a possible reason to explain why the lower attine species keep changing the variety of fungus in their mushroom gardens, and occasionally domesticating new ones — to stay one step ahead of the relentless Escovopsis
25	A	But after three years of sifting through attine ant gardens, Mr. Currie discovered they are far from free of infections
26	C	Mr. Currie discovered a specialized patch on the ants' cuticle that harbors a particular kind of bacterium, one well known to the pharmaceutical industry, because it is the source of half the antibiotics used in medicine
27	v	Unless scientists and community leaders directed a worldwide effort to stabilize the decline of local languages, he warned, nine tenths of the linguistic diversity of humankind would probably be doomed to extinction
28	x	Many experts in the field mourn the loss of rare languages, for several reasons. To start, there is scientific self-interest; some of the most basic questions in linguistics have to do with the limits of human speech, which are far from fully explored
29	iii	But there are encouraging signs that the field has turned a comer. The Volkswagen Foundation, a German charity, just issued its second round of grants totaling more than $2 million. It has created a multimedia archive at the Max Planck Institute for Psycholinguistics in the Netherlands that can house recordings, grammars, dictionaries and other data on endangered languages
30	i	For the vast majority of these languages, there is little or no record of their grammar, vocabulary, pronunciation or use in daily life. Even if a language has been fully documented, all that

#	Answer	Explanation
		remains once it vanishes from active use is a fossil skeleton, a scattering of features that the scientist was lucky and astute enough to capture
31	**vii**	Twenty years ago in New Zealand, Maori speakers set up “language nests,” in which preschoolers were immersed in the native language. Additional Maori-only classes were added as the children progressed through elementary and secondary school. A similar approach was tried in Hawaii, with some success—the number of native speakers has stabilized at 1,000 or so, reports Joseph E. Grimes of SIL International, who is working on Oahu
32	**viii**	One factor that always seems to occur in the demise of a language is that the speakers begin to have collective doubts about the usefulness of language loyalty. Once they start regarding their own language as inferior to the majority language, people stop using it for all situations. Kids pick up on the attitude and prefer the dominant language
33	**ii**	Linguists agree that ultimately, the answer to the problem of language extinction is multilingualism
34	**C**	A similar approach was tried in Hawaii, with some success—the number of native speakers has stabilized at 1,000 or so, reports Joseph E. Grimes of SIL International, who is working on Oahu
35	**B**	Ten years ago Michael Krauss sent a shudder through the discipline of linguistics with his prediction that half the 6,000 or so languages spoken in the world would cease to be uttered within a century
36	**E**	Keneth L. Hale of the Massachusetts Institute of Technology noted in the same journal issue that eight languages on which he bad done fieldwork had since passed into extinction
37	**A**	A similar foundation in England, directed by Nicholas Ostler, has raised just $8,000 since 1995
38	**D**	“You would think that there would be some organized response to this dire situation’ some attempt to determine which language can be saved and which should be documented before they disappear, says Sarah G. Thomason, a linguist at the University of Michigan at Ann Arbor. “But there isn’t any such effort organized in the profession. It is only recently that it has become fashionable enough to work on endangered languages.”
39	**C**	“It’s too early to call this language revitalization,” Hinton admits. “In California the death rate of elderly speakers will always be greater than the recruitment rate of young speakers. But at least we prolong the survival of the language.”

#	Answer	Explanation
40	D	The first step in saving dying languages is to persuade the world's majorities to allow the minorities among them to speak with theft own voices

Test 77

PASSAGE 1

Read the text below and answer questions 1-13.

Food for thought 2

1

A There are not enough classrooms at the Msekeni primary school, so half the lessons take place in the shade of yellow-blossomed acacia trees. Given this shortage, it might seem odd that one of the school's purpose-built classrooms has been emptied of pupils and turned into a storeroom for sacks of grain. But it makes sense. Food matters more than shelter.

2

B Msekeni is in one of the poorer parts of Malawi, a landlocked southern African country of exceptional beauty and great poverty. No war lays waste Malawi, nor is the land unusually crowded or infertile, but Malawians still have trouble finding enough to eat. Half of the children under five are underfed to the point of stunting. Hunger blights most aspects of Malawian life, so the country is as good a place as any to investigate how nutrition affects development, and vice versa.

3

C The headmaster at Msekeni, Bernard Kumanda, has strong views on the subject. He thinks food is a priceless teaching aid. Since 1999, his pupils have received free school lunches. Donors such as the World Food Programme (WFP) provide the food: those sacks of grain (mostly mixed maize and soyabean flour, enriched with vitamin A) in that converted classroom. Local volunteers do the cooking—turning the dry ingredients into a bland but nutritious slop, and spooning it out on to plastic plates. The children line up in large crowds, cheerfully singing a song called "We are getting porridge".

4

D When the school's feeding programme was introduced, enrolment at Msekeni doubled. Some of the new pupils had switched from nearby schools that did not give out free porridge, but most were children whose families had previously kept them at home to work. These families were so poor that the long-term benefits of education seemed unattractive when set against the short-term gain of sending children out to gather firewood or help in the fields. One plate of porridge a day completely altered the calculation. A child fed at school will not howl so

plaintively for food at home. Girls, who are more likely than boys to be kept out of school, are given extra snacks to take home.

5

E When a school takes in a horde of extra students from the poorest homes, you would expect standards to drop. Anywhere in the world, poor kids tend to perform worse than their better-off classmates. When the influx of new pupils is not accompanied by any increase in the number of teachers, as was the case at Msekeni, you would expect standards to fall even further. But they have not. Pass rates at Msekeni improved dramatically, from 30% to 65%. Although this was an exceptional example, the nationwide results of school feeding programmes were still pretty good. On average, after a Malawian school started handing out free food it attracted 38% more girls and 24% more boys. The pass rate for boys stayed about the same, while for girls it improved by 93%.

6

F Better nutrition makes for brighter children. Most immediately, well-fed children find it easier to concentrate. It is hard to focus the mind on long division when your stomach is screaming for food. Mr Kumanda says that it used to be easy to spot the kids who were really undernourished. "They were the ones who stared into space and didn't respond when you asked them questions," he says. More crucially, though, more and better food helps brains grow and develop. Like any other organ in the body, the brain needs nutrition and exercise. But if it is starved of the necessary calories, proteins and micronutrients. It Is stunted, perhaps not as severely as a muscle would be, but stunted nonetheless. That is why feeding children at schools works so well. And the fact that the effect of feeding was more pronounced on girls than on boys gives a clue to who eats first in rural Malawian households. It isn't the girls.

7

G On a global scale, the good news Is that people are eating better than ever before. Homo sapiens has grown 50% bigger since the industrial revolution. Three centuries ago, chronic malnutrition was more or less universal. Now, it is extremely rare in rich countries. In developing countries, where most people live, plates and rice bowls are also fuller than ever before. The proportion of children under five in the developing world who are malnourished to the point of stunting fell from 39% in 1990 to 30% in 2000, says the World Health Organisation (WHO). In other places, the battle against hunger is steadily being won. Better nutrition is making people cleverer and more energetic, which will help them grow more prosperous. And when they eventually join the ranks of the well off, they can start fretting about growing too fat.

PART 1 — QUESTIONS

Questions 1-7

The reading passage has seven paragraphs, A-G

Choose the correct heading for paragraphs A-G from the list below. Write the correct number, i-xi.

i. **Why better food helps students' learning**

ii. **A song for getting porridge**

iii. **Surprising use of school premises**

iv. **Global perspective**

v. **Brains can be starved**

vi. **Surprising academics outcome**

vii. **Girls are specially treated in the program**

viii. **How food program is operated**

ix. **How food program affects school attendance**

x. **None of the usual reasons**

xi. **How to maintain academic standard**

Questions 8-11

Complete the sentences below using NO MORE THAN TWO WORDS AND/OR A NUMBER from the passage?

- **8** _____ are exclusively offered to girls in the feeding programme.
- Instead of going to school, many children in poverty are sent to collect **9** _____ in the fields.
- The pass rate at Msekeni has risen to **10** _____ with the help of the feeding programme.
- Since the industrial revolution, the size of the modern human has grown by **11** _____

Questions 12-13

Choose TWO letters, A-F.

12 **13** Which TWO of the following statements are true?

- **A** ☐ Some children are taught in the open air.
- **B** ☐ Malawi have trouble to feed its large population.
- **C** ☐ No new staffs were recruited when attendance rose.
- **D** ☐ Girls enjoy a higher status than boys in the family
- **E** ☐ Boys and girls experience the same improvement in the pass rate.
- **F** ☐ WHO has cooperated with WFP to provide grain to the school at Msekeni.

PASSAGE 2

Read the text below and answer questions 14-27.

Saving the British Bitterns

14

A Breeding bitterns became extinct in the UK by 1886 but, following re-colonisation early last century, numbers rose to a peak of about 70 booming (singing) males in the 1950s, falling to fewer than 20 by the 1990s. In the late 1980s it was clear that the bittern was in trouble, but there was little information on which to base recovery actions.

15

B Bitterns have cryptic plumage and a shy nature, usually remaining hidden within the cover of reedbed vegetation. Our first challenge was to develop standard methods to monitor their numbers. The boom of the male bittern is its most distinctive feature during the breeding season, and we developed a method to count them using the sound patterns unique to each individual. This not only allows US to be much more certain of the number of booming males in the UK, but also enables us to estimate local survival of males from one year to the next.

16

C Our first direct understanding of the habitat needs of breeding bitterns came from comparisons of reedbedsites that had lost their booming birds with those that retained them. This research showed that bitterns had been retained in reedbeds where the natural process of succession, or drying out, had been slowed through management. Based on this work, broad recommendations on how to manage and rehabilitate reedbeds for bitterns were made, and funding was provided through the EU LIFE Fund to manage 13 sites within the core breeding range. This project, though led by the RSPB, involved many other organisations.

17

D To refine these recommendations and provide fine-scale, quantitative habitat prescriptions on the bitterns' preferred feeding habitat, we radio-tracked male bitterns on the RSPB's Minsmere and Leighton Moss reserves. This showed clear preferences for feeding in the wetter reedbed margins, particularly within the reedbed next to larger open pools. The average home range sizes of the male bitterns we followed (about 20 hectares) provided a good indication of the area of reedbed needed when managing or creating habitat for this species. Female bitterns undertake all the incubation and care of the young, so it was important to understand then needs as well. Over the course of our research, we located 87 bittern nests and found that

female bitterns preferred to nest in areas of continuous vegetation, well into the reedbed, but where water was still present during the driest part of the breeding season.

E The success of the habitat prescriptions developed from this research has been spectacular. For instance, at Minsmere, booming bittern numbers gradually increased from one to 10 following reedbed lowering, a management technique designed to halt the drying out process. After a low point of 11 booming males in 1997, bittern numbers in Britain responded to all the habitat management work and started to increase for the first time since the 1950s.

18

F The final phase of research involved understanding the diet, survival and dispersal of bittern chicks. To do this we fitted small radio tags to young bittern chicks in the nest, to determine their fate through to fledgingand beyond. Many chicks did not survive to fledging and starvation was found to be the most likely reason for their demise. The fish prey fed to chicks was dominated by those species penetrating into the reed edge. So, an important element of recent studies (including a PhD with the University of Hull) has been the development of recommendations on habitat and water conditions to promote healthy native fish populations.

19

G Once independent, radio-tagged young bitterns were found to seek out new sites during their first winter; a proportion of these would remain on new sites to breed if the conditions were suitable. A second EU LIFE funded project aims to provide these suitable sites in new areas. A network of 19 sites developed through this partnership project will secure a more sustainable UK bittern population with successful breeding outside of the core area, less vulnerable to chance events and sea level rise.

20

H By 2004, the number of booming male bitterns in the UK had increased to 55, with almost all of the increase being on those sites undertaking management based on advice derived from our research. Although science has been at the core of the bittern story, success has only been achieved through the trust, hard work and dedication of all the managers, owners and wardens of sites that have implemented, in some cases very drastic, management to secure the future of this wetland species in the UK. The constructed bunds and five major sluices now control the water level over 82 ha, with a further 50 ha coming under control in the winter of 2005/06. Reed establishment has principally used natural regeneration or planted seedlings to provide small core areas that will in time expand to create a bigger reed area. To date nearly 275,000 seedlings have been planted and reed cover is extensive. Over 3 km of new ditches have been formed, 3.7 km of existing ditch have been re-profiled and 2.2 km of old meander (former estuarine features) have been cleaned out.

I Bitterns now regularly winter on the site with some indication that they are staying longer into the spring. No breeding has yet occurred but a booming male was present in the spring of

2004. A range of wildfowl breed, as well as a good number of reedbed passerines including reed bunting, reed, sedge and grasshopper warblers. Numbers of wintering shoveler have increased so that the site now holds a UK important wintering population. Malltraeth Reserve now forms part of the UK network of key sites for water vole (a UK priority species) and 12 monitoring transectshave been established. Otter and brown-hare occur on the site as does the rare plant, pillwort.

PART 2 — QUESTIONS

Questions 14-20

Choose the correct heading for paragraphs A-H from the list below. Write the correct number, i-viii.

i. **research findings into habitats and decisions made**

ii. **fluctuation in bittern number**

iii. **protect the young bittern**

iv. **international cooperation works**

v. **Began in calculation of the number**

vi. **importance of food**

vii. **Research has been successful.**

viii. **research into the reedbed**

ix. **reserve established holding bittern in winter**

Questions 21-26

Answer the questions below.

Choose NO MORE THAN THREE WORDS AND/OR A NUMBER from the passage for each answer.

21 When did the bird of bittern reach its peak of number? _____

22 What does the author describe the bittern's character? _____

23 What is the main cause for the chick bittern's death? _____

24 What is the main food for chick bittern? _____

25 What system does it secure the stability for bittern's population? _____

26 Besides bittern and rare vegetation, what mammal does the protection plan benefit?

_____

Questions 27-27

Choose the correct letter, A, B, C or D.

27 What is the main purpose of this passage?

- **A** ○ Main characteristic of a bird called bittern.
- **B** ○ Cooperation can protect an endangered species,
- **C** ○ The difficulty of access information of bittern's habitat and diet.
- **D** ○ To save wetland and reedbed in UK.

PASSAGE 3

Read the text below and answer questions 28-40.

E- training

28

A E-leaming is the unifying term to describe the fields of online learning, web-based training, and technology-delivered instruction, which can be a great benefit to corporate e-learning. IBM, for instance, claims that the institution of its e-training program, Basic Blue, whose purpose is to train new managers, saved the company in the range of $200 million in 1999. Cutting the travel expenses required to bring employees and instructors to a central classroom accounts for the lion's share of the savings. With an online course, employees can learn from any Internet-connected PC, anywhere in the world. Ernst and Young reduced training costs by 35 percent while improving consistency and scalability.

29

B In addition to generally positive economic benefits, other advantages such as convenience, standardized delivery, self-paced learning, and variety of available content, have made e-learning a high priority for many corporations. E-learning is widely believed to offer flexible "any time, any place" learning. The claim for "any place" is valid in principle and is a great development. Many people can engage with rich learning materials that simply were not possible in a paper or broadcast distance learning era. For teaching specific information and skills, e-training holds great promise. It can be especially effective at helping employees prepare for IT certification programs. E-learning also seems to effectively address topics such as sexual harassment education,' safety training and management training - all areas where a clear set of objectives can be identified. Ultimately, training experts recommend a "blended" approach that combines both online and in-person framing as the instruction requires. E-learning is not an end-all solution. But if it helps decrease costs and windowless classrooms filled with snoring students, it definitely has its advantages.

30

C Much of the discussion about implementing e-learning has focused on the technology, but as Driscoll and others have reminded us, e-learning is not just about the technology, but also many human factors. As any capable manager knows, teaching employees new skills is critical to a smoothly run business. Having said that, however, the traditional route of classroom instruction runs the risk of being expensive, slow and, often times, ineffective. Perhaps the classroom's greatest disadvantage is the fact that it takes employees out of their jobs. Every minute an employee is sitting in a classroom training session is a minute they're not out on the floor working. It now looks as if there is a way to circumvent these traditional training drawbacks. E-

training promises more effective teaching techniques by integrating audio, video, animation, text and interactive materials with the intent of teaching each student at his or her own pace. In addition to higher performance results, there are other immediate benefits to students such as increased time on task, higher levels of motivation, and reduced test anxiety for many learners. A California State University Northridge study reported that e-learners performed 20 percent better than traditional learners. Nelson reported a significant difference between the mean grades of 406 university students earned in traditional and distance education classes, where the distance learners outperformed the traditional learners.

31

D On the other hand, nobody said E-training technology would be cheap. E-training service providers, on the average, charge from $10,000 to $60,000 to develop one hour of online instruction. This price varies depending on the complexity of the training topic and the media used. HTML pages are a little cheaper to develop while streaming-video presentations or flash animations cost more. Course content is just the starting place for cost. A complete e-learning solution also includes the technology platform (the computers, applications and network connections that are used to deliver the courses). This technology platform, known as a learning management system (LMS), can either be installed onsite or outsourced. Add to that cost the necessary investments in network bandwidth to deliver multimedia courses, and you're left holding one heck of a bill. For the LMS infrastructure and a dozen or so online courses, costs can top $500,000 in the first year. These kinds of costs mean that custom e-training is, for the time being, an option only for large organizations. For those companies that have a large enough staff, the e-training concept pays for itself. Aware of this fact, large companies are investing heavily in online training. Today, over half of the 400-plus courses that Rockwell Collins offers are delivered instantly to its clients in an e-learning format/ a change that has reduced its annual training costs by 40%. Many other success stories exist.

32

E E-learning isn't expected to replace the classroom entirely. For one thing, bandwidth limitations are still an Issue in presenting multimedia over the Internet Futhermore, e-training isn't suited to every mode of instruction or topic. For instance, it's rather ineffective impasting cultural values or building teams. If your company has a unique corporate culture it would be difficult to convey that to first time employees through a computer monitor. Group training sessions are more ideal for these purposes. In addition, there is a perceived loss of research time because of the work involved in developing and teaching online classes. Professor Wallin estimated that It required between 500 and 1000 person-hours, that is, Wallin-hours, to keep the course at the appropriate level of currency and usefulness, (Distance learning instructors often need technical skills, no matter how advanced the courseware system.) That amounts to between a quarter and half of a person-year. Finally, teaching materials require computer literacy and access to equipment Any e-Learning system Involves basic equipment and a minimum level of computer knowledge in order to perform the tasks required by the system. A student that does not possess these skills, or have access to these tools, cannot succeed in an e-Learning program.

33

F While few people debate the obvious advantages of e-learning, systematic research is needed to confirm that learners are actually acquiring and using -the skills that are being taught online, and that e-learning is the best way to achieve the outcomes in a corporate environment. Nowadays, a go-between style of the Blended learning, which refers to a mixing of different learning environments, is gaining popularity. It combines traditional face-to-face classroom methods with more modem computer-mediated activities. According to its proponents, the strategy creates a more integrated approach for both instructors and learners. Formerly, technology-based materials played a supporting role to face-to-face instruction. Through a blended learning approach, technology will be more important.

PART 3 — QUESTIONS

Questions 28-33

The reading passage has seven paragraphs, A-F.

Choose the correct heading for paragraphs A-F from the list below. Write the correct number, i-xi.

i. **overview of the benefits for the application of E-training**

ii. **IBM's successful choice of training**

iii. **Future direction and a new style of teaching**

iv. **learners' achievement and advanced teaching materials**

v. **limitations when E-training compares with traditional class**

vi. **multimedia over the Internet can be a solution**

vii. **technology can be a huge financial burden**

viii. **the distance learners outperformed the traditional university learners in worldwide**

ix. **other advantages besides economic consideration**

x. **Training offered to help people learn using computers**

Questions 34-37

The reading Passage has seven paragraphs A-F.

Which paragraph contains the following information?

Write the correct letter A-F.

	A	B	C	D	E	F
34 Projected Basic Blue in IBM achieved a great success.	○	○	○	○	○	○
35 E-learning wins as a priority for many corporations as its flexibility.	○	○	○	○	○	○
36 The combination of the traditional and e-training environments may prevail.	○	○	○	○	○	○

	A	B	C	D	E	F
37 Example of a fast electronic delivery for a company's products to its customers.	○	○	○	○	○	○

Questions 38-40

Choose Three correct letters, among A-E

38 **39** **40**

- **A** ☐ Technical facilities are hardly obtained.
- **B** ☐ Presenting multimedia over the Internet is restricted due to the bandwidth limit,
- **C** ☐ It is ineffective imparting a unique corporate value to fresh employees.
- **D** ☐ Employees need block a long time leaving their position attending training.
- **E** ☐ More preparation time is needed to keep the course at the suitable level.

Answer Key

#	Answer	Explanation
1	**iii**	Given this shortage, it might seem odd that one of the school's purpose-built classrooms has been emptied of pupils and turned into a storeroom for sacks of grain
2	**x**	No war lays waste Malawi, nor is the land unusually crowded or infertile, but Malawians still have trouble finding enough to eat
3	**viii**	Donors such as the World Food Programme (WFP) provide the food: those sacks of grain (mostly mixed maize and soyabean flour, enriched with vitamin A) in that converted classroom. Local volunteers do the cooking—turning the dry ingredients into a bland but nutritious slop, and spooning it out on to plastic plates
4	**ix**	When the school's feeding programme was introduced, enrolment at Msekeni doubled
5	**vi**	When a school takes in a horde of extra students from the poorest homes, you would expect standards to drop. Anywhere in the world, poor kids tend to perform worse than their better-off classmates. When the influx of new pupils is not accompanied by any increase in the number of teachers, as was the case at Msekeni, you would expect standards to fall even further. But they have not. Pass rates at Msekeni improved dramatically, from 30% to 65%
6	**i**	Better nutrition makes for brighter children. Most immediately, well-fed children find it easier to concentrate
7	**iv**	On a global scale, the good news Is that people are eating better than ever before
8	**extra snacks**	Girls, who are more likely than boys to be kept out of school, are given extra snacks to take home
9	**firewood**	These families were so poor that the long-term benefits of education seemed unattractive when set against the short-term gain of sending children out to gather firewood or help in the fields
10	**65%/65 percent**	Pass rates at Msekeni improved dramatically, from 30% to 65%
11	**50%/50 percent**	Homo sapiens has grown 50% bigger since the industrial revolution
12	**A / C**	There are not enough classrooms at the Msekeni primary school, so half the lessons take place in the shade of yellow-blossomed

#	Answer	Explanation
		acacia trees When the influx of new pupils is not accompanied by any increase in the number of teachers, as was the case at Msekeni, you would expect standards to fall even further
13	**A / C**	There are not enough classrooms at the Msekeni primary school, so half the lessons take place in the shade of yellow-blossomed acacia trees When the influx of new pupils is not accompanied by any increase in the number of teachers, as was the case at Msekeni, you would expect standards to fall even further
14	**ii**	Breeding bitterns became extinct in the UK by 1886 but, following re-colonisation early last century, numbers rose to a peak of about 70 booming (singing) males in the 1950s, falling to fewer than 20 by the 1990s
15	**v**	Our first challenge was to develop standard methods to monitor their numbers. The boom of the male bittern is its most distinctive feature during the breeding season, and we developed a method to count them using the sound patterns unique to each individual
16	**i**	This research showed that bitterns had been retained in reedbeds where the natural process of succession, or drying out, had been slowed through management. Based on this work, broad recommendations on how to manage and rehabilitate reedbeds for bitterns were made, and funding was provided through the EU LIFE Fund to manage 13 sites within the core breeding range
17	**viii**	To refine these recommendations and provide fine-scale, quantitative habitat prescriptions on the bitterns' preferred feeding habitat, we radio-tracked male bitterns on the RSPB's Minsmere and Leighton Moss reserves. This showed clear preferences for feeding in the wetter reedbed margins, particularly within the reedbed next to larger open pools
18	**vi**	Many chicks did not survive to fledging and starvation was found to be the most likely reason for their demise. The fish prey fed to chicks was dominated by those species penetrating into the reed edge
19	**iii**	Once independent, radio-tagged young bitterns were found to seek out new sites during their first winter; a proportion of these would remain on new sites to breed if the conditions were suitable. A second EU LIFE funded project aims to provide these suitable sites in new areas
20	**iv**	Although science has been at the core of the bittern story, success has only been achieved through the trust, hard work and dedication of all the managers, owners and wardens of sites that have implemented, in some cases very drastic, management to secure the future of this wetland species in the UK

#	Answer	Explanation
21	**(in the) 1950s**	numbers rose to a peak of about 70 booming (singing) males in the 1950s
22	**(being) shy / shyness / (a) shy nature**	Bitterns have cryptic plumage and a shy nature, usually remaining hidden within the cover of reedbed vegetation
23	**starvation**	Many chicks did not survive to fledging and starvation was found to be the most likely reason for their demise
24	**(native) fish / (the) fish prey**	The fish prey fed to chicks was dominated by those species penetrating into the reed edge
25	**partnership project/ network (of sites)/ partnership project network**	A network of 19 sites developed through this partnership project will secure a more sustainable UK bittern population with successful breeding outside of the core area, less vulnerable to chance events and sea level rise
26	**Otter and brown-hare / Otter,brown-hare**	Otter and brown-hare occur on the site as does the rare plant, pillwort
27	**B**	Although science has been at the core of the bittern story, success has only been achieved through the trust, hard work and dedication of all the managers, owners and wardens of sites that have implemented, in some cases very drastic, management to secure the future of this wetland species in the UK
28	**i**	E-leaming is the unifying term to describe the fields of online learning, web-based training, and technology-delivered instruction, which can be a great benefit to corporate e-learning
29	**ix**	In addition to generally positive economic benefits, other advantages such as convenience, standardized delivery, self-paced learning, and variety of available content, have made e-learning a high priority for many corporations
30	**iv**	E-training promises more effective teaching techniques by integrating audio, video, animation, text and interactive materials with the intent of teaching each student at his or her own pace. In addition to higher performance results, there are other immediate benefits to students such as increased time on task, higher levels of motivation, and reduced test anxiety for many learners
31	**vii**	On the other hand, nobody said E-training technology would be cheap. E-training service providers, on the average, charge from $10,000 to $60,000 to develop one hour of online instruction
32	**v**	E-learning isn't expected to replace the classroom entirely. For one thing, bandwidth limitations are still an Issue in presenting multimedia over the Internet Futhermore, e-training isn't suited to

#	Answer	Explanation
		every mode of instruction or topic. For instance, it's rather ineffective impasting cultural values or building teams. If your company has a unique corporate culture it would be difficult to convey that to first time employees through a computer monitor. Group training sessions are more ideal for these purposes
33	**iii**	Nowadays, a go-between style of the Blended learning, which refers to a mixing of different learning environments, is gaining popularity. It combines traditional face-to-face classroom methods with more modem computer-mediated activities. According to its proponents, the strategy creates a more integrated approach for both instructors and learners. Formerly, technology-based materials played a supporting role to face-to-face instruction. Through a blended learning approach, technology will be more important
34	**A**	IBM, for instance, claims that the institution of its e-training program, Basic Blue, whose purpose is to train new managers, saved the company in the range of $200 million in 1999
35	**B**	In addition to generally positive economic benefits, other advantages such as convenience, standardized delivery, self-paced learning, and variety of available content, have made e-learning a high priority for many corporations. E-learning is widely believed to offer flexible "any time, any place" learning
36	**F**	Nowadays, a go-between style of the Blended learning, which refers to a mixing of different learning environments, is gaining popularity. It combines traditional face-to-face classroom methods with more modem computer-mediated activities
37	**D**	Today, over half of the 400-plus courses that Rockwell Collins offers are delivered instantly to its clients in an e-learning format/ a change that has reduced its annual training costs by 40%
38	**B / C / E**	bandwidth limitations are still an Issue in presenting multimedia over the Internet Futhermore, e-training isn't suited to every mode of instruction or topic. For instance, it's rather ineffective impasting cultural values or building teams. If your company has a unique corporate culture it would be difficult to convey that to first time employees through a computer monitor. Group training sessions are more ideal for these purposes. In addition, there is a perceived loss of research time because of the work involved in developing and teaching online classes. Professor Wallin estimated that It required between 500 and 1000 person-hours, that is, Wallin-hours, to keep the course at the appropriate level of currency and usefulness
39	**B / C / E**	bandwidth limitations are still an Issue in presenting multimedia over the Internet Futhermore, e-training isn't suited to every

#	Answer	Explanation
		mode of instruction or topic. For instance, it’s rather ineffective impasting cultural values or building teams. If your company has a unique corporate culture it would be difficult to convey that to first time employees through a computer monitor. Group training sessions are more ideal for these purposes. In addition, there is a perceived loss of research time because of the work involved in developing and teaching online classes. Professor Wallin estimated that It required between 500 and 1000 person-hours, that is, Wallin-hours, to keep the course at the appropriate level of currency and usefulness
40	**B / C / E**	bandwidth limitations are still an Issue in presenting multimedia over the Internet Futhermore, e-training isn’t suited to every mode of instruction or topic. For instance, it’s rather ineffective impasting cultural values or building teams. If your company has a unique corporate culture it would be difficult to convey that to first time employees through a computer monitor. Group training sessions are more ideal for these purposes. In addition, there is a perceived loss of research time because of the work involved in developing and teaching online classes. Professor Wallin estimated that It required between 500 and 1000 person-hours, that is, Wallin-hours, to keep the course at the appropriate level of currency and usefulness

Test 78

PASSAGE 1

Animal minds: Parrot Alex

A In 1977 Irene Pepperberg, a recent graduate of Harvard University, did something very bold. At a time when animals still were considered automatons, she set out to find what was on another creature's mind by talking to it. She brought a one-year-old African gray parrot she named Alex into her lab to teach him to reproduce the sounds of the English language. "I thought if he learned to communicate, I could ask him questions about how he sees the world."

B When Pepperberg began her dialogue with Alex, who died last September at the age of 31, many scientists believed animals were incapable of any thought. They were simply machines, robots programmed to react to stimuli but lacking the ability to think or feel. Any pet owner would disagree. We see the love in our dogs' eyes and know that, of course, they have thoughts and emotions. But such claims remain highly controversial. Gut instinct is not science, and it is all too easy to project human thoughts and feelings onto another creature. How, then, does a scientist prove that an animal is capable of thinking—that it is able to acquire information about the world and act on it? "That's why I started my studies with Alex," Pepperberg said. They were seated—she at her desk, he on top of his cage—in her lab, a windowless room about the size of a boxcar, at Brandeis University. Newspapers lined the floor; baskets of bright toys were stacked on the shelves. They were clearly a team—and because of their work, the notion that animals can think is no longer so fanciful.

C Certain skills are considered key signs of higher mental abilities: good memory, a grasp of grammar and symbols, self-awareness, understanding others' motives, imitating others, and being creative. Bit by bit, in ingenious experiments, researchers have documented these talents in other species, gradually chipping away at what we thought made human beings distinctive while offering a glimpse of where our own abilities came from. Scrub jays know that other jays are thieves and that stashed food can spoil; sheep can recognize faces; chimpanzees use a variety of tools to probe termite mounds and even use weapons to hunt small mammals; dolphins can imitate human postures; the archerfish, which stuns insects with a sudden blast of water, can learn how to aim its squirt simply by watching an experienced fish perform the task. And Alex the parrot turned out to be a surprisingly good talker.

D Thirty years after the Alex studies began; Pepperberg and a changing collection of assistants were still giving him English lessons. The humans, along with two younger parrots, also served as Alex's flock, providing the social input all parrots crave. Like any flock, this one —as small as it was—had its share of drama. Alex dominated his fellow parrots, acted huffy at times around Pepperberg, tolerated the other female humans, and fell to pieces over a male assistant who dropped by for a visit. Pepperberg bought Alex in a Chicago pet store where she let the store's assistant pick him out because she didn't want other scientists saying later that she'd particularly chosen an especially smart bird for her work. Given that Alex's brain was the size of

a shelled walnut, most researchers thought Pepperberg's interspecies communication study would be futile.

E "Some people actually called me crazy for trying this," she said. "Scientists thought that chimpanzees were better subjects, although, of course, chimps can't speak." Chimpanzees, bonobos, and gorillas have been taught to use sign language and symbols to communicate with us, often with impressive results. The bonobo Kanzi, for instance, carries his symbol-communication board with him so he can "talk" to his human researchers, and he has invented combinations of symbols to express his thoughts. Nevertheless, this is not the same thing as having an animal look up at you, open his mouth, and speak. Under Pepperberg's patient tutelage, Alex learned how to use his vocal tract to imitate almost 100 English words, including the sounds for various foods, although he calls an apple a "banerry." "Apples taste a little bit like bananas to him, and they look a little bit like cherries, so Alex made up that word for them," Pepperberg said.

F It sounded a bit mad, the idea of a bird having lessons to practice, and willingly doing it. But after listening to and observing Alex, it was difficult to argue with Pepperberg's explanation for his behaviors. She wasn't handing him treats for the repetitious work or rapping him on the claws to make him say the sounds. "He has to hear the words over and over before he can correctly imitate them," Pepperberg said, after pronouncing "seven" for Alex a good dozen times in a row. "I'm not trying to see if Alex can learn a human language," she added. "That's never been the point. My plan always was to use his imitative skills to get a better understanding of avian cognition."

G In other words, because Alex was able to produce a close approximation of the sounds of some English words, Pepperberg could ask him questions about a bird's basic understanding of the world. She couldn't ask him what he was thinking about, but she could ask him about his knowledge of numbers, shapes, and colors. To demonstrate, Pepperberg carried Alex on her arm to a tall wooden perch in the middle of the room. She then retrieved a green key and a small green cup from a basket on a shelf. She held up the two items to Alex's eye. "What's same?" she asked. Without hesitation, Alex's beak opened: "Color." "What's different?" Pepperberg asked. "Shape," Alex said. His voice had the digitized sound of a cartoon character. Since parrots lack lips (another reason it was difficult for Alex to pronounce some sounds, such as ba), the words seemed to come from the air around him, as if a ventriloquist were speaking. But the words—and what can only be called the thoughts—were entirely his.

H For the next 20 minutes, Alex ran through his tests, distinguishing colors, shapes, sizes, and materials (wool versus wood versus metal). He did some simple arithmetic, such as counting the yellow toy blocks among a pile of mixed hues. And, then, as if to offer final proof of the mind inside his bird's brain, Alex spoke up. "Talk clearly!" he commanded, when one of the younger birds Pepperberg was also teaching talked with wrong pronunciation. "Talk clearly!" "Don't be a smart aleck," Pepperberg said, shaking her head at him. "He knows all this, and he gets bored, so he interrupts the others, or he gives the wrong answer just to be obstinate. At this stage, he's like a teenager; he's moody, and I'm never sure what he'll do."

PART 1 — QUESTIONS

Questions 1-6

Do the following statements agree with the information given in Reading Passage 1? Write

TRUE if the statement is true

FALSE if the statement is false

NOT GIVEN if the information is not given in the passage

1 Firstly, Alex has grasped quite a lot of vocabulary.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

2 At the beginning of study, Alex felt frightened in the presence of humans.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

3 Previously, many scientists realized that animals possess the ability of thinking.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

4 It has taken a long time before people get to know cognition existing in animals.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

5 As Alex could approximately imitate the sounds of English words, he was capable of roughly answering Irene's questions regarding the world.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

6 By breaking in other parrots as well as producing the incorrect answers, he tried to be focused.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

Questions 7-10

Complete the following summary of the paragraphs of Reading Passage, using no more than two words from the Reading Passage for each answer.

After the framing of Irene, Parrot Alex can use his vocal tract to pronounce nearly 7 _____, while other scientists believe that animals have no this advanced ability of thinking, they would rather teach 8 _____. Pepperberg clarified that she wanted to conduct a study concerning 9 _____ but not to teach him to talk. The store's assistant picked out a bird at random for her for the sake of avoiding other scientists saying that the bird is 10 _____ afterwards.

Questions 11-13

Answer the questions below.

Choose NO MORE THAN TWO WORDS from the passage for each answer.

11 What did Alex reply regarding the similarity of the subjects showed to him?

_____

12 What is the problem of the young parrots except Alex? _____

13 To some extent, through the way he behaved what we can call him? _____

PASSAGE 2

stealth Forces in weight Loss

The field of weight loss is like the ancient fable about the blind men and the elephant. Each man investigates a different part of the animal and reports back, only to discover their findings are bafflingly incompatible.

A The various findings by public-health experts, physicians, psychologists, geneticists, molecular biologists, and nutritionists are about as similar as an elephant's tusk is to its tail. Some say obesity is largely predetermined by our genes and biology; others attribute it to an overabundance of fries, soda, and screen-sucking; still others think we're fat because of viral infection, insulin, or the metabolic conditions we encountered in the womb. "Everyone subscribes to their own little theory," says Robert Berkowitz, medical director of the Center for Weight and Eating Disorders at the University of Pennsylvania School of Medicine. We're programmed to hang onto the fat we have, and some people are predisposed to create and carry more fat than others. Diet and exercise help, but in the end the solution will inevitably be more complicated than pushing away the plate and going for a walk. "It's not as simple as 'You're fat because you're lazy,'" says Nikhil Dhurandhar, an associate professor at Pennington Biomedical Research Center in Baton Rouge. "Willpower is not a prerogative of thin people. It's distributed equally."

B Science may still be years away from giving US a miracle formula for fat-loss. hormone leptin is a crucial player in the brain's weight-management circuitry. Some people produce too little leptin; others become desensitized to it. And when obese people lose weight, their leptin levels plummet along with their metabolism. The body becomes more efficient at using fuel and conserving fat, which makes it tough to keep the weight off. Obese dieters' bodies go into a state of chronic hunger, a feeling Rudolph Leibel, an obesity researcher at Columbia University, compares to thirst. "Some people might be able to tolerate chronic thirst, but the majority couldn't stand it," says Leibel "Is that a behavioral problem—a lack of willpower? I don't think so."

C The government has long espoused moderate daily exercise—of the evening-walk or take-the-stairs variety—but that may not do much to budge the needle on the scale. A 150-pound person burns only 150 calories on a half-hour walk, the equivalent of two apples. It's good for the heart, less so for the gut "Radical changes are necessary," says Deirdre Barrett, a psychologist at Harvard Medical School and author of Waistland "People don't lose weight by choosing the small fries or taking a little walk every other day." Barrett suggests taking a cue from the members of the National Weight Control Registry (NWCR), a self-selected group of more than 5,000 successful weight-losers who have shed an average of 66 pounds and kept it off 5.5 years. Some registry members lost weight using low-carb diets; some went low-fat; others eliminated refined foods. Some did it on their own; others relied on counseling. That said, not everyone can lose 66 pounds and not everyone needs to. The goal shouldn't be getting thin, but getting healthy. It's enough to whittle your weight down to the low end of your set range, says Jeffrey Friedman, a geneticist at Rockefeller University. Losing even 10 pounds

vastly decreases your risk of diabetes, heart disease, and high blood pressure. The point is to not give up just because you don't look like a swimsuit model.

D The negotiation between your genes and the environment begins on day one. Your optimal weight, writ by genes, appears to get edited early on by conditions even before birth, inside the womb. If a woman has high blood-sugar levels while she's pregnant, her children are more likely to be overweight or obese, according to a study of almost 10,000 mother-child pairs. Maternal diabetes may influence a child's obesity risk through a process called metabolic imprinting, says Teresa Hillier, an endocrinologist with Kaiser Permanente's Center for Health Research and the study's lead author. The implication is clear: Weight may be established very early on, and obesity largely passed from mother to child Numerous studies in both animals and humans have shown that a mother's obesity directly increases her child's risk for weight gain. The best advice for moms-to-be: Get fit before you get pregnant. You'll reduce your risk of complications during pregnancy and increase your chances of having a normal-weight child.

E It's the $64,000 question: Which diets work? It got people wondering: Isn't there a better way to diet? A study seemed to offer an answer. The paper compared two groups of adults: those who, after eating, secreted high levels of insulin, a hormone that sweeps blood sugar out of the bloodstream and promotes its storage as fat, and those who secreted less. Within each group, half were put on a low-fat diet and half on a low-glycemic-load diet. On average, the low-insulin-secreting group fared the same on both diets, losing nearly 10 pounds in the first six months — but they gained about half of it back by the end of the 18-month study. The high-insulin group didn't do as well on the low-fat plan, losing about 4.5 pounds, and gaining back more than half by the end But the most successful were the high- insulin-secretors on the low-glycemic-load diet. They lost nearly 13 pounds and kept it off.

F What if your fat is caused not by diet or genes, but by germs—say, a virus? It sounds like a sci-fi horror movie, but research suggests some dimension of the obesity epidemic may be attributable to infection by common viruses, says Dhurandhar. The idea of “infectobesity” came to him 20 years ago when he was a young doctor treating obesity in Bombay. He discovered that a local avian virus, SMAM-1, caused chickens to die, sickened with organ damage but also, strangely, with lots of abdominal fat. In experiments, Dhurandhar found that SMAM-1-infected chickens became obese on the same diet as uninfected ones, which stayed svelte.

G He later moved to the U.S. and onto a bona fide human virus, adenovirus 36 (AD-36). In the lab, every species of animal Dhurandhar infected with the virus became obese—chickens got fat, mice got fat, even rhesus monkeys at the zoo that picked up the virus from the environment suddenly gained 15 percent of their body weight upon exposure. In his latest studies, Dhurandhar has isolated a gene that, when blocked from expressing itself, seems to turn off the virus's fattening power. Stem cells extracted from fat cells and then exposed to AD-36 reliably blossom into fat cells—but when stem cells are exposed to an AD-36 virus with the key gene inhibited, the stems cells don't differentiate. The gene appears to be necessary and sufficient to trigger AD-36-related obesity, and the goal is to use the research to create a sort of obesity vaccine. Researchers have discovered 10 microbes so far that trigger obesity—seven of them viruses. It may be a long shot, but for people struggling desperately to be thin, even the possibility of an alternative cause of obesity offers some solace. "They feel better knowing there may be something beyond them that could be responsible," says Dhurandhar. "The

thought that there could be something besides what they've heard all their lives—that they are greedy and lazy—helps."

PART 2 — QUESTIONS

Questions 14-18

Reading Passage 2 has five sections, A-G.

Which section contains the following information? Write the correct letter, A-Q.

NB You may use any letter more than once.

	A	B	C	D	E	F	G
14 evaluation on the effect of weight loss on different kind of diets	○	○	○	○	○	○	○
15 an example of research which include relatives of participants	○	○	○	○	○	○	○
16 Example of a group of people who never regain weight immediately after.	○	○	○	○	○	○	○
17 long term hunger may appear to be acceptable to most of the participants while losing weight	○	○	○	○	○	○	○
18 a continuous experiment may bad to a practical application besides diet or hereditary resort.	○	○	○	○	○	○	○

Questions 19-23

Look at the following researchers and the list of findings below. Match each researcher with the correct finding.

A. Robert Berkowitz

B. Rudolph Leibel

C. Nikhil Dhurandhar

D. Deirdre Barrett

E. Jeffrey Friedman

F. Teresa Hillier

	A	B	C	D	E	F
19 A person's weight is predetermined to a set point by the DNA.	○	○	○	○	○	○
20 Pregnant mother who are overweight may risk their fetus	○	○	○	○	○	○
21 The aim of losing weight should be keeping healthy rather than attractiveness	○	○	○	○	○	○
22 Small changes in lifestyle will not have great impact on reducing much weight	○	○	○	○	○	○
23 Researchers should be divided into different groups with their own point of view about weight loss.	○	○	○	○	○	○

Questions 24-27

Complete the summery below.

Choose NO MORE THAN ONE WORD AND/OR A NUMBER from the passage for each answer.

In Bombay Clinic, a young doctor who came up with the concept 'infect obesity' believed that the obesity is caused by a kind of virus. Years of experiment that he conducted on **24** _____. Later he moved to America and tested on a new virus named **25** _____ which proved to be a significant breakthrough. Although there seems no way to eliminate the virus, a kind of **26** _____ can be separated as to block the expressing power of the virus. The doctor future is aiming at developing a new **27** _____ to effectively combating the virus.

PASSAGE 3

Bright Children

A BY the time Laszlo Polgar's first baby was born in 1969 he already had firm views on child-rearing. An eccentric citizen of communist Hungary, he had written a book called "Bring up Genius" and one of his favourite sayings was “Geniuses are made, not born”. An expert on the theory of chess, he proceeded to teach little Zsuzsa at home, spending up to ten hours a day on the game. Two more daughters were similarly hot-housed. All three obliged their father by becoming world-class players. The youngest, Judit, is currently ranked 13th in the world, and is by far the best female chess player of all time. Would the experiment have succeeded with a different trio of children? If any child can be turned into a star, then a lot of time and money are being wasted worldwide on trying to pick winners.

B America has long held "talent searches", using test results and teacher recommendations to select children for advanced school courses, summer schools and other extra tuition. This provision is set to grow. In his state-of-the-union address in 2006, President George Bush announced the “American Competitiveness Initiative", which, among much else, would train 70,000 high-school teachers to lead advanced courses for selected pupils in mathematics and science. Just as the superpowers' space race made Congress put money into science education, the thought of China and India turning out hundreds of thousands of engineers and scientists is scaring America into prodding its brightest to do their best.

C The philosophy behind this talent search is that ability is innate; that it can be diagnosed with considerable accuracy, and that it is worth cultivating. In America, bright children are ranked as “moderately", "highly", "exceptionally” and "profoundly” gifted. The only chance to influence innate ability is thought to be in the womb or the first couple of years of life. Hence the fad for “teaching aids" such as videos and flashcards for newborns, and “whale sounds" on tape which a pregnant mother can strap to her belly.

D In Britain, there is a broadly similar belief in the existence of innate talent, but also an egalitarian sentiment which makes people queasy about the idea of investing resources in grooming intelligence. Teachers are often opposed to separate provision for the best-performing children, saying any extra help should go to stragglers. In 2002, in a bid to help the able while leaving intact the ban on most selection by ability in state schools, the government set up the National Academy for Gifted and Talented Youth. This outfit runs summer schools and master-classes for children nominated by their schools. To date, though, only seven in ten secondary schools have nominated even a single child. Last year all schools were told they must supply the names of their top 10%.

E Picking winners is also the order of the day in ex-communist states, a hangover from the times when talented individuals were plucked from their homes and ruthlessly trained for the glory of the nation. But in many other countries, opposition to the idea of singling out talent and grooming it runs deep. In Scandinavia, a belief in virtues like modesty and social solidarity makes people flinch from the idea of treating brainy children differently.

F And in Japan there is a widespread belief that all children are born with the same innate abilities—and should therefore be treated alike. All are taught together, covering the same syllabus at the same rate until they finish compulsory schooling. Those who learn quickest are expected then to teach their classmates. In China, extra teaching is provided, but to a self-selected bunch. “Children's palaces'' in big cities offer a huge range of after-school classes. Anyone can sign up; all that is asked is excellent attendance.

G Statistics give little clue as to which system is best. The performance of the most able is heavily affected by factors other than state provision. Most state education in Britain is nominally non-selective, but middle-class parents try to live near the best schools. Ambitious Japanese parents have made private, out-of-school tuition a thriving business. And Scandinavia's egalitarianism might work less well in places with more diverse populations and less competent teachers. For what it's worth, the data suggest that some countries—like Japan and Finland, see table—can eschew selection and still thrive. But that does not mean that any country can ditch selection and do as well.

H Mr Polgar thought any child could be a prodigy given the right teaching, an early start and enough practice. At one point he planned to prove it by adopting three baby boys from a poor country and trying his methods on them. (His wife vetoed the scheme.) Some say the key to success is simply hard graft. Judit, the youngest of the Polgar sisters, was the most driven, and the most successful; Zsofia, the middle one, was regarded as the most talented, but she was the only one who did not achieve the status of grand master. “Everything came easiest to her,” said her older sister. “But she was lazy.”

PART 3 — QUESTIONS

Questions 28-33

Do the following statements agree with the information given in Reading Passage 3? Write

YES if the statement is true

NO if the statement is false

NOT GIVEN if the information is not given in the passage

28 America has a long history of selecting talented students into different categories.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

29 Teachers and schools in Britain held welcome attitude towards government's selection of gifted students.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

30 Some parents agree to move near reputable schools in Britain.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

31 Middle-class parents participate in theft children's education.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

32 Japan and Finland comply with selected student's policy.

A ○ YES

B ○ NO

C ○ NOT GIVEN

33 Avoiding-selection-policy only works in a specific environment.

A ○ YES

B ○ NO

C ○ NOT GIVEN

Questions 34-35

Choose the correct letter, A, B, c or D.

34 What's Laszlo Polgar's point of view towards geniuses of children?

A ○ Chess is the best way to train geniuses

B ○ Genius tend to happen on first child

C ○ Geniuses can be educated later on

D ○ Geniuses are born naturally

35 What is the purpose of citing Zsofia's example in the last paragraph?

A ○ Practice makes genius

B ○ Girls are not good at chessing

C ○ She was an adopted child

D ○ Middle child is always the most talented

Questions 36-40

Use the information in the passage to match the countries (listed A-E) with correct connection below. Write the appropriate letters A-E.

A. Scandinavia

B. Japan

C. Britain

D. China

E. America

	A	B	C	D	E
36 Less gifted children get help from other classmates	○	○	○	○	○
37 Attending extra teaching is open to anyone	○	○	○	○	○
38 People are reluctant to favor gifted children due to social characteristics	○	○	○	○	○
39 Both view of innate and egalitarian co-existed	○	○	○	○	○
40 Craze of audio and video teaching for pregnant women.	○	○	○	○	○

Answer Key

#	Answer	Explanation
1	**NOT GIVEN**	Under Pepperberg's patient tutelage, Alex learned how to use his vocal tract to imitate almost one hundred English words, including the sounds for various foods, although he calls an apple a "banerry."
2	**NOT GIVEN**	She brought a one-year-old African gray parrot she named Alex into her lab to teach him to reproduce the sounds of the English language
3	**FALSE**	When Pepperberg began her dialogue with Alex, who died last September at the age of 31, many scientists believed animals were incapable of any thought
4	**TRUE**	Bit by bit, in ingenious experiments, researchers have documented these talents in other species, gradually chipping away at what we thought made human beings distinctive while offering a glimpse of where our own abilities came from
5	**TRUE**	In other words, because Alex was able to produce a close approximation of the sounds of some English words, Pepperberg could ask him questions about a bird's basic understanding of the world
6	**FALSE**	He knows all this, and he gets bored, so he interrupts the others, or he gives the wrong answer just to be obstinate
7	**100 English words**	Under Pepperberg's patient tutelage, Alex learned how to use his vocal tract to imitate almost 100 English words, including the sounds for various foods, although he calls an apple a "banerry."
8	**chimpanzees**	"Scientists thought that chimpanzees were better subjects, although, of course, chimps can't speak." Chimpanzees, bonobos, and gorillas have been taught to use sign language and symbols to communicate with us, often with impressive results
9	**avian cognition**	"I'm not trying to see if Alex can learn a human language," she added. "That's never been the point. My plan always was to use his imitative skills to get a better understanding of avian cognition."
10	**(particularly) chosen**	Pepperberg bought Alex in a Chicago pet store where she let the store's assistant pick him out because she didn't want other scientists saying later that she'd particularly chosen an especially smart bird for her work

#	Answer	Explanation
11	**color**	She held up the two items to Alex's eye. "What's same?" she asked. Without hesitation, Alex's beak opened: "Color."
12	**wrong pronunciation**	"Talk clearly!" he commanded, when one of the younger birds Pepperberg was also teaching talked with wrong pronunciation
13	**(a) teenager**	At this stage, he's like a teenager; he's moody, and I'm never sure what he'll do
14	**E**	Within each group, half were put on a low-fat diet and half on a low-glycemic-load diet. On average, the low-insulin-secreting group fared the same on both diets, losing nearly 10 pounds in the first six months — but they gained about half of it back by the end of the 18-month study. The high-insulin group didn't do as well on the low-fat plan, losing about 4.5 pounds, and gaining back more than half by the end But the most successful were the high- insulin-secretors on the low-glycemic-load diet. They lost nearly 13 pounds and kept it off
15	**D**	If a woman has high blood-sugar levels while she's pregnant, her children are more likely to be overweight or obese, according to a study of almost 10,000 mother-child pairs
16	**C**	Barrett suggests taking a cue from the members of the National Weight Control Registry (NWCR), a self-selected group of more than 5,000 successful weight-losers who have shed an average of 66 pounds and kept it off 5.5 years
17	**B**	Obese dieters' bodies go into a state of chronic hunger, a feeling Rudolph Leibel, an obesity researcher at Columbia University, compares to thirst
18	**G**	The gene appears to be necessary and sufficient to trigger AD-36-related obesity, and the goal is to use the research to create a sort of obesity vaccine
19	**C**	"It's not as simple as 'You're fat because you're lazy,'" says Nikhil Dhurandhar, an associate professor at Pennington Biomedical Research Center in Baton Rouge. "Willpower is not a prerogative of thin people. It's distributed equally."
20	**F**	Maternal diabetes may influence a child's obesity risk through a process called metabolic imprinting, says Teresa Hillier, an endocrinologist with Kaiser Permanente's Center for Health Research and the study's lead author
21	**E**	The goal shouldn't be getting thin, but getting healthy. It's enough to whittle your weight down to the low end of your set range, says Jeffrey Friedman, a geneticist at Rockefeller University. Losing even 10 pounds vastly decreases your risk of diabetes, heart

#	Answer	Explanation
		disease, and high blood pressure. The point is to not give up just because you don't look like a swimsuit model
22	**D**	"Radical changes are necessary," says Deirdre Barrett, a psychologist at Harvard Medical School and author of Waistland "People don't lose weight by choosing the small fries or taking a little walk every other day."
23	**A**	"Everyone subscribes to their own little theory," says Robert Berkowitz, medical director of the Center for Weight and Eating Disorders at the University of Pennsylvania School of Medicine
24	**Chickens**	The idea of "infectobesity" came to him 20 years ago when he was a young doctor treating obesity in Bombay. He discovered that a local avian virus, SMAM-1, caused chickens to die, sickened with organ damage but also, strangely, with lots of abdominal fat. In experiments, Dhurandhar found that SMAM-1-infected chickens became obese on the same diet as uninfected ones, which stayed svelte
25	**AD-36/adenovirus 36**	He later moved to the U.S. and onto a bona fide human virus, adenovirus 36 (AD-36)
26	**Gene**	In his latest studies, Dhurandhar has isolated a gene that, when blocked from expressing itself, seems to turn off the virus's fattening power
27	**vaccine**	The gene appears to be necessary and sufficient to trigger AD-36-related obesity, and the goal is to use the research to create a sort of obesity vaccine
28	**YES**	America has long held "talent searches", using test results and teacher recommendations to select children for advanced school courses, summer schools and other extra tuition In America, bright children are ranked as "moderately", "highly", "exceptionally" and "profoundly" gifted
29	**NO**	Teachers are often opposed to separate provision for the best-performing children, saying any extra help should go to stragglers
30	**YES**	Most state education in Britain is nominally non-selective, but middle-class parents try to live near the best schools
31	**NOT GIVEN**	Most state education in Britain is nominally non-selective, but middle-class parents try to live near the best schools
32	**NO**	For what it's worth, the data suggest that some countries—like Japan and Finland, see table—can eschew selection and still thrive
33	**YES**	And Scandinavia's egalitarianism might work less well in places with more diverse populations and less competent teachers. For

#	Answer	Explanation
		what it's worth, the data suggest that some countries—like Japan and Finland, see table—can eschew selection and still thrive. But that does not mean that any country can ditch selection and do as well
34	**C**	Mr Polgar thought any child could be a prodigy given the right teaching, an early start and enough practice
35	**A**	Some say the key to success is simply hard graft. Judit, the youngest of the Polgar sisters, was the most driven, and the most successful; Zsofia, the middle one, was regarded as the most talented, but she was the only one who did not achieve the status of grand master. "Everything came easiest to her," said her older sister. "But she was lazy."
36	**B**	And in Japan there is a widespread belief that all children are born with the same innate abilities—and should therefore be treated alike. All are taught together, covering the same syllabus at the same rate until they finish compulsory schooling. Those who learn quickest are expected then to teach their classmates
37	**D**	In China, extra teaching is provided, but to a self-selected bunch. "Children's palaces" in big cities offer a huge range of after-school classes. Anyone can sign up; all that is asked is excellent attendance
38	**A**	In Scandinavia, a belief in virtues like modesty and social solidarity makes people flinch from the idea of treating brainy children differently
39	**C**	In Britain, there is a broadly similar belief in the existence of innate talent, but also an egalitarian sentiment which makes people queasy about the idea of investing resources in grooming intelligence
40	**E**	In America, bright children are ranked as "moderately", "highly", "exceptionally" and "profoundly" gifted. The only chance to influence innate ability is thought to be in the womb or the first couple of years of life. Hence the fad for "teaching aids" such as videos and flashcards for newborns, and "whale sounds" on tape which a pregnant mother can strap to her belly

Test 79

PASSAGE 1

You should spend about 20 minutes on Questions 1-13, which are based on Reading Passage 1 below.

Noise Pollution and Hearing

Section A: A decibel Hell:

It’s not difficult for a person to encounter sound at levels that can cause adverse health effects. During a single day, people living in a typical urban environment can experience a wide range of sounds in many locations, even once-quiet locales have become polluted with noise. In fact, it’s difficult today to escape sound completely. In its 1999 Guidelines for predicting Community Noise, the World Health Organization (WHO) declared "Worldwide, noise-induced hearing impairment is the most prevalent irreversible occupational hazard, and it is estimated that 120 million people worldwide have disabling hearing difficulties." Growing evidence also points to many other health effects of too much volume.

Mark Stephenson, a Cincinnati, Ohio-based senior research audiologist at the National Institute for Occupational Safety and Health (NIOSH), says his agency’s definition of hazardous noise is sound that exceeds the time-weighted average of 85 dBA, meaning the average noise exposure measured over a typical eight-hour work day. Other measures and definitions are used for other purposes.

Section B: Growing Volume

In the United States, about 30 million workers are exposed to hazardous sound levels on the job, according to NIOSH. Industries having a high number of workers exposed to bud sounds include construction, agriculture, mining, manufacturing, utilities, transportation, and the military.

Noise in U.S industry is an extremely difficult problem to monitor, acknowledges Craig Moulton, a senior industrial hygienist for the Occupational Safety and Health Administration (OSHA). "Still," he says, "OSHA does require that any employer with workers overexposed to noise provide protection for those employees against the harmful effects of noise. Additionally, employers must implement a continuing, effective hearing conservation program as outlined in OSHA’s Noise Standard"

Section C: Scary Sound Effects

Numerous scientific studies over the years have confirmed that exposure to certain levels of sound can damage hearing. Prolonged exposure can actually change the structure of the hair cells in the inner ear, resulting in hearing toss. It can also cause tinnitus, a ringing, roaring, buzzing, or clicking in the ears. NIOSH studies from the mid to late 1990s show that 90% of

coal miners have hearing impairment by age 52—compared to 9% of the general population—and 70% of male metal/nonmetal miners will experience hearing impairment by age 60 (Stephenson notes that from adolescence onward, females tend to have better hearing than males). Neitzel says nearly half of all construction workers have some degree of hearing toss. "NIOSH research also reveals that by age twenty-five, the average carpenter's hearing is equivalent to an otherwise healthy fifty-year-old male who hasn't been exposed to noise," he says.

William Luxford, medical director of the House Ear Clinic of St Vincent Medical Center in Los Angeles, points out one piece of good news: "It's true that continuous noise exposure will lead to the continuation of hearing toss, but as soon as the exposure is stopped, the hearing toss stops. So a change in environment can improve a person's hearing health."

Research is catching up with this anecdotal evidence. In the July 2001 issue of Pediatrics, researchers from the Centers for Disease Control and Prevention reported that, based on audiometric testing of 5,249 children as part of the Third National Health and Nutrition, Examination Survey, an estimated 12.5% of American children have noise-induced hearing threshold shifts — or dulled hearing — in one or both ears. Most children with noise-induced hearing threshold shifts have only limited hearing damage, but continued exposure to excessive noise can lead to difficulties with high-frequency sound discrimination. The report listed stereos, music concerts, toys (such as toy telephones and certain rattles), lawn mowers, and fireworks as producing potentially harmful sounds.

Section D: Beyond the Ears

The effects of sound don't stop with the ears. Nonauditory effects of noise exposure are those effects that don't cause hearing toss but still can be measured, such as elevated blood pressure, toss of sleep, increased heart rate, cardiovascular constriction, labored breathing, and changes in brain chemistry.

The nonauditory effects of noise were noted as early as 1930 in a study published by E.L. Smith and D.L. Laird in volume 2 of the Journal of the Acoustical Society of America. The results showed that exposure to noise caused stomach contractions in healthy human beings. Reports on noise's nonauditory effects published since that pioneering study have been both contradictory and controversial in some areas.

Bronzaft and the school principal persuaded the school board to have acoustical tile installed in the classrooms adjacent to the tracks. The Transit Authority also treated the tracks near the school to make them less noisy. A follow-up study published in the September 1981 issue of the Journal of Environmental Psychology found that children's reading scores improved after these interventions were put in place.

Section E: Fighting for Quiet

Anti-noise activists say that Europe and several countries in Asia are more advanced than the United States in terms of combating noise. "Population pressure has prompted Europe to move more quickly on the noise issue than the United States has," Hume says. In the European Union, countries with cities of at least 250,000 people are creating noise maps of those cities to help

leaders determine noise pollution policies. Paris has already prepared its first noise maps. The map data, which must be finished by 2007, will be fed into computer models that will help test the sound impact of street designs or new buildings before construction begins.

Activists in other countries say they too want the United States to play a more leading role on the noise issue. But as in other areas of environmental health, merely having a more powerful government agency in place that can set more regulations is not the ultimate answer, according to other experts. Bronzaft stresses that governments worldwide need to increase funding for noise research and do a better job coordinating their noise pollution efforts so they can establish health and environmental policies based on solid scientific research. "Governments have a responsibility to protect their citizens by curbing noise pollution," she says.

PART 1 — QUESTIONS

Questions 1-5

Complete the summary below.

Choose NO MORE THAN TWO WORDS AND/OR A NUMBER from the passage for each answer.

Nowadays it seems difficult for people to avoid the effects of living in a noisy world. Noise is the sound beyond average of **1** _____ referring to the agency's definition. Scientific studies over the years from the mid to late 1990s have confirmed that exposure to certain levels of sound can cause **2** _____ on certain senior age.

From the testing of 5,249 children, those who are constantly exposed to excessive noise may have trouble in **3** _____ sound discrimination. The effects of sound don't stop with the ears, exposure to noise may lead to unease of **4** _____ in healthy people. Europe has taken steps on the noise issue, big cities of over 250,000 people are creating **5** _____ to help creating noise pollution policies.

Questions 6-10

Look at the following researchers and the list of findings below. Match each researcher with the correct finding.

A. WHO

B. William Luxford (the House Ear Clinic)

C. Carig Moulton (OSHA)

D. Arline Bronzaft

E. Centers for Disease Control and Prevention

	A	B	C	D	E
6 People can change the environment to improve hearing health.	○	○	○	○	○
7 Government should continue the research on anti-noise researches with fund	○	○	○	○	○

	A	B	C	D	E
8 companies should be required to protect the employees to avoid noise	○	○	○	○	○
9 Noise has posed effect on American children children's hearing ability	○	○	○	○	○
10 noise has seriously affected human being where they live worldwide	○	○	○	○	○

Questions 11-13

Choose the correct letter, A, B, C or D.

11 The board of schools built close to the tracks are convinced to

- **A** ○ moved the classrooms away from the noisy track
- **B** ○ regulated the track usage to a less extent
- **C** ○ utilised a special material into classroom buildings lessening the effect of outside noise
- **D** ○ oganised a team for a follow-up study

12 In the European countries, the big cities' research on noise focuses on

- **A** ○ How to record pollution details of the city on maps
- **B** ○ the impact of noise on population shift in the European cities
- **C** ○ how wide can a city be to avoid noise pollution
- **D** ○ helping the authorities better make a decision on management of the city

13 What is the best title of paragraph 1?

- **A** ○ How people cope with noise pollutions
- **B** ○ the fight against the noise with the powerful technology
- **C** ○ The Effects of Living in a Noisy World

D ○ The Effects of noise on children’s learning

PASSAGE 2

You should spend about 20 minutes on Questions 14-27, which are based on Reading Passage 2 below.

Is Graffiti Art or Crime?

A. The term graffiti derives from the Italian graffio meaning 'scratching' and can be defined as uninvited markings or writing scratched or applied to objects, built structures and natural features. It is not a new phenomenon: examples can be found on ancient structures around the world, in some cases predating the Greeks and Romans. In such circumstances it has acquired invaluable historical and archaeological significance, providing a social history of life and events at that time. Graffiti is now a problem that has become pervasive, as a result of the availability of cheap and quick means of mark-making.

B. It is usually considered a priority to remove graffiti as quickly as possible after it appears. This is for several reasons. The first is to prevent 'copy-cat' emulation which can occur rapidly once a clean surface is defaced. It may also be of a racist or otherwise offensive nature and many companies and councils have a policy of removing this type of graffiti within an hour or two of it being reported. Also, as paints, glues and inks dry out over time they can become increasingly difficult to remove and are usually best dealt with as soon as possible after the incident. Graffiti can also lead to more serious forms of vandalism and, ultimately, the deterioration of an area, contributing to social decline.

C. Although graffiti may be regarded as an eyesore, any proposal to remove it from sensitive historic surfaces should be carefully considered: techniques designed for more robust or utilitarian surfaces may result in considerable damage. In the event of graffiti incidents, it is important that the owners of buildings or other structures and their consultants are aware of the approach they should take in dealing with the problem. The police should be informed as there may be other related attacks occurring locally. An incidence pattern can identify possible culprits, as can stylised signatures or nicknames, known as 'tags", which may already be familiar to local police. Photographs are useful to record graffiti incidents and may assist the police in bringing a prosecution. Such images are also required for insurance claims, and can be helpful to cleaning operatives, allowing them to see the problem area before arriving on site.

D. There are a variety of methods that are used to remove graffiti. Broadly these divide between chemical and mechanical systems. Chemical preparations are based on dissolving the media; these solvents can range from water to potentially hazardous chemical 'cocktails'. Mechanical systems such as wire-brushing and grit-blasting attempt to abrade or chip the media from the surface. Care should be taken to comply with health and safety legislation with regard to the protection of both passers-by and any person carrying out the cleaning, operatives should follow product guidelines in terms of application and removal, and wear the appropriate protective equipment. Measures must be taken to ensure that run-off, aerial mists, drips and splashes do not threaten unprotected members of the public. When examining a graffiti incident it is important to assess the ability of the substrate to withstand the prescribed

treatment. If there is any doubt regarding this, then small trial areas should be undertaken to assess the impact of more extensive treatment.

E. A variety of preventive strategies can be adopted to combat a recurring problem of graffiti at a given site. As no two sites are the same, no one set of protection measures will be suitable for all situations. Each site must be looked at individually. Surveillance systems such as closed circuit television may also help. In cities and towns around the country, prominently placed cameras have been shown to reduce anti-social behaviour of all types including graffiti. Security patrols will also act as a deterrent to prevent recurring attacks. However, the cost of this may be too high for most situations. Physical barriers such as a wall, railings, doors or gates can be introduced to discourage unauthorised access to a vulnerable site. However, consideration has to be given to the impact measures have on the structure being protected. In the worst cases, they can be almost as damaging to the quality of the envfronment as the graffiti they prevent. In others, they might simply provide a new surface for graffiti.

F. One of the most significant problems associated with graffiti removal is the need to remove it from surfaces that are repeatedly attacked. Under these circumstances the repeated removal of graffiti using even the most gentle methods will ultimately cause damage to the surface material. There may be situations where the preventive strategies mentioned above do not work or are not a viable proposition at a given site. Anti-graffiti coatings are usually applied by brush or spray leaving a thin veneer that essentially serves to isolate the graffiti from the surface.

G. Removal of graffiti from a surface that has been treated in this way is much easier, usually using low-pressure water which reduces the possibility of damage. Depending on the type of barrier selected it may be necessary to reapply the coating after each graffiti removal exercise.

PART 2 — QUESTIONS

Questions 14-19

Which paragraph contains the following information?

NB You may use any letter more than once.

	A	B	C	D	E	F	G
14 why chemically cleaning graffiti may cause damage	○	○	○	○	○	○	○
15 the benefit of a precautionary strategy on the gentle removal	○	○	○	○	○	○	○
16 the damaging and accumulative impact of graffiti to the community	○	○	○	○	○	○	○
17 the need for different preventive measures being taken to cope with graffiti	○	○	○	○	○	○	○
18 a legal proposal made to the owner of building against graffiti	○	○	○	○	○	○	○
19 the reasons of removing graffiti as soon as possible	○	○	○	○	○	○	○

Questions 20-21

Choose TWO letters, A-E.

20 **21** Which two statements are true concerning the removal of graffiti?

- **A** ☐ cocktail removal can be safer than water treatment
- **B** ☐ small patch trial before applying large scale of removing
- **C** ☐ Chemical treatments are the most expensive way of removing
- **D** ☐ there are risks for both Chemical and medication method
- **E** ☐ mechanical removals are much more applicable than Chemical treatments

Questions 22-23

Choose TWO letters, A-E.

22 **23** Which TWO of the following preventive measures against graffiti are mentioned effective in the passage?

- **A** ☐ organise more anti graffiti movement in the city communities
- **B** ☐ increase the police patrols on the street
- **C** ☐ Build a new building with material repelling to water
- **D** ☐ installing more visible security cameras
- **E** ☐ Provide a whole new surface with chemical coat

Questions 24-27

Complete the Summary of the paragraphs of Reading Passage 2.

Use NO MORE THAN TWO WORDS from the passage for each answer.

Ancient graffiti is of significance and records the **24** _____ of details life for that period.

The police can recognize newly committed incidents of graffiti by the signature which is called **25** _____ that they are familiar with.

Operatives ought to comply with relevant rules during the operation, and put on the suitable **26** _____.

Removal of graffiti from a new type of coating surface can be much convenient of using **27** _____.

PASSAGE 3

You should spend about 20 minutes on Questions 28-40, which are based on Reading Passage 3 below.

Serendipity: The Accidental Scientists

28

A. A paradox lies close to the heart of scientific discovery. If you know just what you are looking for, finding it can hardly count as a discovery, since it was fully anticipated. But if, on the other hand, you have no notion of what you are looking for, you cannot know when you have found it, and discovery, as such, is out of the question. In the philosophy of science, these extremes map onto the purist forms of deductivism and inductivism: In the former, the outcome is supposed to be logically contained in the premises you start with; in the latter, you are recommended to start with no expectations whatsoever and see what turns up.

29

B. As in so many things, the ideal position is widely supposed to reside somewhere in between these two impossible-to-realize extremes. You want to have a good enough idea of what you are looking for to be surprised when you find something else of value, and you want to be ignorant enough of your end point that you can entertain alternative outcomes. Scientific discovery should, therefore, have an accidental aspect, but not too much of one. Serendipity is a word that expresses a position something like that. It's a fascinating word, and the late Robert King Merton—'the father of the sociology of science'—liked it well enough to compose its biography, assisted by the French cultural historian Elinor Barber.

30

C. Serendipity means a 'happy accident' or 'pleasant surprise'; specifically, the accident of finding something good or useful without looking for it. The first noted use of 'serendipity' in the English language was by Horace Walpole (1717-1792). In a letter to Horace Mann (dated 28 January 1754) he said he formed it from the Persian fairy tale The Three Princes of Serendip, whose heroes 'were always making discoveries, by accidents and sagacity, of things they were not in quest of'. The name stems from Serendip, an old name for Sri Lanka.

31

D. Besides antiquarians, the other community that came to dwell on serendipity to say something important about their practice was that of scientists. Many scientists, including the Harvard physiologist Walter Cannon and, later, the British immunologist Peter Medawar, liked to emphasize how much of scientific discovery was unplanned and even accidental. One of

Cannon's favorite examples of such serendipity is Luigi Galvani's observation of the twitching of dissected frogs' legs, hanging from a copper wire, when they accidentally touched an iron railing, leading to the discovery of ‘galvanism’; another is Hans Christian Orsted's discovery of electromagnetism when he unintentionally brought a current-carrying wire parallel to a magnetic needle. The context in which scientific serendipity was most contested and had its greatest resonance was that connected with the idea of planned science. The serendipitists were not all inhabitants of academic ivory towers. Two of the great early-20th-century American pioneers of industrial research—Willis Whitney and Irving Langmuir, both of General Electric—made much play of serendipity, in the course of arguing against overly rigid research planning.

32

E. Yet what Cannon and Medawar took as a benign method, other scientists found incendiary. To say that science had a significant serendipitous aspect was taken by some as dangerous denigration. If scientific discovery were really accidental, then what was the special basis of expert authority?

33

F. In this connection, the aphorism of choice came from no less an authority on scientific discovery than Louis Pasteur: "Chance favors the prepared mind." Accidents may happen, and things may turn up unplanned and unforeseen, as one is looking for something else, but the ability to notice such events, to see their potential bearing and meaning, to exploit then occurrence and make constructive use of them these are the results of systematic mental preparation. What seems like an accident is just another form of expertise. On closer inspection, it is insisted, accident dissolves into sagacity.

G. In 1936, as a very young man, Merton wrote a seminal essay on "The Unanticipated Consequences of Purposive Social Action." It is, he argued, the nature of social action that what one intends is rarely what one gets: Intending to provide resources for buttressing Christian religion, the natural philosophers of the Scientific Revolution laid the groundwork for secularism; people wanting to be alone with nature in Yosemite Valley wind up crowding one another. We just don't know enough—and we can never know enough—to ensure that the past is an adequate guide to the future: Uncertainty about outcomes, even of our best-laid plans, is endemic. All social action, including that undertaken with the best evidence and formulated according to the most rational criteria, is uncertain in its consequences.

PART 3 — QUESTIONS

Questions 28-33

Choose the correct heading for paragraphs A -F from the list of headings below.

i. **The origin of serendipity**

ii. **Horace Walpole's fairy tale**

iii. **Arguments against serendipity**

iv. **Two basic knowledge in the paradox of scientific discovery**

v. **The accidental evidences in and beyond science**

vi. **organization's movement Opposing against the authority**

vii. **Accident and mental preparation**

viii. **Planned research and anticipated outcome**

ix. **The optimum balance between the two extremes**

Questions 34-36

Complete the summary below, using NO MORE THAN TWO WORDS from the Reading Passage for each answer.

The word 'serendipity' was coined in the writing of **34** _____ to Horace Mann. He derived it from a **35** _____, the characters of which were always making fortunate discoveries by accident. The term Serendip was a former name for **36** _____.

Questions 37-40

Choose the correct letter, A, B, C or D.

37 What does 'inductivism' mean in paragraph A?

A ○ observation without anticipation at the beginning

B ○ Looking for what you want in the premise

C ○ The expected discovery

D ○ The map we pursued

38 Scientific discovery should

A ○ be much of accidental aspect

B ○ be full of value

C ○ be between the two exhemes

D ○ be skeptical

39 The writer mentions Luigi Galvani's observation to illustrate

A ○ the cruelty of frog's dissection

B ○ the happy accident in scientific discovery

C ○ the practice of scientists

D ○ the rigid research planning

40 Why does the writer mention the example in Yosemite Valley in paragraph G?

A ○ To illustrate the importance of a systematic plan

B ○ To illustrate there is an unpredictable reality towards expectation

C ○ To illustrate the original anticipation

D ○ To illustrate that intention of social action is totally meaningless

Answer Key

#	Answer	Explanation
1	**85 dBA**	Mark Stephenson, a Cincinnati, Ohio-based senior research audiologist at the National Institute for Occupational Safety and Health (NIOSH), says his agency's definition of hazardous noise is sound that exceeds the time-weighted average of 85 dBA, meaning the average noise exposure measured over a typical eight-hour work day
2	**hearing impairement**	NIOSH studies from the mid to late 1990s show that 90% of coal miners have hearing impairment by age 52—compared to 9% of the general population—and 70% of male metal/nonmetal miners will experience hearing impairment by age 60
3	**high-frequenncy**	Most children with noise-induced hearing threshold shifts have only limited hearing damage, but continued exposure to excessive noise can lead to difficulties with high-frequency sound discrimination
4	**stomach (contractions)**	The results showed that exposure to noise caused stomach contractions in healthy human beings
5	**noise map**	In the European Union, countries with cities of at least 250,000 people are creating noise maps of those cities to help leaders determine noise pollution policies
6	**B**	William Luxford, medical director of the House Ear Clinic of St Vincent Medical Center in Los Angeles, points out one piece of good news: "It's true that continuous noise exposure will lead to the continuation of hearing toss, but as soon as the exposure is stopped, the hearing toss stops. So a change in environment can improve a person's hearing health."
7	**D**	Bronzaft stresses that governments worldwide need to increase funding for noise research and do a better job coordinating their noise pollution efforts so they can establish health and environmental policies based on solid scientific research
8	**C**	"Still," he says, "OSHA does require that any employer with workers overexposed to noise provide protection for those employees against the harmful effects of noise
9	**E**	In the July 2001 issue of Pediatrics, researchers from the Centers for Disease Control and Prevention reported that, based on audiometric testing of 5,249 children as part of the Third National Health and Nutrition, Examination Survey, an estimated 12.5% of

#	Answer	Explanation
		American children have noise-induced hearing threshold shifts — or dulled hearing — in one or both ears
10	**A**	In its 1999 Guidelines for predicting Community Noise, the World Health Organization (WHO) declared “Worldwide, noise-induced hearing impairment is the most prevalent irreversible occupational hazard, and it is estimated that 120 million people worldwide have disabling hearing difficulties.”
11	**C**	Bronzaft and the school principal persuaded the school board to have acoustical tile installed in the classrooms adjacent to the tracks
12	**D**	In the European Union, countries with cities of at least 250,000 people are creating noise maps of those cities to help leaders determine noise pollution policies
13	**C**	It’s not difficult for a person to encounter sound at levels that can cause adverse health effects. During a single day, people living in a typical urban environment can experience a wide range of sounds in many locations, even once-quiet locales have become polluted with noise. In fact, it’s difficult today to escape sound completely. In its 1999 Guidelines for predicting Community Noise, the World Health Organization (WHO) declared “Worldwide, noise-induced hearing impairment is the most prevalent irreversible occupational hazard, and it is estimated that 120 million people worldwide have disabling hearing difficulties.” Growing evidence also points to many other health effects of too much volume
14	**D**	Chemical preparations are based on dissolving the media; these solvents can range from water to potentially hazardous chemical ‘cocktails’
15	**G**	Removal of graffiti from a surface that has been treated in this way is much easier, usually using low-pressure water which reduces the possibility of damage
16	**B**	Graffiti can also lead to more serious forms of vandalism and, ultimately, the deterioration of an area, contributing to social decline
17	**E**	A variety of preventive strategies can be adopted to combat a recurring problem of graffiti at a given site. As no two sites are the same, no one set of protection measures will be suitable for all situations. Each site must be looked at individually
18	**C**	In the event of graffiti incidents, it is important that the owners of buildings or other structures and their consultants are aware of the approach they should take in dealing with the problem. The police should be informed as there may be other related attacks

#	Answer	Explanation
		occurring locally. An incidence pattern can identify possible culprits, as can stylised signatures or nicknames, known as ‘tags, which may already be familiar to local police. Photographs are useful to record graffiti incidents and may assist the police in bringing a prosecution
19	**B**	It is usually considered a priority to remove graffiti as quickly as possible after it appears. This is for several reasons
20	**B / D**	Care should be taken to comply with health and safety legislation with regard to the protection of both passers-by and any person carrying out the cleaning, operatives should follow product guidelines in terms of application and removal, and wear the appropriate protective equipment. Measures must be taken to ensure that run-off, aerial mists, drips and splashes do not threaten unprotected members of the public. When examining a graffiti incident it is important to assess the ability of the substrate to withstand the prescribed treatment. If there is any doubt regarding this, then small trial areas should be undertaken to assess the impact of more extensive treatment
21	**B / D**	Care should be taken to comply with health and safety legislation with regard to the protection of both passers-by and any person carrying out the cleaning, operatives should follow product guidelines in terms of application and removal, and wear the appropriate protective equipment. Measures must be taken to ensure that run-off, aerial mists, drips and splashes do not threaten unprotected members of the public. When examining a graffiti incident it is important to assess the ability of the substrate to withstand the prescribed treatment. If there is any doubt regarding this, then small trial areas should be undertaken to assess the impact of more extensive treatment
22	**B / D**	Surveillance systems such as closed circuit television may also help. In cities and towns around the country, prominently placed cameras have been shown to reduce anti-social behaviour of all types including graffiti. Security patrols will also act as a deterrent to prevent recurring attacks
23	**B / D**	Surveillance systems such as closed circuit television may also help. In cities and towns around the country, prominently placed cameras have been shown to reduce anti-social behaviour of all types including graffiti. Security patrols will also act as a deterrent to prevent recurring attacks
24	**social history**	In such circumstances it has acquired invaluable historical and archaeological significance, providing a social history of life and events at that time

#	Answer	Explanation
25	**tags**	An incidence pattern can identify possible culprits, as can stylised signatures or nicknames, known as ‘tags”, which may already be familiar to local police
26	**protective equiment**	operatives should follow product guidelines in terms of application and removal, and wear the appropriate protective equipment
27	**(low-pressure) water**	Removal of graffiti from a surface that has been treated in this way is much easier, usually using low-pressure water which reduces the possibility of damage
28	**iv**	A paradox lies close to the heart of scientific discovery. If you know just what you are looking for, finding it can hardly count as a discovery, since it was fully anticipated. But if, on the other hand, you have no notion of what you are looking for, you cannot know when you have found it, and discovery, as such, is out of the question. In the philosophy of science, these extremes map onto the purist forms of deductivism and inductivism: In the former, the outcome is supposed to be logically contained in the premises you start with; in the latter, you are recommended to start with no expectations whatsoever and see what turns up
29	**ix**	As in so many things, the ideal position is widely supposed to reside somewhere in between these two impossible-to-realize extremes
30	**i**	The first noted use of ‘serendipity’ in the English language was by Horace Walpole (1717-1792). In a letter to Horace Mann (dated 28 January 1754) he said he formed it from the Persian fairy tale The Three Princes of Serendip, whose heroes ‘were always making discoveries, by accidents and sagacity, of things they were not in quest of’. The name stems from Serendip, an old name for Sri Lanka
31	**v**	One of Cannon’s favorite examples of such serendipity is Luigi Galvani’s observation of the twitching of dissected frogs’ legs, hanging from a copper wire, when they accidentally touched an iron railing, leading to the discovery of ‘galvanism’; another is Hans Christian Orsted’s discovery of electromagnetism when he unintentionally brought a current-carrying wire parallel to a magnetic needle. The context in which scientific serendipity was most contested and had its greatest resonance was that connected with the idea of planned science. The serendipitists were not all inhabitants of academic ivory towers. Two of the great early-20th-century American pioneers of industrial research —Willis Whitney and Irving Langmuir, both of General Electric— made much play of serendipity, in the course of arguing against overly rigid research planning

#	Answer	Explanation
32	**iii**	Yet what Cannon and Medawar took as a benign method, other scientists found incendiary. To say that science had a significant serendipitous aspect was taken by some as dangerous denigration. If scientific discovery were really accidental, then what was the special basis of expert authority
33	**vii**	Accidents may happen, and things may turn up unplanned and unforeseen, as one is looking for something else, but the ability to notice such events, to see their potential bearing and meaning, to exploit then occurrence and make constructive use of them these are the results of systematic mental preparation
34	**Horace Walpole**	The first noted use of ‘serendipity’ in the English language was by Horace Walpole (1717-1792). In a letter to Horace Mann (dated 28 January 1754) he said he formed it from the Persian fairy tale The Three Princes of Serendip, whose heroes ‘were always making discoveries, by accidents and sagacity, of things they were not in quest of’
35	**fairy tale**	In a letter to Horace Mann (dated 28 January 1754) he said he formed it from the Persian fairy tale The Three Princes of Serendip, whose heroes ‘were always making discoveries, by accidents and sagacity, of things they were not in quest of’
36	**Sri Lanka**	The name stems from Serendip, an old name for Sri Lanka
37	**A**	in the latter, you are recommended to start with no expectations whatsoever and see what turns up
38	**C**	As in so many things, the ideal position is widely supposed to reside somewhere in between these two impossible-to-realize extremes
39	**B**	One of Cannon’s favorite examples of such serendipity is Luigi Galvani’s observation of the twitching of dissected frogs’ legs, hanging from a copper wire, when they accidentally touched an iron railing, leading to the discovery of ‘galvanism’
40	**B**	It is, he argued, the nature of social action that what one intends is rarely what one gets: Intending to provide resources for buttressing Christian religion, the natural philosophers of the Scientific Revolution laid the groundwork for secularism; people wanting to be alone with nature in Yosemite Valley wind up crowding one another

Test 80

PASSAGE 1

Read the text below and answer questions 1-13.

LONGAEVA: Ancient Bristlecone Pine

A To understand more about the earth's history, humans have often looked to the natural environment for insight into the past. The bristlecone pine (Pinus longaeva), of the White Mountains in California, has served this purpose greater than any other species of tree on the planet. Conditions here are brutal: scant precipitation and low average temperatures mean a short growing season, only intensified by ferocious wind and mal-nutritious rocky soil. Nevertheless, bristlecone pines have claimed these barren slopes as their permanent home. Evolving here in this harsh environment, super-adapted and without much competition, bristlecones have earned their seat on the longevity throne by becoming the oldest living trees on the planet. Results of extensive studies on bristlecone pine stands have shown that in fact such environmental limitations are positively associated with the attainment of great age. This intriguing phenomenon will be discussed further on.

B But exactly how old is old? Sprouted before the invention of Egyptian hieroglyphs and long before the teachings of Jesus of Nazareth, Methuselah is the oldest bristlecone alive at roughly 4,700 years. Although specimens of this age do not represent the species' average, there are 200 trees more than 3,000 years old, and two dozen more than 4,000. Considering that these high ages are obtained in the face of such remarkable environmental adversity, the bristlecone pines have become the focus of much scientific examination over the past half century.

C Perhaps most interested in the bristlecone pine are dendrochronologists, or tree-ring daters. With every strenuous year that passes in the White Mountains, each bristlecone grows and forms a new outer layer of cambium that reflects a season's particular ease or hardship. So while growing seasons may expand or shrink, the trees carry on, their growth rings faithfully recording the bad years alongside the goods. Through examining the annual growth rings of both living and dead specimens, taking thousands of core samples, and by processes of cross-dating between trees and other qualitative records, scientists have compiled a continuous tree-ring record that dates back to the last Ice Age between eight and ten thousand years ago. Among other linked accomplishments, this record has enhanced the dating process, helping to double-check and correct the radiocarbon-14 method to more accurately estimate the age of organic material.

D Now more than ever the importance of monitoring the bristlecone is being realized. As our global climate continues to undergo its most recent and abrupt atmospheric change, these ancient scribes continue to respond. Since the rings of wood formed each year reveal the trees' response to climatic conditions during a particular growing season, in their persistence they have left us natural recordings of the past, markers of the present, and clues to the future.

E The species' name originates from the appearance of its unusual cones and needles. The bristlecone's short, pale needles are also trademarks, bunching together to form foxtail-like bundles. As is the case of most conifer needles, these specialized leaves cluster together to shelter the stomata so very little moisture is lost through them. This adaptation helps the bristlecone photosynthesize during particularly brutal months, saving the energy of constant needle replacement and providing a stable supply of chlorophyll. For a plant trying to store so much energy, bristlecone seeds are relatively large in size. They are first reproduced when trees reach ages between thirty and seventy-five years old. Germination rates are generally high, in part because seeds require little to no initial stratification. Perhaps the most intriguing physical characteristic of a mature bristlecone, however, is its ratio of living to dead wood on harsh sites and how this relates to old age. In older trees, however, especially in individuals over 1,500 years, a strip-bark trait is adaptive. This condition occurs as a result of cambium dieback, which erodes and thereby exposes certain areas of the bole, leaving only narrow bands of bark intact.

F The technique of cambial edge retreat has helped promote old age in bristlecone pine, but that certainly is not the only reason. Most crucial to these trees' longevity is their compact size and slow rates of growth. By remaining in most cases under ten meters tall, bristlecones stay close to the limited water supply and can hence support more branches and photosynthesizing. Combined with the dry, windy, and often freezing mountain air, slow growth guarantees the bristlecones tight, fibrous rings with a high resin content and structural strength. The absence of natural disaster has also safeguarded the bristlecone's lengthy lifespan. Due to a lack of ground cover vegetation and an evenly spaced layout, bristlecone stands on the White Mountain peaks have been practically unaffected by fire. This lack of vegetation also means a lack of competition for the bristlecones.

G Bristlecone pine's restricted to numerous, rather isolated stands at higher altitudes in the southwestern United States. Stands occur from the Rocky Mountains, through the Colorado Plateau, to the western margin of the Great Basin. Within this natural range, the oldest and most widely researched stands of bristlecones occur in California's White Mountains. Even just 200 miles away from the Pacific Ocean, the White Mountains are home to one of this country's few high-elevation deserts. Located in the extreme eastern rain shadow of the Sierra Nevada, this region receives only 12.54 inches of precipitation per year and experiences temperatures between -20F and +50F. The peaks south of the Owens Valley are higher up than they might appear from a distance. Although most summits exist somewhere around 11,000 feet, snow-capped White Mountain Peak, for which the range is named, stands at 14,246 feet above sea level. That said, to reach areas of pure bristlecone is an intense journey all to itself.

H With seemingly endless areas of wonder and interest, the bristlecone pines have become subject to much research over the past half-century. Since the annual growth of these ancient organisms directly reflects the climatic conditions of a particular time period, bristlecones are of greatest significance to dendrochronologists, or tree-ring specialists. Dating any tree is simple and can be done within reasonable accuracy just by counting out the rings made each year by the plant's natural means of growth. By carefully compiling a nearly 10,000-year-old bristlecone pine record, these patient scientists have accurately corrected the carbon-14 dating method and estimated ages of past periods of global climate change. What makes this record so special to dendrochronologists, too, is that, nowhere, throughout time, is precisely the same

long-term sequence of wide and narrow rings repeated, because year-to-year variations in climate are never exactly the same.

I Historically the bristlecone's remote location and gnarled wood have deterred commercial extraction, but nothing on earth will go unaffected by global warming. If temperatures rise by only 6 degrees F, which many experts say is likely this century, about two-thirds of the bristlecones' ideal habitat in the White Mountains effectively will be gone. Almost 30,000 acres of National Forest now preserves the ancient bristlecone, but paved roads, campsites, and self-guided trails have led only to more human impact. In 1966, the U.S.F.S reported over 20,000 visitors to the Ancient Bristlecone Pine Forest, a figure which could exceed 40,000 today. Over the past hundreds of thousands of years, this species has endured in one of earth's most trying environments; they deserve our respect and reverence. As global climate change slowly alters their environment, we as humans must do our part to raise awareness and lower our impact.

PART 1 — QUESTIONS

Questions 1-4

The reading Passage has nine paragraphs A-I.

Which paragraph contains the following information?

	A	B	C	D	E	F	G	H	I
1 Human activity threats bristlecone pines habitat	○	○	○	○	○	○	○	○	○
2 Explanations for ring of bristlecone pines	○	○	○	○	○	○	○	○	○
3 An accountable recording provided from the past till now	○	○	○	○	○	○	○	○	○
4 Survived in hostile environment	○	○	○	○	○	○	○	○	○

Questions 5-7

Choose the correct letter, A, B, C or D.

5 According to passage A, what aspect of bristlecone pines attracts author's attention?

- **A** ○ Brutal environment they live
- **B** ○ Remarkable long age
- **C** ○ They only live in California
- **D** ○ Outstanding height

6 Why do we investigate Bristlecone pines in higher altitudes of California's White Mountains?

- **A** ○ Because oldest ones researched in this region
- **B** ○ Because most bizarre ones are in this region
- **C** ○ Because precipitation is rich in this region

D ○ Because sea level is comparatively high in this region

7 Why there are repeated patterns of wide and narrow rings?

A ○ Because sea level rises which affects tree ring

B ○ Because tree ring pattern is completely random

C ○ Because ancient organisms affect its growth

D ○ Because variation of climate change is different

Questions 8-13

Complete the summary below.

Choose NO MORE THAN THREE WORDS from the Reading Passage for each answer.

The bristlecone's special adaptation is benefit for photosynthesizing, and reserving the **8** _____ of leave replacement and providing sufficient chlorophyll. Probably because seeds do not rely on primary **9** _____, Germination rate is high. Because of cambium dieback, only narrow **10** _____ remain complete. Due to multiple factors such as windy, cold climate and **11** _____, bristlecones' rings have tight and solid structure full of resin. Moreover, bristlecone stands are safe from fire because of little **12** _____ plants spread in this place. The summits of Owens Valley is higher than they emerge if you observe from a **13** _____.

PASSAGE 2

Read the text below and answer questions 14-27.

Monkeys and Forests

AS AN EAST WIND blasts through a gap in the Cordillera de Tilarán, a rugged mountain range that splits northern Costa Rica in half, a female mantled howler monkey moves through the swaying trees of the forest canopy.

A Ken Glander, a primatologist from Duke University, gazes into the canopy, tracking the female's movements. Holding a dart gun, he waits with infinite patience for the right moment to shoot. With great care, Glander aims and fires. Hit in the rump, the monkey wobbles. This howler belongs to a population that has lived for decades at Hacienda La Pacifica, a working cattle ranch in Guanacaste province. Other native primates — white-faced capuchin monkeys and spider monkeys — once were common in this area, too, but vanished after the Pan-American Highway was built nearby in the 1950s. Most of the surrounding land was clear-cut for pasture.

B Howlers persist at La Pacifica, Glander explains, because they are leaf-eaters. They eat fruit, when it's available but, unlike capuchin and spider monkeys, do not depend on large areas of fruiting trees. "Howlers can survive anyplace you have half a dozen trees, because their eating habits are so flexible," he says. In forests, life is an arms race between trees and the myriad creatures that feed on leaves. Plants have evolved a variety of chemical defenses, ranging from bad-tasting tannins, which bind with plant-produced nutrients, rendering them indigestible, to deadly poisons, such as alkaloids and cyanide.

C All primates, including humans, have some ability to handle plant toxins. "We can detoxify a dangerous poison known as caffeine, which is deadly to a lot of animals" Glander says. For leaf-eaters, long term exposure to a specific plant toxin can increase their ability to defuse the poison and absorb the leaf nutrients. The leaves that grow in regenerating forests, like those at La Pacifica, are actually more howler friendly than those produced by the undisturbed, centuries-old trees that survive farther south, in the Amazon Basin. In younger forests, trees put most of their limited energy into growing wood, leaves and fruit, so they produce much lower levels of toxin than do well-established, old-growth trees.

D The value of maturing forests to primates is a subject of study at Santa Rosa National Park, about 35 miles northwest of Hacienda La Pacifica. The park hosts populations not only of mantled howlers but also of white-faced capuchins and spider monkeys. Yet the forests there are young, most of them less than 50 years old. Capuchins were the first to begin using the reborn forests, when the trees were as young as 14 years. Howlers, larger and heavier than capuchins, need somewhat older trees, with limbs that can support their greater body weight. A working ranch at Hacienda La Pacifica also explain their population boom in Santa Rosa. "Howlers are more resilient than capuchins and spider monkeys for several reasons," Fedigan explains. "They can live within a small home range, as long as the trees have the right food for

them, spider monkeys, on the other hand, occupy a huge home range, so they can't make it in fragmented habitat."

E Howlers also reproduce faster than do other monkey species in the area. Capuchins don't bear their first young until about 7 years old, and spider monkeys do so even later, but howlers give birth for the first time at about 3.5 years of age. Also, while a female spider monkey will have a baby about once every four years, well-fed howlers can produce an infant every two years.

F The leaves howlers eat hold plenty of water, so the monkeys can survive away from open streams and water holes. This ability gives them a real advantage over capuchin and spider monkeys, which have suffered during the long, ongoing drought in Guanacaste.

G Growing human population pressures in Central and South America have led to persistent destruction of forests. During the 1990s, about 1.1 million acres of Central American forest were felled yearly. Alejandro Estrada, an ecologist at Estacion de Biologia Los Tuxtlas in Veracruz, Mexico, has been exploring how monkeys survive in a landscape increasingly shaped by humans. He and his colleagues recently studied the ecology of a group of mantled howler monkeys that thrive in a habitat completely altered by humans: a cacao plantation in Tabasco, Mexico. Like many varieties of coffee, cacao plants need shade to grow, so 40 years ago the landowners planted fig, monkey pod and other tall trees to form a protective canopy over their crop. The howlers moved in about 25 years ago after nearby forests were cut. This strange habitat, a hodgepodge of cultivated native and exotic plants, seems to support about as many monkeys as would a same-sized patch of wild forest. The howlers eat the leaves and fruit of the shade trees, leaving the valuable cacao pods alone, so the farmers tolerate them.

H Estrada believes the monkeys bring underappreciated benefits to such farms, dispersing the seeds of fig and other shade trees and fertilizing the soil with feces. He points out that howler monkeys live in shade coffee and cacao plantations in Nicaragua and Costa Rica as well as in Mexico. Spider monkeys also forage in such plantations, though they need nearby areas of forest to survive in the long term. He hopes that farmers will begin to see the advantages of associating with wild monkeys, which includes potential ecotourism projects. "Conservation is usually viewed as a conflict between agricultural practices and the need to preserve nature, Estrada says. "We're moving away from that vision and beginning to consider ways in which agricultural activities may become a tool for the conservation of primates in human-modified landscapes."

PART 2 — QUESTIONS

Questions 14-19

The reading Passage has seven paragraphs A-H.

Which paragraph contains the following information?

	A	B	C	D	E	F	G	H
14 a reference of reduction in Forest inhabitant	○	○	○	○	○	○	○	○
15 Only one species of monkey survived while other two species were vanished	○	○	○	○	○	○	○	○
16 a reason for howler Monkey of choosing new leaves	○	○	○	○	○	○	○	○
17 mention to howler Monkey's nutrient and eating habits	○	○	○	○	○	○	○	○
18 a reference of asking farmers' changing attitude toward wildlife	○	○	○	○	○	○	○	○
19 the advantage for howler Monkey's flexibility living in a segmented habitat	○	○	○	○	○	○	○	○

Questions 20-22

Look at the following places and the list of descriptions below. Match each description with the correct place, A-E.

A. Hacienda La Pacifica

B. Santa Rosa National Park

C. a cacao plantation in Tabasco, Mexico

D. Estacion de Biologia Los Tuxtlas in Veracruz, Mexico

E. Amazon Basin

	A	B	C	D	E
20 howler Monkey's benefit to the focal region's agriculture	○	○	○	○	○
21 Original home for all three native monkeys	○	○	○	○	○
22 A place where Capuchins monkey comes for a better habitat	○	○	○	○	○

Questions 23-27

Complete the sentences below.

Choose NO MORE THAN TWO WORDS from the passage for each answer.

- Howlers in La Pacifica since they can feed themselves with leaf when **23** _____ is not easily found
- Howlers has better ability to alleviate the **24** _____, which old and young trees used to protect themselves
- when compared to that of spider monkeys and capuchin monkeys, Howlers **25** _____ relatively faster (round for just every 2 years).
- the monkeys can survive away from open streams and water holes as the in Guanacaste leaves howlers eat hold high content of **26** _____ which ensure them to resist to continuous **27** _____ in Guanacaste

PASSAGE 3

Read the text below and answer questions 28-40.

Anti-Aging Research on the Brain

A While it may not be possible to completely age-proof our brains, a brave new world of anti-aging research shows that our gray matter may be far more flexible than we thought. So no one, no matter how old, has to lose their mind. The brain has often been called the three-pound universe. It's our most powerful and mysterious organ, the seat of the self, laced with as many billions of neurons as the galaxy has stars. No wonder the mere notion of an aging, failing brain —and the prospect of memory loss, confusion, and the unraveling of our personality—is so terrifying. As Mark Williams, M.D., author of The American Geriatrics Society's Complete Guide to Aging and Health, says, 'The fear of dementia is stronger than the fear of death itself.' Yet the degeneration of the brain is far from inevitable. 'Its design features are such that it should continue to function for a lifetime,' says Zaven Khachaturian, Ph.D., director of the Alzheimer's Association's Ronald and Nancy Reagan Research Institute. 'There's no reason to expect it to deteriorate with age, even though many of us are living longer lives.' In fact, scientists' view of the brain's potential is rapidly changing, according to Stanford University neuroscientist Robert Sapolsky, Ph.D. Thirty-five years ago we thought Alzheimer's disease was a dramatic version of normal aging. Now we realize it's a disease with a distinct pathology. In fact, some people simply don't experience any mental decline, so we've begun to study them. Antonio Damasio, M.D., Ph.D., head of the Department of Neurology at the University of Iowa and author of Descartes' Error, concurs: 'Older people can continue to have extremely rich and healthy mental lives.'

B The seniors were tested in 1988 and again in 1991. Four factors were found to be related to their mental fitness: levels of education and physical activity, lung function, and feelings of self-efficacy. "Each of these elements alters the way our brain functions," says Marilyn Albert, Ph.D., of Harvard Medical School, and colleagues from Yale, Duke, and Brandeis Universities and the Mt. Sinai School of Medicine, who hypothesizes that regular exercise may actually stimulate blood flow to the brain and nerve growth, both of which create more densely branched neurons, rendering the neurons stronger and better able to resist disease. Moderate aerobic exercise, including long brisk walks and frequently climbing stairs, will accomplish this.

C Education also seems to enhance brain function. People who have challenged themselves with at least a college education may actually stimulate the neurons in their brains. Moreover, native intelligence may protect our brains. It's possible that smart people begin life with a greater number of neurons, and therefore have a greater reserve to fall back on if some begin to fail. "If you have a lot of neurons and keep them busy, you may be able to tolerate more damage to your brain before it shows," says Peter Davies, M.D., of the Albert Einstein College of Medicine in the Bronx, New York. Early linguistic ability also seems to help our brains later in life. A recent study in the New England Journal of Medicine looked at 93 elderly nuns and examined the autobiographies they had written 60 years earlier, just as they were joining a

convent. The nuns whose essays were complex and dense with ideas remained sharp into their eighties and nineties.

D Finally, personality seems to play an important role in protecting our mental prowess. A sense of self-efficacy may protect our brain, buffeting it from the harmful effects of stress. According to Albert, there's evidence that elevated levels of stress hormones may harm brain cells and cause the hippocampus, a small seahorse-shaped organ that's a crucial moderator of memory, to atrophy. A sense that we can effectively chart our own course in the world may retard the release of stress hormones and protect us as we age. "It's not a matter of whether you experience stress or not," Albert concludes, "it's your attitude toward it." Reducing stress by meditating on a regular basis may buffer the brain as well. It also increases the activity of the brain's pineal gland, the source of the antioxidant hormone melatonin, which regulates sleep and may retard the aging process. Studies at the University of Massachusetts Medical Center and the University of Western Ontario found that people who meditated regularly had higher levels of melatonin than those who took 5-milligram supplements. Another study, conducted jointly by Maharishi International University, Harvard University, and the University of Maryland, found that seniors who meditated for three months experienced dramatic improvements in their psychological well-being, compared to their non-meditative peers.

E Animal studies confirm that both mental and physical activity boost brain fitness. At the Beckman Institute for Advanced Science and Technology in Urbana, Illinois, psychologist William Greenough, Ph.D., let some rats play with a profusion of toys. These rodents developed about 25 percent more connections between their neurons than did rats that didn't get any mentally stimulating recreation. In addition, rats that exercised on a treadmill developed more capillaries in specific parts of their brains than did their sedentary counterparts. This increased the blood flow to their brains. "Clearly the message is to do as many different things as possible," Greenough says.

F It's not just scientists who are catching anti-aging fever. Walk into any health food store, and you'll find nutritional formulas—with names like Brainstorm and Smart ALEC—that claim to sharpen mental ability. The book Smart Drugs & Nutrients, by Ward Dean, M.D., and John Morgenthaler, was self-published in 1990 and has sold over 120,000 copies worldwide. It has also spawned an underground network of people tweaking their own brain chemistry with nutrients and drugs, the latter sometimes obtained from Europe and Mexico. Sales of ginkgo, an extract from the leaves of the 200-million-year-old ginkgo tree, which has been shown in published studies to increase oxygen in the brain and ameliorate symptoms of Alzheimer's disease—are up by 22 percent in the last six months alone, according to Paddy Spence, president of SPINS, a San Francisco-based market research firm. Indeed, products that increase and preserve mental performance are a small but emerging segment of the supplements industry, says Linda Gilbert, president of HealthFocus, a company that researches consumer health trends. While neuroscientists like Khachaturian liken the use of these products to the superstition of tossing salt over your shoulder, the public is nevertheless gobbling up nutrients that promise cognitive enhancement.

PART 3 — QUESTIONS

Questions 28-31

Choose FOUR correct letters among A-G.

28 **29** **30** **31** Which of the FOUR situations or conditions assisting the Brains' function?

- **A** ☐ Preventive treatment against Alzheimer's disease
- **B** ☐ Doing active aerobic exercise and frequently climbing stairs
- **C** ☐ High levels of education
- **D** ☐ Early verbal or language competence training
- **E** ☐ Having more supplements such as ginkgo tree
- **F** ☐ Participate in more physical activity involving in stimulating tasks
- **G** ☐ Personality and feelings of self-fulfillment

Questions 32-39

Use the information in the passage to match the people (listed A-G) with opinions or deeds below.

NB You may use any letter more than once.

A. Zaven Khachaturian

B. William Greenough

C. Marilyn Albert

D. Robert Sapolsky

E. Linda Gilbert

F. Peter Davies

G. Paddy Spence

	A	B	C	D	E	F	G
32 Alzheimer's was probably a kind of disease rather than a normal aging process.	○	○	○	○	○	○	○
33 Keeping neurons busy, people may be able to endure more harm to your brain	○	○	○	○	○	○	○
34 Regular exercises boost blood flow to the brain and increase anti-disease disability.	○	○	○	○	○	○	○
35 Significant increase of Sales of ginkgo has been shown.	○	○	○	○	○	○	○
36 More links between their neurons are found among stimulated animals.	○	○	○	○	○	○	○
37 Effectiveness of the use of brains supplements products can be of little scientific proof.	○	○	○	○	○	○	○
38 Heightened levels of stress may damage brain cells and cause part of brain to deteriorate.	○	○	○	○	○	○	○
39 Products that upgrade and preserve mental competence are still a newly developing industry.	○	○	○	○	○	○	○

Questions 40-40

Choose the correct letter, A, B, C or D.

40 According to the passage, what is the most appropriate title for this passage?

- **A** ○ Making our minds last a lifetime
- **B** ○ amazing pills of the ginkgo
- **C** ○ how to stay healthy in your old hood
- **D** ○ more able a brain and neurons

Answer Key

#	Answer	Explanation
1	**I**	Almost 30,000 acres of National Forest now preserves the ancient bristlecone, but paved roads, campsites, and self-guided trails have led only to more human impact
2	**C**	With every strenuous year that passes in the White Mountains, each bristlecone grows and forms a new outer layer of cambium that reflects a season's particular ease or hardship. So while growing seasons may expand or shrink, the trees carry on, their growth rings faithfully recording the bad years alongside the goods
3	**D**	Since the rings of wood formed each year reveal the trees' response to climatic conditions during a particular growing season, in their persistence they have left us natural recordings of the past, markers of the present, and clues to the future
4	**A**	Evolving here in this harsh environment, super-adapted and without much competition, bristlecones have earned their seat on the longevity throne by becoming the oldest living trees on the planet
5	**B**	Results of extensive studies on bristlecone pine stands have shown that in fact such environmental limitations are positively associated with the attainment of great age. This intriguing phenomenon will be discussed further on
6	**A**	Within this natural range, the oldest and most widely researched stands of bristlecones occur in California's White Mountains
7	**D**	What makes this record so special to dendrochronologists, too, is that, nowhere, throughout time, is precisely the same long-term sequence of wide and narrow rings repeated, because year-to-year variations in climate are never exactly the same
8	**energy**	This adaptation helps the bristlecone photosynthesize during particularly brutal months, saving the energy of constant needle replacement and providing a stable supply of chlorophyll
9	**stratification**	Germination rates are generally high, in part because seeds require little to no initial stratification
10	**(bands of) bark**	This condition occurs as a result of cambium dieback, which erodes and thereby exposes certain areas of the bole, leaving only narrow bands of bark intact

#	Answer	Explanation
11	**(dry) (moutain) air**	Combined with the dry, windy, and often freezing mountain air, slow growth guarantees the bristlecones tight, fibrous rings with a high resin content and structural strength
12	**ground cover**	Due to a lack of ground cover vegetation and an evenly spaced layout, bristlecone stands on the White Mountain peaks have been practically unaffected by fire
13	**distance**	The peaks south of the Owens Valley are higher up than they might appear from a distance
14	**G**	Growing human population pressures in Central and South America have led to persistent destruction of forests. During the 1990s, about 1.1 million acres of Central American forest were felled yearly
15	**A**	This howler belongs to a population that has lived for decades at Hacienda La Pacifica, a working cattle ranch in Guanacaste province. Other native primates — white-faced capuchin monkeys and spider monkeys — once were common in this area, too, but vanished after the Pan-American Highway was built nearby in the 1950s
16	**C**	The leaves that grow in regenerating forests, like those at La Pacifica, are actually more howler friendly than those produced by the undisturbed, centuries-old trees that survive farther south, in the Amazon Basin. In younger forests, trees put most of their limited energy into growing wood, leaves and fruit, so they produce much lower levels of toxin than do well-established, old-growth trees
17	**B**	Howlers persist at La Pacifica, Glander explains, because they are leaf-eaters. They eat fruit, when it's available but, unlike capuchin and spider monkeys, do not depend on large areas of fruiting trees. "Howlers can survive anyplace you have half a dozen trees, because their eating habits are so flexible," he says
18	**H**	He hopes that farmers will begin to see the advantages of associating with wild monkeys, which includes potential ecotourism projects
19	**D**	"Howlers are more resilient than capuchins and spider monkeys for several reasons," Fedigan explains. "They can live within a small home range, as long as the trees have the right food for them, spider monkeys, on the other hand, occupy a huge home range, so they can't make it in fragmented habitat."
20	**C**	He and his colleagues recently studied the ecology of a group of mantled howler monkeys that thrive in a habitat completely altered by humans: a cacao plantation in Tabasco, Mexico Estrada

#	Answer	Explanation
		believes the monkeys bring underappreciated benefits to such farms, dispersing the seeds of fig and other shade trees and fertilizing the soil with feces
21	**A**	This howler belongs to a population that has lived for decades at Hacienda La Pacifica, a working cattle ranch in Guanacaste province. Other native primates — white-faced capuchin monkeys and spider monkeys — once were common in this area, too, but vanished after the Pan-American Highway was built nearby in the 1950s
22	**B**	The value of maturing forests to primates is a subject of study at Santa Rosa National Park, about 35 miles northwest of Hacienda La Pacifica. The park hosts populations not only of mantled howlers but also of white-faced capuchins and spider monkeys. Yet the forests there are young, most of them less than 50 years old. Capuchins were the first to begin using the reborn forests, when the trees were as young as 14 years
23	**fruit**	They eat fruit, when it’s available but, unlike capuchin and spider monkeys, do not depend on large areas of fruiting trees
24	**plant toxins/plant toxin**	All primates, including humans, have some ability to handle plant toxins. “We can detoxify a dangerous poison known as caffeine, which is deadly to a lot of animals” Glander says. For leaf-eaters, long term exposure to a specific plant toxin can increase their ability to defuse the poison and absorb the leaf nutrients
25	**reproduce**	Howlers also reproduce faster than do other monkey species in the area. Capuchins don’t bear their first young until about 7 years old, and spider monkeys do so even later, but howlers give birth for the first time at about 3.5 years of age. Also, while a female spider monkey will have a baby about once every four years, well-fed howlers can produce an infant every two years
26	**water**	The leaves howlers eat hold plenty of water, so the monkeys can survive away from open streams and water holes
27	**drought**	The leaves howlers eat hold plenty of water, so the monkeys can survive away from open streams and water holes. This ability gives them a real advantage over capuchin and spider monkeys, which have suffered during the long, ongoing drought in Guanacaste
28	**C / D / F / G**	Education also seems to enhance brain function Early linguistic ability also seems to help our brains later in life Finally, personality seems to play an important role in protecting our mental prowess Animal studies confirm that both mental and physical activity boost brain fitness

#	Answer	Explanation
29	**C / D / F / G**	Education also seems to enhance brain function Early linguistic ability also seems to help our brains later in life Finally, personality seems to play an important role in protecting our mental prowess Animal studies confirm that both mental and physical activity boost brain fitness
30	**C / D / F / G**	Education also seems to enhance brain function Early linguistic ability also seems to help our brains later in life Finally, personality seems to play an important role in protecting our mental prowess Animal studies confirm that both mental and physical activity boost brain fitness
31	**C / D / F / G**	Education also seems to enhance brain function Early linguistic ability also seems to help our brains later in life Finally, personality seems to play an important role in protecting our mental prowess Animal studies confirm that both mental and physical activity boost brain fitness
32	**D**	In fact, scientists' view of the brain's potential is rapidly changing, according to Stanford University neuroscientist Robert Sapolsky, Ph.D. Thirty-five years ago we thought Alzheimer's disease was a dramatic version of normal aging. Now we realize it's a disease with a distinct pathology
33	**F**	"If you have a lot of neurons and keep them busy, you may be able to tolerate more damage to your brain before it shows," says Peter Davies, M.D., of the Albert Einstein College of Medicine in the Bronx, New York
34	**C**	"Each of these elements alters the way our brain functions," says Marilyn Albert, Ph.D., of Harvard Medical School, and colleagues from Yale, Duke, and Brandeis Universities and the Mt. Sinai School of Medicine, who hypothesizes that regular exercise may actually stimulate blood flow to the brain and nerve growth, both of which create more densely branched neurons, rendering the neurons stronger and better able to resist disease
35	**G**	Sales of ginkgo, an extract from the leaves of the 200-million-year-old ginkgo tree, which has been shown in published studies to increase oxygen in the brain and ameliorate symptoms of Alzheimer's disease—are up by 22 percent in the last six months alone, according to Paddy Spence, president of SPINS, a San Francisco-based market research firm
36	**B**	At the Beckman Institute for Advanced Science and Technology in Urbana, Illinois, psychologist William Greenough, Ph.D., let some rats play with a profusion of toys. These rodents developed about 25 percent more connections between their neurons than did rats that didn't get any mentally stimulating recreation

#	Answer	Explanation
37	**A**	While neuroscientists like Khachaturian liken the use of these products to the superstition of tossing salt over your shoulder, the public is nevertheless gobbling up nutrients that promise cognitive enhancement
38	**C**	According to Albert, there's evidence that elevated levels of stress hormones may harm brain cells and cause the hippocampus, a small seahorse-shaped organ that's a crucial moderator of memory, to atrophy
39	**E**	Indeed, products that increase and preserve mental performance are a small but emerging segment of the supplements industry, says Linda Gilbert, president of HealthFocus, a company that researches consumer health trends
40	**A**	'Its design features are such that it should continue to function for a lifetime,' says Zaven Khachaturian, Ph.D., director of the Alzheimer's Association's Ronald and Nancy Reagan Research Institute. 'There's no reason to expect it to deteriorate with age, even though many of us are living longer lives.'

Test 81

PASSAGE 1

You should spend about 20 minutes on Questions 1-13, which are based on Reading Passage 1 below.

In Praise of Amateurs

Despite the specialisation of scientific research, amateurs still have an important role to play

During the scientific revolution of the 17th century, scientists were largely men of private means who pursued their interest in natural philosophy for their own edification. Only in the past century or two has it become possible to make a living from investigating the workings of nature. Modern science was, in other words, built on the work of amateurs. Today, science is an increasingly specialised and compartmentalised subject, the domain of experts who know more and more about less and less. Perhaps surprisingly, however, amateurs – even those without private means – are still important.

A recent poll carried out at a meeting of the American Association for the Advancement of Science by astronomer Dr Richard Fienberg found that, in addition to his field of astronomy, amateurs are actively involved in such fields as acoustics, horticulture, ornithology, meteorology, hydrology and palaeontology. Far from being crackpots, amateur scientists are often in close touch with professionals, some of whom rely heavily on their co-operation.

Admittedly, some fields are more open to amateurs than others. Anything that requires expensive equipment is clearly a no-go area. And some kinds of research can be dangerous; most amateur chemists, jokes Dr Fienberg, are either locked up or have blown themselves to bits. But amateurs can make valuable contributions in fields from rocketry to palaeontology and the rise of the Internet has made it easier than ever before to collect data and distribute results.

Exactly which field of study has benefited most from the contributions of amateurs is a matter of some dispute. Dr Fienberg makes a strong case for astronomy. There is, he points out, a long tradition of collaboration between amateur and professional sky watchers. Numerous comets, asteroids and even the planet Uranus were discovered by amateurs. Today, in addition to comet and asteroid spotting, amateurs continue to do valuable work observing the brightness of variable stars and detecting novae – 'new' stars in the Milky Way and supernovae in other galaxies. Amateur observers are helpful, says Dr Fienberg, because there are so many of them (they far outnumber professionals) and because they are distributed all over the world. This makes special kinds of observations possible: if several observers around the world accurately record the time when a star is eclipsed by an asteroid, for example, it is possible to derive useful information about the asteroid's shape.

Another field in which amateurs have traditionally played an important role is palaeontology. Adrian Hunt, a palaeontologist at Mesa Technical College in New Mexico, insists that his is the field in which amateurs have made the biggest contribution. Despite the development of high-

tech equipment, he says, the best sensors for finding fossils are human eyes – lots of them. Finding volunteers to look for fossils is not difficult, he says, because of the near-universal interest in anything to do with dinosaurs. As well as helping with this research, volunteers learn about science, a process he calls ‘recreational education’.

Rick Bonney of the Cornell Laboratory of Ornithology in Ithaca, New York, contends that amateurs have contributed the most in his field. There are, he notes, thought to be as many as 60 million birdwatchers in America alone. Given their huge numbers and the wide geographical coverage they provide, Mr Bonney has enlisted thousands of amateurs in a number of research projects. Over the past few years their observations have uncovered previously unknown trends and cycles in bird migrations and revealed declines in the breeding populations of several species of migratory birds, prompting a habitat conservation programme.

Despite the successes and whatever the field of study, collaboration between amateurs and professionals is not without its difficulties. Not everyone, for example is happy with the term 'amateur'. Mr Bonney has coined the term 'citizen scientist' because he felt that other words, such as 'volunteer' sounded disparaging. A more serious problem is the question of how professionals can best acknowledge the contributions made by amateurs. Dr Fienberg says that some amateur astronomers are happy to provide their observations but grumble about not being reimbursed for out-of-pocket expenses. Others feel let down when their observations are used in scientific papers, but they are not listed as co-authors. Dr Hunt says some amateur palaeontologists are disappointed when told that they cannot take finds home with them.

These are legitimate concerns but none seems insurmountable. Provided amateurs and professionals agree the terms on which they will work together beforehand, there is no reason why co-operation between the two groups should not flourish. Last year Dr S. Carlson, founder of the Society for Amateur Scientists won an award worth $290,000 for his work in promoting such co-operation. He says that one of the main benefits of the prize is the endorsement it has given to the contributions of amateur scientists, which has done much to silence critics among those professionals who believe science should remain their exclusive preserve.

At the moment, says Dr Carlson, the society is involved in several schemes including an innovative rocket-design project and the setting up of a network of observers who will search for evidence of a link between low-frequency radiation and earthquakes. The amateurs, he says, provide enthusiasm and talent, while the professionals provide guidance 'so that anything they do discover will be taken seriously'. Having laid the foundations of science, amateurs will have much to contribute to its ever-expanding edifice.

PART 1 — QUESTIONS

Questions 1-8

Complete the summary below. Choose ONE or TWO WORDS from the passage for each answer.

Prior to the 19th century, professional ... **1** _____ ... did not exist and scientific research was largely carried out by amateurs. However, while ... **2** _____ ... today is mostly the domain of professionals, a recent US survey highlighted the fact that amateurs play an important role in at least seven ... **3** _____ ... and indeed many professionals are reliant on their ... **4** _____ .... In areas such as astronomy, amateurs can be invaluable when making specific ... **5** _____ ... on a global basis. Similarly in the area of palaeontology their involvement is invaluable and helpers are easy to recruit because of the popularity of ... **6** _____ .... Amateur birdwatchers also play an active role and their work has led to the establishment of a ... **7** _____ ....

Occasionally the term 'amateur' has been the source of disagreement and alternative names have been suggested but generally speaking, as long as the professional scientists ... **8** _____ ... the work of the non-professionals, the two groups can work productively together.

Questions 9-13

Match each opinion with the scientists A–D.

NB You may use any of the scientists A–D more than once.

A. Dr Fienberg

B. Adrian Hunt

C. Rick Bonney

D. Dr Carlson

	A	B	C	D
9 Amateur involvement can also be an instructive pastime.	○	○	○	○

	A	B	C	D
10 Amateur scientists are prone to accidents.	○	○	○	○
11 Science does not belong to professional scientists alone.	○	○	○	○
12 In certain areas of my work, people are a more valuable resource than technology.	○	○	○	○
13 It is important to give amateurs a name which reflects the value of their work.	○	○	○	○

PASSAGE 2

You should spend about 20 minutes on Questions 14–26 which are based on Reading Passage 2 below.

READING THE SCREEN

Are the electronic media exacerbating illiteracy and making our children stupid? On the contrary, says Colin McCabe, they have the potential to make us truly literate

The debate surrounding literacy is one of the most charged in education. On the one hand there is an army of people convinced that traditional skills of reading and writing are declining. On the other, a host of progressives protest that literacy is much more complicated than a simple technical mastery of reading and writing. This second position is supported by most of the relevant academic work over the past 20 years. These studies argue that literacy can only be understood in its social and technical context. In Renaissance England, for example, many more people could read than could write, and within reading there was a distinction between those who could read print and those who could manage the more difficult task of reading manuscript. An understanding of these earlier periods helps us understand today's 'crisis in literacy' debate.

There does seem to be evidence that there has been an overall decline in some aspects of reading and writing - you only need to compare the tabloid newspapers of today with those of 50 years ago to see a clear decrease in vocabulary and simplification of syntax. But the picture is not uniform and doesn't readily demonstrate the simple distinction between literate and illiterate which had been considered adequate since the middle of the 19th century.

While reading a certain amount of writing is as crucial as it has ever been in industrial societies, it is doubtful whether a fully extended grasp of either is as necessary as it was 30 or 40 years ago. While print retains much of its authority as a source of topical information, television has increasingly usurped this role. The ability to write fluent letters has been undermined by the telephone and research suggests that for many people the only use for writing, outside formal education, is the compilation of shopping lists.

The decision of some car manufacturers to issue their instructions to mechanics as a video pack rather than as a handbook might be taken to spell the end of any automatic link between industrialisation and literacy. On the other hand, it is also the case that ever-increasing numbers of people make their living out of writing, which is better rewarded than ever before. Schools are generally seen as institutions where the book rules – film, television and recorded sound have almost no place; but it is not clear that this opposition is appropriate. While you may not need to read and write to watch television, you certainly need to be able to read and write in order to make programmes.

Those who work in the new media are anything but illiterate. The traditional oppositions between old and new media are inadequate for understanding the world which a young child now encounters. The computer has re-established a central place for the written word on the

screen, which used to be entirely devoted to the image. There is even anecdotal evidence that children are mastering reading and writing in order to get on to the Internet. There is no reason why the new and old media cannot be integrated in schools to provide the skills to become economically productive and politically enfranchised.

Nevertheless, there is a crisis in literacy and it would be foolish to ignore it. To understand that literacy may be declining because it is less central to some aspects of everyday life is not the same as acquiescing in this state of affairs. The production of school work with the new technologies could be a significant stimulus to literacy. How should these new technologies be introduced into the schools? It isn't enough to call for computers, camcorders and edit suites in every classroom; unless they are properly integrated into the educational culture, they will stand unused. Evidence suggests that this is the fate of most information technology used in the classroom. Similarly, although media studies are now part of the national curriculum, and more and more students are now clamouring to take these course, teachers remain uncertain about both methods and aims in this area.

This is not the fault of the teachers. The entertainment and information industries must be drawn into a debate with the educational institutions to determine how best to blend these new technologies into the classroom.

Many people in our era are drawn to the pessimistic view that the new media are destroying old skills and eroding critical judgement. It may be true that past generations were more literate but - taking the pre-19th century meaning of the term - this was true of only a small section of the population. The word literacy is a 19th-century coinage to describe the divorce of reading and writing from a full knowledge of literature. The education reforms of the 19th century produced reading and writing as skills separable from full participation in the cultural heritage.

The new media now point not only to a futuristic cyber-economy, they also make our cultural past available to the whole nation. Most children's access to these treasures is initially through television. It is doubtful whether our literary heritage has ever been available to or sought out by more than about 5 per cent of the population; it has certainly not been available to more than 10 per cent. But the new media joined to the old, through the public service tradition of British broadcasting, now makes our literary tradition available to all.

PART 2 — QUESTIONS

Questions 14-17

Choose the appropriate letters A-D.

14 When discussing the debate on literacy in education, the writer notes that

- **A** ○ children cannot read and write as well as they used to.
- **B** ○ academic work has improved over the last 20 years.
- **C** ○ there is evidence that literacy is related to external factors.
- **D** ○ there are opposing arguments that are equally convincing.

15 In the 4th paragraph, the writer's main point is that

- **A** ○ the printed word is both gaining and losing power.
- **B** ○ all inventions bring disadvantages as well as benefits.
- **C** ○ those who work in manual jobs no longer need to read.
- **D** ○ the media offers the best careers for those who like writing.

16 According to the writer, the main problem that schools face today is

- **A** ○ how best to teach the skills of reading and writing.
- **B** ○ how best to incorporate technology into classroom teaching.
- **C** ○ finding the means to purchase technological equipment.
- **D** ○ managing the widely differing levels of literacy amongst pupils.

17 At the end of the article, the writer is suggesting that

- **A** ○ literature and culture cannot be divorced.
- **B** ○ the term 'literacy' has not been very useful.
- **C** ○ 10 per cent of the population never read literature.
- **D** ○ our exposure to cultural information is likely to increase.

Questions 18-23

Do the following statements agree with the views of the writer?

Write:

YES if the statement agrees with the writer

NO if the statement contradicts the writer

NOT GIVEN if it is impossible to say what the writer thinks about this

18 It is not as easy to analyse literacy levels as it used to be.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

19 Our literacy skills need to be as highly developed as they were in the past.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

20 Illiteracy is on the increase.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

21 Professional writers earn relatively more than they used to.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

22 A good literacy level is important for those who work in television.

- **A** ○ YES

B ○ NO

C ○ NOT GIVEN

23 Computers are having a negative impact on literacy in schools.

A ○ YES

B ○ NO

C ○ NOT GIVEN

Questions 24-26

Complete the sentences below with words taken from the reading passage. Use NO MORE THAN THREE WORDS for each answer.

- In Renaissance England, the best readers were those able to read **24** _____ .
- The writer uses the example of **25** _____ ...to illustrate the general fall in certain areas of literacy.
- It has been shown that after leaving school, the only things that a lot of people write are **26** _____ .

PASSAGE 3

You should spend about 20 minutes on Questions 27-40, which are based on Reading Passage 3 below.

The Revolutionary Bridges of Robert Maillart

Swiss engineer Robert Maillart built some of the greatest bridges of the 20th century. His designs elegantly solved a basic engineering problem: how to support enormous weights using a slender arch

27

A Just as railway bridges were the great structural symbols of the 19th century, highway bridges became the engineering emblems of the 20th century. The invention of the automobile created an irresistible demand for paved roads and vehicular bridges throughout the developed world. The type of bridge needed for cars and trucks, however, is fundamentally different from that needed for locomotives. Most highway bridges carry lighter loads than railway bridges do, and their roadways can be sharply curved or steeply sloping. To meet these needs, many turn-of-the-century bridge designers began working with a new building material: reinforced concrete, which has steel bars embedded in it. And the master of this new material was Swiss structural engineer, Robert Maillart.

28

B Early in his career, Maillart developed a unique method for designing bridges, buildings and other concrete structures. He rejected the complex mathematical analysis of loads and stresses that was being enthusiastically adopted by most of his contemporaries. At the same time, he also eschewed the decorative approach taken by many bridge builders of his time. He resisted imitating architectural styles and adding design elements solely for ornamentation. Maillart's method was a form of creative intuition. He had a knack for conceiving new shapes to solve classic engineering problems. And because he worked in a highly competitive field, one of his goals was economy – he won design and construction contracts because his structures were reasonably priced, often less costly than all his rivals' proposals.

29

C Maillart's first important bridge was built in the small Swiss town of Zuoz. The local officials had initially wanted a steel bridge to span the 30-metre wide Inn River, but Maillart argued that he could build a more elegant bridge made of reinforced concrete for about the same cost. His crucial innovation was incorporating the bridge's arch and roadway into a form called the hollow-box arch, which would substantially reduce the bridge's expense by minimising the amount of concrete needed. In a conventional arch bridge the weight of the roadway is transferred by columns to the arch, which must be relatively thick. In Maillart's design, though,

the roadway and arch were connected by three vertical walls, forming two hollow boxes running under the roadway (see diagram). The big advantage of this design was that because the arch would not have to bear the load alone, it could be much thinner - as little as one-third as thick as the arch in the conventional bridge.

30

D His first masterpiece, however, was the 1905 Tavanasa Bridge over the Rhine river in the Swiss Alps. In this design, Maillart removed the parts of the vertical walls which were not essential because they carried no load. This produced a slender, lighter-looking form, which perfectly met the bridge's structural requirements. But the Tavanasa Bridge gained little favourable publicity in Switzerland; on the contrary, it aroused strong aesthetic objections from public officials who were more comfortable with old-fashioned stone-faced bridges. Maillart, who had founded his own construction firm in 1902, was unable to win any more bridge projects, so he shifted his focus to designing buildings, water tanks and other structures made of reinforced concrete and did not resume his work on concrete bridges until the early 1920s.

31

E His most important breakthrough during this period was the development of the deck-stiffened arch, the first example of which was the Flienglibach Bridge, built in 1923. An arch bridge is somewhat like an inverted cable. A cable curves downward when a weight is hung from it, an arch bridge curves upward to support the roadway and the compression in the arch balances the dead load of the traffic. For aesthetic reasons, Maillart wanted a thinner arch and his solution was to connect the arch to the roadway with transverse walls. In this way, Maillart justified making the arch as thin as he could reasonably build it. His analysis accurately predicted the behaviour of the bridge but the leading authorities of Swiss engineering would argue against his methods for the next quarter of a century.

32

F Over the next 10 years, Maillart concentrated on refining the visual appearance of the deck-stiffened arch. His best-known structure is the Salginatobel Bridge, completed in 1930. He won the competition for the contract because his design was the least expensive of the 19 submitted - the bridge and road were built for only 700,000 Swiss francs, equivalent to some $3.5 million today. Salginatobel was also Maillart's longest span, at 90 metres and it had the most dramatic setting of all his structures, vaulting 80 metres above the ravine of the Salgina brook. In 1991 it became the first concrete bridge to be designated an international historic landmark.

33

G Before his death in 1940, Maillart completed other remarkable bridges and continued to refine his designs. However, architects often recognised the high quality of Maillart's structures

before his fellow engineers did and in 1947 the architectural section of the Museum of Modern Art in New York City devoted a major exhibition entirely to his works. In contrast, very few American structural engineers at that time had even heard of Maillart. In the following years, however, engineers realised that Maillart's bridges were more than just aesthetically pleasing - they were technically unsurpassed. Maillart's hollow-box arch became the dominant design form for medium and long-span concrete bridges in the US. In Switzerland, professors finally began to teach Maillart's ideas, which then influenced a new generation of designers.

PART 3 — QUESTIONS

Questions 27-33

The passage has seven paragraphs A–G.

From the list of headings below choose the most suitable heading for each paragraph.

i. **The long-term impact**

ii. **A celebrated achievement**

iii. **Early brilliance passes unrecognised**

iv. **Outdated methods retain popularity**

v. **The basis of a new design is born**

vi. **Frustration at never getting the design right**

vii. **Further refinements meet persistent objections**

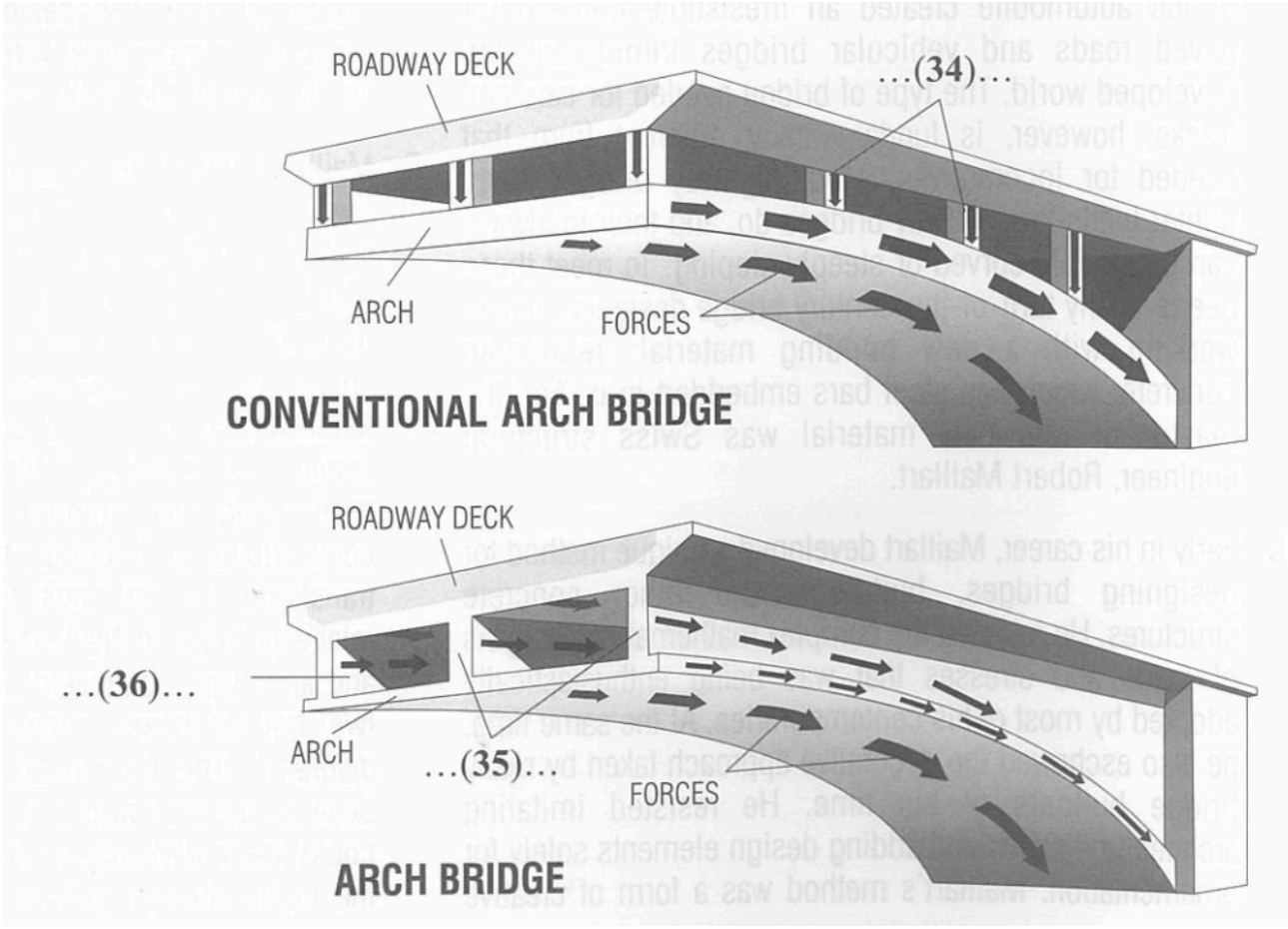
viii. **Different in all respects**

ix. **Bridge-makers look elsewhere**

x. **Transport developments spark a major change**

Questions 34-36

Complete the labels on the diagrams below using ONE or TWO WORDS from the reading passage.



34 _____

35 _____

36 _____

Questions 37-40

Complete each of the following statements with the best ending (A–G) from the box below.

• Maillart designed the hollow-box arch in order to 37 _____

• Following the construction of the Tavanasa Bridge, Maillart failed to 38 _____

• The transverse walls of the Flienglibach Bridge allowed Maillart to 39 _____

• Of all his bridges, the Salginatobel enabled Maillart to 40 _____

A. **prove that local people were wrong.**

B. **find work in Switzerland.**

C. **win more building commissions.**

D. **reduce the amount of raw material required.**

E. **recognise his technical skills.**

F. **capitalise on the spectacular terrain.**

G. **improve the appearance of his bridges.**

Answer Key

#	Answer	Explanation
1	**scientists**	Only in the past century or two has it become possible to make a living from investigating the workings of nature. Modern science was, in other words, built on the work of amateurs
2	**science**	Today, science is an increasingly specialised and compartmentalised subject, the domain of experts who know more and more about less and less
3	**fields**	A recent poll carried out at a meeting of the American Association for the Advancement of Science by astronomer Dr Richard Fienberg found that, in addition to his field of astronomy, amateurs are actively involved in such fields as acoustics, horticulture, ornithology, meteorology, hydrology and palaeontology
4	**co-operation / collaboration**	some of whom rely heavily on their co-operation
5	**observations**	Amateur observers are helpful, says Dr Fienberg, because there are so many of them (they far outnumber professionals) and because they are distributed all over the world. This makes special kinds of observations possible: if several observers around the world accurately record the time when a star is eclipsed by an asteroid, for example, it is possible to derive useful information about the asteroid's shape
6	**dinosaurs**	Finding volunteers to look for fossils is not difficult, he says, because of the near-universal interest in anything to do with dinosaurs
7	**conservation programme**	prompting a habitat conservation programme
8	**acknowledge**	A more serious problem is the question of how professionals can best acknowledge the contributions made by amateurs Provided amateurs and professionals agree the terms on which they will work together beforehand, there is no reason why co-operation between the two groups should not flourish
9	**B**	As well as helping with this research, volunteers learn about science, a process he calls 'recreational education'
10	**A**	And some kinds of research can be dangerous; most amateur chemists, jokes Dr Fienberg, are either locked up or have blown themselves to bits

#	Answer	Explanation
11	**D**	He says that one of the main benefits of the prize is the endorsement it has given to the contributions of amateur scientists, which has done much to silence critics among those professionals who believe science should remain their exclusive preserve
12	**B**	Despite the development of high-tech equipment, he says, the best sensors for finding fossils are human eyes – lots of them
13	**C**	Not everyone, for example is happy with the term 'amateur'. Mr Bonney has coined the term 'citizen scientist' because he felt that other words, such as 'volunteer' sounded disparaging
14	**C**	These studies argue that literacy can only be understood in its social and technical context
15	**A**	While reading a certain amount of writing is as crucial as it has ever been in industrial societies, it is doubtful whether a fully extended grasp of either is as necessary as it was 30 or 40 years ago. While print retains much of its authority as a source of topical information, television has increasingly usurped this role. The ability to write fluent letters has been undermined by the telephone and research suggests that for many people the only use for writing, outside formal education, is the compilation of shopping lists. The decision of some car manufacturers to issue their instructions to mechanics as a video pack rather than as a handbook might be taken to spell the end of any automatic link between industrialisation and literacy On the other hand, it is also the case that ever-increasing numbers of people make their living out of writing, which is better rewarded than ever before. Schools are generally seen as institutions where the book rules – film, television and recorded sound have almost no place; but it is not clear that this opposition is appropriate. While you may not need to read and write to watch television, you certainly need to be able to read and write in order to make programmes
16	**B**	Nevertheless, there is a crisis in literacy and it would be foolish to ignore it. To understand that literacy may be declining because it is less central to some aspects of everyday life is not the same as acquiescing in this state of affairs. The production of school work with the new technologies could be a significant stimulus to literacy. How should these new technologies be introduced into the schools? It isn't enough to call for computers, camcorders and edit suites in every classroom; unless they are properly integrated into the educational culture, they will stand unused. Evidence suggests that this is the fate of most information technology used in the classroom. Similarly, although media studies are now part of the national curriculum, and more and more students are now clamouring to take these course, teachers

#	Answer	Explanation
		remain uncertain about both methods and aims in this area. This is not the fault of the teachers. The entertainment and information industries must be drawn into a debate with the educational institutions to determine how best to blend these new technologies into the classroom
17	**D**	The new media now point not only to a futuristic cyber-economy, they also make our cultural past available to the whole nation. Most children's access to these treasures is initially through television. It is doubtful whether our literary heritage has ever been available to or sought out by more than about 5 per cent of the population; it has certainly not been available to more than 10 per cent. But the new media joined to the old, through the public service tradition of British broadcasting, now makes our literary tradition available to all
18	**YES**	But the picture is not uniform and doesn't readily demonstrate the simple distinction between literate and illiterate which had been considered adequate since the middle of the 19th century
19	**NO**	it is doubtful whether a fully extended grasp of either is as necessary as it was 30 or 40 years ago
20	**NOT GIVEN**	There does seem to be evidence that there has been an overall decline in some aspects of reading and writing – you only need to compare the tabloid newspapers of today with those of 50 years ago to see a clear decrease in vocabulary and simplification of syntax. But the picture is not uniform and doesn't readily demonstrate the simple distinction between literate and illiterate which had been considered adequate since the middle of the 19th century
21	**YES**	On the other hand, it is also the case that ever-increasing numbers of people make their living out of writing, which is better rewarded than ever before
22	**YES**	While you may not need to read and write to watch television, you certainly need to be able to read and write in order to make programmes
23	**NO**	The computer has re-established a central place for the written word on the screen, which used to be entirely devoted to the image. There is even anecdotal evidence that children are mastering reading and writing in order to get on to the Internet The production of school work with the new technologies could be a significant stimulus to literacy

#	Answer	Explanation
24	**manuscript**	In Renaissance England, for example, many more people could read than could write, and within reading there was a distinction between those who could read print and those who could manage the more difficult task of reading manuscript
25	**newspapers / tabloid newspapers**	you only need to compare the tabloid newspapers of today with those of 50 years ago to see a clear decrease in vocabulary and simplification of syntax
26	**shopping lists**	research suggests that for many people the only use for writing, outside formal education, is the compilation of shopping lists
27	**x**	The invention of the automobile created an irresistible demand for paved roads and vehicular bridges throughout the developed world. The type of bridge needed for cars and trucks, however, is fundamentally different from that needed for locomotives
28	**viii**	He rejected the complex mathematical analysis of loads and stresses that was being enthusiastically adopted by most of his contemporaries. At the same time, he also eschewed the decorative approach taken by many bridge builders of his time
29	**v**	His crucial innovation was incorporating the bridge's arch and roadway into a form called the hollow-box arch, which would substantially reduce the bridge's expense by minimising the amount of concrete needed
30	**iii**	His first masterpiece, however, was the 1905 Tavanasa Bridge over the Rhine river in the Swiss Alps But the Tavanasa Bridge gained little favourable publicity in Switzerland; on the contrary, it aroused strong aesthetic objections from public officials who were more comfortable with old-fashioned stone-faced bridges. Maillart, who had founded his own construction firm in 1902, was unable to win any more bridge projects, so he shifted his focus to designing buildings, water tanks and other structures made of reinforced concrete and did not resume his work on concrete bridges until the early 1920s
31	**vii**	His most important breakthrough during this period was the development of the deck-stiffened arch, the first example of which was the Flienglibach Bridge, built in 1923 For aesthetic reasons, Maillart wanted a thinner arch and his solution was to connect the arch to the roadway with transverse walls His analysis accurately predicted the behaviour of the bridge but the leading authorities of Swiss engineering would argue against his methods for the next quarter of a century
32	**ii**	His best-known structure is the Salginatobel Bridge, completed in 1930 In 1991 it became the first concrete bridge to be designated an international historic landmark

#	Answer	Explanation
33	**i**	Maillart's hollow-box arch became the dominant design form for medium and long-span concrete bridges in the US. In Switzerland, professors finally began to teach Maillart's ideas, which then influenced a new generation of designers
34	**columns**	In a conventional arch bridge the weight of the roadway is transferred by columns to the arch, which must be relatively thick
35	**vertical walls**	In Maillart's design, though, the roadway and arch were connected by three vertical walls, forming two hollow boxes running under the roadway (see diagram)
36	**hollow boxes**	In Maillart's design, though, the roadway and arch were connected by three vertical walls, forming two hollow boxes running under the roadway (see diagram)
37	**D**	His crucial innovation was incorporating the bridge's arch and roadway into a form called the hollow-box arch, which would substantially reduce the bridge's expense by minimising the amount of concrete needed
38	**C**	But the Tavanasa Bridge gained little favourable publicity in Switzerland; on the contrary, it aroused strong aesthetic objections from public officials who were more comfortable with old-fashioned stone-faced bridges. Maillart, who had founded his own construction firm in 1902, was unable to win any more bridge projects, so he shifted his focus to designing buildings, water tanks and other structures made of reinforced concrete and did not resume his work on concrete bridges until the early 1920s
39	**G**	For aesthetic reasons, Maillart wanted a thinner arch and his solution was to connect the arch to the roadway with transverse walls
40	**F**	Salginatobel was also Maillart's longest span, at 90 metres and it had the most dramatic setting of all his structures, vaulting 80 metres above the ravine of the Salgina brook

Test 82

PASSAGE 1

You should spend about 20 minutes on Questions 1–13 which are based on Reading Passage 1 below.

Tackling Obesity in the Western World

1

A Obesity is a huge problem in many Western countries and one which now attracts considerable medical interest as researchers take up the challenge to find a 'cure' for the common condition of being seriously overweight. However, rather than take responsibility for their weight, obese people have often sought solace in the excuse that they have a slow metabolism, a genetic hiccup which sentences more than half the Australian population (63% of men and 47% of women) to a life of battling with their weight. The argument goes like this: it doesn't matter how little they eat, they gain weight because their bodies break down food and turn it into energy more slowly than those with a so-called normal metabolic rate.

2

B 'This is nonsense,' says Dr Susan Jebb from the Dunn Nutrition Unit at Cambridge in England. Despite the persistence of this metabolism myth, science has known for several years that the exact opposite is in fact true. Fat people have faster metabolisms than thin people. 'What is very clear,' says Dr Jebb, 'is that overweight people actually burn off more energy. They have more cells, bigger hearts, bigger lungs and they all need more energy just to keep going.'

3

C It took only one night, spent in a sealed room at the Dunn Unit to disabuse one of their patients of the beliefs of a lifetime: her metabolism was fast, not slow. By sealing the room and measuring the exact amount of oxygen she used, researchers were able to show her that her metabolism was not the culprit. It wasn't the answer she expected and probably not the one she wanted but she took the news philosophically.

4

D Although the metabolism myth has been completely disproved, science has far from discounted our genes as responsible for making us whatever weight we are, fat or thin. One of the world's leading obesity researchers, geneticist Professor Stephen O'Rahilly, goes so far as to say we are on the threshold of a complete change in the way we view not only morbid

obesity, but also everyday overweight. Prof. O'Rahilly's groundbreaking work in Cambridge has proven that obesity can be caused by our genes. 'These people are not weak-willed, slothful or lazy,' says Prof. O'Rahilly, 'They have a medical condition due to a genetic defect and that causes them to be obese.'

5

E In Australia, the University of Sydney's Professor Ian Caterson says while major genetic defects may be rare, many people probably have minor genetic variations that combine to dictate weight and are responsible for things such as how much we eat, the amount of exercise we do and the amount of energy we need. When you add up all these little variations, the result is that some people are genetically predisposed to putting on weight. He says while the fast/slow metabolism debate may have been settled, that doesn't mean some other subtle change in the metabolism gene won't be found in overweight people. He is confident that science will, eventually, be able to 'cure' some forms of obesity but the only effective way for the vast majority of overweight and obese people to lose weight is a change of diet and an increase in exercise.

6

F Despite the $500 million a year Australians spend trying to lose weight and the $830 million it costs the community in health care, obesity is at epidemic proportions here, as it is in all Western nations. Until recently, research and treatment for obesity had concentrated on behaviour modification, drugs to decrease appetite and surgery. How the drugs worked was often not understood and many caused severe side effects and even death in some patients. Surgery for obesity has also claimed many lives.

7

G It has long been known that a part of the brain called the hypothalamus is responsible for regulating hunger, among other things. But it wasn't until 1994 that Professor Jeffery Friedman from Rockerfeller University in the US sent science in a new direction by studying an obese mouse. Prof. Friedman found that unlike its thin brothers, the fat mouse did not produce a hitherto unknown hormone called leptin. Manufactured by the fat cells, leptin acts as a messenger, sending signals to the hypothalamus to turn off the appetite. Previously, the fat cells were thought to be responsible simply for storing fat. Prof. Friedman gave the fat mouse leptin and it lost 30% of its body weight in two weeks.

8

H On the other side of the Atlantic, Prof. O'Rahilly read about this research with great excitement. For many months two blood samples had lain in the bottom of his freezer, taken from two extremely obese young cousins. He hired a doctor to develop a test for leptin in human blood, which eventually resulted in the discovery that neither of the children's blood

contained the hormone. When one cousin was given leptin, she lost a stone in weight and Prof. O'Rahilly made medical history. Here was the first proof that a genetic defect could cause obesity in humans. But leptin deficiency turned out to be an extremely rare condition and there is a lot more research to be done before the 'magic' cure for obesity is ever found.

PART 1 — QUESTIONS

Questions 1-8

Reading Passage 1 has seven paragraphs A-H.

From the list of headings below choose the most suitable heading for each paragraph.

Write the appropriate numbers (i-xi).

i. **Obesity in animals**

ii. **Hidden dangers**

iii. **Proof of the truth**

iv. **New perspective on the horizon**

v. **No known treatment**

vi. **Rodent research leads the way**

vii. **Expert explains energy requirements of obese people**

viii. **A very uncommon complaint**

ix. **Nature or nurture**

x. **Shifting the blame**

xi. **Lifestyle change required despite new findings**

Questions 9-13

Complete the summary using words from the box.

OBESITY

People with a problem often try to deny responsibility.

They do this by seeking to blame their **9** _____ for the fact that they are overweight and erroneously believe that they use **10** _____ energy than thin people to stay alive. However, recent research has shown that a **11** _____ problem can be responsible for obesity as some people seem programmed to **12** _____ more than others. The new research points to a shift from trying to

change people's **13** _____ to seeking an answer to the problem in the laboratory.

A. **weight** B. **mind** C. **metabolism** D. **less** E. **behaviour**

F. **exercise** G. **bodies** H. **more** I. **physical** J. **use** K. **sleep**

L. **exercise** M. **genetic** N. **consume** O. **mental**

PASSAGE 2

You should spend about 20 minutes on Questions 14–27 which are based on Reading Passage 2 below.

Wheel of Fortune

A Since moving pictures were invented a century ago, a new way of distributing entertainment to consumers has emerged about once every generation. Each such innovation has changed the industry irreversibly; each has been accompanied by a period of fear mixed with exhilaration. The arrival of digital technology, which translates music, pictures and text into the zeros and ones of computer language, marks one of those periods.

B This may sound familiar, because the digital revolution, and the explosion of choice that would go with it, has been heralded for some time. In 1992, John Malone, chief executive of TCI, an American cable giant, welcomed the '500-channel universe'. Digital television was about to deliver everything except pizzas to people's living rooms. When the entertainment companies tried out the technology, it worked fine – but not at a price that people were prepared to pay.

C Those 500 channels eventually arrived but via the Internet and the PC rather than through television. The digital revolution was starting to affect the entertainment business in unexpected ways. Eventually it will change every aspect of it, from the way cartoons are made to the way films are screened to the way people buy music. That much is clear. What nobody is sure of is how it will affect the economics of the business.

D New technologies always contain within them both threats and opportunities. They have the potential both to make the companies in the business a great deal richer, and to sweep them away. Old companies always fear new technology. Hollywood was hostile to television, television terrified by the VCR. Go back far enough, points out Hal Varian, an economist at the University of California at Berkeley, and you find publishers complaining that 'circulating libraries' would cannibalise their sales. Yet whenever a new technology has come in, it has made more money for existing entertainment companies. The proliferation of the means of distribution results, gratifyingly, in the proliferation of dollars, pounds, pesetas and the rest to pay for it.

E All the same, there is something in the old companies' fears. New technologies may not threaten their lives, but they usually change their role. Once television became widespread, film and radio stopped being the staple form of entertainment. Cable television has undermined the power of the broadcasters. And as power has shifted the movie studios, the radio companies and the television broadcasters have been swallowed up. These days, the grand old names of entertainment have more resonance than power. Paramount is part of Viacom, a cable company; Universal, part of Seagram, a drinks-and-entertainment company; MGM, once the roaring lion of Hollywood, has been reduced to a whisper because it is not part of one of the giants. And RCA, once the most important broadcasting company in the world, is now a recording label belonging to Bertelsmann, a large German entertainment company.

F Part of the reason why incumbents got pushed aside was that they did not see what was coming. But they also faced a tighter regulatory environment than the present one. In America, laws preventing television broadcasters from owning programme companies were repealed earlier this decade, allowing the creation of vertically integrated businesses. Greater freedom, combined with a sense of history, prompted the smarter companies in the entertainment business to re-invent themselves. They saw what happened to those of their predecessors who were stuck with one form of distribution. So, these days, the powers in the entertainment business are no longer movie studios, or television broadcasters, or publishers; all those businesses have become part of bigger businesses still, companies that can both create content and distribute it in a range of different ways.

G Out of all this, seven huge entertainment companies have emerged – Time Warner, Walt Disney, Bertelsmann, Viacom, News Corp, Seagram and Sony. They cover pretty well every bit of the entertainment business except pornography. Three are American, one is Australian, one Canadian, one German and one Japanese. 'What you are seeing', says Christopher Dixon, managing director of media research at PaineWebber, a stockbroker, 'is the creation of a global oligopoly. It happened to the oil and automotive businesses earlier this century; now it is happening to the entertainment business.' It remains to be seen whether the latest technology will weaken those great companies, or make them stronger than ever.

PART 2 — QUESTIONS

Questions 14-21

Reading Passage 2 has seven paragraphs A-G.

Which paragraph mentions the following?

Write the appropriate letters (A-G).

NB Some of the paragraphs will be used more than once.

	A	B	C	D	E	F	G
14 the contrasting effects that new technology can have on existing business	○	○	○	○	○	○	○
15 the fact that a total transformation is going to take place in the future in the delivery of all forms of entertainment	○	○	○	○	○	○	○
16 the confused feelings that people are known to have experienced in response to technological innovation	○	○	○	○	○	○	○
17 the fact that some companies have learnt from the mistakes of others	○	○	○	○	○	○	○
18 the high cost to the consumer of new ways of distributing entertainment	○	○	○	○	○	○	○
19 uncertainty regarding the financial impact of wider media access	○	○	○	○	○	○	○
20 the fact that some companies were the victims of strict government policy	○	○	○	○	○	○	○
21 the fact that the digital revolution could undermine the giant entertainment companies	○	○	○	○	○	○	○

Questions 22-25

The writer refers to various individuals and companies in the reading passage. Match the people or companies (A-E) with the points made about the introduction of new technology.

Write the appropriate letter (A-E).

A. John Malone

B. Hal Varian

C. MGM

D. Walt Disney

E. Christopher Dixon

	A	B	C	D	E
22 Historically, new forms of distributing entertainment have alarmed those well-established in the business.	○	○	○	○	○
23 The merger of entertainment companies follows a pattern evident in other industries.	○	○	○	○	○
24 Major entertainment bodies that have remained independent have lost their influence.	○	○	○	○	○
25 News of the most recent technological development was published some years ago.	○	○	○	○	○

Questions 26-27

Choose the appropriate letters A-D.

26 How does the writer put across his views on the digital revolution?

- **A** ○ by examining the forms of media that will be affected by it
- **B** ○ by analysing the way entertainment companies have reacted to it
- **C** ○ by giving a personal definition of technological innovation
- **D** ○ by drawing comparisons with other periods of technological innovation

27 Which of the following best summarises the writer's views in Reading Passage 2?

- **A** ○ The public should cease resisting the introduction of new technology.

B ○ Digital technology will increase profits in the entertainment business.

C ○ Entertainment companies should adapt to technological innovation.

D ○ Technological change only benefits big entertainment companies.

PASSAGE 3

You should spend about 20 minutes on Questions 28-40 which are based on Reading Passage 3 below.

Nurturing talent within the family

What do we mean by being 'talented' or 'gifted'? The most obvious way is to look at the work someone does and if they are capable of significant success, label them as talented. The purely quantitative route – 'percentage definition' – looks not at individuals, but at simple percentages, such as the top five per cent of the population, and labels them – by definition – as gifted. This definition has fallen from favour, eclipsed by the advent of IQ tests, favoured by luminaries such as Professor Hans Eysenck, where a series of written or verbal tests of general intelligence leads to a score of intelligence.

The IQ test has been eclipsed in turn. Most people studying intelligence and creativity in the new millennium now prefer a broader definition, using a multifaceted approach where talents in many areas are recognised rather than purely concentrating on academic achievement. If we are therefore assuming that talented, creative or gifted individuals may need to be assessed across a range of abilities, does this mean intelligence can run in families as a genetic or inherited tendency? Mental dysfunction – such as schizophrenia – can, so is an efficient mental capacity passed on from parent to child?

Animal experiments throw some light on this question, and on the whole area of whether it is genetics, the environment or a combination of the two that allows for intelligence and creative ability. Different strains of rats show great differences in intelligence or 'rat reasoning'. If these are brought up in normal conditions and then run through a maze to reach a food goal, the 'bright' strain make far fewer wrong turns that the 'dull' ones. But if the environment is made dull and boring the number of errors becomes equal. Return the rats to an exciting maze and the discrepancy returns as before – but is much smaller. In other words, a dull rat in a stimulating environment will almost do as well as a bright rat who is bored in a normal one. This principle applies to humans too – someone may be born with innate intelligence, but their environment probably has the final say over whether they become creative or even a genius.

Evidence now exists that most young children, if given enough opportunities and encouragement, are able to achieve significant and sustainable levels of academic or sporting prowess. Bright or creative children are often physically very active at the same time, and so may receive more parental attention as a result – almost by default – in order to ensure their safety. They may also talk earlier, and this, in turn, breeds parental interest. This can sometimes cause problems with other siblings who may feel jealous even though they themselves may be bright. Their creative talents may be undervalued and so never come to fruition. Two themes seem to run through famously creative families as a result. The first is that the parents were able to identify the talents of each child, and nurture and encourage these accordingly but in an even-handed manner. Individual differences were encouraged, and friendly sibling rivalry was not seen as a particular problem. If the father is, say, a famous actor, there is no undue pressure for his children to follow him onto the boards, but instead their chosen interests are

encouraged. There need not even by any obvious talent in such a family since there always needs to be someone who sets the family career in motion, as in the case of the Sheen acting dynasty.

Martin Sheen was the seventh of ten children born to a Spanish immigrant father and an Irish mother. Despite intense parental disapproval he turned his back on entrance exams to university and borrowed cash from a local priest to start a fledgling acting career. His acting successes in films such as Badlands and Apocalypse Now made him one of the most highly-regarded actors of the 1970s. Three sons – Emilio Estevez, Ramon Estevez and Charlie Sheen - have followed him into the profession as a consequence of being inspired by his motivation and enthusiasm.

A stream seems to run through creative families. Such children are not necessarily smothered with love by their parents. They feel loved and wanted, and are secure in their home, but are often more surrounded by an atmosphere of work and where following a calling appears to be important. They may see from their parents that it takes time and dedication to be master of a craft, and so are in less of a hurry to achieve for themselves once they start to work.

The generation of creativity is complex: it is a mixture of genetics, the environment, parental teaching and luck that determines how successful or talented family members are. This last point – luck – is often not mentioned where talent is concerned but plays an undoubted part. Mozart, considered by many to be the finest composer of all time, was lucky to be living in an age that encouraged the writing of music. He was brought up surrounded by it, his father was a musician who encouraged him to the point of giving up his job to promote his child genius, and he learnt musical composition with frightening speed – the speed of a genius. Mozart himself simply wanted to create the finest music ever written but did not necessarily view himself as a genius – he could write sublime music at will, and so often preferred to lead a hedonistic lifestyle that he found more exciting than writing music to order.

Albert Einstein and Bill Gates are two more examples of people whose talents have blossomed by virtue of the times they were living in. Einstein was a solitary, somewhat slow child who had affection at home but whose phenomenal intelligence emerged without any obvious parental input. This may have been partly due to the fact that at the start of the 20th Century a lot of the Newtonian laws of physics were being questioned, leaving a fertile ground for ideas such as his to be developed. Bill Gates may have had the creative vision to develop Microsoft, but without the new computer age dawning at the same time he may never have achieved the position on the world stage he now occupies.

PART 3 — QUESTIONS

Questions 28-29

Complete the notes, which show how the approaches to defining 'talent' have changed.

Choose ONE or TWO WORDS from the passage for each answer.

'percentage definition'

↓

28 _____

↓

29 _____

Questions 30-32

Which THREE of the following does the writer regard as a feature of creative families?

Write the appropriate letters A-F.

30 **31** **32** Which THREE of the following does the writer regard as a feature of creative families?

- **A** ☐ a higher than average level of parental affection
- **B** ☐ competition between brothers and sisters
- **C** ☐ parents who demonstrate vocational commitment
- **D** ☐ strong motivation to take exams and attend university
- **E** ☐ a patient approach to achieving success
- **F** ☐ the identification of the most talented child in the family

Questions 33-34

Choose the appropriate letters A-D.

33 The rat experiment was conducted to show that

A ◯ certain species of rat are more intelligent than others.

B ◯ intelligent rats are more motivated than 'dull' rats.

C ◯ a rat's surroundings can influence its behaviour.

D ◯ a boring environment has little impact on a 'bright' rat.

34 The writer cites the story of Martin Sheen to show that

A ◯ he was the first in a creative line.

B ◯ his parents did not have his creative flair.

C ◯ he became an actor without proper training.

D ◯ his sons were able to benefit from his talents.

Questions 35-39

Do the following statements agree with the claims of the writer in Reading Passage 3?

write

YES if the statement agrees with the writer's claims

NO if the statement contradicts the writer's claims

NOT GIVEN if it is impossible to say what the writer thinks about this

35 Intelligence tests have now been proved to be unreliable.

A ◯ YES

B ◯ NO

C ◯ NOT GIVEN

36 The brother or sister of a gifted older child may fail to fulfil their own potential.

A ◯ YES

B ◯ NO

C ◯ NOT GIVEN

37 The importance of luck in the genius equation tends to be ignored.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

38 Mozart was acutely aware of his own remarkable talent.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

39 Einstein and Gates would have achieved success in any era.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

Questions 40-40

From the list below choose the most suitable title for the whole of Reading Passage 3.

Write the appropriate letter A-D.

40 From the list below choose the most suitable title for the whole of Reading Passage 3.

- **A** ○ Geniuses in their time
- **B** ○ Education for the gifted
- **C** ○ Revising the definition of intelligence
- **D** ○ Nurturing talent within the family

Answer Key

#	Answer	Explanation
1	**x**	However, rather than take responsibility for their weight, obese people have often sought solace in the excuse that they have a slow metabolism, a genetic hiccup which sentences more than half the Australian population (63% of men and 47% of women) to a life of battling with their weight
2	**vii**	'What is very clear,' says Dr Jebb, 'is that overweight people actually burn off more energy. They have more cells, bigger hearts, bigger lungs and they all need more energy just to keep going.'
3	**iii**	By sealing the room and measuring the exact amount of oxygen she used, researchers were able to show her that her metabolism was not the culprit
4	**iv**	One of the world's leading obesity researchers, geneticist Professor Stephen O'Rahilly, goes so far as to say we are on the threshold of a complete change in the way we view not only morbid obesity, but also everyday overweight
5	**xi**	He is confident that science will, eventually, be able to 'cure' some forms of obesity but the only effective way for the vast majority of overweight and obese people to lose weight is a change of diet and an increase in exercise
6	**ii**	How the drugs worked was often not understood and many caused severe side effects and even death in some patients. Surgery for obesity has also claimed many lives
7	**vi**	But it wasn't until 1994 that Professor Jeffery Friedman from Rockerfeller University in the US sent science in a new direction by studying an obese mouse. Prof. Friedman found that unlike its thin brothers, the fat mouse did not produce a hitherto unknown hormone called leptin
8	**viii**	But leptin deficiency turned out to be an extremely rare condition and there is a lot more research to be done before the 'magic' cure for obesity is ever found
9	**C**	However, rather than take responsibility for their weight, obese people have often sought solace in the excuse that they have a slow metabolism, a genetic hiccup which sentences more than half the Australian population (63% of men and 47% of women) to a life of battling with their weight

#	Answer	Explanation
10	**D**	The argument goes like this: it doesn't matter how little they eat, they gain weight because their bodies break down food and turn it into energy more slowly than those with a so-called normal metabolic rate
11	**M**	Prof. O'Rahilly's groundbreaking work in Cambridge has proven that obesity can be caused by our genes. 'These people are not weak-willed, slothful or lazy,' says Prof. O'Rahilly, 'They have a medical condition due to a genetic defect and that causes them to be obese.'
12	**N**	many people probably have minor genetic variations that combine to dictate weight and are responsible for things such as how much we eat, the amount of exercise we do and the amount of energy we need
13	**E**	Until recently, research and treatment for obesity had concentrated on behaviour modification, drugs to decrease appetite and surgery
14	**D**	New technologies always contain within them both threats and opportunities. They have the potential both to make the companies in the business a great deal richer, and to sweep them away
15	**C**	Eventually it will change every aspect of it, from the way cartoons are made to the way films are screened to the way people buy music
16	**A**	Each such innovation has changed the industry irreversibly; each has been accompanied by a period of fear mixed with exhilaration
17	**F**	Greater freedom, combined with a sense of history, prompted the smarter companies in the entertainment business to re-invent themselves. They saw what happened to those of their predecessors who were stuck with one form of distribution
18	**B**	When the entertainment companies tried out the technology, it worked fine – but not at a price that people were prepared to pay
19	**C**	What nobody is sure of is how it will affect the economics of the business
20	**F**	Part of the reason why incumbents got pushed aside was that they did not see what was coming. But they also faced a tighter regulatory environment than the present one
21	**G**	It remains to be seen whether the latest technology will weaken those great companies, or make them stronger than ever

#	Answer	Explanation
22	**B**	Go back far enough, points out Hal Varian, an economist at the University of California at Berkeley, and you find publishers complaining that 'circulating libraries' would cannibalise their sales
23	**E**	'What you are seeing', says Christopher Dixon, managing director of media research at PaineWebber, a stockbroker, 'is the creation of a global oligopoly. It happened to the oil and automotive businesses earlier this century; now it is happening to the entertainment business.'
24	**C**	MGM, once the roaring lion of Hollywood, has been reduced to a whisper because it is not part of one of the giants
25	**A**	In 1992, John Malone, chief executive of TCI, an American cable giant, welcomed the '500-channel universe'. Digital television was about to deliver everything except pizzas to people's living rooms
26	**D**	Old companies always fear new technology. Hollywood was hostile to television, television terrified by the VCR. Go back far enough, points out Hal Varian, an economist at the University of California at Berkeley, and you find publishers complaining that 'circulating libraries' would cannibalise their sales
27	**C**	Greater freedom, combined with a sense of history, prompted the smarter companies in the entertainment business to re-invent themselves. They saw what happened to those of their predecessors who were stuck with one form of distribution
28	**IQ/intelligence/IQ tests/intelligence tests**	The purely quantitative route – 'percentage definition' – looks not at individuals, but at simple percentages, such as the top five per cent of the population, and labels them – by definition – as gifted. This definition has fallen from favour, eclipsed by the advent of IQ tests, favoured by luminaries such as Professor Hans Eysenck, where a series of written or verbal tests of general intelligence leads to a score of intelligence
29	**multi-faceted approach**	The IQ test has been eclipsed in turn. Most people studying intelligence and creativity in the new millennium now prefer a broader definition, using a multifaceted approach where talents in many areas are recognised rather than purely concentrating on academic achievement
30	**B / C / E**	friendly sibling rivalry was not seen as a particular problem but are often more surrounded by an atmosphere of work and where following a calling appears to be important. They may see from their parents that it takes time and dedication to be master of a craft, and so are in less of a hurry to achieve for themselves once they start to work

#	Answer	Explanation
31	**B / C / E**	friendly sibling rivalry was not seen as a particular problem but are often more surrounded by an atmosphere of work and where following a calling appears to be important. They may see from their parents that it takes time and dedication to be master of a craft, and so are in less of a hurry to achieve for themselves once they start to work
32	**B / C / E**	friendly sibling rivalry was not seen as a particular problem but are often more surrounded by an atmosphere of work and where following a calling appears to be important. They may see from their parents that it takes time and dedication to be master of a craft, and so are in less of a hurry to achieve for themselves once they start to work
33	**C**	If these are brought up in normal conditions and then run through a maze to reach a food goal, the 'bright' strain make far fewer wrong turns that the 'dull' ones. But if the environment is made dull and boring the number of errors becomes equal. Return the rats to an exciting maze and the discrepancy returns as before – but is much smaller. In other words, a dull rat in a stimulating environment will almost do as well as a bright rat who is bored in a normal one
34	**A**	There need not even by any obvious talent in such a family since there always needs to be someone who sets the family career in motion, as in the case of the Sheen acting dynasty
35	**NOT GIVEN**	The IQ test has been eclipsed in turn. Most people studying intelligence and creativity in the new millennium now prefer a broader definition, using a multifaceted approach where talents in many areas are recognised rather than purely concentrating on academic achievement
36	**YES**	This can sometimes cause problems with other siblings who may feel jealous even though they themselves may be bright. Their creative talents may be undervalued and so never come to fruition
37	**YES**	The generation of creativity is complex: it is a mixture of genetics, the environment, parental teaching and luck that determines how successful or talented family members are. This last point – luck – is often not mentioned where talent is concerned but plays an undoubted part
38	**NO**	Mozart himself simply wanted to create the finest music ever written but did not necessarily view himself as a genius – he could write sublime music at will, and so often preferred to lead a hedonistic lifestyle that he found more exciting than writing music to order

#	Answer	Explanation
39	**NO**	Albert Einstein and Bill Gates are two more examples of people whose talents have blossomed by virtue of the times they were living in. Einstein was a solitary, somewhat slow child who had affection at home but whose phenomenal intelligence emerged without any obvious parental input. This may have been partly due to the fact that at the start of the 20th Century a lot of the Newtonian laws of physics were being questioned, leaving a fertile ground for ideas such as his to be developed. Bill Gates may have had the creative vision to develop Microsoft, but without the new computer age dawning at the same time he may never have achieved the position on the world stage he now occupies
40	**D**	Nurturing talent within the family

Test 83

PASSAGE 1

You should spend about 20 minutes on Questions 1-13 which are based on Reading Passage 1 below.

Indoor Pollution

Since the early eighties we have been only too aware of the devastating effects of large-scale environmental pollution. Such pollution is generally the result of poor government planning in many developing nations or the short-sighted, selfish policies of the already industrialised countries which encourage a minority of the world's population to squander the majority of its natural resources.

While events such as the deforestation of the Amazon jungle or the nuclear disaster in Chernobyl continue to receive high media exposure, as do acts of environmental sabotage, it must be remembered that not all pollution is on this grand scale. A large proportion of the world's pollution has its source much closer to home. The recent spillage of crude oil from an oil tanker accidentally discharging its cargo straight into Sydney Harbour not only caused serious damage to the harbour foreshores but also created severely toxic fumes which hung over the suburbs for days and left the angry residents wondering how such a disaster could have been allowed to happen.

Avoiding pollution can be a full-time job. Try not to inhale traffic fumes; keep away from chemical plants and building-sites; wear a mask when cycling. It is enough to make you want to stay at home. But that, according to a growing body of scientific evidence, would also be a bad idea. Research shows that levels of pollutants such as hazardous gases, particulate matter and other chemical 'nasties' are usually higher indoors than out, even in the most polluted cities. Since the average American spends 18 hours indoors for every hour outside, it looks as though many environmentalists may be attacking the wrong target.

The latest study, conducted by two environmental engineers, Richard Corsi and Cynthia Howard-Reed, of the University of Texas in Austin, and published in Environmental Science and Technology, suggests that it is the process of keeping clean that may be making indoor pollution worse. The researchers found that baths, showers, dishwashers and washing machines can all be significant sources of indoor pollution, because they extract trace amounts of chemicals from the water that they use and transfer them to the air.

Nearly all public water supplies contain very low concentrations of toxic chemicals, most of them left over from the otherwise beneficial process of chlorination. Dr. Corsi wondered whether they stay there when water is used, or whether they end up in the air that people breathe. The team conducted a series of experiments in which known quantities of five such chemicals were mixed with water and passed through a dishwasher, a washing machine, a shower head inside a shower stall or a tap in a bath, all inside a specially designed chamber.

The levels of chemicals in the effluent water and in the air extracted from the chamber were then measured to see how much of each chemical had been transferred from the water into the air.

The degree to which the most volatile elements could be removed from the water, a process known as chemical stripping, depended on a wide range of factors, including the volatility of the chemical, the temperature of the water and the surface area available for transfer. Dishwashers were found to be particularly effective: the high-temperature spray, splashing against the crockery and cutlery, results in a nasty plume of toxic chemicals that escapes when the door is opened at the end of the cycle.

In fact, in many cases, the degree of exposure to toxic chemicals in tap water by inhalation is comparable to the exposure that would result from drinking the stuff. This is significant because many people are so concerned about water-borne pollutants that they drink only bottled water, worldwide sales of which are forecast to reach $72 billion by next year. D. Corsi's results suggest that they are being exposed to such pollutants anyway simply by breathing at home.

The aim of such research is not, however, to encourage the use of gas masks when unloading the washing. Instead, it is to bring a sense of perspective to the debate about pollution. According to Dr Corsi, disproportionate effort is wasted campaigning against certain forms of outdoor pollution, when there is as much or more cause for concern indoors, right under people's noses.

Using gas cookers or burning candles, for example, both result in indoor levels of carbon monoxide and particulate matter that are just as high as those to be found outside, amid heavy traffic. Overcrowded classrooms whose ventilation systems were designed for smaller numbers of children frequently contain levels of carbon dioxide that would be regarded as unacceptable on board a submarine. 'New car smell' is the result of high levels of toxic chemicals, not cleanliness. Laser printers, computers, carpets and paints all contribute to the noxious indoor mix.

The implications of indoor pollution for health are unclear. But before worrying about the problems caused by large-scale industry, it makes sense to consider the small-scale pollution at home and welcome international debate about this. Scientists investigating indoor pollution will gather next month in Edinburgh at the Indoor Air conference to discuss the problem. Perhaps unwisely, the meeting is being held indoors.

PART 1 — QUESTIONS

Questions 1-6

Choose the appropriate letters A-D.

1 In the first paragraph, the writer argues that pollution

- **A** ○ has increased since the eighties.
- **B** ○ is at its worst in industrialised countries.
- **C** ○ results from poor relations between nations.
- **D** ○ is caused by human self-interest.

2 The Sydney Harbour oil spill was the result of a

- **A** ○ ship refuelling in the harbour.
- **B** ○ tanker pumping oil into the sea.
- **C** ○ collision between two oil tankers.
- **D** ○ deliberate act of sabotage.

3 In the 3rd paragraph the writer suggests that

- **A** ○ people should avoid working in cities.
- **B** ○ Americans spend too little time outdoors.
- **C** ○ hazardous gases are concentrated in industrial suburbs.
- **D** ○ there are several ways to avoid city pollution.

4 The Corsi research team hypothesised that

- **A** ○ toxic chemicals can pass from air to water.
- **B** ○ pollution is caused by dishwashers and baths.
- **C** ○ city water contains insufficient chlorine.
- **D** ○ household appliances are poorly designed.

5 As a result of their experiments, Dr Corsi's team found that

- **A** ○ dishwashers are very efficient machines.
- **B** ○ tap water is as polluted as bottled water.
- **C** ○ indoor pollution rivals outdoor pollution.
- **D** ○ gas masks are a useful protective device.

6 Regarding the dangers of pollution, the writer believes that

- **A** ○ there is a need for rational discussion.
- **B** ○ indoor pollution is a recent phenomenon.
- **C** ○ people should worry most about their work environment.
- **D** ○ industrial pollution causes specific diseases.

Questions 7-13

Reading Passage 1 describes a number of cause and effect relationships. Match each Cause in List A with its Effect in List B.

A. The focus of pollution moves to the home.

B. The levels of carbon monoxide rise.

C. The world's natural resources are unequally shared.

D. People demand an explanation.

E. Environmentalists look elsewhere for an explanation.

F. Chemicals are effectively stripped from the water.

G. A clean odour is produced.

H. Sales of bottled water increase.

I. The levels of carbon dioxide rise.

J. The chlorine content of drinking water increased.

	A	B	C	D	E	F	G	H	I	J
7 Industrialised nations use a lot of energy.	○	○	○	○	○	○	○	○	○	○
8 Oil spills into the sea.	○	○	○	○	○	○	○	○	○	○
9 The researchers publish their findings.	○	○	○	○	○	○	○	○	○	○
10 Water is brought to a high temperature.	○	○	○	○	○	○	○	○	○	○
11 People fear pollutants in tap water.	○	○	○	○	○	○	○	○	○	○
12 Air conditioning systems are inadequate.	○	○	○	○	○	○	○	○	○	○
13 Toxic chemicals are abundant in new cars.	○	○	○	○	○	○	○	○	○	○

PASSAGE 2

You should spend about 20 minutes on Questions 14–27 which are based on Reading Passage 2 below.

ROBOTS

Since the dawn of human ingenuity, people have devised ever more cunning tools to cope with work that is dangerous, boring, onerous, or just plain nasty. That compulsion has culminated in robotics – the science of conferring various human capabilities on machines

14

A The modern world is increasingly populated by quasi-intelligent gizmos whose presence we barely notice but whose creeping ubiquity has removed much human drudgery. Our factories hum to the rhythm of robot assembly arms. Our banking is done at automated teller terminals that thank us with rote politeness for the transaction. Our subway trains are controlled by tireless robo-drivers. Our mine shafts are dug by automated moles, and our nuclear accidents – such as those at Three Mile Island and Chernobyl – are cleaned up by robotic muckers fit to withstand radiation.

Such is the scope of uses envisioned by Karel Capek, the Czech playwright who coined the term 'robot' in 1920 (the word 'robota' means 'forced labor' in Czech). As progress accelerates, the experimental becomes the exploitable at record pace.

15

B Other innovations promise to extend the abilities of human operators. Thanks to the incessant miniaturisation of electronics and micro-mechanics, there are already robot systems that can perform some kinds of brain and bone surgery with submillimeter accuracy - far greater precision than highly skilled physicians can achieve with their hands alone. At the same time, techniques of long-distance control will keep people even farther from hazard. In 1994 a ten-foot-tall NASA robotic explorer called Dante, with video-camera eyes and with spiderlike legs, scrambled over the menacing rim of an Alaskan volcano while technicians 2,000 miles away in California watched the scene by satellite and controlled Dante's descent.

16

C But if robots are to reach the next stage of labour-saving utility, they will have to operate with less human supervision and be able to make at least a few decisions for themselves – goals that pose a formidable challenge. 'While we know how to tell a robot to handle a specific error,' says one expert, 'we can't yet give a robot enough common sense to reliably interact with a dynamic world.' Indeed the quest for true artificial intelligence (AI) has produced very mixed results. Despite a spasm of initial optimism in the 1960s and 1970s, when it appeared that transistor

circuits and microprocessors might be able to perform in the same way as the human brain by the 21st century, researchers lately have extended their forecasts by decades if not centuries.

17

D What they found, in attempting to model thought, is that the human brain's roughly one hundred billion neurons are much more talented – and human perception far more complicated - than previously imagined. They have built robots that can recognise the misalignment of a machine panel by a fraction of a millimeter in a controlled factory environment. But the human mind can glimpse a rapidly changing scene and immediately disregard the 98 per cent that is irrelevant, instantaneously focusing on the woodchuck at the side of a winding forest road or the single suspicious face in a tumultuous crowd. The most advanced computer systems on Earth can't approach that kind of ability, and neuroscientists still don't know quite how we do it.

18

E Nonetheless, as information theorists, neuroscientists, and computer experts pool their talents, they are finding ways to get some lifelike intelligence from robots. One method renounces the linear, logical structure of conventional electronic circuits in favour of the messy, ad hoc arrangement of a real brain's neurons. These 'neural networks' do not have to be programmed. They can ‘teach' themselves by a system of feedback signals that reinforce electrical pathways that produced correct responses and, conversely, wipe out connections that produced errors. Eventually the net wires itself into a system that can pronounce certain words or distinguish certain shapes.

19

F In other areas researchers are struggling to fashion a more natural relationship between people and robots in the expectation that some day machines will take on some tasks now done by humans in, say, nursing homes. This is particularly important in Japan, where the percentage of elderly citizens is rapidly increasing. So experiments at the Science University of Tokyo have created a 'face robot' – a life-size, soft plastic model of a female head with a video camera imbedded in the left eye – as a prototype. The researchers' goal is to create robots that people feel comfortable around. They are concentrating on the face because they believe facial expressions are the most important way to transfer emotional messages. We read those messages by interpreting expressions to decide whether a person is happy, frightened, angry, or nervous. Thus the Japanese robot is designed to detect emotions in the person it is 'looking at' by sensing changes in the spatial arrangement of the person's eyes, nose, eyebrows, and mouth. It compares those configurations with a database of standard facial expressions and guesses the emotion. The robot then uses an ensemble of tiny pressure pads to adjust its plastic face into an appropriate emotional response.

G Other labs are taking a different approach, one that doesn't try to mimic human intelligence or emotions. Just as computer design has moved away from one central mainframe in favour of myriad individual workstations – and single processors have been replaced by arrays of smaller

units that break a big problem into parts that are solved simultaneously – many experts are now investigating whether swarms of semi-smart robots can generate a collective intelligence that is greater than the sum of its parts. That's what beehives and ant colonies do, and several teams are betting that legions of mini-critters working together like an ant colony could be sent to explore the climate of planets or to inspect pipes in dangerous industrial situations.

PART 2 — QUESTIONS

Questions 14-19

Reading Passage 2 has seven paragraphs A-G.

From the list of headings below choose the most suitable heading for each paragraph.

i. **Some success has resulted from observing how the brain functions.**

ii. **Are we expecting too much from one robot?**

iii. **Scientists are examining the humanistic possibilities.**

iv. **There are judgements that robots cannot make.**

v. **Has the power of robots become too great?**

vi. **Human skills have been heightened with the help of robotics.**

vii. **There are some things we prefer the brain to control.**

viii. **Robots have quietly infiltrated our lives.**

ix. **Original predictions have been revised.**

x. **Another approach meets the same result.**

Questions 20-24

Do the following statements agree with the information given in Reading Passage 2?

write

YES if the statement agrees with the information

NO if the statement contradicts the information

NOT GIVEN if there is no information on this in the passage

20 Karel Capek successfully predicted our current uses for robots.

A ○ YES

B ○ NO

C ○ NOT GIVEN

21 Lives were saved by the NASA robot, Dante.

A ○ YES

B ○ NO

C ○ NOT GIVEN

22 Robots are able to make fine visual judgements.

A ○ YES

B ○ NO

C ○ NOT GIVEN

23 The internal workings of the brain can be replicated by robots.

A ○ YES

B ○ NO

C ○ NOT GIVEN

24 The Japanese have the most advanced robot systems.

A ○ YES

B ○ NO

C ○ NOT GIVEN

Questions 25-27

Complete the summary below with words taken from paragraph F.

Use NO MORE THAN THREE WORDS for each answer.

The prototype of the Japanese 'face robot' observes humans through a ... **25** _____ ... which is planted in its head. It then refers to a ... **26** _____ ... of typical 'looks' that the human face can have, to decide what emotion the person is feeling. To respond to this expression, the robot alters its own expression using a number of ... **27** _____ ... .

PASSAGE 3

You should spend about 20 minutes on Questions 28-40 which are based on Reading Passage 3 below.

SAVING LANGUAGE

For the first time, linguists have put a price on language. To save a language from extinction isn't cheap - but more and more people are arguing that the alternative is the death of communities

There is nothing unusual about a single language dying. Communities have come and gone throughout history, and with them their language. But what is happening today is extraordinary, judged by the standards of the past. It is language extinction on a massive scale. According to the best estimates, there are some 6,000 languages in the world. Of these, about half are going to die out in the course of the next century: that's 3,000 languages in 1,200 months. On average, there is a language dying out somewhere in the world every two weeks or so.

How do we know? In the course of the past two or three decades, linguists all over the world have been gathering comparative data. If they find a language with just a few speakers left, and nobody is bothering to pass the language on to the children, they conclude that language is bound to die out soon. And we have to draw the same conclusion if a language has less than 100 speakers. It is not likely to last very long. A 1999 survey shows that 97 per cent of the world's languages are spoken by just four per cent of the people.

It is too late to do anything to help many languages, where the speakers are too few or too old, and where the community is too busy just trying to survive to care about their language. But many languages are not in such a serious position. Often, where languages are seriously endangered, there are things that can be done to give new life to them. It is called revitalisation.

Once a community realises that its language is in danger, it can start to introduce measures which can genuinely revitalise. The community itself must want to save its language. The culture of which it is a part must need to have a respect for minority languages. There needs to be funding, to support courses, materials, and teachers. And there need to be linguists, to get on with the basic task of putting the language down on paper. That's the bottom line: getting the language documented – recorded, analysed, written down. People must be able to read and write if they and their language are to have a future in an increasingly computer-literate civilisation.

But can we save a few thousand languages, just like that? Yes, if the will and funding were available. It is not cheap, getting linguists into the field, training local analysts, supporting the community with language resources and teachers, compiling grammars and dictionaries, writing materials for use in schools. It takes time, lots of it, to revitalise an endangered language. Conditions vary so much that it is difficult to generalise, but a figure of $100,000 a year per language cannot be far from the truth. If we devoted that amount of effort over three years for each of 3,000 languages, we would be talking about some $900 million.

There are some famous cases which illustrate what can be done. Welsh, alone among the Celtic languages, is not only stopping its steady decline towards extinction but showing signs of real growth. Two Language Acts protect the status of Welsh now, and its presence is increasingly in evidence wherever you travel in Wales.

On the other side of the world, Maori in New Zealand has been maintained by a system of so-called 'language nests', first introduced in 1982. These are organisations which provide children under five with a domestic setting in which they are intensively exposed to the language. The staff are all Maori speakers from the local community. The hope is that the children will keep their Maori skills alive after leaving the nests, and that as they grow older they will in turn become role models to a new generation of young children. There are cases like this all over the world. And when the reviving language is associated with a degree of political autonomy, the growth can be especially striking, as shown by Faroese, spoken in the Faroe Islands, after the islanders received a measure of autonomy from Denmark.

In Switzerland, Romansch was facing a difficult situation, spoken in five very different dialects, with small and diminishing numbers, as young people left their community for work in the German-speaking cities. The solution here was the creation in the 1980s of a unified written language for all these dialects. Romansch Grischun, as it is now called, has official status in parts of Switzerland, and is being increasingly used in spoken form on radio and television.

A language can be brought back from the very brink of extinction. The Ainu language of Japan, after many years of neglect and repression, had reached a stage where there were only eight fluent speakers left, all elderly. However, new government policies brought fresh attitudes and a positive interest in survival. Several 'semi-speakers' - people who had become unwilling to speak Ainu because of the negative attitudes by Japanese speakers – were prompted to become active speakers again. There is fresh interest now and the language is more publicly available than it has been for years.

If good descriptions and materials are available, even extinct languages can be resurrected. Kaurna, from South Australia, is an example. This language had been extinct for about a century, but had been quite well documented. So, when a strong movement grew for its revival, it was possible to reconstruct it. The revised language is not the same as the original, of course. It lacks the range that the original had, and much of the old vocabulary. But it can nonetheless act as a badge of present-day identity for its people. And as long as people continue to value it as a true marker of their identity, and are prepared to keep using it, it will develop new functions and new vocabulary, as any other living language would do.

It is too soon to predict the future of these revived languages, but in some parts of the world they are attracting precisely the range of positive attitudes and grass roots support which are the preconditions for language survival. In such unexpected but heart-warming ways might we see the grand total of languages in the world minimally increased.

PART 3 — QUESTIONS

Questions 28-32

Do the following statements agree with the views of the writer in Reading Passage 3?

write

YES if the statement agrees with the writer's views

NO if the statement contradicts the writer's views

NOT GIVEN if it is impossible to say what the writer thinks about this

28 The rate at which languages are becoming extinct has increased.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

29 Research on the subject of language extinction began in the 1990s.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

30 In order to survive, a language needs to be spoken by more than 100 people.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

31 Certain parts of the world are more vulnerable than others to language extinction.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

32 Saving language should be the major concern of any small community whose language is under threat.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

Questions 33-35

The list below gives some of the factors that are necessary to assist the revitalisation of a language within a community.

33 **34** **35** Which THREE of the factors are mentioned by the writer of the text?

- **A** ☐ the existence of related languages
- **B** ☐ support from the indigenous population
- **C** ☐ books tracing the historical development of the language
- **D** ☐ on-the-spot help from language experts
- **E** ☐ a range of speakers of different ages
- **F** ☐ formal education procedures
- **G** ☐ a common purpose for which the language is required

Questions 36-40

Match the languages A-F with the statements below which describe how a language was saved.

A. Welsh

B. Maori

C. Faroese

D. Romansch

E. Ainu

F. Kaurna

	A	B	C	D	E	F
36 The region in which the language was spoken gained increased independence.	○	○	○	○	○	○
37 People were encouraged to view the language with less prejudice.	○	○	○	○	○	○
38 Language immersion programmes were set up for sectors of the population.	○	○	○	○	○	○
39 A merger of different varieties of the language took place.	○	○	○	○	○	○
40 Written samples of the language permitted its revitalisation.	○	○	○	○	○	○

Answer Key

#	Answer	Explanation
1	D	Such pollution is generally the result of poor government planning in many developing nations or the short-sighted, selfish policies of the already industrialised countries which encourage a minority of the world's population to squander the majority of its natural resources
2	B	The recent spillage of crude oil from an oil tanker accidentally discharging its cargo straight into Sydney Harbour
3	D	Try not to inhale traffic fumes; keep away from chemical plants and building-sites; wear a mask when cycling
4	B	Dr. Corsi wondered whether they stay there when water is used, or whether they end up in the air that people breathe. The team conducted a series of experiments in which known quantities of five such chemicals were mixed with water and passed through a dishwasher, a washing machine, a shower head inside a shower stall or a tap in a bath, all inside a specially designed chamber
5	C	Research shows that levels of pollutants such as hazardous gases, particulate matter and other chemical 'nasties' are usually higher indoors than out, even in the most polluted cities
6	A	The aim of such research is not, however, to encourage the use of gas masks when unloading the washing. Instead, it is to bring a sense of perspective to the debate about pollution. According to Dr Corsi, disproportionate effort is wasted campaigning against certain forms of outdoor pollution, when there is as much or more cause for concern indoors, right under people's noses
7	C	the short-sighted, selfish policies of the already industrialised countries which encourage a minority of the world's population to squander the majority of its natural resources
8	D	The recent spillage of crude oil from an oil tanker accidentally discharging its cargo straight into Sydney Harbour not only caused serious damage to the harbour foreshores but also created severely toxic fumes which hung over the suburbs for days and left the angry residents wondering how such a disaster could have been allowed to happen
9	A	The latest study, conducted by two environmental engineers, Richard Corsi and Cynthia Howard-Reed, of the University of Texas in Austin, and published in Environmental Science and

#	Answer	Explanation
		Technology, suggests that it is the process of keeping clean that may be making indoor pollution worse
10	**F**	The degree to which the most volatile elements could be removed from the water, a process known as chemical stripping, depended on a wide range of factors, including the volatility of the chemical, the temperature of the water and the surface area available for transfer. Dishwashers were found to be particularly effective: the high-temperature spray, splashing against the crockery and cutlery, results in a nasty plume of toxic chemicals that escapes when the door is opened at the end of the cycle
11	**H**	This is significant because many people are so concerned about water-borne pollutants that they drink only bottled water, worldwide sales of which are forecast to reach $72 billion by next year
12	**I**	Overcrowded classrooms whose ventilation systems were designed for smaller numbers of children frequently contain levels of carbon dioxide that would be regarded as unacceptable on board a submarine
13	**G**	‘New car smell’ is the result of high levels of toxic chemicals, not cleanliness
14	**viii**	The modern world is increasingly populated by quasi-intelligent gizmos whose presence we barely notice but whose creeping ubiquity has removed much human drudgery. Our factories hum to the rhythm of robot assembly arms. Our banking is done at automated teller terminals that thank us with rote politeness for the transaction. Our subway trains are controlled by tireless robo-drivers. Our mine shafts are dug by automated moles, and our nuclear accidents – such as those at Three Mile Island and Chernobyl – are cleaned up by robotic muckers fit to withstand radiation
15	**vi**	Thanks to the incessant miniaturisation of electronics and micro-mechanics, there are already robot systems that can perform some kinds of brain and bone surgery with submillimeter accuracy – far greater precision than highly skilled physicians can achieve with their hands alone. At the same time, techniques of long-distance control will keep people even farther from hazard
16	**ix**	Despite a spasm of initial optimism in the 1960s and 1970s, when it appeared that transistor circuits and microprocessors might be able to perform in the same way as the human brain by the 21st century, researchers lately have extended their forecasts by decades if not centuries
17	**iv**	What they found, in attempting to model thought, is that the human brain’s roughly one hundred billion neurons are much

#	Answer	Explanation
		more talented – and human perception far more complicated – than previously imagined. They have built robots that can recognise the misalignment of a machine panel by a fraction of a millimeter in a controlled factory environment. But the human mind can glimpse a rapidly changing scene and immediately disregard the 98 per cent that is irrelevant, instantaneously focusing on the woodchuck at the side of a winding forest road or the single suspicious face in a tumultuous crowd. The most advanced computer systems on Earth can't approach that kind of ability, and neuroscientists still don't know quite how we do it
18	**i**	One method renounces the linear, logical structure of conventional electronic circuits in favour of the messy, ad hoc arrangement of a real brain's neurons. These 'neural networks' do not have to be programmed. They can 'teach' themselves by a system of feedback signals that reinforce electrical pathways that produced correct responses and, conversely, wipe out connections that produced errors. Eventually the net wires itself into a system that can pronounce certain words or distinguish certain shapes
19	**iii**	In other areas researchers are struggling to fashion a more natural relationship between people and robots in the expectation that some day machines will take on some tasks now done by humans in, say, nursing homes. The researchers' goal is to create robots that people feel comfortable around
20	**YES**	Our factories hum to the rhythm of robot assembly arms. Our banking is done at automated teller terminals that thank us with rote politeness for the transaction. Our subway trains are controlled by tireless robo-drivers. Our mine shafts are dug by automated moles, and our nuclear accidents – such as those at Three Mile Island and Chernobyl – are cleaned up by robotic muckers fit to withstand radiation. Such is the scope of uses envisioned by Karel Capek, the Czech playwright who coined the term 'robot' in 1920 (the word 'robota' means 'forced labor' in Czech)
21	**NOT GIVEN**	In 1994 a ten-foot-tall NASA robotic explorer called Dante, with video-camera eyes and with spiderlike legs, scrambled over the menacing rim of an Alaskan volcano while technicians 2,000 miles away in California watched the scene by satellite and controlled Dante's descent
22	**YES**	They have built robots that can recognise the misalignment of a machine panel by a fraction of a millimeter in a controlled factory environment
23	**NO**	What they found, in attempting to model thought, is that the human brain's roughly one hundred billion neurons are much

#	Answer	Explanation
		more talented – and human perception far more complicated – than previously imagined The most advanced computer systems on Earth can't approach that kind of ability, and neuroscientists still don't know quite how we do it
24	**NOT GIVEN**	This is particularly important in Japan, where the percentage of elderly citizens is rapidly increasing. So experiments at the Science University of Tokyo have created a 'face robot' – a life-size, soft plastic model of a female head with a video camera imbedded in the left eye – as a prototype
25	**video camera**	a life-size, soft plastic model of a female head with a video camera imbedded in the left eye – as a prototype
26	**database**	It compares those configurations with a database of standard facial expressions and guesses the emotion
27	**(tiny/small) pressure pads**	The robot then uses an ensemble of tiny pressure pads to adjust its plastic face into an appropriate emotional response
28	**YES**	But what is happening today is extraordinary, judged by the standards of the past. It is language extinction on a massive scale
29	**NO**	In the course of the past two or three decades, linguists all over the world have been gathering comparative data
30	**YES**	And we have to draw the same conclusion if a language has less than 100 speakers. It is not likely to last very long
31	**NOT GIVEN**	What is happening today is extraordinary, judged by the standards of the past. It is language extinction on a massive scale. According to the best estimates, there are some 6,000 languages in the world. Of these, about half are going to die out in the course of the next century: that's 3,000 languages in 1,200 months. On average, there is a language dying out somewhere in the world every two weeks or so
32	**NO**	where the community is too busy just trying to survive to care about their language
33	**B / D / F**	The community itself must want to save its language. The culture of which it is a part must need to have a respect for minority languages. There needs to be funding, to support courses, materials, and teachers. And there need to be linguists, to get on with the basic task of putting the language down on paper
34	**B / D / F**	The community itself must want to save its language. The culture of which it is a part must need to have a respect for minority languages. There needs to be funding, to support courses, materials, and teachers. And there need to be linguists, to get on with the basic task of putting the language down on paper

#	Answer	Explanation
35	**B / D / F**	The community itself must want to save its language. The culture of which it is a part must need to have a respect for minority languages. There needs to be funding, to support courses, materials, and teachers. And there need to be linguists, to get on with the basic task of putting the language down on paper
36	**C**	And when the reviving language is associated with a degree of political autonomy, the growth can be especially striking, as shown by Faroese, spoken in the Faroe Islands, after the islanders received a measure of autonomy from Denmark
37	**E**	The Ainu language of Japan, after many years of neglect and repression, had reached a stage where there were only eight fluent speakers left, all elderly. However, new government policies brought fresh attitudes and a positive interest in survival. Several 'semi-speakers' – people who had become unwilling to speak Ainu because of the negative attitudes by Japanese speakers – were prompted to become active speakers again
38	**B**	On the other side of the world, Maori in New Zealand has been maintained by a system of so-called 'language nests', first introduced in 1982. These are organisations which provide children under five with a domestic setting in which they are intensively exposed to the language
39	**D**	In Switzerland, Romansch was facing a difficult situation, spoken in five very different dialects, with small and diminishing numbers, as young people left their community for work in the German-speaking cities. The solution here was the creation in the 1980s of a unified written language for all these dialects
40	**F**	If good descriptions and materials are available, even extinct languages can be resurrected. Kaurna, from South Australia, is an example. This language had been extinct for about a century, but had been quite well documented. So, when a strong movement grew for its revival, it was possible to reconstruct it

Test 84

PASSAGE 1

You should spend about 20 minutes on Questions 1–13 which are based on the Reading Passage below.

The Great Australian Fence

A war has been going on for almost a hundred years between the sheep farmers of Australia and the dingo, Australia's wild dog. To protect their livelihood, the farmers built a wire fence, 3,307 miles of continuous wire mesh, reaching from the coast of South Australia all the way to the cotton fields of eastern Queensland, just short of the Pacific Ocean.

The Fence is Australia's version of the Great Wall of China, but even longer, erected to keep out hostile invaders, in this case hordes of yellow dogs. The empire it preserves is that of the woolgrowers, sovereigns of the world's second largest sheep flock, after China's – some 123 million head – and keepers of a wool export business worth four billion dollars. Never mind that more and more people – conservationists, politicians, taxpayers and animal lovers – say that such a barrier would never be allowed today on ecological grounds. With sections of it almost a hundred years old, the dog fence has become, as conservationist Lindsay Fairweather ruefully admits, 'an icon of Australian frontier ingenuity'.

To appreciate this unusual outback monument and to meet the people whose livelihoods depend on it, I spent part of an Australian autumn travelling the wire. It's known by different names in different states: the Dog Fence in South Australia, the Border Fence in New South Wales and the Barrier Fence in Queensland. I would call it simply the Fence.

For most of its prodigious length, this epic fence winds like a river across a landscape that, unless a big rain has fallen, scarcely has rivers. The eccentric route, prescribed mostly by property lines, provides a sampler of outback topography: the Fence goes over sand dunes, past salt lakes, up and down rock-strewn hills, through dense scrub and across barren plains.

The Fence stays away from towns. Where it passes near a town, it has actually become a tourist attraction visited on bus tours. It marks the traditional dividing line between cattle and sheep. Inside, where the dingoes are legally classified as vermin, they are shot, poisoned and trapped. Sheep and dingoes do not mix and the Fence sends that message mile after mile.

What is this creature that by itself threatens an entire industry, inflicting several millions of dollars of damage a year despite the presence of the world's most obsessive fence? Cousin to the coyote and the jackal, descended from the Asian wolf, Canis lupus dingo is an introduced species of wild dog. Skeletal remains indicate that the dingo was introduced to Australia more than 3,500 years ago probably with Asian seafarers who landed on the north coast. The adaptable dingo spread rapidly and in a short time became the top predator, killing off all its marsupial competitors. The dingo looks like a small wolf with a long nose, short pointed ears

and a bushy tail. Dingoes rarely bark; they yelp and howl. Standing about 22 inches at the shoulder - slightly taller than a coyote - the dingo is Australia's largest land carnivore.

The woolgrowers' war against dingoes, which is similar to the sheep ranchers' rage against coyotes in the US, started not long after the first European settlers disembarked in 1788, bringing with them a cargo of sheep. Dingoes officially became outlaws in 1830 when governments placed a bounty on their heads. Today bounties for problem dogs killing sheep inside the Fence can reach $500. As pioneers penetrated the interior with their flocks of sheep, fences replaced shepherds until, by the end of the 19th century, thousands of miles of barrier fencing crisscrossed the vast grazing lands.

'The dingo started out as a quiet observer,' writes Roland Breckwoldt, in A Very Elegant Animal: The Dingo, 'but soon came to represent everything that was dark and dangerous on the continent.' It is estimated that since sheep arrived in Australia, dingo numbers have increased a hundredfold. Though dingoes have been eradicated from parts of Australia, an educated guess puts the population at more than a million.

Eventually government officials and graziers agreed that one well-maintained fence, placed on the outer rim of sheep country and paid for by taxes levied on woolgrowers, should supplant the maze of private netting. By 1960, three states joined their barriers to form a single dog fence.

The intense private battles between woolgrowers and dingoes have usually served to define the Fence only in economic terms. It marks the difference between profit and loss. Yet the Fence casts a much broader ecological shadow for it has become a kind of terrestrial dam, deflecting the flow of animals inside and out. The ecological side effects appear most vividly at Sturt National Park. In 1845, explorer Charles Sturt led an expedition through these parts on a futile search for an inland sea. For Sturt and other early explorers, it was a rare event to see a kangaroo. Now they are ubiquitous for without a native predator the kangaroo population has exploded inside the Fence. Kangaroos are now cursed more than dingoes. They have become the rivals of sheep, competing for water and grass. In response state governments cull* more than three million kangaroos a year to keep Australia's national symbol from overrunning the pastoral lands. Park officials, who recognise that the fence is to blame, respond to the excess of kangaroos by saying 'The fence is there, and we have to live with it.'

*Cull = to kill animals to reduce their population.

PART 1 — QUESTIONS

Questions 1-4

Choose the appropriate letters A–D.

1 Why was the fence built?

- **A** ○ to separate the sheep from the cattle
- **B** ○ to stop the dingoes from being slaughtered by farmers
- **C** ○ to act as a boundary between properties
- **D** ○ to protect the Australian wool industry

2 On what point do the conservationists and politicians agree?

- **A** ○ Wool exports are vital to the economy.
- **B** ○ The fence poses a threat to the environment.
- **C** ○ The fence acts as a useful frontier between states.
- **D** ○ The number of dogs needs to be reduced.

3 Why did the author visit Australia?

- **A** ○ to study Australian farming methods
- **B** ○ to investigate how the fence was constructed
- **C** ○ because he was interested in life around the fence
- **D** ○ because he wanted to learn more about the wool industry

4 How does the author feel about the fence?

- **A** ○ impressed
- **B** ○ delighted
- **C** ○ shocked
- **D** ○ annoyed

Questions 5-11

Do the following statements agree with the information given in Reading Passage 1?

Write

YES if the statement agrees with the information

NO if the statement contradicts the information

NOT GIVEN if there is no information on this in the passage

5 The fence serves a different purpose in each state.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

6 The fence is only partially successful.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

7 The dingo is indigenous to Australia.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

8 Dingoes have flourished as a result of the sheep industry.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

9 Dingoes are known to attack humans.

- **A** ○ YES

B ○ NO

C ○ NOT GIVEN

10 Kangaroos have increased in number because of the fence.

A ○ YES

B ○ NO

C ○ NOT GIVEN

11 The author does not agree with the culling of kangaroos.

A ○ YES

B ○ NO

C ○ NOT GIVEN

Questions 12-13

Choose the appropriate letters A–D.

12 When did the authorities first acknowledge the dingo problem?

A ○ 1788

B ○ 1830

C ○ 1845

D ○ 1960

13 How do the park officials feel about the fence?

A ○ philosophical

B ○ angry

C ○ pleased

D ○ proud

PASSAGE 2

You should spend about 20 minutes on Questions 14–27 which are based on Reading Passage 2 below.

IT'S ECO-LOGICAL

Planning an eco-friendly holiday can be a minefield for the well-meaning traveller, says Steve Watkins. But help is now at hand

If there were awards for tourism phrases that have been hijacked, diluted and misused then 'ecotourism' would earn top prize. The term first surfaced in the early 1980s reflecting a surge in environmental awareness and a realisation by tour operators that many travellers wanted to believe their presence abroad would not have a negative impact. It rapidly became the hottest marketing tag a holiday could carry.

These days the ecotourism label is used to cover anything from a two-week tour living with remote Indonesian tribes, to a one-hour motorboat trip through an Australian gorge. In fact, any tour that involves cultural interaction, natural beauty spots, wildlife or a dash of soft adventure is likely to be included in the overflowing ecotourism folder. There is no doubt the original motives behind the movement were honourable attempts to provide a way for those who cared to make informed choices, but the lack of regulations and a standard industry definition left many travellers lost in an ecotourism jungle.

It is easier to understand why the ecotourism market has become so overcrowded when we look at its wider role in the world economy. According to World Tourism Organisation figures, ecotourism is worth US$20 billion a year and makes up one-fifth of all international tourism. Add to this an annual growth rate of around five per cent and the pressure for many operators, both in developed and developing countries, to jump on the accelerating bandwagon is compelling. Without any widely recognised accreditation system, the consumer has been left to investigate the credentials of an operator themselves. This is a time-consuming process and many travellers usually take an operator's claims at face value, only adding to the proliferation of fake ecotours.

However, there are several simple questions that will provide qualifying evidence of a company's commitment to minimise its impact on the environment and maximise the benefits to the tourism area's local community. For example, does the company use recycled or sustainable, locally harvested materials to build its tourist properties? Do they pay fair wages to all employees? Do they offer training to employees? It is common for city entrepreneurs to own tour companies in country areas, which can mean the money you pay ends up in the city rather than in the community being visited. By taking a little extra time to investigate the ecotourism options, it is not only possible to guide your custom to worthy operators but you will often find that the experience they offer is far more rewarding.

The ecotourism business is still very much in need of a shake-up and a standardised approach. There are a few organisations that have sprung up in the last ten years or so that endeavour to

educate travellers and operators about the benefits of responsible ecotourism. Founded in 1990, the Ecotourism Society (TES) is a non-profit organisation of travel industry, conservation and ecological professionals, which aims to make ecotourism a genuine tool for conservation and sustainable development. Helping to create inherent economic value in wilderness environments and threatened cultures has undoubtedly been one of the ecotourism movement's most notable achievements. TES organises an annual initiative to further aid development of the ecotourism industry. This year it is launching 'Your Travel Choice Makes a Difference', an educational campaign aimed at helping consumers understand the potential positive and negative impacts of their travel decisions. TES also offers guidance on the choice of ecotour and has established a register of approved ecotourism operators around the world.

A leading ecotourism operator in the United Kingdom is Tribes, which won the 1999 Tourism Concern and Independent Traveller's World 'Award for Most Responsible Tour Operator'. Amanda Marks, owner and director of Tribes, believes that the ecotourism industry still has some way to go to get its house in order. Until now, no ecotourism accreditation scheme has really worked, principally because there has been no systematic way of checking that accredited companies actually comply with the code of practice. Amanda believes that the most promising system is the recently re-launched Green Globe 21 scheme. The Green Globe 21 award is based on the sustainable development standards contained in Agenda 21 from the 1992 Earth Summit and was originally coordinated by the World Travel & Tourism Council (WTTC). The scheme is now an independent concern, though the WTTC still supports it. Until recently, tour companies became affiliates and could use the Green Globe logo merely on payment of an annual fee, hardly a suitable qualifying standard. However, in November 1999 Green Globe 21 introduced an annual, independent check on operators wishing to use the logo.

Miriam Cain, from the Green Globe 21 marketing development, explains that current and new affiliates will now have one year to ensure that their operations comply with Agenda 21 standards. If they fail the first inspection, they can only reapply once. The inspection process is not a cheap option, especially for large companies, but the benefits of having Green Globe status and the potential operational cost savings that complying with the standards can bring should be significant. 'We have joint ventures with organisations around the world, including Australia and the Caribbean, that will allow us to effectively check all affiliate operators,' says Miriam. The scheme also allows destination communities to become Green Globe 21 approved.

For a relatively new industry it is not surprising that ecotourism has undergone teething pains. However, there are signs that things are changing for the better. With a committed and unified approach by the travel industry, local communities, travellers and environmental experts could make ecotourism a tag to be proud of and trusted.

PART 2 — QUESTIONS

Questions 14-19

Do the following statements agree with the views of the writer in Reading Passage 2?

Write

YES if the statement agrees with the writer's views

NO if the statement contradicts the writer's views

NOT GIVEN if it is impossible to say what the writer thinks about this

14 The term 'ecotourism' has become an advertising gimmick.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

15 The intentions of those who coined the term 'ecotourism' were sincere.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

16 Ecotourism is growing at a faster rate than any other type of travel.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

17 It is surprising that so many tour organisations decided to become involved in ecotourism.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

18 Tourists have learnt to make investigations about tour operators before using them.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

19 Tourists have had bad experiences on ecotour holidays.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

Questions 20-22

According to the information given in the reading passage, which THREE of the following are true of the Ecotourism Society (TES)?

Write the appropriate letters A–F.

20 **21** **22** Which THREE of the following are true of the Ecotourism Society (TES)?

- **A** ☐ It has monitored the growth in ecotourism.
- **B** ☐ It involves a range of specialists in the field.
- **C** ☐ It has received public recognition for the role it performs.
- **D** ☐ It sets up regular ecotour promotions.
- **E** ☐ It offers information on ecotours at an international level.
- **F** ☐ It consults with people working in tourist destinations

Questions 23-24

According to the information given in the reading passage, which TWO of the following are true of the Green Globe 21 award?

Write the appropriate letters A–D.

23 **24** Which TWO of the following are true of the Green Globe 21 award?

A ☐ The scheme is self-regulating.

B ☐ Amanda Marks was recruited to develop the award.

C ☐ Prior to 1999 companies were not required to pay for membership.

D ☐ Both tour operators and tour sites can apply for affiliation.

E ☐ It intends to reduce the number of ecotour operators.

Questions 25-27

Using NO MORE THAN THREE WORDS, answer the following questions.

25 Which body provides information on global tourist numbers? _____

26 Who often gains financially from tourism in rural environments? _____

27 Which meeting provided the principles behind the Green Globe 21 regulations?

_____

PASSAGE 3

You should spend about 20 minutes on Questions 28–40 which are based on Reading Passage 3 below.

Striking the RIGHT NOTE

Is perfect pitch a rare talent possessed solely by the likes of Beethoven? Kathryn Brown discusses this much sought-after musical ability

The uncanny, if sometimes distracting, ability to name a solitary note out of the blue, without any other notes for reference, is a prized musical talent – and a scientific mystery. Musicians with perfect pitch – or, as many researchers prefer to call it, absolute pitch – can often play pieces by ear, and many can transcribe music brilliantly. That's because they perceive the position of a note in the musical stave – its pitch – as clearly as the fact that they heard it. Hearing and naming the pitch go hand in hand.

By contrast, most musicians follow not the notes, but the relationship between them. They may easily recognise two notes as being a certain number of tones apart, but could name the higher note as an E only if they are told the lower one is a C, for example. This is relative pitch. Useful, but much less mysterious.

For centuries, absolute pitch has been thought of as the preserve of the musical elite. Some estimates suggest that maybe fewer than 1 in 2,000 people possess it. But a growing number of studies, from speech experiments to brain scans, are now suggesting that a knack for absolute pitch may be far more common, and more varied, than previously thought. 'Absolute pitch is not an all or nothing feature,' says Marvin, a music theorist at the University of Rochester in New York state. Some researchers even claim that we could all develop the skill, regardless of our musical talent. And their work may finally settle a decades-old debate about whether absolute pitch depends on melodious genes – or early music lessons.

Music psychologist Diana Deutsch at the University of California in San Diego is the leading voice. Last month at the Acoustical Society of America meeting in Columbus, Ohio, Deutsch reported a study that suggests we all have the potential to acquire absolute pitch – and that speakers of tone languages use it every day. A third of the world's population - chiefly people in Asia and Africa - speak tone languages, in which a word's meaning can vary depending on the pitch a speaker uses.

Deutsch and her colleagues asked seven native Vietnamese speakers and 15 native Mandarin speakers to read out lists of words on different days. The chosen words spanned a range of pitches, to force the speakers to raise and lower their voices considerably. By recording these recited lists and taking the average pitch for each whole word, the researchers compared the pitches used by each person to say each word on different days.

Both groups showed strikingly consistent pitch for any given word – often less than a quarter-tone difference between days. 'The similarity,' Deutsch says, 'is mind-boggling.' It's also, she says, a real example of absolute pitch. As babies, the speakers learnt to associate certain

pitches with meaningful words - just as a musician labels one tone A and another B - and they demonstrate this precise use of pitch regardless of whether or not they have had any musical training, she adds.

Deutsch isn't the only researcher turning up everyday evidence of absolute pitch. At least three other experiments have found that people can launch into familiar songs at or very near the correct pitches. Some researchers have nicknamed this ability 'absolute memory', and they say it pops up on other senses, too. Given studies like these, the real mystery is why we don't all have absolute pitch, says cognitive psychologist Daniel Levitin of McGill University in Montreal.

Over the past decade, researchers have confirmed that absolute pitch often runs in families. Nelson Freimer of the University of California in San Francisco, for example, is just completing a study that he says strongly suggests the right genes help create this brand of musical genius. Freimer gave tone tests to people with absolute pitch and to their relatives. He also tested several hundred other people who had taken early music lessons. He found that relatives of people with absolute pitch were far more likely to develop the skill than people who simply had the music lessons. 'There is clearly a familial aggregation of absolute pitch,' Freimer says.

Freimer says some children are probably genetically predisposed toward absolute pitch – and this innate inclination blossoms during childhood music lessons. Indeed, many researchers now point to this harmony of nature and nurture to explain why musicians with absolute pitch show different levels of the talent.

Indeed, researchers are finding more and more evidence suggesting music lessons are critical to the development of absolute pitch. In a survey of 2,700 students in American music conservatories and college programmes, New York University geneticist Peter Gregersen and his colleagues found that a whopping 32 per cent of the Asian students reported having absolute pitch, compared with just 7 per cent of non-Asian students. While that might suggest a genetic tendency towards absolute pitch in the Asian population, Gregersen says that the type and timing of music lessons probably explains much of the difference.

For one thing, those with absolute pitch started lessons, on average, when they were five years old, while those without absolute pitch started around the age of eight. Moreover, adds Gregersen, the type of music lessons favoured in Asia, and by many of the Asian families in his study, such as the Suzuki method, often focus on playing by ear and learning the names of musical notes, while those more commonly used in the US tend to emphasise learning scales in a relative pitch way. In Japanese pre-school music programmes, he says, children often have to listen to notes played on a piano and hold up a coloured flag to signal the pitch. 'There's a distinct cultural difference,' he says.

Deutsch predicts that further studies will reveal absolute pitch – in its imperfect, latent form – inside all of us. The Western emphasis on relative pitch simply obscures it, she contends. 'It's very likely that scientists will end up concluding that we're all born with the potential to acquire very fine-grained absolute pitch. It's really just a matter of life getting in the way.'

PART 3 — QUESTIONS

Questions 28-35

Complete the notes below using words from the box.

NOTES

Research is being conducted into the mysterious musical **28** _____ some people possess known as perfect pitch. Musicians with this talent are able to name and sing a **29** _____ without reference to another and it is this that separates them from the majority who have only **30** _____ pitch. The research aims to find out whether this skill is the product of genetic inheritance or early exposure to **31** _____ or, as some researchers believe, a combination of both. One research team sought a link between perfect pitch and **32** _____ languages in order to explain the high number of Asian speakers with perfect pitch. Speakers of Vietnamese and Mandarin were asked to recite **33** _____ on different occasions and the results were then compared in terms of **34** _____ . A separate study found that the approach to teaching music in many Asian **35** _____ emphasised playing by ear whereas the US method was based on the relative pitch approach.

A. **tendency** B. **note** C. **cultures** D. **ability** E. **song** F. **ancient**
G. **pitch** H. **learning scales** I. **relative** J. **primitive** K. **absolute**
L. **spoken** M. **music lessons** N. **language** O. **melody** P. **names**
Q. **tone** R. **words** S. **universities** T. **musical instruments**

Questions 36-40

Reading Passage 3 contains a number of opinions provided by five different scientists.

Match each opinion with one of the scientists (A–E).

You may use any of the people A–E more than once.

A. Levitin

B. Deutsch

C. Gregersen

D. Marvin

E. Freimer

	A	B	C	D	E
36 Absolute pitch is not a clear-cut issue.	○	○	○	○	○
37 Anyone can learn how to acquire perfect pitch.	○	○	○	○	○
38 It's actually surprising that not everyone has absolute pitch.	○	○	○	○	○
39 The perfect pitch ability is genetic.	○	○	○	○	○
40 The important thing is the age at which music lessons are started.	○	○	○	○	○

Answer Key

#	Answer	Explanation
1	**D**	A war has been going on for almost a hundred years between the sheep farmers of Australia and the dingo, Australia's wild dog. To protect their livelihood, the farmers built a wire fence, 3,307 miles of continuous wire mesh, reaching from the coast of South Australia all the way to the cotton fields of eastern Queensland, just short of the Pacific Ocean The empire it preserves is that of the woolgrowers, sovereigns of the world's second largest sheep flock, after China's – some 123 million head – and keepers of a wool export business worth four billion dollars
2	**B**	Never mind that more and more people – conservationists, politicians, taxpayers and animal lovers – say that such a barrier would never be allowed today on ecological grounds
3	**C**	To appreciate this unusual outback monument and to meet the people whose livelihoods depend on it, I spent part of an Australian autumn travelling the wire
4	**A**	To appreciate this unusual outback monument and to meet the people whose livelihoods depend on it, I spent part of an Australian autumn travelling the wire
5	**NO**	It's known by different names in different states: the Dog Fence in South Australia, the Border Fence in New South Wales and the Barrier Fence in Queensland. I would call it simply the Fence
6	**YES**	Yet the Fence casts a much broader ecological shadow for it has become a kind of terrestrial dam, deflecting the flow of animals inside and out. The ecological side effects appear most vividly at Sturt National Park. In 1845, explorer Charles Sturt led an expedition through these parts on a futile search for an inland sea. For Sturt and other early explorers, it was a rare event to see a kangaroo. Now they are ubiquitous for without a native predator the kangaroo population has exploded inside the Fence. Kangaroos are now cursed more than dingoes. They have become the rivals of sheep, competing for water and grass
7	**NO**	Canis lupus dingo is an introduced species of wild dog. Skeletal remains indicate that the dingo was introduced to Australia more than 3,500 years ago probably with Asian seafarers who landed on the north coast
8	**YES**	It is estimated that since sheep arrived in Australia, dingo numbers have increased a hundredfold

#	Answer	Explanation
9	**NOT GIVEN**	What is this creature that by itself threatens an entire industry, inflicting several millions of dollars of damage a year despite the presence of the world's most obsessive fence
10	**YES**	Now they are ubiquitous for without a native predator the kangaroo population has exploded inside the Fence
11	**NOT GIVEN**	In response state governments cull* more than three million kangaroos a year to keep Australia's national symbol from overrunning the pastoral lands
12	**B**	Dingoes officially became outlaws in 1830 when governments placed a bounty on their heads
13	**A**	Park officials, who recognise that the fence is to blame, respond to the excess of kangaroos by saying 'The fence is there, and we have to live with it.'
14	**YES**	If there were awards for tourism phrases that have been hijacked, diluted and misused then 'ecotourism' would earn top prize It rapidly became the hottest marketing tag a holiday could carry
15	**YES**	There is no doubt the original motives behind the movement were honourable attempts to provide a way for those who cared to make informed choices
16	**NOT GIVEN**	Add to this an annual growth rate of around five per cent and the pressure for many operators, both in developed and developing countries, to jump on the accelerating bandwagon is compelling
17	**NO**	It is easier to understand why the ecotourism market has become so overcrowded when we look at its wider role in the world economy. According to World Tourism Organisation figures, ecotourism is worth US$20 billion a year and makes up one-fifth of all international tourism. Add to this an annual growth rate of around five per cent and the pressure for many operators, both in developed and developing countries, to jump on the accelerating bandwagon is compelling
18	**NO**	This is a time-consuming process and many travellers usually take an operator's claims at face value, only adding to the proliferation of fake ecotours
19	**NOT GIVEN**	In fact, any tour that involves cultural interaction, natural beauty spots, wildlife or a dash of soft adventure is likely to be included in the overflowing ecotourism folder. There is no doubt the original motives behind the movement were honourable attempts to provide a way for those who cared to make informed choices, but the lack of regulations and a standard industry definition left many travellers lost in an ecotourism jungle

#	Answer	Explanation
20	**B / D / E**	Founded in 1990, the Ecotourism Society (TES) is a non-profit organisation of travel industry, conservation and ecological professionals, which aims to make ecotourism a genuine tool for conservation and sustainable development TES organises an annual initiative to further aid development of the ecotourism industry. This year it is launching 'Your Travel Choice Makes a Difference', an educational campaign aimed at helping consumers understand the potential positive and negative impacts of their travel decisions. TES also offers guidance on the choice of ecotour and has established a register of approved ecotourism operators around the world
21	**B / D / E**	Founded in 1990, the Ecotourism Society (TES) is a non-profit organisation of travel industry, conservation and ecological professionals, which aims to make ecotourism a genuine tool for conservation and sustainable development TES organises an annual initiative to further aid development of the ecotourism industry. This year it is launching 'Your Travel Choice Makes a Difference', an educational campaign aimed at helping consumers understand the potential positive and negative impacts of their travel decisions. TES also offers guidance on the choice of ecotour and has established a register of approved ecotourism operators around the world
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23	**A / D**	The scheme is now an independent concern The scheme also allows destination communities to become Green Globe 21 approved
24	**A / D**	The scheme is now an independent concern The scheme also allows destination communities to become Green Globe 21 approved
25	**World Tourism Organisation**	According to World Tourism Organisation figures, ecotourism is worth US$20 billion a year and makes up one-fifth of all international tourism
26	**city entrepreneurs**	It is common for city entrepreneurs to own tour companies in country areas, which can mean the money you pay ends up in the

#	Answer	Explanation
		city rather than in the community being visited
27	**(the) 1992 Earth Summit**	The Green Globe 21 award is based on the sustainable development standards contained in Agenda 21 from the 1992 Earth Summit
28	**D**	The uncanny, if sometimes distracting, ability to name a solitary note out of the blue, without any other notes for reference, is a prized musical talent – and a scientific mystery
29	**B**	The uncanny, if sometimes distracting, ability to name a solitary note out of the blue, without any other notes for reference, is a prized musical talent – and a scientific mystery
30	**I**	By contrast, most musicians follow not the notes, but the relationship between them. They may easily recognise two notes as being a certain number of tones apart, but could name the higher note as an E only if they are told the lower one is a C, for example. This is relative pitch
31	**M**	And their work may finally settle a decades-old debate about whether absolute pitch depends on melodious genes – or early music lessons
32	**Q**	Deutsch reported a study that suggests we all have the potential to acquire absolute pitch – and that speakers of tone languages use it every day. A third of the world's population – chiefly people in Asia and Africa – speak tone languages, in which a word's meaning can vary depending on the pitch a speaker uses
33	**R**	Deutsch and her colleagues asked seven native Vietnamese speakers and 15 native Mandarin speakers to read out lists of words on different days
34	**G**	By recording these recited lists and taking the average pitch for each whole word, the researchers compared the pitches used by each person to say each word on different days
35	**C**	Moreover, adds Gregersen, the type of music lessons favoured in Asia, and by many of the Asian families in his study, such as the Suzuki method, often focus on playing by ear and learning the names of musical notes, while those more commonly used in the US tend to emphasise learning scales in a relative pitch way. In Japanese pre-school music programmes, he says, children often have to listen to notes played on a piano and hold up a coloured flag to signal the pitch. 'There's a distinct cultural difference,' he says
36	**D**	'Absolute pitch is not an all or nothing feature,' says Marvin, a music theorist at the University of Rochester in New York state

#	Answer	Explanation
37	**B**	Deutsch reported a study that suggests we all have the potential to acquire absolute pitch – and that speakers of tone languages use it every day
38	**A**	Given studies like these, the real mystery is why we don’t all have absolute pitch, says cognitive psychologist Daniel Levitin of McGill University in Montreal
39	**E**	Nelson Freimer of the University of California in San Francisco, for example, is just completing a study that he says strongly suggests the right genes help create this brand of musical genius
40	**C**	For one thing, those with absolute pitch started lessons, on average, when they were five years old, while those without absolute pitch started around the age of eight

Test 85

PASSAGE 1

You should spend about 20 minutes on Questions 1–14 which are based on Reading Passage 1 below.

Twist in the Tale

A Less than three years ago, doom merchants were predicting that the growth in video games and the rise of the Internet would sound the death knell for children's literature. But contrary to popular myth, children are reading more books than ever. A recent survey by Books Marketing found that children up to the age of 11 read on average for four hours a week, particularly girls.

B Moreover, the children's book market, which traditionally was seen as a poor cousin to the more lucrative and successful adult market, has come into its own. Publishing houses are now making considerable profits on the back of new children's books and children's authors can now command significant advances. 'Children's books are going through an incredibly fertile period,' says Wendy Cooling, a children's literature consultant. 'There's a real buzz around them. Book clubs are happening, sales are good, and people are much more willing to listen to children's authors.'

C The main growth area has been the market for eight to fourteen-year-olds, and there is little doubt that the boom has been fuelled by the bespectacled apprentice, Harry Potter. So influential has J. K. Rowling's series of books been that they have helped to make reading fashionable for pre-teens. 'Harry made it OK to be seen on a bus reading a book,' says Cooling. ‘To a child, that is important.' The current buzz around the publication of the fourth Harry Potter beats anything in the world of adult literature.

D 'People still tell me, “Children don't read nowadays”,' says David Almond, the award-winning author of children's books such as Skellig. 'The truth is that they are skilled, creative readers. When I do classroom visits, they ask me very sophisticated questions about use of language, story structure, chapters and dialogue.' No one is denying that books are competing with other forms of entertainment for children's attention but it seems as though children find a special kind of mental nourishment within the printed page.

E 'A few years ago, publishers lost confidence and wanted to make books more like television, the medium that frightened them most,' says children's book critic Julia Eccleshare. ‘But books aren't TV, and you will find that children always say that the good thing about books is that you can see them in your head. Children are demanding readers,' she says. 'If they don't get it in two pages, they'll drop it.'

F No more are children's authors considered mere sentimentalists or failed adult writers. 'Some feted adult writers would kill for the sales,' says Almond, who sold 42,392 copies of Skellig in 1999 alone. And advances seem to be growing too: UK publishing outfit Orion recently

negotiated a six-figure sum from US company Scholastic for The Seeing Stone, a children's novel by Kevin Crossley-Holland, the majority of which will go to the author.

G It helps that once smitten, children are loyal and even fanatical consumers. Author Jacqueline Wilson says that children spread news of her books like a bushfire. 'My average reader is a girl of ten,' she explains. 'They're sociable and acquisitive. They collect. They have parties – where books are a good present. If they like something, they have to pass it on.' After Rowling, Wilson is currently the best-selling children's writer, and her sales have boomed over the past three years. She has sold more than three million books, but remains virtually invisible to adults, although most ten-year-old girls know about her.

H Children's books are surprisingly relevant to contemporary life. Provided they are handled with care, few topics are considered off-limits for children. One senses that children's writers relish the chance to discuss the whole area of topics and language. But Anne Fine, author of many award-winning children's books is concerned that the British literati still ignore children's culture. ‘It's considered worthy but boring,' she says.

I 'I think there's still a way to go,' says Almond, who wishes that children's books were taken more seriously as literature. Nonetheless, he derives great satisfaction from his child readers. 'They have a powerful literary culture,' he says. 'It feels as if you're able to step into the store of mythology and ancient stories that run through all societies and encounter the great themes: love and loss and death and redemption.'

J At the moment, the race is on to find the next Harry Potter. The bidding for new books at Bologna this year – the children's equivalent of the Frankfurt Book Fair – was as fierce as anything anyone has ever seen. All of which bodes well for the long-term future of the market – and for children's authors, who have traditionally suffered the lowest profile in literature, despite the responsibility of their role.

PART 1 — QUESTIONS

Questions 1-7

Look at the following list of people A–E and the list of statements. Match each statement with one of the people listed.

A. Wendy Cooling

B. David Almond

C. Julia Eccleshare

D. Jacqueline Wilson

E. Anne Fine

	A	B	C	D	E
1 Children take pleasure in giving books to each other.	○	○	○	○	○
2 Reading in public is an activity that children have not always felt comfortable about doing.	○	○	○	○	○
3 Some well-known writers of adult literature regret that they earn less than popular children's writers.	○	○	○	○	○
4 Children are quick to decide whether they like or dislike a book.	○	○	○	○	○
5 Children will read many books by an author that they like.	○	○	○	○	○
6 The public do not realise how much children read today.	○	○	○	○	○
7 We are experiencing a rise in the popularity of children's literature.	○	○	○	○	○

Questions 8-10

Using NO MORE THAN THREE WORDS taken from the reading passage, answer the following questions.

8 For which age group have sales of books risen the most? _____

9 Which company has just invested heavily in an unpublished children's book?

_____

10 Who is currently the best-selling children's writer? _____

Questions 11-14

Reading Passage 1 has ten paragraphs A–J.

Which paragraph mentions the following?

	A	B	C	D	E	F	G	H	I	J
11 the fact that children are able to identify and discuss the important elements of fiction	○	○	○	○	○	○	○	○	○	○
12 the undervaluing of children's society	○	○	○	○	○	○	○	○	○	○
13 the impact of a particular fictional character on the sales of children's books	○	○	○	○	○	○	○	○	○	○
14 an inaccurate forecast regarding the reading habits of children	○	○	○	○	○	○	○	○	○	○

PASSAGE 2

You should spend about 20 minutes on Questions 15–27, which are based on Reading Passage 2 below.

Fun for the Masses

15

A Are you better off than you used to be? Even after six years of sustained economic growth, Americans worry about that question. Economists who plumb government income statistics agree that Americans' incomes, as measured in inflation-adjusted dollars, have risen more slowly in the past two decades than in earlier times, and that some workers' real incomes have actually fallen. They also agree that by almost any measure, income is distributed less equally than it used to be. Neither of those claims, however, sheds much light on whether living standards are rising or falling. This is because 'living standard' is a highly amorphous concept. Measuring how much people earn is relatively easy, at least compared with measuring how well they live.

16

B A recent paper by Dora Costa, an economist at the Massachusetts Institute of Technology, looks at the living-standards debate from an unusual direction. Rather than worrying about cash incomes, Ms Costa investigates Americans' recreational habits over the past century. She finds that people of all income levels have steadily increased the amount of time and money they devote to having fun. The distribution of dollar incomes may have become more skewed in recent years, but leisure is more evenly spread than ever.

17

C Ms Costa bases her research on consumption surveys dating back as far as 1888. The industrial workers surveyed in that year spent, on average, three-quarters of their incomes on food, shelter and clothing. Less than 2% of the average family's income was spent on leisure but that average hid large disparities. The share of a family's budget that was spent on having fun rose sharply with its income: the lowest-income families in this working-class sample spent barely 1% of their budgets on recreation, while higher earners spent more than 3%. Only the latter group could afford such extravagances as theatre and concert performances, which were relatively much more expensive than they are today.

18

D Since those days, leisure has steadily become less of a luxury. By 1991, the average household needed to devote only 38% of its income to the basic necessities, and was able to

spend 6% on recreation. Moreover, Ms Costa finds that the share of the family budget spent on leisure now rises much less sharply with income than it used to. At the beginning of this century a family's recreational spending tended to rise by 20% for every 10% rise in income. By 1972–73, a 10% income gain led to roughly a 15% rise in recreational spending, and the increase fell to only 13% in 1991. What this implies is that Americans of all income levels are now able to spend much more of their money on having fun.

E One obvious cause is that real income overall has risen. If Americans in general are richer, their consumption of entertainment goods is less likely to be affected by changes in their income. But Ms Costa reckons that rising incomes are responsible for, at most, half of the changing structure of leisure spending. Much of the rest may be due to the fact that poorer Americans have more time off than they used to. In earlier years, low-wage workers faced extremely long hours and enjoyed few days off. But since the 1940s, the less skilled (and lower paid) have worked ever-fewer hours, giving them more time to enjoy leisure pursuits.

19

F Conveniently, Americans have had an increasing number of recreational possibilities to choose from. Public investment in sports complexes, parks and golf courses has made leisure cheaper and more accessible. So too has technological innovation. Where listening to music used to imply paying for concert tickets or owning a piano, the invention of the radio made music accessible to everyone and virtually free. Compact discs, videos and other paraphernalia have widened the choice even further.

20

G At a time when many economists are pointing accusing fingers at technology for causing a widening inequality in the wages of skilled and unskilled workers, Ms Costa's research gives it a much more egalitarian face. High earners have always been able to afford amusement. By lowering the price of entertainment, technology has improved the standard of living of those in the lower end of the income distribution. The implication of her results is that once recreation is taken into account, the differences in Americans' living standards may not have widened so much after all.

21

H These findings are not water-tight. Ms Costa's results depend heavily upon what exactly is classed as a recreational expenditure. Reading is an example. This was the most popular leisure activity for working men in 1888, accounting for one-quarter of all recreational spending. In 1991, reading took only 16% of the entertainment dollar. But the American Department of Labour's expenditure surveys do not distinguish between the purchase of a mathematics tome and that of a best-selling novel. Both are classified as recreational expenses. If more money is being spent on textbooks and professional books now than in earlier years, this could make 'recreational' spending appear stronger than it really is.

I Although Ms Costa tries to address this problem by showing that her results still hold even when tricky categories, such as books, are removed from the sample, the difficulty is not entirely eliminated. Nonetheless, her broad conclusion seems fair. Recreation is more available to all and less dependent on income. On this measure at least, inequality of living standards has fallen.

PART 2 — QUESTIONS

Questions 15-21

Reading Passage 2 has nine paragraphs A–I.

From the list of headings below choose the most suitable heading for each paragraph.

i. **Wide differences in leisure activities according to income**

ii. **Possible inconsistencies in Ms Costa's data**

iii. **More personal income and time influence leisure activities**

iv. **Investigating the lifestyle problem from a new angle**

v. **Increased incomes fail to benefit everyone**

vi. **A controversial development offers cheaper leisure activities**

vii. **Technology heightens differences in living standards**

viii. **The gap between income and leisure spending closes**

ix. **Two factors have led to a broader range of options for all**

x. **Have people's lifestyles improved?**

xi. **High earners spend less on leisure**

Questions 22-26

Complete each of the following statements using words from the box.

- It is easier to determine **22** _____ than living standards.
- A decrease in **23** _____ during the 20th century led to a bigger investment in leisure.
- According to Ms Costa, how much Americans spend on leisure has been directly affected by salaries and **24** _____ .
- The writer notes both positive and negative influences of **25** _____ .
- According to the writer, the way Ms Costa defined **26** _____ may have been misleading.

A. **recreational activities** B. **the family budget** C. **holiday time**

D. **government expenditure** E. **computer technology** F. **income levels**

G. **non-luxury spending** H. **professional reading** I. **high-income earners**

Questions 27-27

Choose the appropriate letter A–D.

27 The writer thinks that Ms Costa

A ○ provides strong evidence to support her theory.

B ○ displays serious flaws in her research methods.

C ○ attempts to answer too many questions.

D ○ has a useful overall point to make.

PASSAGE 3

You should spend about 20 minutes on Questions 28-40, which are based on Reading Passage 3 below.

THE ART OF HEALING

If no further evidence was available of the sophistication of China in the Tang era, then a look at Chinese medicine would be sufficient. At the Western end of the Eurasian continent the Roman empire had vanished, and there was nowhere new to claim the status of the cultural and political centre of the world. In fact, for a few centuries, this centre happened to be the capital of the Tang empire, and Chinese medicine under the Tang was far ahead of its European counterpart. The organisational context of health and healing was structured to a degree that had no precedence in Chinese history and found no parallel elsewhere.

An Imperial Medical Office had been inherited from previous dynasties: it was immediately restructured and staffed with directors and deputy directors, chief and assistant medical directors, pharmacists and curators of medicinal herb gardens and further personnel. Within the first two decades after consolidating its rule, the Tang administration set up one central and several provincial medical colleges with professors, lecturers, clinical practitioners and pharmacists to train students in one or all of the four departments of medicine, acupuncture, physical therapy and exorcism.

Physicians were given positions in governmental medical service only after passing qualifying examinations. They were remunerated in accordance with the number of cures they had effected during the past year.

In 723 Emperor Xuanzong personally composed a general formulary of prescriptions recommended to him by one of his imperial pharmacists and sent it to all the provincial medical schools. An Arabic traveller, who visited China in 851, noted with surprise that prescriptions from the emperor's formulary were publicised on notice boards at crossroads to enhance the welfare of the population.

The government took care to protect the general populace from potentially harmful medical practice. The Tang legal code was the first in China to include laws concerned with harmful and heterodox medical practices. For example, to treat patients for money without adhering to standard procedures was defined as fraud combined with theft and had to be tried in accordance with the legal statutes on theft. If such therapies resulted in the death of a patient, the healer was to be banished for two and a half years. In case a physician purposely failed to practice according to the standards, he was to be tried in accordance with the statutes on premeditated homicide. Even if no harm resulted, he was to be sentenced to sixty strokes with a heavy cane.

In fact, physicians practising during the Tang era had access to a wealth of pharmaceutical and medical texts, their contents ranging from purely pragmatic advice to highly sophisticated theoretical considerations. Concise descriptions of the position, morphology, and functions of

the organs of the human body stood side by side in libraries with books enabling readers to calculate the daily, seasonal and annual climatic conditions of cycles of sixty years and to understand and predict their effects on health.

Several Tang authors wrote large collections of prescriptions, continuing a literary tradition documented since the 2nd century BC. The two most outstanding works to be named here were those by Sun Simiao (581–682?) and Wang Tao (c.670–755). The latter was a librarian who copied more than six thousand formulas, categorised in 1,104 sections, from sixty-five older works and published them under the title Waitai miyao. Twenty-four sections, for example, were devoted to ophthalmology. They reflect the Indian origin of much Chinese knowledge on ailments of the eye and, in particular, of cataract surgery.

Sun Simiao was the most eminent physician and author not only of the Tang dynasty, but of the entire first millennium AD. He was a broadly educated intellectual and physician; his world view integrated notions of all three of the major currents competing at his time – Confucianism, Daoism and Buddhism. Sun Simiao gained fame during his lifetime as a clinician (he was summoned to the imperial court at least once) and as author of the Prescriptions Worth Thousands in Gold (Qianjinfang) and its sequel. In contrast to developments in the 12th century, physicians relied on prescriptions and single substances to treat their patients' illnesses. The theories of systematic correspondences, characteristic of the acupuncture tradition, had not been extended to cover pharmacology yet. Sun Simiao rose to the pantheon of Chinese popular Buddhism in about the 13th century. He was revered as paramount Medicine God. He gained this extraordinary position in Chinese collective memory not only because he was an outstanding clinician and writer, but also for his ethical concerns. Sun Simiao was the first Chinese author known to compose an elaborate medical ethical code. Even though based on Buddhist and Confucian values, his deontology is comparable to the Hippocratic Oath. It initiated a debate on the task of medicine, its professional obligations, social position and moral justification that continued until the arrival of Western medicine in the 19th century.

Despite or – more likely – because of its long-lasting affluence and political stability, the Tang dynasty did not add any significantly new ideas to the interpretation of illness, health and healing. Medical thought reflects human anxieties; changes in medical thought always occur in the context of new existential fears or of fundamentally changed social circumstances. Nevertheless, medicine was a most fascinating ingredient of Tang civilisation and it left a rich legacy to subsequent centuries.

PART 3 — QUESTIONS

Questions 28-30

Choose the appropriate letters A–D.

28 In the first paragraph, the writer draws particular attention to

- **A** ○ the lack of medical knowledge in China prior to the Tang era.
- **B** ○ the Western interest in Chinese medicine during the Tang era.
- **C** ○ the systematic approach taken to medical issues during the Tang era.
- **D** ○ the rivalry between Chinese and Western cultures during the Tang era.

29 During the Tang era, a government doctor's annual salary depended upon

- **A** ○ the effectiveness of his treatment.
- **B** ○ the extent of his medical experience.
- **C** ○ the number of people he had successfully trained.
- **D** ○ the breadth of his medical expertise.

30 Which of the following contravened the law during the Tang era?

- **A** ○ a qualified doctor's refusal to practise
- **B** ○ the use of unorthodox medical practices
- **C** ○ a patient dying under medical treatment
- **D** ○ the receipt of money for medical treatment

Questions 31-37

Do the following statements agree with the information given in Reading Passage 3?

Write

YES if the statement agrees with the information

NO if the statement contradicts the information

NOT GIVEN if there is no information on this in the passage

31 Academic staff sometimes taught a range of medical subjects during the Tang era.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

32 The medical knowledge available during the Tang era only benefited the wealthy.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

33 Tang citizens were encouraged to lead a healthy lifestyle.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

34 Doctors who behaved in a fraudulent manner were treated in the same way as ordinary criminals during the Tang era.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

35 Medical reference books published during the Tang era covered practical and academic issues.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

36 Waitai miyao contained medical data from the Tang era.

A ○ YES

B ○ NO

C ○ NOT GIVEN

37 Chinese medical authors are known to have influenced Indian writing.

A ○ YES

B ○ NO

C ○ NOT GIVEN

Questions 38-40

Complete the sentences below with words taken from Reading Passage 3.

Use NO MORE THAN FOUR WORDS for each answer.

- The first known medical writing in China dates back to the **38** _____.
- During the Tang era, doctors depended most on **39** _____ to treat their patients.
- **40** _____ is famous for producing a set of medical rules for Chinese physicians.

Answer Key

#	Answer	Explanation
1	**D**	They have parties – where books are a good present. If they like something, they have to pass it on
2	**A**	‘Harry made it OK to be seen on a bus reading a book,’ says Cooling. ‘To a child, that is important.’
3	**B**	‘Some feted adult writers would kill for the sales,’ says Almond, who sold 42,392 copies of Skellig in 1999 alone
4	**C**	‘Children are demanding readers,’ she says. ‘If they don’t get it in two pages, they’ll drop it.’
5	**D**	It helps that once smitten, children are loyal and even fanatical consumers. Author Jacqueline Wilson says that children spread news of her books like a bushfire. ‘My average reader is a girl of ten,’ she explains. ‘They’re sociable and acquisitive. They collect. They have parties – where books are a good present. If they like something, they have to pass it on.’
6	**B**	‘People still tell me, “Children don’t read nowadays”,’ says David Almond, the award-winning author of children’s books such as Skellig. ‘The truth is that they are skilled, creative readers.’
7	**A**	‘Children’s books are going through an incredibly fertile period,’ says Wendy Cooling, a children’s literature consultant. ‘There’s a real buzz around them. Book clubs are happening, sales are good, and people are much more willing to listen to children’s authors.’
8	**eight to fourteen-year-olds**	The main growth area has been the market for eight to fourteen-year-olds
9	**Orion**	UK publishing outfit Orion recently negotiated a six-figure sum from US company Scholastic for The Seeing Stone, a children’s novel by Kevin Crossley-Holland, the majority of which will go to the author
10	**J.K. Rowling**	After Rowling, Wilson is currently the best-selling children’s writer
11	**D**	‘The truth is that they are skilled, creative readers. When I do classroom visits, they ask me very sophisticated questions about use of language, story structure, chapters and dialogue.’
12	**H**	But Anne Fine, author of many award-winning children’s books is concerned that the British literati still ignore children’s culture. ‘It’s considered worthy but boring,’ she says

#	Answer	Explanation
13	**C**	The main growth area has been the market for eight to fourteen-year-olds, and there is little doubt that the boom has been fuelled by the bespectacled apprentice, Harry Potter. So influential has J. K. Rowling's series of books been that they have helped to make reading fashionable for pre-teens
14	**A**	Less than three years ago, doom merchants were predicting that the growth in video games and the rise of the Internet would sound the death knell for children's literature. But contrary to popular myth, children are reading more books than ever
15	**x**	Are you better off than you used to be? Even after six years of sustained economic growth, Americans worry about that question. Economists who plumb government income statistics agree that Americans' incomes, as measured in inflation-adjusted dollars, have risen more slowly in the past two decades than in earlier times, and that some workers' real incomes have actually fallen. They also agree that by almost any measure, income is distributed less equally than it used to be. Neither of those claims, however, sheds much light on whether living standards are rising or falling. This is because 'living standard' is a highly amorphous concept. Measuring how much people earn is relatively easy, at least compared with measuring how well they live
16	**iv**	A recent paper by Dora Costa, an economist at the Massachusetts Institute of Technology, looks at the living-standards debate from an unusual direction Rather than worrying about cash incomes, Ms Costa investigates Americans' recreational habits over the past century
17	**i**	The share of a family's budget that was spent on having fun rose sharply with its income: the lowest-income families in this working-class sample spent barely 1% of their budgets on recreation, while higher earners spent more than 3%
18	**viii**	Moreover, Ms Costa finds that the share of the family budget spent on leisure now rises much less sharply with income than it used to
19	**ix**	Conveniently, Americans have had an increasing number of recreational possibilities to choose from. Public investment in sports complexes, parks and golf courses has made leisure cheaper and more accessible. So too has technological innovation
20	**vi**	At a time when many economists are pointing accusing fingers at technology for causing a widening inequality in the wages of skilled and unskilled workers, Ms Costa's research gives it a much more egalitarian face. High earners have always been able to afford amusement. By lowering the price of entertainment,

#	Answer	Explanation
		technology has improved the standard of living of those in the lower end of the income distribution
21	**ii**	These findings are not water-tight. Ms Costa's results depend heavily upon what exactly is classed as a recreational expenditure. Reading is an example. This was the most popular leisure activity for working men in 1888, accounting for one-quarter of all recreational spending. In 1991, reading took only 16% of the entertainment dollar. But the American Department of Labour's expenditure surveys do not distinguish between the purchase of a mathematics tome and that of a best-selling novel. Both are classified as recreational expenses. If more money is being spent on textbooks and professional books now than in earlier years, this could make 'recreational' spending appear stronger than it really is
22	**F**	Moreover, Ms Costa finds that the share of the family budget spent on leisure now rises much less sharply with income than it used to. At the beginning of this century a family's recreational spending tended to rise by 20% for every 10% rise in income. By 1972–73, a 10% income gain led to roughly a 15% rise in recreational spending, and the increase fell to only 13% in 1991. What this implies is that Americans of all income levels are now able to spend much more of their money on having fun
23	**G**	By 1991, the average household needed to devote only 38% of its income to the basic necessities, and was able to spend 6% on recreation
24	**C**	But since the 1940s, the less skilled (and lower paid) have worked ever-fewer hours, giving them more time to enjoy leisure pursuits
25	**E**	At a time when many economists are pointing accusing fingers at technology for causing a widening inequality in the wages of skilled and unskilled workers, Ms Costa's research gives it a much more egalitarian face. High earners have always been able to afford amusement. By lowering the price of entertainment, technology has improved the standard of living of those in the lower end of the income distribution
26	**A**	Ms Costa's results depend heavily upon what exactly is classed as a recreational expenditure. Reading is an example. This was the most popular leisure activity for working men in 1888, accounting for one-quarter of all recreational spending. In 1991, reading took only 16% of the entertainment dollar. But the American Department of Labour's expenditure surveys do not distinguish between the purchase of a mathematics tome and that of a best-selling novel. Both are classified as recreational expenses. If more money is being spent on textbooks and

#	Answer	Explanation
		professional books now than in earlier years, this could make ‘recreational’ spending appear stronger than it really is
27	**D**	Nonetheless, her broad conclusion seems fair. Recreation is more available to all and less dependent on income. On this measure at least, inequality of living standards has fallen
28	**C**	The organisational context of health and healing was structured to a degree that had no precedence in Chinese history and found no parallel elsewhere
29	**A**	They were remunerated in accordance with the number of cures they had effected during the past year
30	**B**	The Tang legal code was the first in China to include laws concerned with harmful and heterodox medical practices
31	**YES**	Within the first two decades after consolidating its rule, the Tang administration set up one central and several provincial medical colleges with professors, lecturers, clinical practitioners and pharmacists to train students in one or all of the four departments of medicine, acupuncture, physical therapy and exorcism
32	**NO**	An Arabic traveller, who visited China in 851, noted with surprise that prescriptions from the emperor’s formulary were publicised on notice boards at crossroads to enhance the welfare of the population
33	**NOT GIVEN**	An Arabic traveller, who visited China in 851, noted with surprise that prescriptions from the emperor’s formulary were publicised on notice boards at crossroads to enhance the welfare of the population
34	**YES**	For example, to treat patients for money without adhering to standard procedures was defined as fraud combined with theft and had to be tried in accordance with the legal statutes on theft
35	**YES**	In fact, physicians practising during the Tang era had access to a wealth of pharmaceutical and medical texts, their contents ranging from purely pragmatic advice to highly sophisticated theoretical considerations
36	**NOT GIVEN**	The latter was a librarian who copied more than six thousand formulas, categorised in 1,104 sections, from sixty-five older works and published them under the title Waitai miyao
37	**NO**	They reflect the Indian origin of much Chinese knowledge on ailments of the eye and, in particular, of cataract surgery

#	Answer	Explanation
38	**2nd century BC**	Several Tang authors wrote large collections of prescriptions, continuing a literary tradition documented since the 2nd century BC
39	**prescriptions and single substances**	In contrast to developments in the 12th century, physicians relied on prescriptions and single substances to treat their patients' illnesses
40	**Sun Simiao**	Sun Simiao was the first Chinese author known to compose an elaborate medical ethical code

Test 86

PASSAGE 1

You should spend about 20 minutes on Questions 1-13, which are based on Reading Passage 1 on pages 18-19.

Snow-makers

Skiing is big business nowadays. But what can ski resort owners do if the snow doesn't come?

A In the early to mid twentieth century, with the growing popularity of skiing, ski slopes became extremely profitable businesses. But ski resort owners were completely dependent on the weather; if it didn't snow, or didn't snow enough, they had to close everything down. Fortunately, a device called the snow gun can now provide snow whenever it is needed. These days such machines are standard equipment in the vast majority of ski resorts around the world, making it possible for many resorts to stay open four months or more a year.

B Snow formed by natural weather systems comes from water vapour in the atmosphere. The water vapour condenses into droplets, forming clouds. If the temperature is sufficiently low, the water droplets freeze into tiny ice crystals. More water particles then condense onto the crystal and join with it to form a snowflake. As the snowflake grows heavier, it falls towards the Earth.

1

C The snow gun works very differently from a natural weather system, but it accomplishes exactly the same thing. The device basically works by combining water and air. Two different hoses are attached to the gun, one leading from a water pumping station which pumps water up from a lake or reservoir, and the other leading from an air compressor. When the compressed air passes through the hose into the gun, it atomises the water - that is, it disrupts the stream so that the water splits up into tiny droplets. The droplets are then blown out of the gun and if the outside temperature is below 0°C, ice crystals will form, and will then make snowflakes in the same way as natural snow.

2

D Snow-makers often talk about dry snow and wet snow. Dry snow has a relatively low amount of water, so it is very light and powdery. This type of snow is excellent for skiing because skis glide over it easily without getting stuck in wet slush. One of the advantages of using a snow-maker is that this powdery snow can be produced to give the ski slopes a level surface. However, on slopes which receive heavy use, resort owners also use denser, wet snow underneath the dry snow. Many resorts build up the snow depth this way once or twice a year, and then regularly coat the trails with a layer of dry snow throughout the winter.

3

E The wetness of snow is dependent on the temperature and humidity outside, as well as the size of the water droplets launched by the gun. Snow-makers have to adjust the proportions of water and air in their snow guns to get the perfect snow consistency for the outdoor weather conditions. Many ski slopes now do this with a central computer system that is connected to weather-reading stations all over the slope.

4

F But man-made snow makes heavy demands on the environment. It takes about 275,000 litres of water to create a blanket of snow covering a 60 x 60 metre area. Most resorts pump water from one or more reservoirs located in low-lying areas. The run-off water from the slopes feeds back into these reservoirs, so the resort can actually use the same water over and over again. However, considerable amounts of energy are needed to run the large air-compressing pumps, and the diesel engines which run them also cause air pollution.

5

G Because of the expense of making snow, ski resorts have to balance the cost of running the machines with the benefits of extending the ski season, making sure they only make snow when it is really needed, and when it will bring the maximum amount of profit in return for the investment. But man-made snow has a number of other uses as well. A layer of snow keeps a lot of the Earth's heat from escaping into the atmosphere, so farmers often use man-made snow to provide insulation for winter crops. Snow-making machines have played a big part in many movie productions. Movie producers often take several months to shoot scenes that cover just a few days. If the movie takes place in a snowy setting, the set decorators have to get the right amount of snow for each day of shooting either by adding man-made snow or melting natural snow. And another important application of man-made snow is its use in the tests that aircraft must undergo in order to ensure that they can function safely in extreme conditions.

PART 1 — QUESTIONS

Questions 1-5

Reading Passage 1 has seven paragraphs A-G.

Choose the correct heading for each paragraph from the list of headings below.

i. **Considering ecological costs**

ii. **Modifications to the design of the snow gun**

iii. **The need for different varieties of snow**

iv. **Local concern over environmental issues**

v. **A problem and a solution**

vi. **Applications beyond the ski slopes**

vii. **Converting wet snow to dry snow**

viii. **New method for calculating modifications**

ix. **Artificial process, natural product**

x. **Snow formation in nature**

Questions 6-8

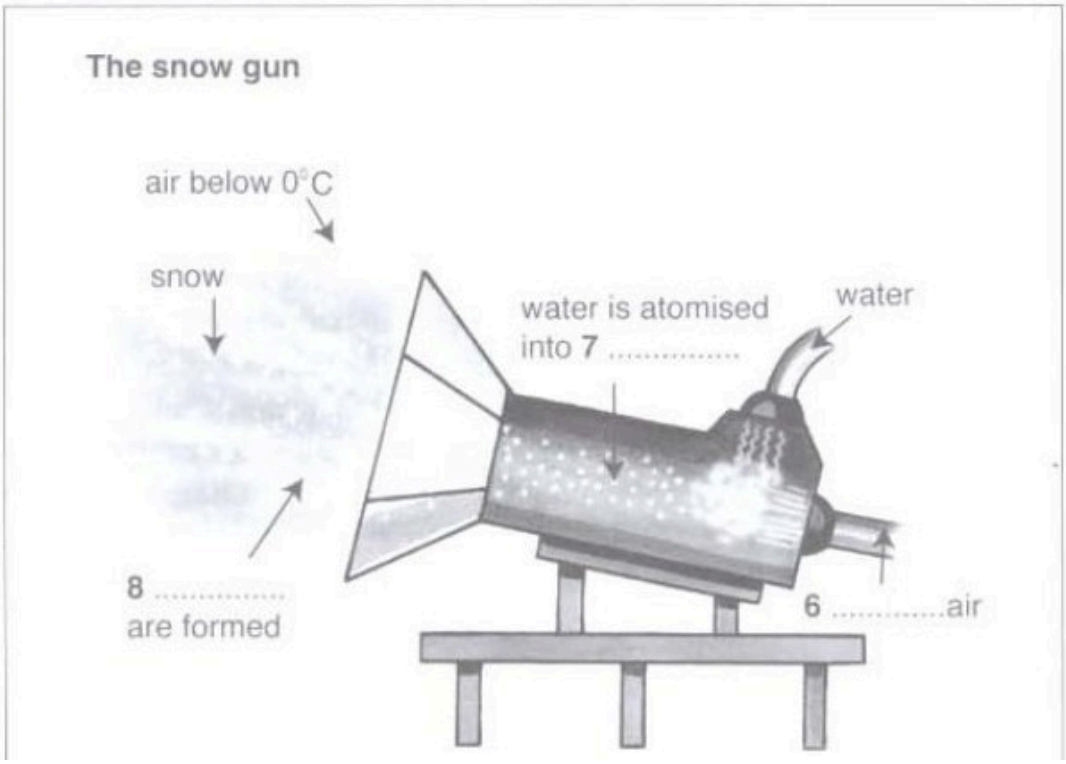
Label the diagram below.

Choose NO MORE THAN TWO WORDS from the passage for each answer.

Label the diagram below.

*Choose **NO MORE THAN TWO WORDS** from the passage for each answer.*

Write your answers in boxes 6–8 on your answer sheet.



6 _____

7 _____

8 _____

Questions 9-13

Complete the sentences below.

Choose NO MORE THAN THREE WORDS from the passage for each answer.

- Dry snow is used to give slopes a level surface, while wet snow is used to increase the **9** _____ on busy slopes.
- To calculate the required snow consistency, the **10** _____ of the atmosphere must first be measured.
- The machinery used in the process of making the snow consumes a lot of **11** _____ which is damaging to the environment.

- Artificial snow is used in agriculture as a type of **12** _____ for plants in cold conditions.
- Artificial snow may also be used in carrying out safety checks on **13** _____.

PASSAGE 2

You should spend about 20 minutes on Questions 14-26, which are based on Reading Passage 2 below.

Why are so few tigers man-eaters?

A As you leave the Bandhavgarh National Park in central India, there is a notice which shows a huge, placid tiger. The notice says, 'You may not have seen me, but I have seen you.' There are more than a billion people in India and Indian tigers probably see humans every single day of their lives. Tigers can and do kill almost anything they meet in the jungle - they will even attack elephants and rhino. Surely, then, it is a little strange that attacks on humans are not more frequent.

B Some people might argue that these attacks were in fact common in the past. British writers of adventure stories, such as Jim Corbett, gave the impression that village life in India in the early years of the twentieth century involved a state of constant siege by man-eating tigers. But they may have overstated the terror spread by tigers. There were also far more tigers around in those days (probably 60,000 in the subcontinent, compared to just 3000 today). So in proportion, attacks appear to have been as rare then as they are today.

C It is widely assumed that the constraint is fear; but what exactly are tigers afraid of? Can they really know that we may be even better armed than they are? Surely not. Has the species programmed the experiences of all tigers with humans into its genes to be inherited as instinct? Perhaps. But I think the explanation may be more simple and, in a way, more intriguing.

D Since the growth of ethology[1] in the 1950s, we have tried to understand animal behaviour from the animal's point of view. Until the first elegant experiments by pioneers in the field, such as Konrad Lorenz, naturalists wrote about animals as if they were slightly less intelligent humans. Jim Corbett's breathless accounts of his duels with man-eaters in truth tell us more about Jim Corbett than they do about the animals. The principle of ethology, on the other hand, requires us to attempt to think in the same way as the animal we are studying thinks, and to observe every tiny detail of its behaviour without imposing our own human significances on its actions.

E I suspect that a tiger's fear of humans lies not in some preprogrammed ancestral logic but in the way he actually perceives us visually. If you try to think like a tiger, a human in a car might appear just to be part of the car, and because tigers don't eat cars the human is safe unless the car is menacing the tiger or its cubs, in which case a brave or enraged tiger may charge. A human on foot is a different sort of puzzle. Imagine a tiger sees a man who is 1.8m tall. A tiger is less than 1m tall but he may be up to 3m long from head to tail. So when a tiger sees the man face on, it might not be unreasonable for him to assume that the man is 6m long. If he met a deer of this size, he might attack the animal by leaping on its back, but when he looks behind the man, he can't see a back. From the front the man is huge, but looked at from the side he all but disappears. This must be very disconcerting. A hunter has to be confident that it can tackle its prey, and no one is confident when they are disconcerted. This is especially true of a solitary

hunter such as the tiger and may explain why lions - particularly young lionesses who tend to encourage one another to take risks - are more dangerous than tigers.

F If the theory that a tiger is disconcerted to find that a standing human is both very big and yet somehow invisible is correct, the opposite should be true of a squatting human. A squatting human is half the size and presents twice the spread of back, and more closely resembles a medium-sized deer. If tigers were simply frightened of all humans, then a squatting person would be no more attractive as a target than a standing one. This, however, appears not to be the case. Many incidents of attacks on people involve villagers squatting or bending over to cut grass for fodder or building material.

G The fact that humans stand upright may therefore not just be something that distinguishes them from nearly all other species, but also a factor that helped them to survive in a dangerous and unpredictable environment.

ethology the branch of zoology that studies the behaviour of animals in their natural habitats

PART 2 — QUESTIONS

Questions 14-18

Reading Passage 2 has seven paragraphs labelled A-G.

Which paragraph contains the following information?

	A	B	C	D	E	F	G
14 a rejected explanation of why tiger attacks on humans are rare	○	○	○	○	○	○	○
15 a reason why tiger attacks on humans might be expected to happen more often than they do	○	○	○	○	○	○	○
16 examples of situations in which humans are more likely to be attacked by tigers	○	○	○	○	○	○	○
17 a claim about the relative frequency of tiger attacks on humans	○	○	○	○	○	○	○
18 an explanation of tiger behaviour based on the principles of ethology	○	○	○	○	○	○	○

Questions 19-23

Do the following statements agree with the information given in Reading

Passage 2?

19 Tigers in the Bandhavgarh National Park are a protected species.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

20 Some writers of fiction have exaggerated the danger of tigers to man.

- **A** ○ TRUE
- **B** ○ FALSE

C ○ NOT GIVEN

21 The fear of humans may be passed down in a tiger's genes.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

22 Konrad Lorenz claimed that some animals are more intelligent than humans.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

23 Ethology involves applying principles of human behaviour to animals.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

Questions 24-26

Choose the correct answer, A, B, C or D.

24 Why do tigers rarely attack people in cars?

A ○ They have learned that cars are not dangerous.

B ○ They realise that people in cars cannot be harmed.

C ○ They do not think people in cars are living creatures.

D ○ They do not want to put their cubs at risk.

25 The writer says that tigers rarely attack a man who is standing up because

A ○ they are afraid of the man's height.

B ○ they are confused by the man's shape.

C ○ they are puzzled by the man's lack of movement.

D ○ his back appears longer in relation to his height.

26 A human is more vulnerable to tiger attack when squatting because

A ○ he may be unaware of the tiger's approach.

B ○ he cannot easily move his head to see behind him.

C ○ his head becomes a better target for the tiger.

D ○ his back appears longer in relation to his height.

PASSAGE 3

You should spend about 20 minutes on Questions 27-40, which are based on Reading Passage 3 below.

Keep taking the tablets

The history of aspirin is a product of a rollercoaster ride through time, of accidental discoveries, intuitive reasoning and intense corporate rivalry

In the opening pages of *Aspirin: The Remarkable Story of a Wonder Drug*, Diarmuid Jeffreys describes this little white pill as 'one of the most amazing creations in medical history, a drug so astonishingly versatile that it can relieve headache, ease your aching limbs, lower your temperature and treat some of the deadliest human diseases'.

Its properties have been known for thousands of years. Ancient Egyptian physicians used extracts from the willow tree as an analgesic, or pain killer. Centuries later the Greek physician Hippocrates recommended the bark of the willow tree as a remedy for the pains of childbirth and as a fever reducer. But it wasn't until the eighteenth and nineteenth centuries that salicylates - the chemical found in the willow tree - became the subject of serious scientific investigation. The race was on to identify the active ingredient and to replicate it synthetically. At the end of the nineteenth century a German company, Friedrich Bayer & Co. succeeded in creating a relatively safe and very effective chemical compound, acetylsalicylic acid, which was renamed aspirin.

The late nineteenth century was a fertile period for experimentation, partly because of the hunger among scientists to answer some of the great scientific questions, but also because those questions were within their means to answer. One scientist in a laboratory with some chemicals and a test tube could make significant breakthroughs - whereas today, in order to map the human genome for instance, one needs 'an army of researchers, a bank of computers and millions and millions of dollars'.

But an understanding of the nature of science and scientific inquiry is not enough on its own to explain how society innovates. In the nineteenth century, scientific advance was closely linked to the industrial revolution. This was a period when people frequently had the means, motive and determination to take an idea and turn it into reality. In the case of aspirin that happened piecemeal - a series of minor, often unrelated advances, fertilised by the century's broader economic, medical and scientific developments, that led to one big final breakthrough.

The link between big money and pharmaceutical innovation is also a significant one. Aspirin's continued shelf life was ensured because for the first 70 years of its life, huge amounts of money were put into promoting it as an ordinary everyday analgesic. In the 1970s other analgesics, such as ibuprofen and paracetamol, were entering the market, and the pharmaceutical companies then focused on publicising these new drugs. But just at the same time, discoveries were made regarding the beneficial role of aspirin in preventing heart attacks,

strokes and other afflictions. Had it not been for these findings, this pharmaceutical marvel may well have disappeared.

So the relationship between big money and drugs is an odd one. Commercial markets are necessary for developing new products and ensuring that they remain around long enough for scientists to carry out research on them. But the commercial markets are just as likely to kill off certain products when something more attractive comes along. In the case of aspirin, a potential 'wonder drug' was around for over 70 years without anybody investigating the way in which it achieved its effects, because they were making more than enough money out of it as it was. If ibuprofen or paracetamol had entered the market just a decade earlier, aspirin might not be here today. It would be just another forgotten drug that people hadn't bothered to explore.

None of the recent discoveries of aspirin's benefits were made by the big pharmaceutical companies; they were made by scientists working in the public sector. The reason for that is very simple and straightforward, Jeffreys says in his book. 'Drug companies will only pursue research that is going to deliver financial benefits. There's no profit in aspirin any more. It is incredibly inexpensive with tiny profit margins and it has no patent any more, so anyone can produce it.' In fact, there's almost a disincentive for drug companies to further boost the drug, he argues, as it could possibly put them out of business by stopping them from selling their more expensive brands.

So what is the solution to a lack of commercial interest in further exploring the therapeutic benefits of aspirin? More public money going into clinical trials, says Jeffreys. 'If I were the Department of Health, I would say "this is a very inexpensive drug. There may be a lot of other things we could do with it." We should put a lot more money into trying to find out.'

Jeffreys' book - which not only tells the tale of a 'wonder drug' but also explores the nature of innovation and the role of big business, public money and regulation - reminds us why such research is so important.

PART 3 — QUESTIONS

Questions 27-32

Complete each sentence with the correct ending A-H from the box below.

• Ancient Egyptian and Greek doctors were aware of **27** _____

• Frederick Bayer & Co were able to reproduce **28** _____

• The development of aspirin was partly due to the effects of **29** _____

• The creation of a market for aspirin as a painkiller was achieved through **30** _____

• Aspirin might have become unavailable without **31** _____

• The way in which aspirin actually worked was not investigated by **32** _____

A. **the discovery of new medical applications.**

B. **the negative effects of publicity.**

C. **the large pharmaceutical companies.**

D. **the industrial revolution.**

E. **the medical uses of a particular tree.**

F. **the limited availability of new drugs.**

G. **the chemical found in the willow tree.**

H. **commercial advertising campaigns.**

Questions 33-37

Do the following statements agree with the views of the writer in Reading

Passage 3?

33 For nineteenth-century scientists, small-scale research was enough to make important discoveries.

A ○ YES

B ○ NO

C ○ NOT GIVEN

34 The nineteenth-century industrial revolution caused a change in the focus of scientific research.

A ○ YES

B ○ NO

C ○ NOT GIVEN

35 The development of aspirin in the nineteenth century followed a structured pattern of development.

A ○ YES

B ○ NO

C ○ NOT GIVEN

36 In the 1970s sales of new analgesic drugs overtook sales of asprin.

A ○ YES

B ○ NO

C ○ NOT GIVEN

37 Commercial companies may have both good and bad effects on the availability of pharmaceutical products.

A ○ YES

B ○ NO

C ○ NOT GIVEN

Questions 38-40

Complete the summary below using the list of words A-I below.

Research into aspirin

Jeffreys argues that the reason why **38** _____ did not find out about new uses of aspirin is that aspirin is no longer a **39** _____ drug. He therefore suggests that there should be **40** _____ support for further research into the possible applications of the drug.

A. **useful** B. **cheap** C. **state** D. **international**

E. **major drug companies** F. **profitable** G. **commercial**

H. **public sector scientists** I. **health officials**

Answer Key

#	Answer	Explanation
1	ix	The snow gun works very differently from a natural weather system, but it accomplishes exactly the same thing The droplets are then blown out of the gun and if the outside temperature is below 0°C, ice crystals will form, and will then make snowflakes in the same way as natural snow
2	iii	Snow-makers often talk about dry snow and wet snow. Dry snow has a relatively low amount of water, so it is very light and powdery. This type of snow is excellent for skiing because skis glide over it easily without getting stuck in wet slush. One of the advantages of using a snow-maker is that this powdery snow can be produced to give the ski slopes a level surface. However, on slopes which receive heavy use, resort owners also use denser, wet snow underneath the dry snow. Many resorts build up the snow depth this way once or twice a year, and then regularly coat the trails with a layer of dry snow throughout the winter
3	viii	Snow-makers have to adjust the proportions of water and air in their snow guns to get the perfect snow consistency for the outdoor weather conditions. Many ski slopes now do this with a central computer system that is connected to weather-reading stations all over the slope
4	i	But man-made snow makes heavy demands on the environment. It takes about 275,000 litres of water to create a blanket of snow covering a 60 x 60 metre area. Most resorts pump water from one or more reservoirs located in low-lying areas. The run-off water from the slopes feeds back into these reservoirs, so the resort can actually use the same water over and over again. However, considerable amounts of energy are needed to run the large air-compressing pumps, and the diesel engines which run them also cause air pollution
5	vi	But man-made snow has a number of other uses as well. A layer of snow keeps a lot of the Earth’s heat from escaping into the atmosphere, so farmers often use man-made snow to provide insulation for winter crops. Snow-making machines have played a big part in many movie productions. Movie producers often take several months to shoot scenes that cover just a few days. If the movie takes place in a snowy setting, the set decorators have to get the right amount of snow for each day of shooting either by adding man-made snow or melting natural snow. And another important application of man-made snow is its use in the tests

#	Answer	Explanation
		that aircraft must undergo in order to ensure that they can function safely in extreme conditions
6	**compressed**	When the compressed air passes through the hose into the gun, it atomises the water
7	**(tiny) droplets**	When the compressed air passes through the hose into the gun, it atomises the water – that is, it disrupts the stream so that the water splits up into tiny droplets
8	**ice crystals**	The droplets are then blown out of the gun and if the outside temperature is below 0°C, ice crystals will form, and will then make snowflakes in the same way as natural snow
9	**(snow) depth**	However, on slopes which receive heavy use, resort owners also use denser, wet snow underneath the dry snow. Many resorts build up the snow depth this way once or twice a year, and then regularly coat the trails with a layer of dry snow throughout the winter
10	**temperature and humidity / humidity and temperature**	The wetness of snow is dependent on the temperature and humidity outside, as well as the size of the water droplets launched by the gun. Snow-makers have to adjust the proportions of water and air in their snow guns to get the perfect snow consistency for the outdoor weather conditions
11	**energy**	However, considerable amounts of energy are needed to run the large air-compressing pumps, and the diesel engines which run them also cause air pollution
12	**insulation**	A layer of snow keeps a lot of the Earth's heat from escaping into the atmosphere, so farmers often use man-made snow to provide insulation for winter crops
13	**aircraft**	And another important application of man-made snow is its use in the tests that aircraft must undergo in order to ensure that they can function safely in extreme conditions
14	**C**	Can they really know that we may be even better armed than they are? Surely not
15	**A**	There are more than a billion people in India and Indian tigers probably see humans every single day of their lives. Tigers can and do kill almost anything they meet in the jungle – they will even attack elephants and rhino. Surely, then, it is a little strange that attacks on humans are not more frequent
16	**F**	Many incidents of attacks on people involve villagers squatting or bending over to cut grass for fodder or building material

#	Answer	Explanation
17	**B**	So in proportion, attacks appear to have been as rare then as they are today
18	**E**	If you try to think like a tiger, a human in a car might appear just to be part of the car, and because tigers don't eat cars the human is safe unless the car is menacing the tiger or its cubs, in which case a brave or enraged tiger may charge. A human on foot is a different sort of puzzle. Imagine a tiger sees a man who is 1.8m tall
19	**NOT GIVEN**	As you leave the Bandhavgarh National Park in central India, there is a notice which shows a huge, placid tiger
20	**TRUE**	British writers of adventure stories, such as Jim Corbett, gave the impression that village life in India in the early years of the twentieth century involved a state of constant siege by man-eating tigers. But they may have overstated the terror spread by tigers
21	**TRUE**	Has the species programmed the experiences of all tigers with humans into its genes to be inherited as instinct? Perhaps
22	**NOT GIVEN**	Until the first elegant experiments by pioneers in the field, such as Konrad Lorenz, naturalists wrote about animals as if they were slightly less intelligent humans. Jim Corbett's breathless accounts of his duels with man-eaters in truth tell us more about Jim Corbett than they do about the animals. The principle of ethology, on the other hand, requires us to attempt to think in the same way as the animal we are studying thinks, and to observe every tiny detail of its behaviour without imposing our own human significances on its actions
23	**FALSE**	The principle of ethology, on the other hand, requires us to attempt to think in the same way as the animal we are studying thinks, and to observe every tiny detail of its behaviour without imposing our own human significances on its actions
24	**C**	If you try to think like a tiger, a human in a car might appear just to be part of the car, and because tigers don't eat cars the human is safe unless the car is menacing the tiger or its cubs, in which case a brave or enraged tiger may charge
25	**B**	From the front the man is huge, but looked at from the side he all but disappears. This must be very disconcerting
26	**D**	A squatting human is half the size and presents twice the spread of back, and more closely resembles a medium-sized deer
27	**E**	Ancient Egyptian physicians used extracts from the willow tree as an analgesic, or pain killer. Centuries later the Greek physician

#	Answer	Explanation
		Hippocrates recommended the bark of the willow tree as a remedy for the pains of childbirth and as a fever reducer
28	**G**	But it wasn't until the eighteenth and nineteenth centuries that salicylates – the chemical found in the willow tree – became the subject of serious scientific investigation. The race was on to identify the active ingredient and to replicate it synthetically. At the end of the nineteenth century a German company, Friedrich Bayer & Co. succeeded in creating a relatively safe and very effective chemical compound, acetylsalicylic acid, which was renamed aspirin
29	**D**	In the nineteenth century, scientific advance was closely linked to the industrial revolution. This was a period when people frequently had the means, motive and determination to take an idea and turn it into reality. In the case of aspirin that happened piecemeal – a series of minor, often unrelated advances, fertilised by the century's broader economic, medical and scientific developments, that led to one big final breakthrough
30	**H**	Aspirin's continued shelf life was ensured because for the first 70 years of its life, huge amounts of money were put into promoting it as an ordinary everyday analgesic
31	**A**	But just at the same time, discoveries were made regarding the beneficial role of aspirin in preventing heart attacks, strokes and other afflictions. Had it not been for these findings, this pharmaceutical marvel may well have disappeared
32	**C**	In the case of aspirin, a potential 'wonder drug' was around for over 70 years without anybody investigating the way in which it achieved its effects, because they were making more than enough money out of it as it was None of the recent discoveries of aspirin's benefits were made by the big pharmaceutical companies; they were made by scientists working in the public sector. The reason for that is very simple and straightforward, Jeffreys says in his book. 'Drug companies will only pursue research that is going to deliver financial benefits. There's no profit in aspirin any more.'
33	**YES**	One scientist in a laboratory with some chemicals and a test tube could make significant breakthroughs – whereas today, in order to map the human genome for instance, one needs 'an army of researchers, a bank of computers and millions and millions of dollars'
34	**NOT GIVEN**	In the nineteenth century, scientific advance was closely linked to the industrial revolution. This was a period when people frequently had the means, motive and determination to take an idea and turn it into reality

#	Answer	Explanation
35	**NO**	In the case of aspirin that happened piecemeal – a series of minor, often unrelated advances, fertilised by the century's broader economic, medical and scientific developments, that led to one big final breakthrough
36	**NOT GIVEN**	In the 1970s other analgesics, such as ibuprofen and paracetamol, were entering the market, and the pharmaceutical companies then focused on publicising these new drugs
37	**YES**	Commercial markets are necessary for developing new products and ensuring that they remain around long enough for scientists to carry out research on them. But the commercial markets are just as likely to kill off certain products when something more attractive comes along
38	**E**	None of the recent discoveries of aspirin's benefits were made by the big pharmaceutical companies; they were made by scientists working in the public sector. The reason for that is very simple and straightforward, Jeffreys says in his book. 'Drug companies will only pursue research that is going to deliver financial benefits. There's no profit in aspirin any more.'
39	**F**	Drug companies will only pursue research that is going to deliver financial benefits. There's no profit in aspirin any more
40	**C**	More public money going into clinical trials, says Jeffreys. 'If I were the Department of Health, I would say "this is a very inexpensive drug. There may be a lot of other things we could do with it." We should put a lot more money into trying to find out.'

Test 87

PASSAGE 1

You should spend about 20 minutes on Questions 1-13, which are based on Reading Passage 1 opposite.

Why risks can go wrong

Human intuition is a bad guide to handling risk

A People make terrible decisions about the future. The evidence is all around, from their investments in the stock markets to the way they run their businesses. In fact, people are consistently bad at dealing with uncertainty, underestimating some kinds of risk and overestimating others. Surely there must be a better way than using intuition?

1

B In the 1960s a young American research psychologist, Daniel Kahneman, became interested in people's inability to make logical decisions. That launched him on a career to show just how irrationally people behave in practice. When Kahneman and his colleagues first started work, the idea of applying psychological insights to economics and business decisions was seen as rather bizarre. But in the past decade the fields of behavioural finance and behavioural economics have blossomed, and in 2002 Kahneman shared a Nobel Prize in economics for his work. Today he is in demand by business organisations and international banking companies. But, he says, there are plenty of institutions that still fail to understand the roots of their poor decisions. He claims that, far from being random, these mistakes are systematic and predictable.

C One common cause of problems in decision-making is over-optimism. Ask most people about the future, and they will see too much blue sky ahead, even if past experience suggests otherwise. Surveys have shown that people's forecasts of future stock market movements are far more optimistic than past long-term returns would justify. The same goes for their hopes of ever-rising prices for their homes or doing well in games of chance. Such optimism can be useful for managers or sportsmen, and sometimes turns into a self-fulfilling prophecy. But most of the time it results in wasted effort and dashed hopes. Kahneman's work points to three types of over-confidence. First, people tend to exaggerate their own skill and prowess; in polls, far fewer than half the respondents admit to having below-average skills in, say, driving. Second, they overestimate the amount of control they have over the future, forgetting about luck and chalking up success solely to skill. And third, in competitive pursuits such as dealing on shares, they forget that they have to judge their skills against those of the competition.

2

D Another source of wrong decisions is related to the decisive effect of the initial meeting, particularly in negotiations over money. This is referred to as the 'anchor effect'. Once a figure has been mentioned, it takes a strange hold over the human mind. The asking price quoted in a house sale, for example, tends to become accepted by all parties as the 'anchor' around which negotiations take place. Much the same goes for salary negotiations or mergers and acquisitions. If nobody has much information to go on, a figure can provide comfort - even though it may lead to a terrible mistake.

3

E In addition, mistakes may arise due to stubbornness. No one likes to abandon a cherished belief, and the earlier a decision has been taken, the harder it is to abandon it. Drug companies must decide early to cancel a failing research project to avoid wasting money, but may find it difficult to admit they have made a mistake. In the same way, analysts may have become wedded early to a single explanation that coloured their perception. A fresh eye always helps.

4

F People also tend to put a lot of emphasis on things they have seen and experienced themselves, which may not be the best guide to decision-making. For example, somebody may buy an overvalued share because a relative has made thousands on it, only to get his fingers burned. In finance, too much emphasis on information close at hand helps to explain the tendency by most investors to invest only within the country they live in. Even though they know that diversification is good for their portfolio, a large majority of both Americans and Europeans invest far too heavily in the shares of their home countries. They would be much better off spreading their risks more widely.

5

G More information is helpful in making any decision but, says Kahneman, people spend proportionally too much time on small decisions and not enough on big ones. They need to adjust the balance. During the boom years, some companies put as much effort into planning their office party as into considering strategic mergers.

6

H Finally, crying over spilled milk is not just a waste of time; it also often colours people's perceptions of the future. Some stock market investors trade far too frequently because they are chasing the returns on shares they wish they had bought earlier.

I Kahneman reckons that some types of businesses are much better than others at dealing with risk. Pharmaceutical companies, which are accustomed to many failures and a few big successes in their drug-discovery programmes, are fairly rational about their risk-taking. But banks, he says, have a long way to go. They may take big risks on a few huge loans, but are

extremely cautious about their much more numerous loans to small businesses, many of which may be less risky than the big ones. And the research has implications for governments too. They face a whole range of sometimes conflicting political pressures, which means they are even more likely to take irrational decisions.

PART 1 — QUESTIONS

Questions 1-6

Choose the correct heading for Paragraphs B and D-H from the list of headings

below. Write the correct number (i-xi).

i. **Not identifying the correct priorities**

ii. **A solution for the long term**

iii. **The difficulty of changing your mind**

iv. **Why looking back is unhelpful**

v. **Strengthening inner resources**

vi. **A successful approach to the study of decision-making**

vii. **The danger of trusting a global market**

viii. **Reluctance to go beyond the familiar**

ix. **The power of the first number**

x. **The need for more effective risk assessment**

xi. **Underestimating the difficulties ahead**

Questions 7-10

Choose the correct answer, A, B, C or D.

7 People initially found Kahneman's work unusual because he

A ○ A saw mistakes as following predictable patterns.

B ○ B was unaware of behavioural approaches.

C ○ C dealt with irrational types of practice.

D ○ D applied psychology to finance and economics.

8 The writer mentions house-owners' attitudes towards the value of their homes to illustrate that

A ○ A past failures may destroy an optimistic attitude.

B ○ B people tend to exaggerate their chances of success.

C ○ C optimism may be justified in certain circumstances.

D ○ D people are influenced by the success of others.

9 Stubbornness and inflexibility can cause problems when people

A ○ A think their financial difficulties are just due to bad luck.

B ○ B avoid seeking advice from experts and analysts.

C ○ C refuse to invest in the early stages of a project.

D ○ D are unwilling to give up unsuccessful activities or beliefs.

10 Why do many Americans and Europeans fail to spread their financial risks when investing?

A ○ A They feel safer dealing in a context which is close to home.

B ○ B They do not understand the benefits of diversification.

C ○ C They are over-influenced by the successes of their relatives.

D ○ D They do not have sufficient knowledge of one another's countries.

Questions 11-13

Answer the questions below, using NO MORE THAN THREE WORDS for each

answer.

11 Which two occupations may benefit from being over-optimistic? _____

12 Which practical skill are many people over-confident about? _____

13 Which type of business has a generally good attitude to dealing with uncertainty?

_____

PASSAGE 2

You should spend about 20 minutes on Questions 14-26, which are based on Reading Passage 2 below.

There has always been a sense in which America and Europe owned film. They invented it at the end of the nineteenth century in unfashionable places like New Jersey, Leeds and the suburbs of Lyons. At first, they saw their clumsy new camera-projectors merely as more profitable versions of Victorian lantern shows, mechanical curiosities which might have a use as a sideshow at a funfair. Then the best of the pioneers looked beyond the fairground properties of their invention. A few directors, now mostly forgotten, saw that the flickering new medium was more than just a diversion. This crass commercial invention gradually began to evolve as an art. DW Griffith in California glimpsed its grace, German directors used it as an analogue to the human mind and the modernising city, Soviets emphasised its agitational and intellectual properties, and the Italians reconfigured it on an operatic scale.

So heady were these first decades of cinema that America and Europe can be forgiven for assuming that they were the only game in town. In less than twenty years western cinema had grown out of all recognition; its unknowns became the most famous people in the world; it made millions. It never occurred to its financial backers that another continent might borrow their magic box and make it its own. But film industries were emerging in Shanghai, Bombay and Tokyo, some of which would outgrow those in the west.

Between 1930 and 1935, China produced more than 500 films, mostly conventionally made in studios in Shanghai, without soundtracks. China's best directors – Bu Wancang and Yuan Muzhi – introduced elements of realism to their stories. The Peach Girl (1931) and Street Angel (1937) are regularly voted among the best ever made in the country.

India followed a different course. In the west, the arrival of talkies gave birth to a new genre – the musical – but in India, every one of the 5000 films made between 1931 and the mid-1950s had musical interludes. The films were stylistically more wide-ranging than the western musical, encompassing realism and escapist dance within individual sequences, and they were often three hours long rather than Hollywood's 90 minutes. The cost of such productions resulted in a distinctive national style of cinema. They were often made in Bombay, the centre of what is now known as 'Bollywood'. Performed in Hindi (rather than any of the numerous regional languages), they addressed social and peasant themes in an optimistic and romantic way and found markets in the Middle East, Africa and the Soviet Union.

In Japan, the film industry did not rival India's in size but was unusual in other ways. Whereas in Hollywood the producer was the central figure, in Tokyo the director chose the stories and hired the producer and actors. The model was that of an artist and his studio of apprentices. Employed by a studio as an assistant, a future director worked with senior figures, learned his craft, gained authority, until promoted to director with the power to select screenplays and performers. In the 1930s and 40s, this freedom of the director led to the production of some of Asia's finest films.

The films of Kenji Mizoguchi were among the greatest of these. Mizoguchi's films were usually set in the nineteenth century and analysed the way in which the lives of the female characters whom he chose as his focus were constrained by the society of the time. From Osaka Elegy (1936) to Ugetsu Monogatari (1953) and beyond, he evolved a sinuous way of moving his camera in and around a scene, advancing towards significant details but often retreating at moments of confrontation or strong feeling. No one had used the camera with such finesse before.

Even more important for film history, however, is the work of the great Ozu. Where Hollywood cranked up drama, Ozu avoided it. His camera seldom moved. It nestled at seated height, framing people square on, listening quietly to their words. Ozu rejected the conventions of editing, cutting not on action, as is usually done in the west, but for visual balance. Even more strikingly, Ozu regularly cut away from his action to a shot of a tree or a kettle or clouds, not to establish a new location but as a moment of repose. Many historians now compare such 'pillow shots' to the Buddhist idea that mu – empty space or nothing – is itself an element of composition.

As the art form most swayed by money and market, cinema would appear to be too busy to bother with questions of philosophy. The Asian nations proved and are still proving that this is not the case. Just as deep ideas about individual freedom have led to the aspirational cinema of Hollywood, so it is the beliefs which underlie cultures such as those of China and Japan that explain the distinctiveness of Asian cinema at its best. Yes, these films are visually striking, but it is their different sense of what a person is, and what space and action are, which makes them new to western eyes.

PART 2 — QUESTIONS

Questions 14-18

Do the following statements agree with the information given in Reading

Passage 2?

TRUE

if the statement agrees with the information

FALSE

if the statement contradicts the information

NOT GIVEN

if there is no information on this

14 The inventors of cinema regarded it as a minor attraction.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

15 Some directors were aware of cinema's artistic possibilities from the very beginning.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

16 The development of cinema's artistic potential depended on technology.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

17 Cinema's possibilities were developed in varied ways in different western countries.

- **A** ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

18 Western businessmen were concerned about the emergence of film industries in other parts of the world.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

Questions 19-25

Complete the notes below using the list of words (A-K) from the box below.

Write the correct letters.

Chinese cinema

- large number of **19** _____ films produced in 1930s
- some early films still generally regarded as **20** _____

Indian cinema

- films included musical interludes
- films avoided **21** _____ topics

Japanese cinema

- unusual because film director was very **22** _____
- two important directors:
  - Mizoguchi-focused on the **23** _____ restrictions faced by women
    - camera movement related to **24** _____ content
  - Ozu **25** _____ camera movement

A. **emotional** B. **negative** C. **expensive** D. **silent** E. **social**

F. **outstanding** G. **little** H. **powerful** I. **realistic** J. **stylistic**

K. **economic**

Questions 26-26

Which of the following is the most suitable title for Reading Passage 2?

26 Which of the following is the most suitable title for Reading Passage 2?

- **A** ○ Blind to change: how is it that the west has ignored Asian cinema for so long?
- **B** ○ A different basis: how has the cinema of Asian countries been shaped by their cultures and beliefs?
- **C** ○ Outside Asia: how did the origins of cinema affect its development worldwide?
- **D** ○ Two cultures: how has western cinema tried to come to terms with the challenge of the Asian market?

PASSAGE 3

You should spend about 20 minutes on Questions 27-40, which are based on Reading Passage 3 below.

Quiet roads ahead

The roar of passing vehicles could soon be a thing of the past

A The noise produced by busy roads is a growing problem. While vehicle designers have worked hard to quieten engines, they have been less successful elsewhere. The sound created by the tyres on the surface of the road now accounts for more than half the noise that vehicles create, and as road building and car sales continue to boom - particularly in Asia and the US - this is turning into a global issue.

B According to the World Health Organization, exposure to noise from road traffic over long periods can lead to stress-related health problems. And where traffic noise exceeds a certain threshold, road builders have to spend money erecting sound barriers and installing double glazing in blighted homes. Houses become harder to sell where environmental noise is high, and people are not as efficient or productive at work.

C Already, researchers in the Netherlands - one of the most densely populated countries in the world - are working to develop techniques for silencing the roads. In the next five years the Dutch government aims to have reduced noise levels from the country's road surfaces by six decibels overall. Dutch mechanical engineer Ard Kuijpers has come up with one of the most promising, and radical, ideas. He set out to tackle the three most important factors: surface texture, hardness and ability to absorb sound.

D The rougher the surface, the more likely it is that a tyre will vibrate and create noise. Road builders usually eliminate bumps on freshly laid asphalt with heavy rollers, but Kuijpers has developed a method of road building that he thinks can create the ultimate quiet road. His secret is a special mould 3 metres wide and 50 metres long. Hot asphalt, mixed with small stones, is spread into the mould by a rail-mounted machine which flattens the asphalt mix with a roller. When it sets, the 10-millimetre-thick sheet has a surface smoother than anything that can be achieved by conventional methods.

E To optimise the performance of his road surface - to make it hard wearing yet soft enough to snuff out vibrations - he then adds another layer below the asphalt. This consists of a 30-millimetre-thick layer of rubber, mixed with stones which are larger than those in the layer above. 'It's like a giant mouse mat, making the road softer,' says Kuijpers.

F The size of the stones used in the two layers is important, since they create pores of a specific size in the road surface. Those used in the top layer are just 4 or 5 millimetres across, while the ones below are approximately twice that size - about 9 millimetres. Kuijpers says the surface can absorb any air that is passing through a tyre's tread, damping oscillations that would otherwise create noise. And in addition they make it easier for the water to drain away, which can make the road safer in wet weather.

G Compared with the complex manufacturing process, laying the surface is quite simple. It emerges from the factory rolled, like a carpet, onto a drum 1.5 metres in diameter. On site, it is unrolled and stuck onto its foundation with bitumen. Even the white lines are applied in the factory.

H The foundation itself uses an even more sophisticated technique to reduce noise further. It consists of a sound-absorbing concrete base containing flask-shaped slots up to 10 millimetres wide and 30 millimetres deep that are open at the top and sealed at the lower end. These cavities act like Helmholtz resonators - when sound waves of specific frequencies enter the top of a flask, they set up resonances inside and the energy of the sound dissipates into the concrete as heat. The cavities play another important role: they help to drain water that seeps through from the upper surface. This flow will help flush out waste material and keep the pores in the outer layers clear.

I Kuijpers can even control the sounds that his resonators absorb, simply by altering their dimensions. This could prove especially useful since different vehicles produce noise at different frequencies. Car tyres peak at around 1000 hertz, for example, but trucks generate lower-frequency noise at around 600 hertz. By varying the size of the Kuijpers resonators, it is possible to control which frequencies the concrete absorbs. On large highways, trucks tend to use the inside lane, so resonators here could be tuned to absorb sounds at around 600 hertz while those in other lanes could deal with higher frequency noise from cars.

J Kuijpers believes he can cut noise by five decibels compared to the quietest of today's roads. He has already tested a 100-metre-long section of his road on a motorway near Apeldoorn, and Dutch construction company Heijmans is discussing the location of the next roll-out road with the country's government. The success of Kuijpers' design will depend on how much it eventually costs. But for those affected by traffic noise there is hope of quieter times ahead.

PART 3 — QUESTIONS

Questions 27-32

Reading Passage 3 has ten paragraphs labelled A-J.

Which paragraph contains the following information?

Write the correct letter A-J.

	A	B	C	D	E	F	G	H	I	J
27 a description of the form in which Kuijpers' road surface is taken to its destination	○	○	○	○	○	○	○	○	○	○
28 an explanation of how Kuijpers makes a smooth road surface	○	○	○	○	○	○	○	○	○	○
29 something that has to be considered when evaluating Kuijpers' proposal	○	○	○	○	○	○	○	○	○	○
30 various economic reasons for reducing road noise	○	○	○	○	○	○	○	○	○	○
31 a generalisation about the patterns of use of vehicles on major roads	○	○	○	○	○	○	○	○	○	○
32 a summary of the different things affecting levels of noise on roads	○	○	○	○	○	○	○	○	○	○

Questions 33-35

Label the diagram below.

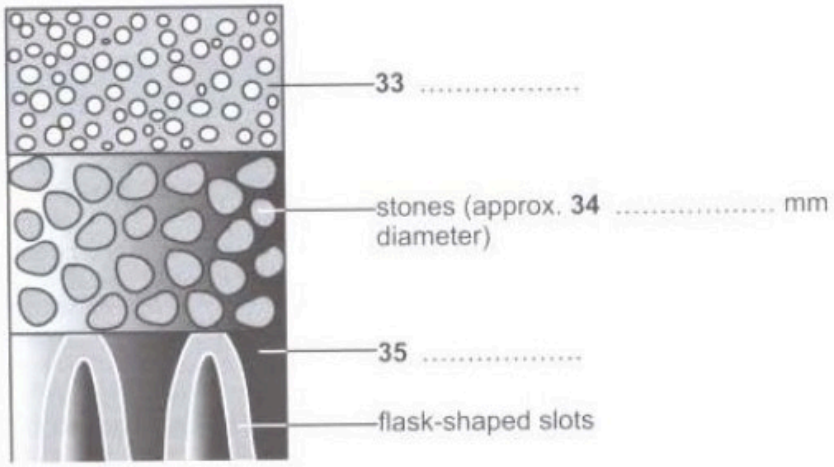
Choose NO MORE THAN ONE WORD AND/OR A NUMBER from the passage

for each answer.

section of the text, or to several paragraphs.

Write your answers in boxes 33–35 on your answer sheet.

Cross section of Kuijpers' proposed noise-reducing road



33 _____

34 _____

35 _____

Questions 36-40

Complete the table below using the list of words (A-K) from the box below.

Write the correct letters.

Layer	Component	Function
upper and lower	stones	• reduce oscillations caused by **36** _____ • create pores which help **37** _____
foundation	slots	• convert **38** _____ to heat. • help to remove **39** _____

Layer	Component	Function
		• can be adapted to absorb different **40** _____

A. **frequencies** B. **the engine** C. **rubbish** D. **resonators** E. **air flow**

F. **dissipation** G. **sound energy** H. **pores** I. **lanes** J. **drainage**

K. **sources**

Answer Key

#	Answer	Explanation
1	**vi**	When Kahneman and his colleagues first started work, the idea of applying psychological insights to economics and business decisions was seen as rather bizarre. But in the past decade the fields of behavioural finance and behavioural economics have blossomed, and in 2002 Kahneman shared a Nobel Prize in economics for his work. Today he is in demand by business organisations and international banking companies
2	**ix**	Another source of wrong decisions is related to the decisive effect of the initial meeting, particularly in negotiations over money. This is referred to as the 'anchor effect'. Once a figure has been mentioned, it takes a strange hold over the human mind
3	**iii**	In addition, mistakes may arise due to stubbornness. No one likes to abandon a cherished belief, and the earlier a decision has been taken, the harder it is to abandon it
4	**viii**	In finance, too much emphasis on information close at hand helps to explain the tendency by most investors to invest only within the country they live in. Even though they know that diversification is good for their portfolio, a large majority of both Americans and Europeans invest far too heavily in the shares of their home countries
5	**i**	More information is helpful in making any decision but, says Kahneman, people spend proportionally too much time on small decisions and not enough on big ones. They need to adjust the balance. During the boom years, some companies put as much effort into planning their office party as into considering strategic mergers
6	**iv**	Finally, crying over spilled milk is not just a waste of time; it also often colours people's perceptions of the future
7	**D**	When Kahneman and his colleagues first started work, the idea of applying psychological insights to economics and business decisions was seen as rather bizarre
8	**B**	One common cause of problems in decision-making is over-optimism. Ask most people about the future, and they will see too much blue sky ahead, even if past experience suggests otherwise. Surveys have shown that people's forecasts of future stock market movements are far more optimistic than past long-term returns would justify. The same goes for their hopes of ever-rising prices for their homes or doing well in games of chance

#	Answer	Explanation
9	**D**	In addition, mistakes may arise due to stubbornness. No one likes to abandon a cherished belief, and the earlier a decision has been taken, the harder it is to abandon it. Drug companies must decide early to cancel a failing research project to avoid wasting money, but may find it difficult to admit they have made a mistake
10	**A**	In finance, too much emphasis on information close at hand helps to explain the tendency by most investors to invest only within the country they live in. Even though they know that diversification is good for their portfolio, a large majority of both Americans and Europeans invest far too heavily in the shares of their home countries
11	**managers and sportsmen / managers or sportsmen**	Such optimism can be useful for managers or sportsmen, and sometimes turns into a self-fulfilling prophecy
12	**driving**	First, people tend to exaggerate their own skill and prowess; in polls, far fewer than half the respondents admit to having below-average skills in, say, driving
13	**Pharmaceutical (companies)**	Pharmaceutical companies, which are accustomed to many failures and a few big successes in their drug-discovery programmes, are fairly rational about their risk-taking
14	**TRUE**	At first, they saw their clumsy new camera-projectors merely as more profitable versions of Victorian lantern shows, mechanical curiosities which might have a use as a sideshow at a funfair
15	**FALSE**	At first, they saw their clumsy new camera-projectors merely as more profitable versions of Victorian lantern shows, mechanical curiosities which might have a use as a sideshow at a funfair. Then the best of the pioneers looked beyond the fairground properties of their invention. A few directors, now mostly forgotten, saw that the flickering new medium was more than just a diversion. This crass commercial invention gradually began to evolve as an art
16	**NOT GIVEN**	This crass commercial invention gradually began to evolve as an art. DW Griffith in California glimpsed its grace, German directors used it as an analogue to the human mind and the modernising city, Soviets emphasised its agitational and intellectual properties, and the Italians reconfigured it on an operatic scale
17	**TRUE**	DW Griffith in California glimpsed its grace, German directors used it as an analogue to the human mind and the modernising city, Soviets emphasised its agitational and intellectual properties, and the Italians reconfigured it on an operatic scale

#	Answer	Explanation
18	**FALSE**	It never occurred to its financial backers that another continent might borrow their magic box and make it its own
19	**D**	Between 1930 and 1935, China produced more than 500 films, mostly conventionally made in studios in Shanghai, without soundtracks
20	**F**	The Peach Girl (1931) and Street Angel (1937) are regularly voted among the best ever made in the country
21	**B**	Performed in Hindi (rather than any of the numerous regional languages), they addressed social and peasant themes in an optimistic and romantic way and found markets in the Middle East, Africa and the Soviet Union
22	**H**	Whereas in Hollywood the producer was the central figure, in Tokyo the director chose the stories and hired the producer and actors until promoted to director with the power to select screenplays and performers In the 1930s and 40s, this freedom of the director led to the production of some of Asia's finest films
23	**E**	Mizoguchi's films were usually set in the nineteenth century and analysed the way in which the lives of the female characters whom he chose as his focus were constrained by the society of the time.
24	**A**	From Osaka Elegy (1936) to Ugetsu Monogatari (1953) and beyond, he evolved a sinuous way of moving his camera in and around a scene, advancing towards significant details but often retreating at moments of confrontation or strong feeling
25	**G**	His camera seldom moved
26	**B**	Yes, these films are visually striking, but it is their different sense of what a person is, and what space and action are, which makes them new to western eyes
27	**G**	It emerges from the factory rolled, like a carpet, onto a drum 1.5 metres in diameter
28	**D**	Kuijpers has developed a method of road building that he thinks can create the ultimate quiet road. His secret is a special mould 3 metres wide and 50 metres long. Hot asphalt, mixed with small stones, is spread into the mould by a rail-mounted machine which flattens the asphalt mix with a roller. When it sets, the 10-millimetre-thick sheet has a surface smoother than anything that can be achieved by conventional methods
29	**J**	The success of Kuijpers' design will depend on how much it eventually costs

#	Answer	Explanation
30	**B**	And where traffic noise exceeds a certain threshold, road builders have to spend money erecting sound barriers and installing double glazing in blighted homes. Houses become harder to sell where environmental noise is high, and people are not as efficient or productive at work
31	**I**	On large highways, trucks tend to use the inside lane, so resonators here could be tuned to absorb sounds at around 600 hertz while those in other lanes could deal with higher frequency noise from cars
32	**C**	He set out to tackle the three most important factors: surface texture, hardness and ability to absorb sound
33	**asphalt**	Hot asphalt, mixed with small stones, is spread into the mould by a rail-mounted machine which flattens the asphalt mix with a roller. When it sets, the 10-millimetre-thick sheet has a surface smoother than anything that can be achieved by conventional methods
34	**9/nine**	Those used in the top layer are just 4 or 5 millimetres across, while the ones below are approximately twice that size – about 9 millimetres
35	**concrete**	It consists of a sound-absorbing concrete base containing flask-shaped slots up to 10 millimetres wide and 30 millimetres deep that are open at the top and sealed at the lower end
36	**E**	Kuijpers says the surface can absorb any air that is passing through a tyre's tread, damping oscillations that would otherwise create noise
37	**J**	The cavities play another important role: they help to drain water that seeps through from the upper surface
38	**G**	These cavities act like Helmholtz resonators – when sound waves of specific frequencies enter the top of a flask, they set up resonances inside and the energy of the sound dissipates into the concrete as heat
39	**C**	The cavities play another important role: they help to drain water that seeps through from the upper surface. This flow will help flush out waste material and keep the pores in the outer layers clear
40	**A**	Kuijpers can even control the sounds that his resonators absorb, simply by altering their dimensions. This could prove especially useful since different vehicles produce noise at different frequencies. Car tyres peak at around 1000 hertz, for example, but trucks generate lower-frequency noise at around 600 hertz.

#	Answer	Explanation
		By varying the size of the Kuijpers resonators, it is possible to control which frequencies the concrete absorbs

Test 88

PASSAGE 1

You should spend about 20 minutes on Questions 1-13, which are based on Reading Passage 1 below.

A song on the brain

Some songs just won't leave you alone. But this may give us clues about how our brain works

A Everyone knows the situation where you can't get a song out of your head. You hear a pop song on the radio - or even just read the song's title - and it haunts you for hours, playing over and over in your mind until you're heartily sick of it. The condition now even has a medical name - 'song-in-head syndrome'.

B But why does the mind annoy us like this? No one knows for sure, but it's probably because the brain is better at holding onto information than it is at knowing what information is important. Roger Chaffin, a psychologist at the University of Connecticut says, 'It's a manifestation of an aspect of memory which is normally an asset to us, but in this instance it can be a nuisance.'

C This eager acquisitiveness of the brain may have helped our ancestors remember important information in the past. Today, students use it to learn new material, and musicians rely on it to memorise complicated pieces. But when this useful function goes awry it can get you stuck on a tune. Unfortunately, superficial, repetitive pop tunes are, by their very nature, more likely to stick than something more inventive.

D The annoying playback probably originates in the auditory cortex. Located at the front of the brain, this region handles both listening and playback of music and other sounds. Neuroscientist Robert Zatorre of McGill University in Montreal proved this some years ago when he asked volunteers to replay the theme from the TV show Dallas in their heads. Brain imaging studies showed that this activated the same region of the auditory cortex as when the people actually heard the song.

E Not every stored musical memory emerges into consciousness, however. The frontal lobe of the brain gets to decide which thoughts become conscious and which ones are simply stored away. But it can become fatigued or depressed, which is when people most commonly suffer from song-in-head syndrome and other intrusive thoughts, says Susan Ball, a clinical psychologist at Indiana University School of Medicine in Indianapolis. And once the unwanted song surfaces, it's hard to stuff it back down into the subconscious. 'The more you try to suppress a thought, the more you get it,' says Ball. 'We call this the pink elephant phenomenon. Tell the brain not to think about pink elephants, and it's guaranteed to do so,' she says.

F For those not severely afflicted, simply avoiding certain kinds of music can help. 'I know certain pieces that are kind of "sticky" to me, so I will not play them in the early morning for fear

that they will run around in my head all day,' says Steven Brown, who trained as a classical pianist but is now a neuroscientist at the University of Texas Health Science Center at San Antonio. He says he always has a song in his head and, even more annoying, his mind never seems to make it all the way through. 'It tends to involve short fragments between, say, 5 or 15 seconds. They seem to get looped, for hours sometimes,' he says.

G Brown's experience of repeated musical loops may represent a phenomenon called 'chunking', in which people remember musical phrases as a single unit of memory, says Caroline Palmer, a psychologist at Ohio State University in Columbus. Most listeners have little choice about what chunks they remember. Particular chunks may be especially 'sticky' if you hear them often or if they follow certain predictable patterns, such as the chord progression of rock 'n' roll music. Palmer's research shows that the more a piece of music conforms to these patterns, the easier it is to remember. That's why you're more likely to be haunted by the tunes of pop music than by those of a classical composer such as J. S. Bach.

H But this ability can be used for good as well as annoyance. Teachers can tap into memory reinforcement by setting their lessons to music. For example, in one experiment students who heard a history text set as the lyrics to a catchy song remembered the words better than those who simply read them, says Sandra Calvert, a psychologist at Georgetown University in Washington DC.

I This sort of memory enhancement may even explain the origin of music. Before the written word could be used to record history, people memorised it in songs, says Leon James, a psychologist at the University of Hawaii. And music may have had an even more important role. 'All music has a message,' he says. 'This message functions to unite society and to standardise the thought processes of people in society.'

PART 1 — QUESTIONS

Questions 1-3

Choose the correct answer, A, B, C or D.

1 The writer says that 'song-in-head syndrome' may occur because the brain

- **A** ○ confuses two different types of memory.
- **B** ○ cannot decide what information it needs to retain.
- **C** ○ has been damaged by harmful input.
- **D** ○ cannot hold onto all the information it processes.

2 A tune is more likely to stay in your head if

- **A** ○ it is simple and unoriginal.
- **B** ○ you have musical training.
- **C** ○ it is part of your culture.
- **D** ○ you have a good memory.

3 Robert Zatorre found that a part of the auditory cortex was activated when volunteers

- **A** ○ listened to certain types of music.
- **B** ○ learned to play a tune on an instrument.
- **C** ○ replayed a piece of music after several years.
- **D** ○ remembered a tune they had heard previously.

Questions 4-7

Look at the following theories and the list of people below.

Match each theory with the person it is credited to.

Write the correct letter A-F.

A. Roger Chaffin

B. Susan Ball

C. Steven Brown

D. Caroline Palmer

E. Sandra Calvert

F. Leon James

	A	B	C	D	E	F
4 The memorable nature of some tunes can help other learning processes.	○	○	○	○	○	○
5 Music may not always be stored in the memory in the form of separate notes.	○	○	○	○	○	○
6 People may have started to make music because of their need to remember things.	○	○	○	○	○	○
7 Having a song going round your head may happen to you more often when one part of the brain is tired.	○	○	○	○	○	○

Questions 8-13

Reading Passage 1 has nine paragraphs labelled A-I.

Which paragraph contains the following information?

Write the correct letter A-I.

NB You may use any letter more than once.

	A	B	C	D	E	F	G	H	I
8 a claim that music strengthens social bonds	○	○	○	○	○	○	○	○	○
9 two reasons why some bits of music tend to stick in your mind more than others	○	○	○	○	○	○	○	○	○
10 an example of how the brain may respond in opposition to your wishes	○	○	○	○	○	○	○	○	○

	A	B	C	D	E	F	G	H	I
11 the name of the part of the brain where song-in-head syndrome begins	○	○	○	○	○	○	○	○	○
12 examples of two everyday events that can set off song-in-head syndrome	○	○	○	○	○	○	○	○	○
13 a description of what one person does to prevent song-in-head syndrome	○	○	○	○	○	○	○	○	○

PASSAGE 2

You should spend about 20 minutes on Questions 14-27, which are based on Reading Passage 2 below.

Worldly Wealth

Can the future population of the world enjoy a comfortable lifestyle, with possessions, space and mobility, without crippling the environment?

The world's population is expected to stabilize at around nine billion. Will it be possible for nine billion people to have the lifestyle enjoyed today only by the wealthy? One school of thought says no: not only should the majority of the world's people resign themselves to poverty forever, but rich nations must also revert to simpler lifestyles in order to save the planet.

Admittedly, there may be political or social barriers to achieving a rich world. But in fact there seems to be no insuperable physical or ecological reason why nine billion people should not achieve a comfortable lifestyle, using technology only slightly more advanced than that which we now possess. In thinking about the future of civilization, we ought to start by asking what people want. The evidence demonstrates that as people get richer they want a greater range of personal technology, they want lots of room (preferably near or in natural surroundings) and they want greater speed in travel. More possessions, more space, more mobility.

In the developed world, the personal technologies of the wealthy, including telephones, washing machines and cars, have become necessities within a generation or two. Increasing productivity that results in decreasing costs for such goods has been responsible for the greatest gains in the standard of living, and there is every reason to believe that this will continue.

As affluence grows, the amount of energy and raw materials used for production of machinery will therefore escalate. But this need not mean an end to the machine age. Rather than being thrown away, materials from old machinery can be recycled by manufacturers. And long before all fossil fuels are exhausted, their rising prices may compel industrial society not only to become more energy efficient but also to find alternative energy sources sufficient for the demands of an advanced technological civilization - nuclear fission, nuclear fusion, solar energy, chemical photosynthesis, geothermal, biomass or some yet unknown source of energy.

The growth of cities and suburbs is often seen as a threat to the environment. However, in fact the increasing amount of land consumed by agriculture is a far greater danger than urban sprawl. Stopping the growth of farms is the best way to preserve many of the world's remaining wild areas. But is a dramatic downsizing of farmland possible? Thanks to the growth of agricultural productivity, reforestation and 're-wilding' has been under way in the industrial countries for generations. Since 1950 more land in the US has been set aside in parks than has been occupied by urban and suburban growth. And much of what was farmland in the nineteenth century is now forest again. Taking the best Iowa maize growers as the norm for world food productivity, it has been calculated that less than a tenth of present cropland could support a population of 10 billion.

In The Environment Game, a vision of a utopia that would be at once high-tech and environmentalist, Nigel Calder suggested that 'nourishing but unpalatable primary food produced by industrial techniques — like yeast from petroleum — may be fed to animals, so that we can continue to eat our customary meat, eggs, milk, butter, and cheese — and so that people in underdeveloped countries can have adequate supplies of animal protein for the first time.'

In the long run, tissue-cloning techniques could be used to grow desired portions of meat by themselves. Once their DNA has been extracted to create cowless steaks and chickenless drumsticks, domesticated species of livestock, bred for millennia to be stupid or to have grotesquely enhanced traits, should be allowed to become extinct, except for a few specimens in zoos. However, game such as wild deer, rabbits and wild ducks will be ever more abundant as farms revert to wilderness, so this could supplement the laboratory-grown meat in the diets of tomorrow's affluent.

With rising personal incomes come rising expectations of mobility. This is another luxury of today's rich that could become a necessity of tomorrow's global population - particularly if its members choose to live widely dispersed in a post-agrarian wilderness. In his recent book Free Flight, James Fallows, a pilot as well as a writer, describes serious attempts by both state and private entrepreneurs in the USA to promote an 'air taxi' system within the price range of today's middle class - and perhaps tomorrow's global population.

Two of the chief obstacles to the science fiction fantasy of the personal plane or hover car are price and danger. While technological improvements are driving prices down, piloting an aircraft in three dimensions is still more difficult than driving a car in two, and pilot error causes more fatalities than driver error. But before long our aircraft and cars will be piloted by computers which are never tired or stressed.

So perhaps there are some grounds for optimism when viewing the future of civilization. With the help of technology, and without putting serious strains on the global environment, possessions, space and mobility can be achieved for all the projected population of the world.

PART 2 — QUESTIONS

Questions 14-19

Do the following statements reflect the claims of the writer in Reading Passage 2?

write

YES if the statement reflects the writer's claims

NO if the statement contradicts the writer's claims

NOT GIVEN if it is impossible to say what the writer thinks about this

14 Today's wealthy people ignore the fact that millions are living in poverty.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

15 There are reasons why the future population of the world may not enjoy a comfortable lifestyle.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

16 The first thing to consider when planning for the future is environmental protection.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

17 As manufactured goods get cheaper, people will benefit more from them.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

18 It may be possible to find new types of raw materials for use in the production of machinery.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

19 The rising prices of fossil fuels may bring some benefits.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

Questions 20-25

Complete the summary below.

Choose ONE WORD ONLY from the passage for each answer.

Space for an increased population

According to the writer, the use of land for **20** _____ is the most serious threat to the environment. However, in the US, there has already been an increase in the amount of land used for **21** _____ and forests. Far less land would be required to feed the world's population if the **22** _____ of the land could be improved worldwide. It has also been claimed that the industrial production of animal foods could allow greater access to animal **23** _____ by the entire world's population. Scientists could use **24** _____ from domesticated animals to help produce meat by tissue cloning, and these species could then be allowed to die out. In addition to this type of meat, **25** _____ will also be widely available.

Questions 26-27

Choose the correct answer, A, B, C or D.

26 Greater mobility may be a feature of the future because of changes in

A ○ the location of housing.

B ○ patterns of employment.

C ○ centres of transport.

D ○ the distribution of wealth.

27 Air transport will be safe because of

A ○ new types of aircraft.

B ○ better training methods.

C ○ three-dimensional models.

D ○ improved technology.

PASSAGE 3

You should spend about 20 minutes on Questions 28-40, which are based on Reading Passage 3 below.

Space: The Final Archaeological Frontier

Space travel may still have a long way to go, but the notion of archaeological research and heritage management in space is already concerning scientists and environmentalists.

In 1993, University of Hawaii's anthropologist Ben Finney, who for much of his career has studied the technology once used by Polynesians to colonize islands in the Pacific, suggested that it would not be premature to begin thinking about the archaeology of Russian and American aerospace sites on the Moon and Mars. Finney pointed out that just as today's scholars use archaeological records to investigate how Polynesians diverged culturally as they explored the Pacific, archaeologists will someday study off-Earth sites to trace the development of humans in space. He realized that it was unlikely anyone would be able to conduct fieldwork in the near future, but he was convinced that one day such work would be done.

There is a growing awareness, however, that it won't be long before both corporate adventurers and space tourists reach the Moon and Mars. There is a wealth of important archaeological sites from the history of space exploration on the Moon and Mars and measures need to be taken to protect these sites. In addition to the threat from profit-seeking corporations, scholars cite other potentially destructive forces such as souvenir hunting and unmonitored scientific sampling, as has already occurred in explorations of remote polar regions. Already in 1999 one company was proposing a robotic lunar rover mission beginning at the site of Tranquility Base and rumbling across the Moon from one archaeological site to another, from the wreck of the Ranger 8 probe to Apollo 17's landing site. The mission, which would leave vehicle tyre-marks all over some of the most famous sites on the Moon, was promoted as a form of theme-park entertainment.

According to the vaguely worded United Nations Outer Space Treaty of 1967, what it terms 'space junk' remains the property of the country that sent the craft or probe into space. But the treaty doesn't explicitly address protection of sites like Tranquility Base, and equating the remains of human exploration of the heavens with 'space junk' leaves them vulnerable to scavengers. Another problem arises through other international treaties proclaiming that land in space cannot be owned by any country or individual. This presents some interesting dilemmas for the aspiring manager of extraterrestrial cultural resources. Does the US own Neil Armstrong's famous first footprints on the Moon but not the lunar dust in which they were recorded? Surely those footprints are as important in the story of human development as those left by hominids at Laetoli, Tanzania. But unlike the Laetoli prints, which have survived for 3.5 million years encased in cement-like ash, those at Tranquility Base could be swept away with a casual brush of a space tourist's hand. To deal with problems like these, it may be time to look to innovative international administrative structures for the preservation of historic remains on the new frontier.

The Moon, with its wealth of sites, will surely be the first destination of archaeologists trained to work in space. But any young scholars hoping to claim the mantle of history's first lunar archaeologist will be disappointed. That distinction is already taken.

On November 19, 1969, astronauts Charles Conrad and Alan Bean made a difficult manual landing of the Apollo 12 lunar module in the Moon's Ocean of Storms, just a few hundred feet from an unmanned probe, Surveyor 3, that had landed in a crater on April 19, 1967. Unrecognized at the time, this was an important moment in the history of science. Bean and Conrad were about to conduct the first archaeological studies on the Moon.

After the obligatory planting of the American flag and some geological sampling, Conrad and Bean made their way to Surveyor 3. They observed that the probe had bounced after touchdown and carefully photographed the impressions made by its footpads. The whole spacecraft was covered in dust, perhaps kicked up by the landing.

The astronaut-archaeologists carefully removed the probe's television camera, remote sampling arm, and pieces of tubing. They bagged and labelled these artefacts, and stowed them on board their lunar module. On their return to Earth, they passed them on to the Daveson Space Center in Houston, Texas, and the Hughes Air and Space Corporation in El Segundo, California. There, scientists analyzed the changes in these aerospace artefacts.

One result of the analysis astonished them. A fragment of the television camera revealed evidence of the bacteria Streptococcus mitis. For a moment it was thought Conrad and Bean had discovered evidence for life on the Moon, but after further research the real explanation became apparent. While the camera was being installed in the probe prior to the launch, someone sneezed on it. The resulting bacteria had travelled to the Moon, remained in an alternating freezing/boiling vacuum for more than two years, and returned promptly to life upon reaching the safety of a laboratory back on Earth.

The finding that not even the vastness of space can stop humans from spreading a sore throat was an unexpected spin-off. But the artefacts brought back by Bean and Conrad have a broader significance. Simple as they may seem, they provide the first example of extraterrestrial archaeology and - perhaps more significant for the history of the discipline - formational archaeology, the study of environmental and cultural forces upon the life history of human artefacts in space.

PART 3 — QUESTIONS

Questions 28-33

Complete each sentence with the correct ending A-H from the box below.

Write the correct letter A-H.

• Ben Finney's main academic work investigates the way that **28** _____

• Ben Finney thought that in the long term **29** _____

• Commercial pressures mean that in the immediate future **30** _____

• Academics are concerned by the fact that in isolated regions on Earth, **31** _____

• One problem with the 1967 UN treaty is that **32** _____

• The wording of legal agreements over ownership of land in space means that **33** _____

A. **activities of tourists and scientists have harmed the environment.**

B. **some sites in space could be important in the history of space exploration.**

C. **vehicles used for tourism have polluted the environment.**

D. **it may be unclear who has responsibility for historic human footprints.**

E. **past explorers used technology in order to find new places to live.**

F. **man-made objects left in space are regarded as rubbish.**

G. **astronauts may need to work more closely with archaeologists.**

H. **important sites on the Moon may be under threat.**

Questions 34-38

Complete the flow chart below.

Choose NO MORE THAN ONE WORD from the passage for each answer.

During the assembly of the Surveyor 3 probe, someone **34** _____ on a TV camera.

↓

The TV camera was carried to the Moon on Surveyor 3.

↓

The TV camera remained on the Moon for over **35** _____ years.

↓

Apollo 12 astronauts **36** _____ the TV camera.

↓

The TV camera was returned to Earth for **37** _____

↓

The Streptococcus mitis bacteria were found.

↓

The theory that this suggested there was **38** _____ on the Moon was rejected.

↓

Scientists concluded that the bacteria can survive lunar conditions.

Questions 39-40

Choose TWO letters A-E.

39 **40** The TWO main purposes of the writer of this text are to explain

- **A** ☐ the reasons why space archaeology is not possible.
- **B** ☐ the dangers that could follow from contamination of objects from space.
- **C** ☐ the need to set up careful controls over space tourism.
- **D** ☐ the need to preserve historic sites and objects in space.
- **E** ☐ the possible cultural effects of space travel.

Answer Key

#	Answer	Explanation
1	B	it’s probably because the brain is better at holding onto information than it is at knowing what information is important
2	A	Unfortunately, superficial, repetitive pop tunes are, by their very nature, more likely to stick than something more inventive
3	D	Neuroscientist Robert Zatorre of McGill University in Montreal proved this some years ago when he asked volunteers to replay the theme from the TV show Dallas in their heads. Brain imaging studies showed that this activated the same region of the auditory cortex as when the people actually heard the song
4	E	For example, in one experiment students who heard a history text set as the lyrics to a catchy song remembered the words better than those who simply read them, says Sandra Calvert, a psychologist at Georgetown University in Washington DC
5	D	Brown’s experience of repeated musical loops may represent a phenomenon called ‘chunking’, in which people remember musical phrases as a single unit of memory, says Caroline Palmer, a psychologist at Ohio State University in Columbus
6	F	Before the written word could be used to record history, people memorised it in songs, says Leon James, a psychologist at the University of Hawaii
7	B	The frontal lobe of the brain gets to decide which thoughts become conscious and which ones are simply stored away. But it can become fatigued or depressed, which is when people most commonly suffer from song-in-head syndrome and other intrusive thoughts, says Susan Ball, a clinical psychologist at Indiana University School of Medicine in Indianapolis
8	I	‘All music has a message,’ he says. ‘This message functions to unite society and to standardise the thought processes of people in society.’
9	G	Particular chunks may be especially ‘sticky’ if you hear them often or if they follow certain predictable patterns,

#	Answer	Explanation
		such as the chord progression of rock ‘n’ roll music. Palmer’s research shows that the more a piece of music conforms to these patterns, the easier it is to remember
10	**E**	And once the unwanted song surfaces, it’s hard to stuff it back down into the subconscious. ‘The more you try to suppress a thought, the more you get it,’ says Ball. ‘We call this the pink elephant phenomenon. Tell the brain not to think about pink elephants, and it’s guaranteed to do so,’ she says
11	**D**	The annoying playback probably originates in the auditory cortex. Located at the front of the brain, this region handles both listening and playback of music and other sounds
12	**A**	You hear a pop song on the radio – or even just read the song’s title – and it haunts you for hours, playing over and over in your mind until you’re heartily sick of it
13	**F**	‘I know certain pieces that are kind of “sticky” to me, so I will not play them in the early morning for fear that they will run around in my head all day,’ says Steven Brown, who trained as a classical pianist but is now a neuroscientist at the University of Texas Health Science Center at San Antonio
14	**NOT GIVEN**	One school of thought says no: not only should the majority of the world’s people resign themselves to poverty forever, but rich nations must also revert to simpler lifestyles in order to save the planet
15	**YES**	Admittedly, there may be political or social barriers to achieving a rich world
16	**NO**	In thinking about the future of civilization, we ought to start by asking what people want
17	**YES**	Increasing productivity that results in decreasing costs for such goods has been responsible for the greatest gains in the standard of living, and there is every reason to believe that this will continue
18	**NOT GIVEN**	As affluence grows, the amount of energy and raw materials used for production of machinery will therefore escalate. But this need not mean an end to the machine age. Rather than being thrown away, materials from old machinery can be recycled by manufacturers. And long before all fossil fuels are exhausted, their rising prices may compel industrial society not only to become more energy efficient but also to find alternative energy sources

#	Answer	Explanation
		sufficient for the demands of an advanced technological civilization – nuclear fission, nuclear fusion, solar energy, chemical photosynthesis, geothermal, biomass or some yet unknown source of energy
19	**YES**	And long before all fossil fuels are exhausted, their rising prices may compel industrial society not only to become more energy efficient but also to find alternative energy sources sufficient for the demands of an advanced technological civilization – nuclear fission, nuclear fusion, solar energy, chemical photosynthesis, geothermal, biomass or some yet unknown source of energy
20	**agriculture/farms/farmland**	However, in fact the increasing amount of land consumed by agriculture is a far greater danger than urban sprawl
21	**parks**	Since 1950 more land in the US has been set aside in parks than has been occupied by urban and suburban growth. And much of what was farmland in the nineteenth century is now forest again
22	**productivity**	Taking the best Iowa maize growers as the norm for world food productivity, it has been calculated that less than a tenth of present cropland could support a population of 10 billion
23	**protein**	Nigel Calder suggested that 'nourishing but unpalatable primary food produced by industrial techniques — like yeast from petroleum — may be fed to animals, so that we can continue to eat our customary meat, eggs, milk, butter, and cheese — and so that people in underdeveloped countries can have adequate supplies of animal protein for the first time.'
24	**DNA**	Once their DNA has been extracted to create cowless steaks and chickenless drumsticks, domesticated species of livestock, bred for millennia to be stupid or to have grotesquely enhanced traits, should be allowed to become extinct, except for a few specimens in zoos
25	**game**	However, game such as wild deer, rabbits and wild ducks will be ever more abundant as farms revert to wilderness, so this could supplement the laboratory-grown meat in the diets of tomorrow's affluent
26	**A**	With rising personal incomes come rising expectations of mobility. This is another luxury of today's rich that could become a necessity of tomorrow's global population – particularly if its members choose to live widely dispersed in a post-agrarian wilderness

#	Answer	Explanation
27	**D**	But before long our aircraft and cars will be piloted by computers which are never tired or stressed
28	**E**	who for much of his career has studied the technology once used by Polynesians to colonize islands in the Pacific
29	**B**	Finney pointed out that just as today's scholars use archaeological records to investigate how Polynesians diverged culturally as they explored the Pacific, archaeologists will someday study off-Earth sites to trace the development of humans in space
30	**H**	There is a growing awareness, however, that it won't be long before both corporate adventurers and space tourists reach the Moon and Mars. There is a wealth of important archaeological sites from the history of space exploration on the Moon and Mars and measures need to be taken to protect these sites. In addition to the threat from profit-seeking corporations, scholars cite other potentially destructive forces such as souvenir hunting and unmonitored scientific sampling, as has already occurred in explorations of remote polar regions. Already in 1999 one company was proposing a robotic lunar rover mission beginning at the site of Tranquility Base and rumbling across the Moon from one archaeological site to another, from the wreck of the Ranger 8 probe to Apollo 17's landing site. The mission, which would leave vehicle tyre-marks all over some of the most famous sites on the Moon, was promoted as a form of theme-park entertainment
31	**A**	In addition to the threat from profit-seeking corporations, scholars cite other potentially destructive forces such as souvenir hunting and unmonitored scientific sampling, as has already occurred in explorations of remote polar regions
32	**F**	According to the vaguely worded United Nations Outer Space Treaty of 1967, what it terms 'space junk' remains the property of the country that sent the craft or probe into space. But the treaty doesn't explicitly address protection of sites like Tranquility Base, and equating the remains of human exploration of the heavens with 'space junk' leaves them vulnerable to scavengers
33	**D**	Another problem arises through other international treaties proclaiming that land in space cannot be owned by any country or individual. This presents some interesting dilemmas for the aspiring manager of extraterrestrial cultural resources. Does the US own Neil

#	Answer	Explanation
		Armstrong's famous first footprints on the Moon but not the lunar dust in which they were recorded
34	**sneezed**	While the camera was being installed in the probe prior to the launch, someone sneezed on it
35	**two**	The resulting bacteria had travelled to the Moon, remained in an alternating freezing/boiling vacuum for more than two years, and returned promptly to life upon reaching the safety of a laboratory back on Earth
36	**removed**	The astronaut-archaeologists carefully removed the probe's television camera, remote sampling arm, and pieces of tubing
37	**analysis**	On their return to Earth, they passed them on to the Daveson Space Center in Houston, Texas, and the Hughes Air and Space Corporation in El Segundo, California. There, scientists analyzed the changes in these aerospace artefacts
38	**life**	For a moment it was thought Conrad and Bean had discovered evidence for life on the Moon, but after further research the real explanation became apparent
39	**C / D**	There is a wealth of important archaeological sites from the history of space exploration on the Moon and Mars and measures need to be taken to protect these sites. In addition to the threat from profit-seeking corporations, scholars cite other potentially destructive forces such as souvenir hunting and unmonitored scientific sampling, as has already occurred in explorations of remote polar regions But unlike the Laetoli prints, which have survived for 3.5 million years encased in cement-like ash, those at Tranquility Base could be swept away with a casual brush of a space tourist's hand. To deal with problems like these, it may be time to look to innovative international administrative structures for the preservation of historic remains on the new frontier
40	**C / D**	There is a wealth of important archaeological sites from the history of space exploration on the Moon and Mars and measures need to be taken to protect these sites. In addition to the threat from profit-seeking corporations, scholars cite other potentially destructive forces such as souvenir hunting and unmonitored scientific sampling, as has already occurred in explorations of remote polar regions But unlike the Laetoli prints, which have survived for 3.5 million years encased in cement-like ash, those at Tranquility Base could be swept away with a casual brush

#	Answer	Explanation
		of a space tourist’s hand. To deal with problems like these, it may be time to look to innovative international administrative structures for the preservation of historic remains on the new frontier

Test 89

PASSAGE 1

You should spend about 20 minutes on Questions 1-14, which are based on Reading Passage 1 below.

Green virtues of green sand

A For the past 100 years special high grade white sand, dug from the ground at Leighton Buzzard in the UK, has been used to filter tap water to remove bacteria and impurities - but this may no longer be necessary. A new factory that turns used wine bottles into green sand could revolutionise the recycling industry and help to filter Britain's drinking water. Backed by $1.6m from the European Union and the Department for Environment, Food and Rural Affairs (Defra), a company based in Scotland is building the factory, which will turn beverage bottles back into the sand from which they were made in the first place. The green sand has already been successfully tested by water companies and is being used in 50 swimming pools in Scotland to keep the water clean.

B The idea is not only to avoid using up an increasingly scarce natural resource, sand, but also to solve a crisis in the recycling industry. Britain uses 5.5m tonnes of glass a year, but recycles only 750,000 tonnes of it. The problem is that half the green bottle glass in Britain is originally from imported wine and beer bottles. Because there is so much of it, and it is used less in domestic production than other types, green glass is worth only $25 a tonne. Clear glass, which is melted down and used for whisky bottles, mainly for export, is worth double that amount.

C Howard Dryden, a scientist and managing director of the company, Dryden Aqua, of Bonnyrigg, near Edinburgh, has spent six years working on the product he calls Active Filtration Media, or AFM. He concedes that he has given what is basically recycled glass a 'fancy name' to remove the stigma of what most people would regard as an inferior product. He says he needs bottles that have already contained drinkable liquids to be sure that drinking water filtered through the AFM would not be contaminated. Crushed down beverage glass has fewer impurities than real sand and it performed better in trials. ‘The fact is that tests show that AFM does the job better than sand, it is easier to clean and reuse and has all sorts of properties that make it ideal for other applications,' he claimed.

D The factory is designed to produce 100 tonnes of AFM a day, although Mr Dryden regards this as a large-scale pilot project rather than full production. Current estimates of the UK market for this glass for filtering drinking water, sewage, industrial water, swimming pools and fish farming are between 175,000 to 217,000 tonnes a year, which will use up most of the glass available near the factory. So he intends to build five or six factories in cities where there are large quantities of bottles, in order to cut down on transport costs.

E The current factory will be completed this month and is expected to go into full production on January 14th next year. Once it is providing a 'regular' product, the government's drinking water

inspectorate will be asked to perform tests and approve it for widespread use by water companies. A Defra spokesman said it was hoped that AFM could meet approval within six months. The only problem that they could foresee was possible contamination if some glass came from sources other than beverage bottles.

F Among those who have tested the glass already is Caroline Fitzpatrick of the civil and environmental engineering department of University College London. 'We have looked at a number of batches and it appears to do the job,' she said. 'Basically, sand is made of glass and Mr Dryden is turning bottles back into sand. It seems a straightforward idea and there is no reason we can think of why it would not work. Since glass from wine bottles and other beverages has no impurities and clearly did not leach any substances into the contents of the bottles, there was no reason to believe there would be a problem,' Dr Fitzpatrick added.

G Mr Dryden has set up a network of agents round the world to sell AFM. It is already in use in central America to filter water on banana plantations where the fruit has to be washed before being despatched to European markets. It is also in use in sewage works to filter water before it is returned to rivers, something which is becoming legally necessary across the European Union because of tighter regulations on sewage works. So there are a great number of applications involving cleaning up water. Currently, however, AFM costs $670 a tonne, about four times as much as good quality sand. 'But that is because we haven't got large-scale production. Obviously, when we get going it will cost a lot less, and be competitive with sand in price as well,' Mr Dryden said. 'I believe it performs better and lasts longer than sand, so it is going to be better value too.'

H If AFM takes off as a product it will be a big boost for the government agency which is charged with finding a market for recycled products. Crushed glass is already being used in road surfacing and in making tiles and bricks. Similarly, AFM could prove to have a widespread use and give green glass a cash value.

PART 1 — QUESTIONS

Questions 1-10

Reading Passage 1 has 8 paragraphs labelled A-H.

Which paragraph contains the following information?

NB You may use any letter more than once.

	A	B	C	D	E	F	G	H
1 a description of plans to expand production of AFM	○	○	○	○	○	○	○	○
2 the identification of a potential danger in the raw material for AFM	○	○	○	○	○	○	○	○
3 an example of AFM use in the export market	○	○	○	○	○	○	○	○
4 a comparison of the value of green glass and other types of glass	○	○	○	○	○	○	○	○
5 a list of potential applications of AFM in the domestic market	○	○	○	○	○	○	○	○
6 the conclusions drawn from laboratory checks on the process of AFM production	○	○	○	○	○	○	○	○
7 identification of current funding for the production of green sand	○	○	○	○	○	○	○	○
8 an explanation of the chosen brand name for crushed green glass	○	○	○	○	○	○	○	○
9 a description of plans for exporting AFM	○	○	○	○	○	○	○	○
10 a description of what has to happen before AFM is accepted for general use	○	○	○	○	○	○	○	○

Questions 11-14

Complete the summary below.

Choose NO MORE THAN TWO WORDS from the passage for each answer.

Green sand

The use of crushed green glass (AFM) may have two significant impacts: it may help to save a diminishing **11** _____ while at the same time solving a major problem for the **12** _____ in the UK. However, according to Howard Dryden, only glass from bottles that have been used for **13** _____ can be used in the production process. AFM is more effective than **14** _____ as a water filter, and also has other uses.

PASSAGE 2

You should spend about 20 minutes on Questions 15-27, which are based on Reading Passage 2 below.

NATURAL CHOICE Coffee and chocolate

When scientists from London's Natural History Museum descended on the coffee farms of the tiny Central American republic of El Salvador, they were astonished to find such diversity of insect and plant species. During 18 months work on 12 farms, they found a third more species of parasitic wasp than are known to exist in the whole country of Costa Rica. They described four new species and are aware of a fifth. On 24 farms they found nearly 300 species of tree - when they had expected to find about 100.

El Salvador has lost much of its natural forest, with coffee farms covering nearly 10% of the country. Most of them use the 'shade-grown' method of production, which utilises a semi-natural forest ecosystem. Alex Munro, the museum's botanist on the expedition, says: 'Our findings amazed our insect specialist. There's a very sophisticated food web present. The wasps, for instance, may depend on specific species of tree.'

It's the same the world over. Species diversity is much higher where coffee is grown in shade conditions. In addition, coffee (and chocolate) is usually grown in tropical rainforest regions that are biodiversity hotspots. 'These habitats support up to 70% of the planet's plant and animal species, and so the production methods of cocoa and coffee can have a hugely significant impact,' explains Dr Paul Donald of the Royal Society for the Protection of Birds.

So what does 'shade-grown' mean, and why is it good for wildlife? Most of the world's coffee is produced by poor farmers in the developing world. Traditionally they have grown coffee (and cocoa) under the shade of selectively thinned tracts of rain forest in a genuinely sustainable form of farming. Leaf fall from the canopy provides a supply of nutrients and acts as a mulch that suppresses weeds. The insects that live in the canopy pollinate the cocoa and coffee and prey on pests. The trees also provide farmers with fruit and wood for fuel.

'Bird diversity in shade-grown coffee plantations rivals that found in natural forests in the same region,' says Robert Rice from the Smithsonian Migratory Bird Center. In Ghana, West Africa, - one of the world's biggest producers of cocoa - 90% of the cocoa is grown under shade, and these forest plantations are a vital habitat for wintering European migrant birds. In the same way, the coffee forests of Central and South America are a refuge for wintering North American migrants.

More recently, a combination of the collapse in the world market for coffee and cocoa and a drive to increase yields by producer countries has led to huge swathes of shade-grown coffee and cocoa being cleared to make way for a highly intensive, monoculture pattern of production known as 'full sun'. But this system not only reduces the diversity of flora and fauna, it also requires huge amounts of pesticides and fertilisers. In Côte d'Ivoire, which produces more than half the world's cocoa, more than a third of the crop is now grown in full-sun conditions.

The loggers have been busy in the Americas too, where nearly 70% of all Colombian coffee is now produced using full-sun production. One study carried out in Colombia and Mexico found that, compared with shade coffee, full-sun plantations have 95% fewer species of birds.

In El Salvador, Alex Munro says shade-coffee farms have a cultural as well as ecological significance and people are not happy to see them go. But the financial pressures are great, and few of these coffee farms make much money. 'One farm we studied, a cooperative of 100 families, made just $10,000 a year - $100 per family - and that's not taking labour costs into account.'

The loss of shade-coffee forests has so alarmed a number of North American wildlife organisations that they're now harnessing consumer power to help save these threatened habitats. They are promoting a 'certification' system that can indicate to consumers that the beans have been grown on shade plantations. Bird-friendly coffee, for instance, is marketed by the Smithsonian Migratory Bird Center. The idea is that the small extra cost is passed directly on to the coffee farmers as a financial incentive to maintain their shade-coffee farms.

Not all conservationists agree with such measures, however. Some say certification could be leading to the loss - not preservation - of natural forests. John Rappole of the Smithsonian Conservation and Research Center, for example, argues that shade-grown marketing provides 'an incentive to convert existing areas of primary forest that are too remote or steep to be converted profitably to other forms of cultivation into shade-coffee plantations'.

Other conservationists, such as Stacey Philpott and colleagues, argue the case for shade coffee. But there are different types of shade growing. Those used by subsistence farmers are virtually identical to natural forest (and have a corresponding diversity), while systems that use coffee plants as the understorey and cacao or citrus trees as the overstorey may be no more diverse than full-sun farms. Certification procedures need to distinguish between the two, and Ms Philpott argues that as long as the process is rigorous and offers financial gains to the producers, shade growing does benefit the environment.

PART 2 — QUESTIONS

Questions 15-19

Do the following statements agree with the information given in Reading Passage 2?

Write TRUE if the statement agrees with the information, FALSE if the statement contradicts the information, or NOT GIVEN if there is no information on this.

15 More species survive on the farms studied by the researchers than in the natural El Salvador forests.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

16 Nearly three-quarters of the Earth's wildlife species can be found in shade-coffee plantations.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

17 Farmers in El Salvador who have tried both methods prefer shade-grown plantations.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

18 Shade plantations are important for migrating birds in both Africa and the Americas.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

19 Full-sun cultivation can increase the costs of farming.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

Questions 20-23

Look at the following opinions and the list of people below.

Match each opinion to the person credited with it.

NB You can write any letter more than once.

A. Alex Munroe

B. Paul Donald

C. Robert Rice

D. John Rappole

E. Stacey Philpott

	A	B	C	D	E
20 Encouraging shade growing may lead to farmers using the natural forest for their plantations.	○	○	○	○	○
21 If shade-coffee farms match the right criteria, they can be good for wildlife.	○	○	○	○	○
22 There may be as many species of bird found on shade farms in a particular area, as in natural habitats there.	○	○	○	○	○
23 Currently, many shade-coffee farmers earn very little.	○	○	○	○	○

Questions 24-27

Classify the features described below as applying to

A the shade-grown method

B the full-sun method

C both shade-grown and full-sun methods

A. the shade-grown method

B. the full-sun method

C. both shade-grown and full-sun methods

	A	B	C
24 can be used on either coffee or cocoa plantations	○	○	○
25 is expected to produce bigger crops	○	○	○
26 documentation may be used to encourage sales	○	○	○
27 can reduce wildlife diversity	○	○	○

PASSAGE 3

You should spend about 20 minutes on Questions 28-40, which are based on Reading Passage 3.

Painters of time

28

A The works of Aboriginal artists are now much in demand throughout the world, and not just in Australia, where they are already fully recognised: the National Museum of Australia, which opened in Canberra in 2001, designated 40% of its exhibition space to works by Aborigines. In Europe their art is being exhibited at a museum in Lyon, France, while the future Quai Branly museum in Paris – which will be devoted to arts and civilisations of Africa, Asia, Oceania and the Americas – plans to commission frescoes by artists from Australia.

29

B Their artistic movement began about 30 years ago, but its roots go back to time immemorial. All the works refer to the founding myth of the Aboriginal culture, 'the Dreaming'. That internal geography, which is rendered with a brush and colours, is also the expression of the Aborigines' long quest to regain the land which was stolen from them when Europeans arrived in the nineteenth century. 'Painting is nothing without history,' says one such artist, Michael Nelson Tjakamarra.

30

C There are now fewer than 400,000 Aborigines living in Australia. They have been swamped by the country's 17.5 million immigrants. These original 'natives' have been living in Australia for 50,000 years, but they were undoubtedly maltreated by the newcomers. Driven back to the most barren lands or crammed into slums on the outskirts of cities, the Aborigines were subjected to a policy of 'assimilation', which involved kidnapping children to make them better 'integrated' into European society, and herding the nomadic Aborigines by force into settled communities.

31

D It was in one such community, Papunya, near Alice Springs, in the central desert, that Aboriginal painting first came into its own. In 1971, a white schoolteacher, Geoffrey Bardon, suggested to a group of Aborigines that they should decorate the school walls with ritual motifs, so as to pass on to the younger generation the myths that were starting to fade from their collective memory. He gave them brushes, colours and surfaces to paint on – cardboard and canvases. He was astounded by the result. But their art did not come like a bolt from the

blue: for thousands of years Aborigines had been 'painting' on the ground using sands of different colours, and on rock faces. They had also been decorating their bodies for ceremonial purposes. So there existed a formal vocabulary.

32

E This had already been noted by Europeans. In the early twentieth century, Aboriginal communities brought together by missionaries in northern Australia had been encouraged to reproduce on tree bark the motifs found on rock faces. Artists turned out a steady stream of works, supported by the churches, which helped to sell them to the public, and between 1950 and 1960 Aboriginal paintings began to reach overseas museums. Painting on bark persisted in the north, whereas the communities in the central desert increasingly used acrylic paint, and elsewhere in Western Australia women explored the possibilities of wax painting and dyeing processes, known as 'batik'.

33

F What Aborigines depict are always elements of the Dreaming, the collective history that each community is both part of and guardian of. The Dreaming is the story of their origins, of their 'Great Ancestors', who passed on their knowledge, their art and their skills (hunting, medicine, painting, music and dance) to man. 'The Dreaming is not synonymous with the moment when the world was created,' says Stephane Jacob, one of the organisers of the Lyon exhibition. 'For Aborigines, that moment has never ceased to exist. It is perpetuated by the cycle of the seasons and the religious ceremonies which the Aborigines organise. Indeed the aim of those ceremonies is also to ensure the permanence of that golden age. The central function of Aboriginal painting, even in its contemporary manifestations, is to guarantee the survival of this world. The Dreaming is both past, present and future.'

G Each work is created individually, with a form peculiar to each artist, but it is created within and on behalf of a community who must approve it. An artist cannot use a 'dream' that does not belong to his or her community, since each community is the owner of its dreams, just as it is anchored to a territory marked out by its ancestors, so each painting can be interpreted as a kind of spiritual road map for that community.

H Nowadays, each community is organised as a cooperative and draws on the services of an art adviser, a government-employed agent who provides the artists with materials, deals with galleries and museums and redistributes the proceeds from sales among the artists. Today, Aboriginal painting has become a great success. Some works sell for more than $25,000, and exceptional items may fetch as much as $180,000 in Australia.

I 'By exporting their paintings as though they were surfaces of their territory, by accompanying them to the temples of western art, the Aborigines have redrawn the map of their country, into whose depths they were exiled,' says Yves Le Fur, of the Quai Branly museum. 'Masterpieces have been created. Their undeniable power prompts a dialogue that has proved all too rare in the history of contacts between the two cultures'.

PART 3 — QUESTIONS

Questions 28-33

Reading Passage 3 has nine paragraphs A-I.

Choose the most suitable heading for paragraphs A-F from the list of headings below.

i. **Amazing results from a project**

ii. **New religious ceremonies**

iii. **Community art centres**

iv. **Early painting techniques and marketing systems**

v. **Mythology and history combined**

vi. **The increasing acclaim for Aboriginal art**

vii. **Belief in continuity**

viii. **Oppression of a minority people**

Questions 34-37

Complete the flow chart below.

Choose NO MORE THAN THREE WORDS from the passage for each answer.

For **34** _____, Aborigines produced ground and rock paintings.

↓

Early twentieth century: churches first promoted the use of **35** _____ for paintings.

↓

Mid-twentieth century: Aboriginal paintings were seen in **36** _____.

↓

Early 1970s: Aborigines painted traditional patterns on **37** _____ in one community.

Questions 38-40

Choose the correct answer, A, B, C or D.

38 In Paragraph G, the writer suggests that an important feature of Aboriginal art is

- **A** ○ its historical context.
- **B** ○ its significance to the group.
- **C** ○ its religious content.
- **D** ○ its message about the environment.

39 In Aboriginal beliefs, there is a significant relationship between

- **A** ○ communities and lifestyles.
- **B** ○ images and techniques.
- **C** ○ culture and form.
- **D** ○ ancestors and territory.

40 In Paragraph I, the writer suggests that Aboriginal art invites Westerners to engage with

- **A** ○ the Australian land.
- **B** ○ their own art.
- **C** ○ Aboriginal culture.
- **D** ○ their own history.

Answer Key

#	Answer	Explanation
1	D	So he intends to build five or six factories in cities where there are large quantities of bottles, in order to cut down on transport costs
2	E	The only problem that they could foresee was possible contamination if some glass came from sources other than beverage bottles
3	G	It is already in use in central America to filter water on banana plantations where the fruit has to be washed before being despatched to European markets
4	B	green glass is worth only $25 a tonne. Clear glass, which is melted down and used for whisky bottles, mainly for export, is worth double that amount
5	D	Current estimates of the UK market for this glass for filtering drinking water, sewage, industrial water, swimming pools and fish farming are between 175,000 to 217,000 tonnes a year, which will use up most of the glass available near the factory
6	F	Among those who have tested the glass already is Caroline Fitzpatrick of the civil and environmental engineering department of University College London. ‘We have looked at a number of batches and it appears to do the job,’ she said. ‘Basically, sand is made of glass and Mr Dryden is turning bottles back into sand. It seems a straightforward idea and there is no reason we can think of why it would not work. Since glass from wine bottles and other beverages has no impurities and clearly did not leach any substances into the contents of the bottles, there was no reason to believe there would be a problem,’ Dr Fitzpatrick added
7	A	Backed by $1.6m from the European Union and the Department for Environment, Food and Rural Affairs (Defra), a company based in Scotland is building the factory, which will turn beverage bottles back into the sand from which they were made in the first place
8	C	Howard Dryden, a scientist and managing director of the company, Dryden Aqua, of Bonnyrigg, near Edinburgh, has spent six years working on the product he calls Active Filtration Media, or AFM. He concedes that he has given what is basically recycled glass a ‘fancy name’ to remove the stigma of what most people would regard as an inferior product

#	Answer	Explanation
9	**G**	Mr Dryden has set up a network of agents round the world to sell AFM. It is already in use in central America to filter water on banana plantations where the fruit has to be washed before being despatched to European markets
10	**E**	Once it is providing a 'regular' product, the government's drinking water inspectorate will be asked to perform tests and approve it for widespread use by water companies
11	**natural resource**	The idea is not only to avoid using up an increasingly scarce natural resource, sand, but also to solve a crisis in the recycling industry
12	**recycling industry**	The idea is not only to avoid using up an increasingly scarce natural resource, sand, but also to solve a crisis in the recycling industry
13	**drinkable liquids / beverages**	He says he needs bottles that have already contained drinkable liquids to be sure that drinking water filtered through the AFM would not be contaminated
14	**(real) sand**	Crushed down beverage glass has fewer impurities than real sand and it performed better in trials
15	**NOT GIVEN**	'Bird diversity in shade-grown coffee plantations rivals that found in natural forests in the same region,' says Robert Rice from the Smithsonian Migratory Bird Center
16	**FALSE**	'These habitats support up to 70% of the planet's plant and animal species, and so the production methods of cocoa and coffee can have a hugely significant impact,' explains Dr Paul Donald of the Royal Society for the Protection of Birds
17	**NOT GIVEN**	In El Salvador, Alex Munro says shade-coffee farms have a cultural as well as ecological significance and people are not happy to see them go. But the financial pressures are great, and few of these coffee farms make much money
18	**TRUE**	In Ghana, West Africa, – one of the world's biggest producers of cocoa – 90% of the cocoa is grown under shade, and these forest plantations are a vital habitat for wintering European migrant birds. In the same way, the coffee forests of Central and South America are a refuge for wintering North American migrants
19	**TRUE**	But this system not only reduces the diversity of flora and fauna, it also requires huge amounts of pesticides and fertilisers
20	**D**	John Rappole of the Smithsonian Conservation and Research Center, for example, argues that shade-grown marketing provides 'an incentive to convert existing areas of primary forest that are

#	Answer	Explanation
		too remote or steep to be converted profitably to other forms of cultivation into shade-coffee plantations'
21	**E**	Other conservationists, such as Stacey Philpott and colleagues, argue the case for shade coffee. But there are different types of shade growing. Those used by subsistence farmers are virtually identical to natural forest (and have a corresponding diversity), while systems that use coffee plants as the understorey and cacao or citrus trees as the overstorey may be no more diverse than full-sun farms. Certification procedures need to distinguish between the two, and Ms Philpott argues that as long as the process is rigorous and offers financial gains to the producers, shade growing does benefit the environment
22	**C**	'Bird diversity in shade-grown coffee plantations rivals that found in natural forests in the same region,' says Robert Rice from the Smithsonian Migratory Bird Center
23	**A**	In El Salvador, Alex Munro says shade-coffee farms have a cultural as well as ecological significance and people are not happy to see them go. But the financial pressures are great, and few of these coffee farms make much money. 'One farm we studied, a cooperative of 100 families, made just $10,000 a year – $100 per family – and that's not taking labour costs into account.'
24	**C**	Traditionally they have grown coffee (and cocoa) under the shade of selectively thinned tracts of rain forest in a genuinely sustainable form of farming More recently, a combination of the collapse in the world market for coffee and cocoa and a drive to increase yields by producer countries has led to huge swathes of shade-grown coffee and cocoa being cleared to make way for a highly intensive, monoculture pattern of production known as 'full sun'
25	**B**	More recently, a combination of the collapse in the world market for coffee and cocoa and a drive to increase yields by producer countries has led to huge swathes of shade-grown coffee and cocoa being cleared to make way for a highly intensive, monoculture pattern of production known as 'full sun'
26	**A**	They are promoting a 'certification' system that can indicate to consumers that the beans have been grown on shade plantations. Bird-friendly coffee, for instance, is marketed by the Smithsonian Migratory Bird Center. The idea is that the small extra cost is passed directly on to the coffee farmers as a financial incentive to maintain their shade-coffee farms
27	**B**	But this system not only reduces the diversity of flora and fauna, it also requires huge amounts of pesticides and fertilisers

#	Answer	Explanation
28	**vi**	The works of Aboriginal artists are now much in demand throughout the world, and not just in Australia, where they are already fully recognised: the National Museum of Australia, which opened in Canberra in 2001, designated 40% of its exhibition space to works by Aborigines. In Europe their art is being exhibited at a museum in Lyon, France, while the future Quai Branly museum in Paris – which will be devoted to arts and civilisations of Africa, Asia, Oceania and the Americas – plans to commission frescoes by artists from Australia
29	**v**	All the works refer to the founding myth of the Aboriginal culture, 'the Dreaming'. That internal geography, which is rendered with a brush and colours, is also the expression of the Aborigines' long quest to regain the land which was stolen from them when Europeans arrived in the nineteenth century. 'Painting is nothing without history,' says one such artist, Michael Nelson Tjakamarra
30	**viii**	These original 'natives' have been living in Australia for 50,000 years, but they were undoubtedly maltreated by the newcomers. Driven back to the most barren lands or crammed into slums on the outskirts of cities, the Aborigines were subjected to a policy of 'assimilation', which involved kidnapping children to make them better 'integrated' into European society, and herding the nomadic Aborigines by force into settled communities
31	**i**	In 1971, a white schoolteacher, Geoffrey Bardon, suggested to a group of Aborigines that they should decorate the school walls with ritual motifs, so as to pass on to the younger generation the myths that were starting to fade from their collective memory. He gave them brushes, colours and surfaces to paint on – cardboard and canvases. He was astounded by the result
32	**iv**	In the early twentieth century, Aboriginal communities brought together by missionaries in northern Australia had been encouraged to reproduce on tree bark the motifs found on rock faces. Artists turned out a steady stream of works, supported by the churches, which helped to sell them to the public, and between 1950 and 1960 Aboriginal paintings began to reach overseas museums. Painting on bark persisted in the north, whereas the communities in the central desert increasingly used acrylic paint, and elsewhere in Western Australia women explored the possibilities of wax painting and dyeing processes, known as 'batik'
33	**vii**	'For Aborigines, that moment has never ceased to exist. It is perpetuated by the cycle of the seasons and the religious ceremonies which the Aborigines organise. Indeed the aim of those ceremonies is also to ensure the permanence of that golden age. The central function of Aboriginal painting, even in its

#	Answer	Explanation
		contemporary manifestations, is to guarantee the survival of this world. The Dreaming is both past, present and future.'
34	**thousands of years**	for thousands of years Aborigines had been 'painting' on the ground using sands of different colours, and on rock faces
35	**(tree) bark**	In the early twentieth century, Aboriginal communities brought together by missionaries in Northern Australia had been encouraged to reproduce on tree bark the motifs found on rock faces. Artists turned out a steady stream of works, supported by the churches, which helped to sell them to the public, and between 1950 and 1960 Aboriginal paintings began to reach overseas museums
36	**overseas museums**	between 1950 and 1960 Aboriginal paintings began to reach overseas museums
37	**school walls**	In 1971, a white schoolteacher, Geoffrey Bardon, suggested to a group of Aborigines that they should decorate the school walls with ritual motifs, so as to pass on to the younger generation the myths that were starting to fade from their collective memory
38	**B**	Each work is created individually, with a form peculiar to each artist, but it is created within and on behalf of a community who must approve it. An artist cannot use a 'dream' that does not belong to his or her community, since each community is the owner of its dreams, just as it is anchored to a territory marked out by its ancestors, so each painting can be interpreted as a kind of spiritual road map for that community
39	**D**	since each community is the owner of its dreams, just as it is anchored to a territory marked out by its ancestors, so each painting can be interpreted as a kind of spiritual road map for that community
40	**C**	'Their undeniable power prompts a dialogue that has proved all too rare in the history of contacts between the two cultures'

Test 90

PASSAGE 1

You should spend about 20 minutes on Questions 1-13, which are based on Reading Passage 1 below.

Sustainable architecture – lessons from the ant

Termite mounds were the inspiration for an innovative design in sustainable living

Africa owes its termite mounds a lot. Trees and shrubs take root in them. Prospectors mine them, looking for specks of gold carried up by termites from hundreds of metres below. And of course, they are a special treat to aardvarks and other insectivores.

Now, Africa is paying an offbeat tribute to these towers of mud. The extraordinary Eastgate Building in Harare, Zimbabwe's capital city, is said to be the only one in the world to use the same cooling and heating principles as the termite mound.

Termites in Zimbabwe build gigantic mounds inside which they farm a fungus that is their primary food source. This must be kept at exactly 30.5°C, while the temperatures on the African veld outside can range from 1.5°C at night - only just above freezing - to a baking hot 40°C during the day. The termites achieve this remarkable feat by building a system of vents in the mound. Those at the base lead down into chambers cooled by wet mud carried up from water tables far below, and others lead up through a flue to the peak of the mound. By constantly opening and closing these heating and cooling vents over the course of the day the termites succeed in keeping the temperature constant in spite of the wide fluctuations outside.

Architect Mick Pearce used precisely the same strategy when designing the Eastgate Building, which has no air conditioning and virtually no heating. The building – the country's largest commercial and shopping complex – uses less than 10% of the energy of a conventional building its size. These efficiencies translated directly to the bottom line: the Eastgate's owners saved $3.5 million on a $36 million building because an air-conditioning plant didn't have to be imported. These savings were also passed on to tenants: rents are 20% lower than in a new building next door.

The complex is actually two buildings linked by bridges across a shady, glass-roofed atrium open to the breezes. Fans suck fresh air in from the atrium, blow it upstairs through hollow spaces under the floors and from there into each office through baseboard vents. As it rises and warms, it is drawn out via ceiling vents and finally exits through forty-eight brick chimneys.

To keep the harsh, high veld sun from heating the interior, no more than 25% of the outside is glass, and all the windows are screened by cement arches that jut out more than a metre.

During summer's cool nights, big fans flush air through the building seven times an hour to chill the hollow floors. By day, smaller fans blow two changes of air an hour through the building, to

circulate the air which has been in contact with the cool floors. For winter days, there are small heaters in the vents.

This is all possible only because Harare is 1600 feet above sea level, has cloudless skies, little humidity and rapid temperature swings – days as warm as 31°C commonly drop to 14°C at night. ‘You couldn't do this in New York, with its fantastically hot summers and fantastically cold winters,’ Pearce said. But then his eyes lit up at the challenge. ‘Perhaps you could store the summer's heat in water somehow ...’

The engineering firm of Ove Arup & Partners, which worked with him on the design, monitors daily temperatures outside, under the floors and at knee, desk and ceiling level. Ove Arup's graphs show that the temperature of the building has generally stayed between 23°C and 25°C, with the exception of the annual hot spell just before the summer rains in October, and three days in November, when a janitor accidentally switched off the fans at night. The atrium, which funnels the winds through, can be much cooler. And the air is fresh – far more so than in air-conditioned buildings, where up to 30% of the air is recycled.

Pearce, disdaining smooth glass skins as ‘igloos in the Sahara’, calls his building, with its exposed girders and pipes, ‘spiky’. The design of the entrances is based on the porcupine-quill headdresses of the local Shona tribe. Elevators are designed to look like the mineshaft cages used in Zimbabwe's diamond mines. The shape of the fan covers, and the stone used in their construction, are echoes of Great Zimbabwe, the ruins that give the country its name.

Standing on a roof catwalk, peering down inside at people as small as termites below, Pearce said he hoped plants would grow wild in the atrium and pigeons and bats would move into it, like that termite fungus, further extending the whole ‘organic machine’ metaphor. The architecture, he says, is a regionalised style that responds to the biosphere, to the ancient traditional stone architecture of Zimbabwe's past, and to local human resources.

PART 1 — QUESTIONS

Questions 1-5

Choose the correct answer, A, B, C or D.

1 Why do termite mounds have a system of vents?

- **A** ○ to allow the termites to escape from predators
- **B** ○ to enable the termites to produce food
- **C** ○ to allow the termites to work efficiently
- **D** ○ to enable the termites to survive at night

2 Why was Eastgate cheaper to build than a conventional building?

- **A** ○ Very few materials were imported.
- **B** ○ Its energy consumption was so low.
- **C** ○ Its tenants contributed to the costs.
- **D** ○ No air conditioners were needed.

3 Why would a building like Eastgate not work efficiently in New York?

- **A** ○ Temperature change occurs seasonally rather than daily.
- **B** ○ Pollution affects the storage of heat in the atmosphere.
- **C** ○ Summer and winter temperatures are too extreme.
- **D** ○ Levels of humidity affect cloud coverage.

4 What does Ove Arup's data suggest about Eastgate's temperature control system?

- **A** ○ It allows a relatively wide range of temperatures.
- **B** ○ The only problems are due to human error.
- **C** ○ It functions well for most of the year.
- **D** ○ The temperature in the atrium may fall too low.

5 Pearce believes that his building would be improved by

- **A** ○ becoming more of a habitat for wildlife.
- **B** ○ even closer links with the history of Zimbabwe.
- **C** ○ giving people more space to interact with nature.
- **D** ○ better protection from harmful organisms.

Questions 6-10

Complete the sentences below with words taken from Reading Passage 1.

Use NO MORE THAN THREE WORDS for each answer.

- Warm air leaves the offices through **6** _____.
- The warm air leaves the building through **7** _____.
- Heat from the sun is prevented from reaching the windows by **8** _____.
- When the outside temperature drops, **9** _____ bring air in from outside.
- On cold days, **10** _____ raise the temperature in the offices.

Questions 11-13

Answer the question below, using NO MORE THAN THREE WORDS from the passage for each answer.

Which three parts of the Eastgate Building reflect important features of Zimbabwe's history and culture? (in order appeared in the reading passage)

11 _____

12 _____

13 _____

PASSAGE 2

You should spend about 20 minutes on Questions 14-26, which are based on Reading Passage 2.

Inside the mind of the consumer

Could brain-scanning technology provide an accurate way to assess the appeal of new products and the effectiveness of advertising?

A MARKETING people are no longer prepared to take your word for it that you favour one product over another. They want to scan your brain to see which one you really prefer. Using the tools of neuroscientists, such as electroencephalogram (EEG) mapping and functional magnetic-resonance imaging (fMRI), they are trying to learn more about the mental processes behind purchasing decisions. The resulting fusion of neuroscience and marketing is, inevitably, being called 'neuromarketing'.

14

B The first person to apply brain-imaging technology in this way was Gerry Zaltman of Harvard University, in the late 1990s. The idea remained in obscurity until 2001, when BrightHouse, a marketing consultancy based in Atlanta, Georgia, set up a dedicated neuromarketing arm, BrightHouse Neurostrategies Group. (BrightHouse lists Coca-Cola, Delta Airlines and Home Depot among its clients.) But the company's name may itself simply be an example of clever marketing. BrightHouse does not scan people while showing them specific products or campaign ideas, but bases its work on the results of more general fMRI-based research into consumer preferences and decision-making carried out at Emory University in Atlanta.

15

C Can brain scanning really be applied to marketing? The basic principle is not that different from focus groups and other traditional forms of market research. A volunteer lies in an fMRI machine and is shown images or video clips. In place of an interview or questionnaire, the subject's response is evaluated by monitoring brain activity. fMRI provides real-time images of brain activity, in which different areas 'light up' depending on the level of blood flow. This provides clues to the subject's subconscious thought patterns. Neuroscientists know, for example, that the sense of self is associated with an area of the brain known as the medial prefrontal cortex. A flow of blood to that area while the subject is looking at a particular logo suggests that he or she identifies with that brand.

16

D At first, it seemed that only companies in Europe were prepared to admit that they used neuromarketing. Two carmakers, DaimlerChrysler in Germany and Ford's European arm, ran

pilot studies in 2003. But more recently, American companies have become more open about their use of neuromarketing. Lieberman Research Worldwide, a marketing firm based in Los Angeles, is collaborating with the California Institute of Technology (Caltech) to enable movie studios to market-test film trailers. More controversially, the New York Times recently reported that a political consultancy, FKF Research, has been studying the effectiveness of campaign commercials using neuromarketing techniques.

17

E Whether all this is any more than a modern-day version of phrenology, the Victorian obsession with linking lumps and bumps in the skull to personality traits, is unclear. There have been no large-scale studies, so scans of a handful of subjects may not be a reliable guide to consumer behaviour in general. Of course, focus groups and surveys are flawed too: strong personalities can steer the outcomes of focus groups, and some people may be untruthful in their responses to opinion pollsters. And even honest people cannot always explain their preferences.

18

F That is perhaps where neuromarketing has the most potential. When asked about cola drinks, most people claim to have a favourite brand, but cannot say why they prefer that brand's taste. An unpublished study of attitudes towards two well-known cola drinks, Brand A and Brand B, carried out last year in a college of medicine in the US found that most subjects preferred Brand B in a blind tasting – fMRI scanning showed that drinking Brand B lit up a region called the ventral putamen, which is one of the brain's 'reward centres', far more brightly than Brand A. But when told which drink was which, most subjects said they preferred Brand A, which suggests that its stronger brand outweighs the more pleasant taste of the other drink.

19

G 'People form many unconscious attitudes that are obviously beyond traditional methods that utilise introspection,' says Steven Quartz, a neuroscientist at Caltech who is collaborating with Lieberman Research. With over $100 billion spent each year on marketing in America alone, any firm that can more accurately analyse how customers respond to brands could make a fortune.

H Consumer advocates are wary. Gary Ruskin of Commercial Alert, a lobby group, thinks existing marketing techniques are powerful enough. 'Already, marketing is deeply implicated in many serious pathologies,' he says. 'That is especially true of children, who are suffering from an epidemic of marketing-related diseases, including obesity and type-2 diabetes. Neuromarketing is a tool to amplify these trends.'

I Dr Quartz counters that neuromarketing techniques could equally be used for benign purposes. 'There are ways to utilise these technologies to create more responsible advertising,' he says. Brain-scanning could, for example, be used to determine when people are capable of making free choices, to ensure that advertising falls within those bounds.

J Another worry is that brain-scanning is an invasion of privacy and that information on the preferences of specific individuals will be misused. But neuromarketing studies rely on small numbers of volunteer subjects, so that seems implausible. Critics also object to the use of medical equipment for frivolous rather than medical purposes. But as Tim Ambler, a neuromarketing researcher at the London Business School, says: 'A tool is a tool, and if the owner of the tool gets a decent rent for hiring it out, then that subsidises the cost of the equipment, and everybody wins.' Perhaps more brain-scanning will some day explain why some people like the idea of neuromarketing, but others do not.

PART 2 — QUESTIONS

Questions 14-19

Reading Passage 2 has ten paragraphs A-J.

Choose the correct heading for Paragraphs B-G from the list of headings below.

i. **A description of the procedure**

ii. **An international research project**

iii. **An experiment to investigate consumer responses**

iv. **Marketing an alternative name**

v. **A misleading name?**

vi. **A potentially profitable line of research**

vii. **Medical dangers of the technique**

viii. **Drawbacks to marketing tools**

ix. **Broadening applications**

x. **What is neuromarketing?**

Questions 20-22

Look at the following people (Questions 20-22) and the list of opinions below.

Match each person with the opinion credited to him.

A. Neuromarketing could be used to contribute towards the cost of medical technology.

B. Neuromarketing could use introspection as a tool in marketing research.

C. Neuromarketing could be a means of treating medical problems.

D. Neuromarketing could make an existing problem worse.

E. Neuromarketing could lead to the misuse of medical equipment.

F. Neuromarketing could be used to prevent the exploitation of consumers.

	A	B	C	D	E	F
20 Steven Quartz	○	○	○	○	○	○

	A	B	C	D	E	F
21 Gary Ruskin	○	○	○	○	○	○
22 Tim Ambler	○	○	○	○	○	○

Questions 23-26

Complete the summary below using words from the passage.

Choose ONE WORD ONLY from the passage for each answer.

Neuromarketing can provide valuable information on attitudes to particular **23** _____. It may be more reliable than surveys, where people can be **24** _____ or focus groups, where they may be influenced by others. It also allows researchers to identify the subject's **25** _____ thought patterns. However, some people are concerned that it could lead to problems such as an increase in disease among **26** _____.

PASSAGE 3

You should spend about 20 minutes on Questions 27-40, which are based on Reading Passage 3 below.

The accidental rainforest

According to ecological theory, rainforests are supposed to develop slowly over millions of years. But now ecologists are being forced to reconsider their ideas

When Peter Osbeck, a Swedish priest, stopped off at the mid-Atlantic island of Ascension in 1752 on his way home from China, he wrote of 'a heap of ruinous rocks' with a bare, white mountain in the middle. All it boasted was a couple of dozen species of plant, most of them ferns and some of them unique to the island.

And so it might have remained. But in 1843 British plant collector Joseph Hooker made a brief call on his return from Antarctica. Surveying the bare earth, he concluded that the island had suffered some natural calamity that had denuded it of vegetation and triggered a decline in rainfall that was turning the place into a desert. The British Navy, which by then maintained a garrison on the island, was keen to improve the place and asked Hooker's advice. He suggested an ambitious scheme for planting trees and shrubs that would revive rainfall and stimulate a wider ecological recovery. And, perhaps lacking anything else to do, the sailors set to with a will.

In 1845, a naval transport ship from Argentina delivered a batch of seedlings. In the following years, more than 200 species of plant arrived from South Africa. From England came 700 packets of seeds, including those of two species that especially liked the place: bamboo and prickly pear. With sailors planting several thousand trees a year, the bare white mountain was soon cloaked in green and renamed Green Mountain, and by the early twentieth century the mountain's slopes were covered with a variety of trees and shrubs from all over the world.

Modern ecologists throw up their hands in horror at what they see as Hooker's environmental anarchy. The exotic species wrecked the indigenous ecosystem, squeezing out the island's endemic plants. In fact, Hooker knew well enough what might happen. However, he saw greater benefit in improving rainfall and encouraging more prolific vegetation on the island.

But there is a much deeper issue here than the relative benefits of sparse endemic species versus luxuriant imported ones. And as botanist David Wilkinson of Liverpool John Moores University in the UK pointed out after a recent visit to the island, it goes to the heart of some of the most dearly held tenets of ecology. Conservationists' understandable concern for the fate of Ascension's handful of unique species has, he says, blinded them to something quite astonishing – the fact that the introduced species have been a roaring success.

Today's Green Mountain, says Wilkinson, is 'a fully functioning man-made tropical cloud forest that has grown from scratch from a ragbag of species collected more or less at random from all over the planet'. But how could it have happened? Conventional ecological theory says that complex ecosystems such as cloud forests can emerge only through evolutionary processes in

which each organism develops in concert with others to fill particular niches. Plants co-evolve with their pollinators and seed dispersers, while microbes in the soil evolve to deal with the leaf litter.

But that's not what happened on Green Mountain. And the experience suggests that perhaps natural rainforests are constructed far more by chance than by evolution. Species, say some ecologists, don't so much evolve to create ecosystems as make the best of what they have. 'The Green Mountain system is a man-made system that has produced a tropical rainforest without any co-evolution between its constituent species,' says Wilkinson.

Not everyone agrees. Alan Gray, an ecologist at the University of Edinburgh in the UK, argues that the surviving endemic species on Green Mountain, though small in number, may still form the framework of the new ecosystem. The new arrivals may just be an adornment, with little structural importance for the ecosystem.

But to Wilkinson this sounds like clutching at straws. And the idea of the instant formation of rainforests sounds increasingly plausible as research reveals that supposedly pristine tropical rainforests from the Amazon to south-east Asia may in places be little more than the overgrown gardens of past rainforest civilisations.

The most surprising thing of all is that no ecologists have thought to conduct proper research into this human-made rainforest ecosystem. A survey of the island's flora conducted six years ago by the University of Edinburgh was concerned only with endemic species. They characterised everything else as a threat. And the Ascension authorities are currently turning Green Mountain into a national park where introduced species, at least the invasive ones, are earmarked for culling rather than conservation.

Conservationists have understandable concerns, Wilkinson says. At least four endemic species have gone extinct on Ascension since the exotics started arriving. But in their urgency to protect endemics, ecologists are missing out on the study of a great enigma.

'As you walk through the forest, you see lots of leaves that have had chunks taken out of them by various insects. There are caterpillars and beetles around,' says Wilkinson. 'But where did they come from? Are they endemic or alien? If alien, did they come with the plant on which they feed or discover it on arrival?' Such questions go to the heart of how rainforests happen.

The Green Mountain forest holds many secrets. And the irony is that the most artificial rainforest in the world could tell us more about rainforest ecology than any number of natural forests.

PART 3 — QUESTIONS

Questions 27-32

Do the following statements agree with the information given in Reading Passage 3?

write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

27 When Peter Osbeck visited Ascension, he found no inhabitants on the island.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

28 The natural vegetation on the island contained some species which were found nowhere else.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

29 Joseph Hooker assumed that human activity had caused the decline in the island's plant life.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

30 British sailors on the island took part in a major tree planting project.

- **A** ○ TRUE
- **B** ○ FALSE

C ○ NOT GIVEN

31 Hooker sent details of his planting scheme to a number of different countries.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

32 The bamboo and prickly pear seeds sent from England were unsuitable for Ascension.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

Questions 33-37

Complete each sentence with the correct ending A-G from the box below.

• The reason for modern conservationists' concern over Hooker's tree planting programme is that **33** _____

• David Wilkinson says the creation of the rainforest in Ascension is important because it shows that **34** _____

• Wilkinson says the existence of Ascension's rainforest challenges the theory that **35** _____

• Alan Gray questions Wilkinson's theory, claiming that **36** _____

• Additional support for Wilkinson's theory comes from findings that **37** _____

A. **other rainforests may have originally been planted by man.**

B. **many of the island's original species were threatened with destruction.**

C. **the species in the original rainforest were more successful than the newer arrivals.**

D. **rainforests can only develop through a process of slow and complex evolution.**

E. **steps should be taken to prevent the destruction of the original ecosystem.**

F. **randomly introduced species can coexist together.**

G. **the introduced species may have less ecological significance than the original ones.**

Questions 38-40

Choose the correct letter, A, B, C or D.

38 Wilkinson suggests that conservationists' concern about the island is misguided because

- **A** ○ it is based on economic rather than environmental principles.
- **B** ○ it is not focusing on the most important question.
- **C** ○ it is encouraging the destruction of endemic species.
- **D** ○ it is not supported by the local authorities.

39 According to Wilkinson, studies of insects on the island could demonstrate

- **A** ○ the possibility of new ecological relationships.
- **B** ○ a future threat to the ecosystem of the island.
- **C** ○ the existence of previously unknown species.
- **D** ○ a chance for the survival of rainforest ecology.

40 Overall, what feature of the Ascension rainforest does the writer stress?

- **A** ○ the conflict of natural and artificial systems
- **B** ○ the unusual nature of its ecological structure
- **C** ○ the harm done by interfering with nature
- **D** ○ the speed and success of its development

Answer Key

#	Answer	Explanation
1	**B**	Termites in Zimbabwe build gigantic mounds inside which they farm a fungus that is their primary food source. This must be kept at exactly 30.5°C, while the temperatures on the African veld outside can range from 1.5°C at night – only just above freezing – to a baking hot 40°C during the day. The termites achieve this remarkable feat by building a system of vents in the mound
2	**D**	These efficiencies translated directly to the bottom line: the Eastgate's owners saved $3.5 million on a $36 million building because an air-conditioning plant didn't have to be imported
3	**A**	This is all possible only because Harare is 1600 feet above sea level, has cloudless skies, little humidity and rapid temperature swings – days as warm as 31°C commonly drop to 14°C at night. 'You couldn't do this in New York, with its fantastically hot summers and fantastically cold winters,' Pearce said
4	**C**	Ove Arup's graphs show that the temperature of the building has generally stayed between 23°C and 25°C, with the exception of the annual hot spell just before the summer rains in October, and three days in November, when a janitor accidentally switched off the fans at night
5	**A**	Standing on a roof catwalk, peering down inside at people as small as termites below, Pearce said he hoped plants would grow wild in the atrium and pigeons and bats would move into it, like that termite fungus, further extending the whole 'organic machine' metaphor
6	**ceiling vents**	Fans suck fresh air in from the atrium, blow it upstairs through hollow spaces under the floors and from there into each office through baseboard vents. As it rises and warms, it is drawn out via ceiling vents and finally exits through forty-eight brick chimneys
7	**(the) (brick) chimneys**	As it rises and warms, it is drawn out via ceiling vents and finally exits through forty-eight brick chimneys
8	**cement arches**	To keep the harsh, high veld sun from heating the interior, no more than 25% of the outside is glass, and all the windows are screened by cement arches that jut out more than a metre
9	**(the) big fans**	During summer's cool nights, big fans flush air through the building seven times an hour to chill the hollow floors

#	Answer	Explanation
10	**(the) (small) heaters**	For winter days, there are small heaters in the vents
11	**(the) entrances**	The design of the entrances is based on the porcupine-quill headdresses of the local Shona tribe
12	**(the) elevators**	Elevators are designed to look like the mineshaft cages used in Zimbabwe's diamond mines
13	**(the) fan covers**	The shape of the fan covers, and the stone used in their construction, are echoes of Great Zimbabwe, the ruins that give the country its name
14	**v**	But the company's name may itself simply be an example of clever marketing. BrightHouse does not scan people while showing them specific products or campaign ideas, but bases its work on the results of more general fMRI-based research into consumer preferences and decision-making carried out at Emory University in Atlanta
15	**i**	A volunteer lies in an fMRI machine and is shown images or video clips. In place of an interview or questionnaire, the subject's response is evaluated by monitoring brain activity. fMRI provides real-time images of brain activity, in which different areas 'light up' depending on the level of blood flow
16	**ix**	At first, it seemed that only companies in Europe were prepared to admit that they used neuromarketing. Two carmakers, DaimlerChrysler in Germany and Ford's European arm, ran pilot studies in 2003. But more recently, American companies have become more open about their use of neuromarketing. Lieberman Research Worldwide, a marketing firm based in Los Angeles, is collaborating with the California Institute of Technology (Caltech) to enable movie studios to market-test film trailers. More controversially, the New York Times recently reported that a political consultancy, FKF Research, has been studying the effectiveness of campaign commercials using neuromarketing techniques
17	**viii**	Whether all this is any more than a modern-day version of phrenology, the Victorian obsession with linking lumps and bumps in the skull to personality traits, is unclear. There have been no large-scale studies, so scans of a handful of subjects may not be a reliable guide to consumer behaviour in general. Of course, focus groups and surveys are flawed too: strong personalities can steer the outcomes of focus groups, and some people may be untruthful in their responses to opinion pollsters. And even honest people cannot always explain their preferences

#	Answer	Explanation
18	**iii**	An unpublished study of attitudes towards two well-known cola drinks, Brand A and Brand B, carried out last year in a college of medicine in the US found that most subjects preferred Brand B in a blind tasting – fMRI scanning showed that drinking Brand B lit up a region called the ventral putamen, which is one of the brain's 'reward centres', far more brightly than Brand A. But when told which drink was which, most subjects said they preferred Brand A, which suggests that its stronger brand outweighs the more pleasant taste of the other drink
19	**vi**	With over $100 billion spent each year on marketing in America alone, any firm that can more accurately analyse how customers respond to brands could make a fortune
20	**F**	Brain-scanning could, for example, be used to determine when people are capable of making free choices, to ensure that advertising falls within those bounds
21	**D**	'Already, marketing is deeply implicated in many serious pathologies,' he says. 'That is especially true of children, who are suffering from an epidemic of marketing-related diseases, including obesity and type-2 diabetes. Neuromarketing is a tool to amplify these trends.'
22	**A**	But as Tim Ambler, a neuromarketing researcher at the London Business School, says: 'A tool is a tool, and if the owner of the tool gets a decent rent for hiring it out, then that subsidises the cost of the equipment, and everybody wins.'
23	**brands**	An unpublished study of attitudes towards two well-known cola drinks, Brand A and Brand B, carried out last year in a college of medicine in the US found that most subjects preferred Brand B in a blind tasting – fMRI scanning showed that drinking Brand B lit up a region called the ventral putamen, which is one of the brain's 'reward centres', far more brightly than Brand A. But when told which drink was which, most subjects said they preferred Brand A, which suggests that its stronger brand outweighs the more pleasant taste of the other drink
24	**untruthful**	Of course, focus groups and surveys are flawed too: strong personalities can steer the outcomes of focus groups, and some people may be untruthful in their responses to opinion pollsters
25	**unconscious**	'People form many unconscious attitudes that are obviously beyond traditional methods that utilise introspection,' says Steven Quartz, a neuroscientist at Caltech who is collaborating with Lieberman Research
26	**children**	'Already, marketing is deeply implicated in many serious pathologies,' he says. 'That is especially true of children, who are

#	Answer	Explanation
		suffering from an epidemic of marketing-related diseases, including obesity and type-2 diabetes. Neuromarketing is a tool to amplify these trends.'
27	**NOT GIVEN**	When Peter Osbeck, a Swedish priest, stopped off at the mid-Atlantic island of Ascension in 1752 on his way home from China, he wrote of 'a heap of ruinous rocks' with a bare, white mountain in the middle. All it boasted was a couple of dozen species of plant, most of them ferns and some of them unique to the island
28	**TRUE**	All it boasted was a couple of dozen species of plant, most of them ferns and some of them unique to the island
29	**FALSE**	Surveying the bare earth, he concluded that the island had suffered some natural calamity that had denuded it of vegetation and triggered a decline in rainfall that was turning the place into a desert
30	**TRUE**	The British Navy, which by then maintained a garrison on the island, was keen to improve the place and asked Hooker's advice. He suggested an ambitious scheme for planting trees and shrubs that would revive rainfall and stimulate a wider ecological recovery. And, perhaps lacking anything else to do, the sailors set to with a will With sailors planting several thousand trees a year, the bare white mountain was soon cloaked in green and renamed Green Mountain, and by the early twentieth century the mountain's slopes were covered with a variety of trees and shrubs from all over the world
31	**NOT GIVEN**	The British Navy, which by then maintained a garrison on the island, was keen to improve the place and asked Hooker's advice. He suggested an ambitious scheme for planting trees and shrubs that would revive rainfall and stimulate a wider ecological recovery
32	**FALSE**	From England came 700 packets of seeds, including those of two species that especially liked the place: bamboo and prickly pear
33	**B**	The exotic species wrecked the indigenous ecosystem, squeezing out the island's endemic plants
34	**F**	Today's Green Mountain, says Wilkinson, is 'a fully functioning man-made tropical cloud forest that has grown from scratch from a ragbag of species collected more or less at random from all over the planet'
35	**D**	Conventional ecological theory says that complex ecosystems such as cloud forests can emerge only through evolutionary processes in which each organism develops in concert with others to fill particular niches. Plants co-evolve with their pollinators and seed dispersers, while microbes in the soil evolve

#	Answer	Explanation
		to deal with the leaf litter. But that's not what happened on Green Mountain. And the experience suggests that perhaps natural rainforests are constructed far more by chance than by evolution. Species, say some ecologists, don't so much evolve to create ecosystems as make the best of what they have. 'The Green Mountain system is a man-made system that has produced a tropical rainforest without any co-evolution between its constituent species,' says Wilkinson
36	**G**	Not everyone agrees. Alan Gray, an ecologist at the University of Edinburgh in the UK, argues that the surviving endemic species on Green Mountain, though small in number, may still form the framework of the new ecosystem. The new arrivals may just be an adornment, with little structural importance for the ecosystem
37	**A**	And the idea of the instant formation of rainforests sounds increasingly plausible as research reveals that supposedly pristine tropical rainforests from the Amazon to south-east Asia may in places be little more than the overgrown gardens of past rainforest civilisations
38	**B**	Conservationists' understandable concern for the fate of Ascension's handful of unique species has, he says, blinded them to something quite astonishing – the fact that the introduced species have been a roaring success But in their urgency to protect endemics, ecologists are missing out on the study of a great enigma
39	**A**	'As you walk through the forest, you see lots of leaves that have had chunks taken out of them by various insects. There are caterpillars and beetles around,' says Wilkinson. 'But where did they come from? Are they endemic or alien? If alien, did they come with the plant on which they feed or discover it on arrival?' Such questions go to the heart of how rainforests happen
40	**D**	Conservationists' understandable concern for the fate of Ascension's handful of unique species has, he says, blinded them to something quite astonishing – the fact that the introduced species have been a roaring success. Today's Green Mountain, says Wilkinson, is 'a fully functioning man-made tropical cloud forest that has grown from scratch from a ragbag of species collected more or less at random from all over the planet'

Test 91

PASSAGE 1

You should spend about 20 minutes on Questions 1-13, which are based on Reading Passage 1 below.

Astronaut ice cream, anyone?

Freeze-drying is like suspended animation for food; you can store a freeze-dried meal for years, and then, when you're finally ready to eat it, you can completely revitalise it with a little hot water. Even after several years, the original foodstuff will be virtually unchanged.

The technique basically involves completely removing the water from some material, such as food, while leaving the rest of the material virtually intact. The main reason for doing this is either to preserve the food or to reduce its weight. Removing the water from food keeps it from spoiling, because the microorganisms such as bacteria that cause spoiling cannot survive without it. Similarly, the enzymes which occur naturally in food cannot cause ripening without water, so removing water from food will also stop the ripening process.

Freeze-drying significantly reduces the total weight of the food because most food is largely made up of water, for example, many fruits are more than 80-90% water. Removing this makes the food much lighter and therefore makes transportation less difficult. The military and camping-supply companies freeze-dry foods to make them easier for an individual to carry and NASA has also freeze-dried foods for the cramped quarters on board spacecraft.

The process is also used to preserve other sorts of material, such as pharmaceuticals. Chemists can greatly extend pharmaceutical shelf life by freeze-drying the material and storing it in a container free of oxygen and water. Similarly, research scientists may use freeze-drying to preserve biological samples for long periods of time. Even valuable manuscripts that had been water damaged have been saved by using this process.

Freeze-drying is different from simple drying because it is able to remove almost all the water from materials, whereas simple drying techniques can only remove 90-95%. This means that the damage caused by bacteria and enzymes can virtually be stopped, rather than just slowed down. In addition, the composition and structure of the material is not significantly changed, so materials can be revitalised without compromising the quality of the original.

This is possible because in freeze-drying, solid water - ice - is converted directly into water vapour, missing out the liquid phase entirely. This is called 'sublimation', the shift from a solid directly into a gas. Just like evaporation, sublimation occurs when a molecule gains enough energy to break free from the molecules around it. Water will sublime from a solid (ice) to a gas (vapour) when the molecules have enough energy to break free but the conditions aren't right for a liquid to form. These conditions are determined by heat and atmospheric pressure. When the temperature is above freezing point, so that ice can thaw, but the atmospheric pressure is too low for a liquid to form (below 0.06 atmospheres (ATM)) then it becomes a gas.

This is the principle on which a freeze-drying machine is based. The material to be preserved is placed in a freeze-drying chamber which is connected to a freezing coil and refrigerator compressor. When the chamber is sealed the compressor lowers the temperature inside it. The material is frozen solid, which separates the water from everything around it on a molecular level, even though the water is still present. Next, a vacuum pump forces air out of the chamber, lowering the atmospheric pressure below to 0.06 ATM. The heating units apply a small amount of heat to the shelves in the chamber, causing the ice to change phase. Since the pressure in the chamber is so low, the ice turns directly into water vapour, which leaves the freeze-drying chamber, and flows past the freezing coil. The water vapour condenses onto the freezing coil in the form of solid ice, in the same way that water condenses as frost on a cold day.

The process continues for many hours (even days) while the material gradually dries out. This time is necessary to avoid overheating, which might affect the structure of the material. Once it has dried sufficiently, it is sealed in a moisture-free package. As long as the package is secure, the material can sit on a shelf for years and years without degrading, until it is restored to its original form with a little hot water. If everything works correctly, the material will go through the entire process almost completely unscathed.

In fact, freeze-drying, as a general concept, is not new but has been around for centuries. The ancient Incas of Peru used mountain peaks along the Andes as natural food preservers. The extremely cold temperatures and low pressure at those high altitudes prevented food from spoiling in the same basic way as a modern freeze-drying machine and a freezer.

PART 1 — QUESTIONS

Questions 1-5

Complete the notes below.

Choose NO MORE THAN THREE WORDS from the passage for each answer.

Uses of freeze-drying:

• food preservation

• easy [1] _____ of food items

• long-term storage of [2] _____ and biological samples

• preservation of precious [3] _____

Freeze-drying

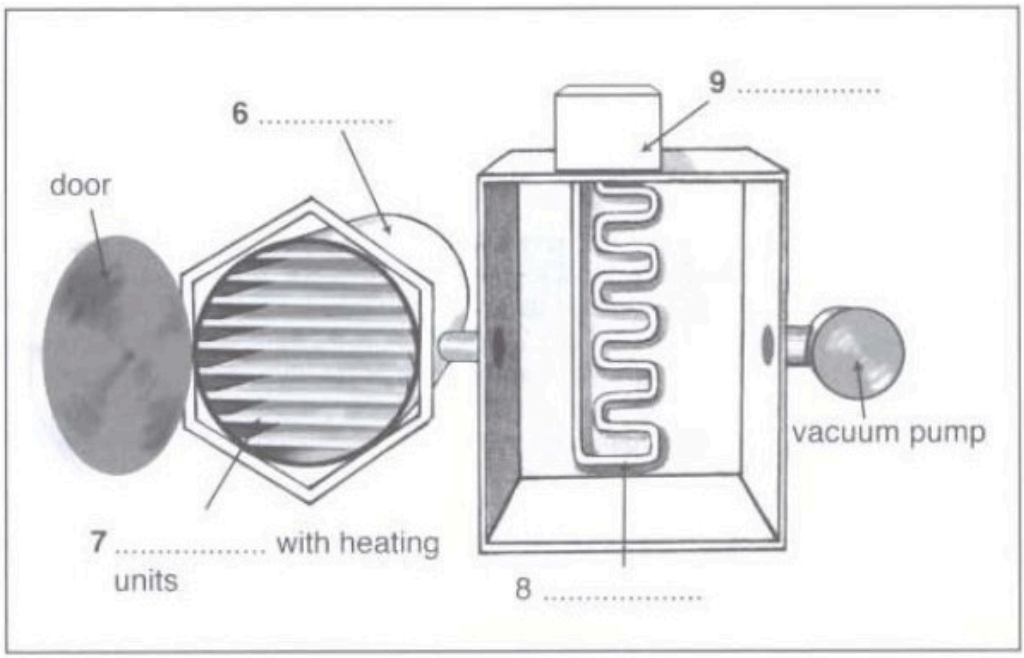
• is based on process of [4] _____

• is more efficient than [5] _____

Questions 6-9

Label the diagram below.

Choose NO MORE THAN TWO WORDS from the passage for each answer.



6 _____

7 _____

8 _____

9 _____

Questions 10-13

Complete the summary below.

Choose NO MORE THAN THREE WORDS AND/OR A NUMBER from the passage for each answer.

Freeze-drying prevents food from going bad by stopping the activity of microorganisms or **10** _____. Its advantages are that the food tastes and feels the same as the original because both the **11** _____ and are preserved. The process is carried out slowly in order to ensure that **12** _____ does not take place. The people of one ancient mountain civilisation were able to use this method of food preservation because the conditions needed were present at **13** _____.

PASSAGE 2

You should spend about 20 minutes on Questions 14-27, which are based on Reading Passage 2 below.

THE WILD SIDE OF TOWN

The past half century has seen an interesting reversal in the fortunes of much of Britain's wildlife. Whilst the rural countryside has become poorer and poorer, wildlife habitat in towns has burgeoned. Now, if you want to hear a deafening dawn chorus of birds or familiarise yourself with foxes, you can head for the urban forest.

Whilst species that depend on wide open spaces such as the hare, the eagle and the red deer may still be restricted to remote rural landscapes, many of our wild plants and animals find the urban ecosystem ideal. This really should be no surprise, since it is the fragmentation and agrochemical pollution in the farming lowlands that has led to the catastrophic decline of so many species.

By contrast, most urban open spaces have escaped the worst of the pesticide revolution, and they are an intimate mosaic of interconnected habitats. Over the years, the cutting down of hedgerows on farmland has contributed to habitat isolation and species loss. In towns, the tangle of canals, railway embankments, road verges and boundary hedges lace the landscape together, providing first-class ecological corridors for species such as hedgehogs, kingfishers and dragonflies.

Urban parks and formal recreation grounds are valuable for some species, and many of them are increasingly managed with wildlife in mind. But in many places their significance is eclipsed by the huge legacy of post-industrial land - demolished factories, waste tips, quarries, redundant railway yards and other so-called 'brownfield' sites. In Merseyside, South Yorkshire and the West Midlands, much of this has been spectacularly colonised with birch and willow woodland, herb-rich grassland and shallow wetlands. As a consequence, there are song birds and predators in abundance over these once-industrial landscapes.

There are fifteen million domestic gardens in the UK, and whilst some are still managed as lifeless chemical war zones, most benefit the local wildlife, either through benign neglect or positive encouragement. Those that do best tend to be woodland species, and the garden lawns and flower borders, climber-covered fences, shrubberies and fruit trees are a plausible alternative. Indeed, in some respects gardens are rather better than the real thing, especially with exotic flowers extending the nectar season. Birdfeeders can also supplement the natural seed supply, and only the millions of domestic cats may spoil the scene.

As Britain's gardeners have embraced the idea of 'gardening with nature', wildlife's response has been spectacular. Between 1990 and the year 2000, the number of different bird species seen at artificial feeders in gardens increased from 17 to an amazing 81. The BUGS project (Biodiversity in Urban Gardens in Sheffield) calculates that there are 25,000 garden ponds and 100,000 nest boxes in that one city alone.

We are at last acknowledging that the wildlife habitat in towns provides a valuable life support system. The canopy of the urban forest is filtering air pollution, and intercepting rainstorms, allowing the water to drip more gradually to the ground. Sustainable urban drainage relies on ponds and wetlands to contain storm water runoff, thus reducing the risk of flooding, whilst reed beds and other wetland wildlife communities also help to clean up the water. We now have scientific proof that contact with wildlife close to home can help to reduce stress and anger. Hospital patients with a view of natural green space make a more rapid recovery and suffer less pain.

Traditionally, nature conservation in the UK has been seen as marginal and largely rural. Now we are beginning to place it at the heart of urban environmental and economic policy. There are now dozens of schemes to create new habitats and restore old ones in and around our big cities. Biodiversity is big in parts of London, thanks to schemes such as the London Wetland Centre in the south west of the city.

This is a unique scheme masterminded by the Wildfowl and Wetlands Trust to create a wildlife reserve out of a redundant Victorian reservoir. Within five years of its creation the Centre has been hailed as one of the top sites for nature in England and made a Site of Special Scientific Interest. It consists of a 105-acre wetland site, which is made up of different wetland habitats of shallow, open water and grazing marsh. The site attracts more than 104 species of bird, including nationally important rarities like the bittern.

We need to remember that if we work with wildlife, then wildlife will work for us - and this is the very essence of sustainable development.

PART 2 — QUESTIONS

Questions 14-19

Do the following statements agree with the information given in Reading Passage 2?

Write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

14 There is now more wildlife in UK cities than in the countryside.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

15 Rural wildlife has been reduced by the use of pesticides on farms.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

16 In the past, hedges on farms used to link up different habitats.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

17 New urban environments are planned to provide ecological corridors for wildlife.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

18 Public parks and gardens are being expanded to encourage wildlife.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

19 Old industrial wastelands have damaged wildlife habitats in urban areas.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

Questions 20-23

Answer the questions below, using NO MORE THAN THREE WORDS AND/OR A NUMBER from the passage for each answer.

20 Which type of wildlife benefits most from urban gardens? _____

21 What type of garden plants can benefit birds and insects? _____

22 What represents a threat to wildlife in urban gardens? _____

23 At the last count, how many species of bird were spotted in urban gardens?

_____

Questions 24-26

Choose THREE letters A-G.

24 **25** **26** In which THREE ways can wildlife habitats benefit people living in urban areas?

- **A** ☐ They can make the cities greener.
- **B** ☐ They can improve the climate.
- **C** ☐ They can promote human well-being.
- **D** ☐ They can extend the flowering season.

- **E** ☐ They can absorb excess water.
- **F** ☐ They can attract wildlife.
- **G** ☐ They can help clean the urban atmosphere.

Questions 27-27

Choose the correct answer, A, B, C or D.

27 The writer believes that sustainable development is dependent on

- **A** ○ urban economic policy.
- **B** ○ large restoration schemes.
- **C** ○ active nature conservation.
- **D** ○ government projects.

PASSAGE 3

You should spend about 20 minutes on Questions 28-40, which are based on Reading Passage 3 below.

Running on empty

28

A For almost a century, scientists have presumed, not unreasonably, that fatigue - or exhaustion - in athletes originates in the muscles. Precise explanations have varied, but all have been based on the 'limitations theory'. In other words, muscles tire because they hit a physical limit: they either run out of fuel or oxygen or they drown in toxic by-products.

29

B In the past few years, however, Timothy Noakes and Alan St Clair Gibson from the University of Cape Town, South Africa, have examined this standard theory. The deeper they dig, the more convinced they have become that physical fatigue simply isn't the same as a car running out of petrol. Fatigue, they argue, is caused not by distress signals springing from overtaxed muscles, but is an emotional response which begins in the brain. The essence of their new theory is that the brain, using a mix of physiological, subconscious and conscious cues, paces the muscles to keep them well back from the brink of exhaustion. When the brain decides it's time to quit, it creates the distressing sensations we interpret as unbearable muscle fatigue. This 'central governor' theory remains controversial, but it does explain many puzzling aspects of athletic performance.

30

C A recent discovery that Noakes calls the 'lactic acid paradox' made him start researching this area seriously. Lactic acid is a by-product of exercise, and its accumulation is often cited as a cause of fatigue. But when research subjects exercise in conditions simulating high altitude, they become fatigued even though lactic acid levels remain low. Nor has the oxygen content of their blood fallen too low for them to keep going. Obviously, Noakes deduced, something else was making them tire before they hit either of these physiological limits.

31

D Probing further, Noakes conducted an experiment with seven cyclists who had sensors taped to their legs to measure the nerve impulses travelling through their muscles. It has long been known that during exercise, the body never uses 100% of the available muscle fibres in a single contraction. The amount used varies, but in endurance tasks such as this cycling test the body calls on about 30%.

32

E Noakes reasoned that if the limitations theory was correct and fatigue was due to muscle fibres hitting some limit, the number of fibres used for each pedal stroke should increase as the fibres tired and the cyclist's body attempted to compensate by recruiting an ever-larger proportion of the total. But his team found exactly the opposite. As fatigue set in, the electrical activity in the cyclists' legs declined - even during sprinting, when they were striving to cycle as fast as they could.

33

F To Noakes, this was strong evidence that the old theory was wrong. 'The cyclists may have felt completely exhausted,' he says, 'but their bodies actually had considerable reserves that they could theoretically tap by using a greater proportion of the resting fibres.' This, he believes, is proof that the brain is regulating the pace of the workout to hold the cyclists well back from the point of catastrophic exhaustion.

G More evidence comes from the fact that fatigued muscles don't actually run out of anything critical. Levels of glycogen, which is the muscles' primary fuel, and ATP, the chemical they use for temporary energy storage, decline with exercise but never bottom out. Even at the end of a marathon, ATP levels are 80-90% of the resting norm, and glycogen levels never get to zero.

H Further support for the central regulator comes from the fact that top athletes usually manage to go their fastest at the end of a race, even though, theoretically, that's when their muscles should be closest to exhaustion. But Noakes believes the end spurt makes no sense if fatigue is caused by muscles poisoning themselves with lactic acid, as this would cause racers to slow down rather than enable them to sprint for the finish line. In the new theory, the explanation is obvious. Knowing the end is near, the brain slightly relaxes its vigil, allowing the athlete to tap some of the body's carefully hoarded reserves.

I But the central governor theory does not mean that what's happening in the muscles is irrelevant. The governor constantly monitors physiological signals from the muscles, along with other information, to set the level of fatigue. A large number of signals are probably involved, but, unlike the limitations theory, the central governor theory suggests that these physiological factors are not the direct determinants of fatigue, but simply information to take into account.

J Conscious factors can also intervene. Noakes believes that the central regulator evaluates the planned workout, and sets a pacing strategy accordingly. Experienced runners know that if they set out on a 10-kilometre run, the first kilometre feels easier than the first kilometre of a 5-kilometre run, even though there should be no difference. That, Noakes says, is because the central governor knows you have farther to go in the longer run and has programmed itself to dole out fatigue symptoms accordingly.

K St Clair Gibson believes there is a good reason why our bodies are designed to keep something back. That way, there's always something left in the tank for an emergency. In

ancient times, and still today, life would be too dangerous if our bodies allowed us to become so tired that we couldn't move quickly when faced with an unexpected need.

PART 3 — QUESTIONS

Questions 28-33

Reading Passage 3 has eleven paragraphs A-K.

Choose the correct heading for Paragraphs A-F from the list of headings below.

Write the correct number (i-viii).

i. **Avoiding tiredness in athletes**

ii. **Puzzling evidence raises a question**

iii. **Traditional explanations**

iv. **Interpreting the findings**

v. **Developing muscle fibres**

vi. **A new hypothesis**

vii. **Description of a new test**

viii. **Surprising results in an endurance test**

Questions 34-40

Classify the following ideas as relating to

Write the correct letter, A, B or C.

NB You may use any letter more than once.

A. the Limitations Theory

B. the Central Governor Theory

C. both the Limitations Theory and the Central Governor Theory

	A	B	C
34 Lactic acid is produced in muscles during exercise.	○	○	○
35 Athletes can keep going until they use up all their available resources.	○	○	○
36 Mental processes control the symptoms of tiredness.	○	○	○

	A	B	C
37 The physiological signals from an athlete's muscles are linked to fatigue.	○	○	○
38 The brain plans and regulates muscle performance in advance of a run.	○	○	○
39 Athletes' performance during a race may be affected by lactic acid build-up.	○	○	○
40 Humans are genetically programmed to keep some energy reserves.	○	○	○

Answer Key

#	Answer	Explanation
1	**transportation**	Removing this makes the food much lighter and therefore makes transportation less difficult
2	**pharmaceuticals**	The process is also used to preserve other sorts of material, such as pharmaceuticals. Chemists can greatly extend pharmaceutical shelf life by freeze-drying the material and storing it in a container free of oxygen and water. Similarly, research scientists may use freeze-drying to preserve biological samples for long periods of time
3	**manuscripts**	Even valuable manuscripts that had been water damaged have been saved by using this process
4	**sublimation**	This is possible because in freeze-drying, solid water – ice – is converted directly into water vapour, missing out the liquid phase entirely. This is called 'sublimation', the shift from a solid directly into a gas This is the principle on which a freeze-drying machine is based
5	**simple drying (techniques)**	Freeze-drying is different from simple drying because it is able to remove almost all the water from materials, whereas simple drying techniques can only remove 90-95%
6	**(freeze-drying) chamber**	The material to be preserved is placed in a freeze-drying chamber which is connected to a freezing coil and refrigerator compressor
7	**shelves**	The heating units apply a small amount of heat to the shelves in the chamber, causing the ice to change phase
8	**freezing coil**	The material to be preserved is placed in a freeze-drying chamber which is connected to a freezing coil and refrigerator compressor The water vapour condenses onto the freezing coil in the form of solid ice, in the same way that water condenses as frost on a cold day
9	**(refrigerator) compressor**	The material to be preserved is placed in a freeze-drying chamber which is connected to a freezing coil and refrigerator compressor. When the chamber is sealed the compressor lowers the temperature inside it
10	**enzymes**	Similarly, the enzymes which occur naturally in food cannot cause ripening without water, so removing water from food will also stop the ripening process

#	Answer	Explanation
11	**composition and structure**	In addition, the composition and structure of the material is not significantly changed, so materials can be revitalised without compromising the quality of the original
12	**overheating**	The process continues for many hours (even days) while the material gradually dries out. This time is necessary to avoid overheating, which might affect the structure of the material
13	**high altitudes**	The ancient Incas of Peru used mountain peaks along the Andes as natural food preservers. The extremely cold temperatures and low pressure at those high altitudes prevented food from spoiling in the same basic way as a modern freeze-drying machine and a freezer
14	**NOT GIVEN**	The past half century has seen an interesting reversal in the fortunes of much of Britain's wildlife. Whilst the rural countryside has become poorer and poorer, wildlife habitat in towns has burgeoned many of our wild plants and animals find the urban ecosystem ideal
15	**TRUE**	This really should be no surprise, since it is the fragmentation and agrochemical pollution in the farming lowlands that has led to the catastrophic decline of so many species
16	**TRUE**	Over the years, the cutting down of hedgerows on farmland has contributed to habitat isolation and species loss
17	**NOT GIVEN**	In towns, the tangle of canals, railway embankments, road verges and boundary hedges lace the landscape together, providing first-class ecological corridors for species such as hedgehogs, kingfishers and dragonflies There are now dozens of schemes to create new habitats and restore old ones in and around our big cities
18	**NOT GIVEN**	Urban parks and formal recreation grounds are valuable for some species, and many of them are increasingly managed with wildlife in mind There are fifteen million domestic gardens in the UK, and whilst some are still managed as lifeless chemical war zones, most benefit the local wildlife, either through benign neglect or positive encouragement
19	**FALSE**	But in many places their significance is eclipsed by the huge legacy of post-industrial land – demolished factories, waste tips, quarries, redundant railway yards and other so-called 'brownfield' sites. In Merseyside, South Yorkshire and the West Midlands, much of this has been spectacularly colonised with birch and willow woodland, herb-rich grassland and shallow wetlands. As a consequence, there are song birds and predators in abundance over these once-industrial landscapes

#	Answer	Explanation
20	**woodland species**	Those that do best tend to be woodland species
21	**exotic flowers**	Indeed, in some respects gardens are rather better than the real thing, especially with exotic flowers extending the nectar season
22	**(domestic) cats**	and only the millions of domestic cats may spoil the scene
23	**81**	Between 1990 and the year 2000, the number of different bird species seen at artificial feeders in gardens increased from 17 to an amazing 81
24	**C / E / G**	The canopy of the urban forest is filtering air pollution, and intercepting rainstorms, allowing the water to drip more gradually to the ground. Sustainable urban drainage relies on ponds and wetlands to contain storm water runoff, thus reducing the risk of flooding, whilst reed beds and other wetland wildlife communities also help to clean up the water. We now have scientific proof that contact with wildlife close to home can help to reduce stress and anger. Hospital patients with a view of natural green space make a more rapid recovery and suffer less pain
25	**C / E / G**	The canopy of the urban forest is filtering air pollution, and intercepting rainstorms, allowing the water to drip more gradually to the ground. Sustainable urban drainage relies on ponds and wetlands to contain storm water runoff, thus reducing the risk of flooding, whilst reed beds and other wetland wildlife communities also help to clean up the water. We now have scientific proof that contact with wildlife close to home can help to reduce stress and anger. Hospital patients with a view of natural green space make a more rapid recovery and suffer less pain
26	**C / E / G**	The canopy of the urban forest is filtering air pollution, and intercepting rainstorms, allowing the water to drip more gradually to the ground. Sustainable urban drainage relies on ponds and wetlands to contain storm water runoff, thus reducing the risk of flooding, whilst reed beds and other wetland wildlife communities also help to clean up the water. We now have scientific proof that contact with wildlife close to home can help to reduce stress and anger. Hospital patients with a view of natural green space make a more rapid recovery and suffer less pain
27	**C**	We need to remember that if we work with wildlife, then wildlife will work for us – and this is the very essence of sustainable development
28	**iii**	For almost a century, scientists have presumed, not unreasonably, that fatigue – or exhaustion – in athletes originates in the muscles. Precise explanations have varied, but all have been based on the ‘limitations theory’

#	Answer	Explanation
29	**vi**	The essence of their new theory is that the brain, using a mix of physiological, subconscious and conscious cues, paces the muscles to keep them well back from the brink of exhaustion. When the brain decides it's time to quit, it creates the distressing sensations we interpret as unbearable muscle fatigue. This 'central governor' theory remains controversial, but it does explain many puzzling aspects of athletic performance
30	**ii**	A recent discovery that Noakes calls the 'lactic acid paradox' made him start researching this area seriously. Lactic acid is a by-product of exercise, and its accumulation is often cited as a cause of fatigue. But when research subjects exercise in conditions simulating high altitude, they become fatigued even though lactic acid levels remain low. Nor has the oxygen content of their blood fallen too low for them to keep going. Obviously, Noakes deduced, something else was making them tire before they hit either of these physiological limits
31	**vii**	Probing further, Noakes conducted an experiment with seven cyclists who had sensors taped to their legs to measure the nerve impulses travelling through their muscles
32	**viii**	Noakes reasoned that if the limitations theory was correct and fatigue was due to muscle fibres hitting some limit, the number of fibres used for each pedal stroke should increase as the fibres tired and the cyclist's body attempted to compensate by recruiting an ever-larger proportion of the total. But his team found exactly the opposite
33	**iv**	To Noakes, this was strong evidence that the old theory was wrong. 'The cyclists may have felt completely exhausted,' he says, 'but their bodies actually had considerable reserves that they could theoretically tap by using a greater proportion of the resting fibres.' This, he believes, is proof that the brain is regulating the pace of the workout to hold the cyclists well back from the point of catastrophic exhaustion
34	**C**	Lactic acid is a by-product of exercise, and its accumulation is often cited as a cause of fatigue
35	**A**	In other words, muscles tire because they hit a physical limit: they either run out of fuel or oxygen or they drown in toxic by-products
36	**B**	Fatigue, they argue, is caused not by distress signals springing from overtaxed muscles, but is an emotional response which begins in the brain When the brain decides it's time to quit, it creates the distressing sensations we interpret as unbearable muscle fatigue

#	Answer	Explanation
37	**C**	In other words, muscles tire because they hit a physical limit: they either run out of fuel or oxygen or they drown in toxic by-products The governor constantly monitors physiological signals from the muscles, along with other information, to set the level of fatigue
38	**B**	Noakes believes that the central regulator evaluates the planned workout, and sets a pacing strategy accordingly. Experienced runners know that if they set out on a 10-kilometre run, the first kilometre feels easier than the first kilometre of a 5-kilometre run, even though there should be no difference. That, Noakes says, is because the central governor knows you have farther to go in the longer run and has programmed itself to dole out fatigue symptoms accordingly
39	**A**	Lactic acid is a by-product of exercise, and its accumulation is often cited as a cause of fatigue
40	**B**	St Clair Gibson believes there is a good reason why our bodies are designed to keep something back. That way, there's always something left in the tank for an emergency. In ancient times, and still today, life would be too dangerous if our bodies allowed us to become so tired that we couldn't move quickly when faced with an unexpected need

Test 92

PASSAGE 1

You should spend about 20 minutes on Questions 1-13, which are based on Reading Passage 1 below.

Reducing electricity consumption on the Isle of Eigg

Background

The Isle of Eigg is situated off the West Coast of Scotland, and is reached by ferry from the mainland. For the island community of about a hundred residents, it has always been expensive to import products, materials and skilled labour from the mainland, and this has encouraged a culture of self-sufficiency and careful use of resources. Today, although the island now has most modern conveniences, CO2 emissions per household are 20 percent lower than the UK average, and electricity use is 50 percent lower.

When Eigg designed its electricity grid, which was switched on in February 2008, it quickly became apparent that in order to keep the capital building costs down, it would be necessary to manage demand. This would also allow the island to generate most of its electricity from renewable sources, mainly water, wind and solar power. This goal was overseen by the Eigg Heritage Trust (EHT).

The technology

Eigg manages electricity demand mainly by capping the instantaneous power that can be used to five kilowatts (kW) for a household and ten kW for a business. If usage goes over the limit, the electricity supply is cut off and the maintenance team must be called to come and switch it back on again. All households and businesses have energy monitors, which display current and cumulative electricity usage, and sound an alarm when consumption reaches a user-defined level, usually set a few hundred watts below the actual limit. The result is that Eigg residents have a keen sense of how much power different electrical appliances use, and are careful to minimise energy consumption.

Demand is also managed by warning the entire island when renewable energy generation is lower than demand, and diesel generators are operating to back it up - a so-called 'red light day', as opposed to 'green light days' when there is sufficient renewable energy. Residents then take steps to temporarily reduce electricity demand further still, or postpone demand until renewable energy generation has increased.

Energy use on the island has also been reduced through improved wall and loft insulation in homes, new boilers, solar water heating, car-sharing and various small, energy-saving measures in households. New energy supplies are being developed, including sustainably harvested forests to supply wood for heating.

Eigg Heritage Trust has installed insulation in all of its own properties at no cost to the tenants, while private properties have paid for their own insulation to be installed. The same applies for installations of solar water heating, although not all Trust properties have received this as yet. The Trust also operates a Green Grants scheme, where residents can claim 50 percent of the cost of equipment to reduce carbon emissions, up to a limit of £300. Purchases included bikes, solar water heating, secondary glazing, thicker curtains, and greenhouses to grow food locally, rather than importing it.

Environmental benefits

Prior to the installation of the new electricity grid and renewable energy generation, most households on Eigg used diesel generators to supply electricity, resulting in significant carbon emissions. Homes were also poorly insulated and had old, inefficient oil-burning boilers, or used coal for heating.

The work by the Eigg Heritage Trust to reduce energy use has resulted in significant reductions in carbon emissions from the island's households and businesses. The average annual electricity use per household is just 2,160 kilowatt hours (kWh), compared to a UK average in 2008 of 4,198 kWh. Domestic carbon emissions have fallen by 47 percent, from 8.4 to 4.45 tonnes per year. This compares to average UK household emissions of 5.5 to 6 tonnes per year. The emissions should fall even further over the next few years as the supply of wood for heating increases.

Social benefits

The completion of Eigg's electricity grid has made a significant difference to the island's residents, freeing them from dependence on diesel generators and providing them with a stable and affordable power supply. A reliable electricity supply has brought improvements in other areas, for example, better treatment of drinking water in some houses, and the elimination of the constant noise of diesel generators. Improved home insulation and heating has also yielded benefits, making it more affordable to keep homes at a comfortable temperature. One of the incentives for capping electricity use, rather than charging different amounts according to usage, was to make access to energy equitable. Every household has the same five kW cap, irrespective of income, so distributing the available resources equally across the island's population.

Economic and employment benefits

Eigg's electricity grid supports four part-time maintenance jobs on the island, and residents have also been employed for building work to improve Trust-owned houses and other buildings. Likewise, the start of organised harvesting of wood for heating has created several forestry jobs for residents. A part-time 'green project manager' post has also been created. A wider economic impact has come from having a reliable and affordable electricity supply, which has enabled several new businesses to start up, including restaurants, shops, guest houses and self-catering accommodation. As Eigg has become known for cutting carbon emissions and protecting the environment, an increasing number of visitors have come to the island to learn about its work, bringing a further economic benefit to the residents.

PART 1 — QUESTIONS

Questions 1-7

Answer the questions below.

Choose NO MORE THAN TWO WORDS AND/OR A NUMBER from the passage for each answer.

1 Approximately how many people live on Eigg? _____

2 What proportion of a UK household's electricity consumption does an Eigg household consume? _____

3 Apart from wind and sun, where does most of Eigg's electricity come from? _____

4 What device measures the amount of electricity Eigg's households are using? _____

5 When renewable energy supplies are insufficient, what backs them up? _____

6 What has EHT provided free of charge in all the houses it owns? _____

7 Which gardening aid did some Eigg inhabitants claim grants for? _____

Questions 8-13

Do the following statements agree with the information given in Reading Passage 1?

Write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

8 Electricity was available for the first time on Eigg when a new grid was switched on.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

9 Eigg's carbon emissions are now much lower than before.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

10 Wood will soon be the main source of heating on Eigg.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

11 Eigg is quieter as a result of having a new electricity supply.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

12 Well-off households pay higher prices for the use of extra electricity.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

13 The new electricity grid has created additional employment opportunities on Eigg.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

PASSAGE 2

You should spend about 20 minutes on Questions 14-26, which are based on Reading Passage 2 below.

Change in business organisations

A The forces that operate to bring about change in organisations can be thought of as winds which are many and varied - from small summer breezes that merely disturb a few papers, to mighty howling gales which cause devastation to structures and operations, causing consequent reorientation of purpose and rebuilding. Sometimes, however, the winds die down to give periods of relative calm, periods of relative organisational stability. Such a period was the agricultural age, which Goodman (1995) maintains prevailed in Europe and western societies as a whole until the early 1700s. During this period, wealth was created in the context of an agriculturally based society influenced mainly by local markets (both customer and labour) and factors outside people's control, such as the weather. During this time, people could fairly well predict the cycle of activities required to maintain life, even if that life might be at little more than subsistence level.

B To maintain the meteorological metaphor, stronger winds of change blew to bring in the Industrial Revolution and the industrial age. Again, according to Goodman, this lasted for a long time, until around 1945. It was characterised by a series of inventions and innovations that reduced the number of people needed to work the land and, in turn, provided the means of production of hitherto rarely obtainable goods; for organisations, supplying these in ever increasing numbers became the aim. To a large extent, demand and supply were predictable, enabling companies to structure their organisations along what Burns and Stalker (1966) described as mechanistic lines, that is as systems of strict hierarchical structures and firm means of control.

C This situation prevailed for some time, with demand still coming mainly from the domestic market and organisations striving to fill the 'supply gap'. Thus the most disturbing environmental influence on organisations of this time was the demand for products, which outstripped supply. The saying attributed to Henry Ford that 'You can have any colour of car so long as it is black', gives a flavour of the supply-led state of the market. Apart from any technical difficulties of producing different colours of car, Ford did not have to worry about customers' colour preferences: he could sell all that he made. Organisations of this period can be regarded as 'task-oriented', with effort being put into increasing production through more effective and efficient production processes.

D As time passed, this favourable period for organisations began to decline. In the neo-industrial age, people became more discriminating in the goods and services they wished to buy and, as technological advancements brought about increased productivity, supply overtook demand. Companies began, increasingly, to look abroad for additional markets.

E At the same time, organisations faced more intensive competition from abroad for their own products and services. In the West, this development was accompanied by a shift in focus from

manufacturing to service, whether this merely added value to manufactured products, or whether it was service in its own right. In the neo-industrial age of western countries, the emphasis moved towards adding value to goods and services - what Goodman calls the value-oriented time, as contrasted with the task-oriented and products/services-oriented times of the past.

F Today, in the post-industrial age, most people agree that organisational life is becoming ever more uncertain, as the pace of change quickens and the future becomes less predictable. Writing in 1999, Nadler and Tushman, two US academics, said: 'Poised on the eve of the next century, we are witnessing a profound transformation in the very nature of our business organisations. Historic forces have converged to fundamentally reshape the scope, strategies, and structures of large enterprises.' At a less general level of analysis, Graeme Leach, Chief Economist at the British Institute of Directors, claimed in the Guardian newspaper (2000) that: 'By 2020, the nine-to-five rat race will be extinct and present levels of self-employment, commuting and technology use, as well as age and sex gaps, will have changed beyond recognition.' According to the article, Leach anticipates that: 'In 20 years time, 20-25 percent of the workforce will be temporary workers and many more will be flexible, ... 25 percent of people will no longer work in a traditional office and ... 50 percent will work from home in some form.' Continuing to use the 'winds of change' metaphor, the expectation is of damaging gale-force winds bringing the need for rebuilding that takes the opportunity to incorporate new ideas and ways of doing things.

G Whether all this will happen is arguable. Forecasting the future is always fraught with difficulties. For instance, Mannermann (1998) sees future studies as part art and part science and notes: 'The future is full of surprises, uncertainty, trends and trend breaks, irrationality and rationality, and it is changing and escaping from our hands as time goes by. It is also the result of actions made by innumerable more or less powerful forces.' What seems certain is that the organisational world is changing at a fast rate - even if the direction of change is not always predictable. Consequently, it is crucial that organisational managers and decision makers are aware of, and able to analyse the factors which trigger organisational change.

PART 2 — QUESTIONS

Questions 14-18

Reading Passage 2 has SEVEN paragraphs, A-G.

Which paragraph contains the following information?

Write the correct letter, A-G.

	A	B	C	D	E	F	G
14 some specific predictions about businesses and working practices	○	○	○	○	○	○	○
15 reference to the way company employees were usually managed	○	○	○	○	○	○	○
16 a warning for business leaders	○	○	○	○	○	○	○
17 the description of an era notable for the relative absence of change	○	○	○	○	○	○	○
18 a reason why customer satisfaction was not a high priority	○	○	○	○	○	○	○

Questions 19-23

Look at the following characteristics (Questions 19-23) and the list of periods below.

Match each characteristic with the correct period, A, B or C.

Write the correct letter, A, B or C.

NB You may use any letter more than once.

A. The agricultural age.

B. The industrial age.

C. The neo-industrial age.

	A	B	C
19 a surplus of goods.	○	○	○

	A	B	C
20 an emphasis on production quantity.	○	○	○
21 the proximity of consumers to workplaces.	○	○	○
22 a focus on the quality of goods.	○	○	○
23 new products and new ways of working.	○	○	○

Questions 24-26

Complete the summary below.

Choose ONE WORD ONLY from the passage for each answer.

Businesses in the 21st century

It is generally agreed that changes are taking place more quickly now, and that organisations are being transformed. One leading economist suggested that by 2020, up to a quarter of employees would be **24** _____ , and half of all employees would be based in the **25** _____ . Although predictions can be wrong, the speed of change is not in doubt, and business leaders need to understand the **26** _____ that will be influential.

PASSAGE 3

You should spend about 20 minutes on Questions 27-40, which are based on Reading Passage 3 below.

The creation of lasting memories

Many studies of the brain processes underlying the creation of memory consolidation (lasting memories) have involved giving various human and animal subjects treatment, while training them to perform a task. These have contributed greatly to our understanding.

In pioneering studies using goldfish, Bernard Agranoff found that protein synthesis inhibitors* injected after training caused the goldfish to forget what they had learned. In other experiments, he administered protein synthesis inhibitors immediately before the fish were trained. The remarkable finding was that the fish learned the task completely normally, but forgot it within a few hours - that is, the protein synthesis inhibitors blocked memory consolidation, but did not influence short-term memory.

There is now extensive evidence that short-term memory is spared by many kinds of treatments, including electro-convulsive therapy (ECT), that block memory consolidation. On the other hand, and equally importantly, neuroscientist Ivan Izquierdo found that many drug treatments can block short-term memory without blocking memory consolidation. Contrary to the hypothesis put forward by Canadian psychologist Donald Hebb, in 1949, long-term memory does not require short-term memory, and vice versa.

Such findings suggest that our experiences create parallel, and possibly independent stages of memory, each with a different life span. All of this evidence from clinical and experimental studies strongly indicates that the brain handles recent and remote memory in different ways; but why does it do that?

We obviously need to have memory that is created rapidly: reacting to an ever and rapidly changing environment requires that. For example, most current building codes require that the heights of all steps in a staircase be equal. After taking a couple of steps, up or down, we implicitly remember the heights of the steps and assume that the others will be the same. If they are not the same, we are very likely to trip and fall. Lack of this kind of rapidly created implicit memory would be bad for us and for insurance companies, but perhaps good for lawyers. It would be of little value to us if we remembered the heights of the steps only after a delay of many hours, when the memory becomes consolidated.

The hypothesis that lasting memory consolidates slowly over time is supported primarily by clinical and experimental evidence that the formation of long-term memory is influenced by treatments and disorders affecting brain functioning. There are also other kinds of evidence indicating more directly that the memories consolidate over time after learning. Avi Kami and Dov Sagi reported that the performance of human subjects trained in a visual skill did not improve until eight hours after the training was completed, and that improvement was even greater the following day. Furthermore, the skill was retained for several years.

Studies using human brain imaging to study changes in neural activity induced by learning have also reported that the changes continue to develop for hours after learning. In an innovative study using functional imaging of the brain, Reza Shadmehr and Henry Holcomb examined brain activity in several brain regions shortly after human subjects were trained in a motor learning task requiring arm and hand movements. They found that while the performance of the subjects remained stable for several hours after completion of the training, their brain activity did not; different regions of the brain were predominantly active at different times over a period of several hours after the training. The activity shifted from the prefrontal cortex to two areas known to be involved in controlling movements, the motor cortex and cerebellar cortex. Consolidation of the motor skill appeared to involve activation of different neural systems that increased the stability of the brain processes underlying the skill.

There is also evidence that learning-induced changes in the activity of neurons in the cerebral cortex continue to increase for many days after the training. In an extensive series of studies using rats with electrodes implanted in the auditory cortex, Norman Weinberger reported that, after a tone of specific frequency was paired a few times with footshock, neurons in the rats' auditory cortex responded more to that specific tone and less to other tones of other frequencies. Even more interestingly, the selectivity of the neurons' response to the specific tone used in training continued to increase for several days after the training was terminated.

It is not intuitively obvious why our lasting memories consolidate slowly. Certainly, one can wonder why we have a form of memory that we have to rely on for many hours, days or a lifetime, that is so susceptible to disruption shortly after it is initiated. Perhaps the brain system that consolidates long-term memory over time was a late development in vertebrate evolution. Moreover, maybe we consolidate memories slowly because our mammalian brains are large and enormously complex. We can readily reject these ideas. All species of animals studied to date have both short- and long-term memory; and all are susceptible to retrograde amnesia. Like humans, birds, bees, and molluscs, as well as fish and rats, make long-term memory slowly. Consolidation of memory clearly emerged early in evolution, and was conserved.

Although there seems to be no compelling reason to conclude that a biological system such as a brain could not quickly make a lasting memory, the fact is that animal brains do not. Thus, memory consolidation must serve some very important adaptive function or functions. There is considerable evidence suggesting that the slow consolidation is adaptive because it enables neurobiological processes occurring shortly after learning to influence the strength of memory for experiences. The extensive evidence that memory can be enhanced, as well as impaired, by treatments administered shortly after training, provides intriguing support for this hypothesis.

* substances which stop or slow the growth of cells

PART 3 — QUESTIONS

Questions 27-31

Choose the correct letter, A, B, C or D.

27 Experiments by Bernard Agranoff described in Reading Passage 3 involved

- **A** ○ injecting goldfish at different stages of the experiments.
- **B** ○ training goldfish to do different types of task.
- **C** ○ using different types of treatment on goldfish.
- **D** ○ comparing the performance of different goldfish on certain tasks.

28 Most findings from recent studies suggest that

- **A** ○ drug treatments do not normally affect short-term memories.
- **B** ○ long-term memories build upon short-term memories.
- **C** ○ short and long-term memories are formed by separate processes.
- **D** ○ ECT treatment affects both short-and long-term memories.

29 In the fifth paragraph, what does the writer want to show by the example of staircases?

- **A** ○ Prompt memory formation underlies the performance of everyday tasks.
- **B** ○ Routine tasks can be carried out unconsciously.
- **C** ○ Physical accidents can impair the function of memory.
- **D** ○ Complex information such as regulations cannot be retained by the memory.

30 Observations about memory by Kami and Sagi

- **A** ○ cast doubt on existing hypotheses.
- **B** ○ related only to short-term memory.
- **C** ○ were based on tasks involving hearing.
- **D** ○ confirmed other experimental findings.

31 What did the experiment by Shadmehr and Holcomb show?

- **A** ○ Different areas of the brain were activated by different tasks.
- **B** ○ Activity in the brain gradually moved from one area to other areas.
- **C** ○ Subjects continued to get better at a task after training had finished.
- **D** ○ Treatment given to subjects improved their performance on a task.

Questions 32-36

Do the following statements agree with the views of the writer in Reading Passage 3?

Write

YES if the statement agrees with the views of the writer

NO if the statement contradicts the views of the writer

NOT GIVEN if it is impossible to say what the writer thinks about this

32 The training which Kami and Sagi's subjects were given was repeated over several days.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

33 The rats in Weinberger's studies learned to associate a certain sound with a specific experience.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

34 The results of Weinberger's studies indicated that the strength of the rats' learned associations increases with time.

- **A** ○ YES
- **B** ○ NO

C ○ NOT GIVEN

35 It is easy to see the evolutionary advantage of the way lasting memories in humans are created.

A ○ YES

B ○ NO

C ○ NOT GIVEN

36 Long-term memories in humans are more stable than in many other species.

A ○ YES

B ○ NO

C ○ NOT GIVEN

Questions 37-40

Complete the summary using the list of words, A-I, below.

Long-term memory

Various researchers have examined the way lasting memories are formed. Laboratory experiments usually involve teaching subjects to do something **37** _____ , and treating them with mild electric shocks or drugs. Other studies monitor behaviour after a learning experience, or use sophisticated equipment to observe brain activity.

The results are generally consistent: they show that lasting memories are the result of a **38** _____ and complex biological process.

The fact that humans share this trait with other species, including animals with **39** _____ brains, suggests that it developed **40** _____ in our evolutionary history.

A. **early** B. **easy** C. **large** D. **late** E. **lengthy** F. **new** G. **recently** H. **small** I. **quick**

Answer Key

#	Answer	Explanation
1	**100/a hundred/one hundred**	For the island community of about a hundred residents
2	**50 percent/fifty percent**	electricity use is 50 percent lower
3	**water**	This would also allow the island to generate most of its electricity from renewable sources, mainly water, wind and solar power
4	**energy monitors**	All households and businesses have energy monitors, which display current and cumulative electricity usage, and sound an alarm when consumption reaches a user-defined level, usually set a few hundred watts below the actual limit
5	**diesel generators**	Demand is also managed by warning the entire island when renewable energy generation is lower than demand, and diesel generators are operating to back it up – a so-called 'red light day', as opposed to 'green light days' when there is sufficient renewable energy
6	**insulation**	Eigg Heritage Trust has installed insulation in all of its own properties at no cost to the tenants, while private properties have paid for their own insulation to be installed
7	**greenhouses**	The Trust also operates a Green Grants scheme, where residents can claim 50 percent of the cost of equipment to reduce carbon emissions, up to a limit of £300. Purchases included bikes, solar water heating, secondary glazing, thicker curtains, and greenhouses to grow food locally, rather than importing it
8	**FALSE**	Prior to the installation of the new electricity grid and renewable energy generation, most households on Eigg used diesel generators to supply electricity, resulting in significant carbon emissions
9	**TRUE**	The work by the Eigg Heritage Trust to reduce energy use has resulted in significant reductions in carbon emissions from the island's households and businesses Domestic carbon emissions have fallen by 47 percent, from 8.4 to 4.45 tonnes per year
10	**NOT GIVEN**	The emissions should fall even further over the next few years as the supply of wood for heating increases
11	**TRUE**	A reliable electricity supply has brought improvements in other areas, for example, better treatment of drinking water in some

#	Answer	Explanation
		houses, and the elimination of the constant noise of diesel generators
12	**FALSE**	Every household has the same five kW cap, irrespective of income, so distributing the available resources equally across the island's population
13	**TRUE**	Eigg's electricity grid supports four part-time maintenance jobs on the island, and residents have also been employed for building work to improve Trust-owned houses and other buildings
14	**F**	At a less general level of analysis, Graeme Leach, Chief Economist at the British Institute of Directors, claimed in the Guardian newspaper (2000) that: 'By 2020, the nine-to-five rat race will be extinct and present levels of self-employment, commuting and technology use, as well as age and sex gaps, will have changed beyond recognition.' According to the article, Leach anticipates that: 'In 20 years time, 20-25 percent of the workforce will be temporary workers and many more will be flexible 25 percent of people will no longer work in a traditional office and 50 percent will work from home in some form.'
15	**B**	enabling companies to structure their organisations along what Burns and Stalker (1966) described as mechanistic lines, that is as systems of strict hierarchical structures and firm means of control
16	**G**	Consequently, it is crucial that organisational managers and decision makers are aware of, and able to analyse the factors which trigger organisational change
17	**A**	Sometimes, however, the winds die down to give periods of relative calm, periods of relative organisational stability. Such a period was the agricultural age, which Goodman (1995) maintains prevailed in Europe and western societies as a whole until the early 1700s
18	**C**	Apart from any technical difficulties of producing different colours of car, Ford did not have to worry about customers' colour preferences: he could sell all that he made
19	**C**	In the neo-industrial age, people became more discriminating in the goods and services they wished to buy and, as technological advancements brought about increased productivity, supply overtook demand

#	Answer	Explanation
20	**B**	It was characterised by a series of inventions and innovations that reduced the number of people needed to work the land and, in turn, provided the means of production of hitherto rarely obtainable goods; for organisations, supplying these in ever increasing numbers became the aim
21	**A**	During this period, wealth was created in the context of an agriculturally based society influenced mainly by local markets (both customer and labour) and factors outside people's control, such as the weather
22	**C**	In the neo-industrial age of western countries, the emphasis moved towards adding value to goods and services – what Goodman calls the value-oriented time, as contrasted with the task-oriented and products/services-oriented times of the past
23	**B**	It was characterised by a series of inventions and innovations that reduced the number of people needed to work the land and, in turn, provided the means of production of hitherto rarely obtainable goods; for organisations, supplying these in ever increasing numbers became the aim
24	**temporary**	Leach anticipates that: 'In 20 years time, 20-25 percent of the workforce will be temporary workers and many more will be flexible 25 percent of people will no longer work in a traditional office and 50 percent will work from home in some form.'
25	**home**	In 20 years time, 20-25 percent of the workforce will be temporary workers and many more will be flexible 25 percent of people will no longer work in a traditional office and 50 percent will work from home in some form
26	**factors**	Consequently, it is crucial that organisational managers and decision makers are aware of, and able to analyse the factors which trigger organisational change
27	**A**	In pioneering studies using goldfish, Bernard Agranoff found that protein synthesis inhibitors* injected after training caused the goldfish to forget what they had learned. In other experiments, he administered protein synthesis inhibitors immediately before the fish were trained
28	**C**	Such findings suggest that our experiences create parallel, and possibly independent stages of memory, each with a different life span
29	**A**	We obviously need to have memory that is created rapidly: reacting to an ever and rapidly changing environment requires that. For example, most current building codes require that the heights of all steps in a staircase be equal. After taking a couple

#	Answer	Explanation
		of steps, up or down, we implicitly remember the heights of the steps and assume that the others will be the same. If they are not the same, we are very likely to trip and fall
30	**D**	The hypothesis that lasting memory consolidates slowly over time is supported primarily by clinical and experimental evidence that the formation of long-term memory is influenced by treatments and disorders affecting brain functioning. There are also other kinds of evidence indicating more directly that the memories consolidate over time after learning. Avi Kami and Dov Sagi reported that the performance of human subjects trained in a visual skill did not improve until eight hours after the training was completed, and that improvement was even greater the following day
31	**B**	different regions of the brain were predominantly active at different times over a period of several hours after the training. The activity shifted from the prefrontal cortex to two areas known to be involved in controlling movements, the motor cortex and cerebellar cortex
32	**NOT GIVEN**	Avi Kami and Dov Sagi reported that the performance of human subjects trained in a visual skill did not improve until eight hours after the training was completed, and that improvement was even greater the following day
33	**YES**	In an extensive series of studies using rats with electrodes implanted in the auditory cortex, Norman Weinberger reported that, after a tone of specific frequency was paired a few times with footshock, neurons in the rats' auditory cortex responded more to that specific tone and less to other tones of other frequencies
34	**YES**	Even more interestingly, the selectivity of the neurons' response to the specific tone used in training continued to increase for several days after the training was terminated
35	**NO**	It is not intuitively obvious why our lasting memories consolidate slowly
36	**NOT GIVEN**	Like humans, birds, bees, and molluscs, as well as fish and rats, make long-term memory slowly
37	**F**	Many studies of the brain processes underlying the creation of memory consolidation (lasting memories) have involved giving various human and animal subjects treatment, while training them to perform a task
38	**E**	The hypothesis that lasting memory consolidates slowly over time is supported primarily by clinical and experimental evidence that

#	Answer	Explanation
		the formation of long-term memory is influenced by treatments and disorders affecting brain functioning
39	**H**	Like humans, birds, bees, and molluscs, as well as fish and rats, make long-term memory slowly
40	**A**	Consolidation of memory clearly emerged early in evolution, and was conserved

Test 93

PASSAGE 1

You should spend about 20 minutes on Questions 1-13, which are based on Reading Passage 1 below.

Sport Science in Australia

The professional career paths available to graduates from courses relating to human movement and sport science are as diverse as the graduate's imagination. However, undergraduate courses with this type of content, in Australia as well as in most other Western countries, were originally designed as preparation programmes for Physical Education (PE) teachers.

The initial programmes commenced soon after the conclusion of World War II in the mid-1940s. One of the primary motives for these initiatives was the fact that, during the war effort, so many of the men who were assessed for military duty had been declared unfit. The government saw the solution in the providing of Physical Education programmes in schools, delivered by better prepared and specifically educated PE teachers.

Later, in the 1970s and early 1980s, the surplus of Australians graduating with a PE degree obliged institutions delivering this qualification to identify new employment opportunities for their graduates, resulting in the first appearance of degrees catering for recreation professionals. In many instances, this diversity of programme delivery merely led to degrees, delivered by physical educators, as a side-line activity to the production of PE teachers.

Whilst the need to produce Physical Education teachers remains a significant social need, and most developed societies demand the availability of quality leisure programmes for their citizens, the career options of graduates within this domain are still developing. The two most evident growth domains are in the area of the professional delivery of sport, and the role of a physical lifestyle for community health.

The sports industry is developing at an unprecedented rate of growth. From a business perspective, sport is now seen as an area with the potential for high returns. It is quite significant that the businessman Rupert Murdoch broadened his business base from media to sport, having purchased an American baseball team and an Australian Rugby League competition, as well as seeking opportunities to invest in an English football club. No business person of such international stature would see fit to invest in sport unless he was satisfied that this was a sound business venture with ideal revenue-generating opportunities.

These developments have confirmed sport as a business with professional management structures, marketing processes, and development strategies in place. They have indicated new and developing career paths for graduates of human movement science, sport science, exercise science and related degrees. Graduates can now visualise career paths extending into such diverse domains as sport management, sport marketing, event and facility management,

government policy development pertaining to sport, sport journalism, sport psychology, and sport or athletic coaching.

Business leaders will only continue their enthusiasm for sport if they receive returns for their money. Such returns will only be forthcoming if astute, enthusiastic and properly educated professionals are delivering the programs that earn appropriate financial returns. The successful universities of the 21st century will be those that have responded to this challenge by delivering such degrees.

A second professional growth area for this group of graduates is associated with community health. The increasing demand for government expenditure within health budgets is reaching the stage where most governments are simply unable to function in a manner that is satisfying their constituents. One of the primary reasons for this problem is the unhelpful emphasis on treatment in medical care programmes. Governments have traditionally given their senior health official the title of 'Minister for Health', when in fact this officer has functioned as 'Minister for Sickness and the Construction of Hospitals'. Government focus simply has to change. If the change is not brought about for philosophical reasons, it will occur naturally, because insufficient funding will be available to address the ever-increasing costs of medical support.

Graduates of human movement, exercise science and sport science have the potential to become major players in this shift in policy focus. It is these graduates who already have the skills, knowledge and understanding to initiate community health education programmes to reduce cardio-vascular disease, to reduce medical dependency upon diabetes, to improve workplace health leading to increased productivity, to initiate and promote programmes of activity for the elderly that reduce medical dependency, and to maintain an active lifestyle for the unemployed and disadvantaged groups in society. This is the graduate that governments will be calling upon to shift the community focus from medical dependency to healthy lifestyles in the decades ahead.

The career paths of these graduates are developing at a pace that is not evident in other professions. The contribution that these graduates can make to society, and the recognition of this contribution is at an unprecedented high, and all indications are that it will continue to grow.

PART 1 — QUESTIONS

Questions 1-5

Complete the flow chart below.

Choose NO MORE THAN TWO WORDS from the passage for each answer.

The history of sports and physical science in Australia

A lot of people identified as being **1** _____

↓

Introduction of PE to **2** _____

↓

Special training programmes for **3** _____

↓

4 _____ of PE graduates

↓

Identification of alternative **5** _____

↓

Diversification of course delivery

Questions 6-13

Do the following statements agree with the information given in Reading Passage 1?

Write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

6 Sport is generally regarded as a profitable area for investment.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

7 Rupert Murdoch has a personal as well as a business interest in sport.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

8 The range of career opportunities available to sport graduates is increasing.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

9 The interests of business and the interests of universities are linked.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

10 Governments have been focusing too much attention on preventative medicine.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

11 It is inevitable that government priorities for health spending will change.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

12 Existing degree courses are unsuitable for careers in community health.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

13 Funding for sport science and related degrees has been increased considerably.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

PASSAGE 2

You should spend about 20 minutes on Questions 14-26, which are based on Reading Passage 2 below.

An assessment of micro-wind turbines

14

A In terms of micro-renewable energy sources suitable for private use, a 15-kilowatt (kW) turbine* is at the biggest end of the spectrum. With a nine metre diameter and a pole as high as a four-storey house, this is the most efficient form of wind micro-turbine, and the sort of thing you could install only if you had plenty of space and money. According to one estimate, a 15-kW micro-turbine (that's one with the maximum output), costing £41,000 to purchase and a further £9,000 to install, is capable of delivering 25,000 kilowatt-hours (kWh)** of electricity each year if placed on a suitably windy site.

15

B I don't know of any credible studies of the greenhouse gas emissions involved in producing and installing turbines, so my estimates here are going to be even more broad than usual. However, it is worth trying. If turbine manufacture is about as carbon intensive per pound sterling of product as other generators and electrical motors, which seems a reasonable assumption, the carbon intensity of manufacture will be around 640 kilograms (kg) per £1,000 of value. Installation is probably about as carbon intensive as typical construction, at around 380 kg per £1,000. That makes the carbon footprint (the total amount of greenhouse gases that installing a turbine creates) 30 tonnes.

16

C The carbon savings from wind-powered electricity generation depend on the carbon intensity of the electricity that you're replacing. Let's assume that your generation replaces the coal-fuelled part of the country's energy mix. In other words, if you live in the UK, let's say that rather than replacing typical grid electricity, which comes from a mix of coal, gas, oil and renewable energy sources, the effect of your turbine is to reduce the use of coal-fired power stations. That's reasonable, because coal is the least preferable source in the electricity mix. In this case the carbon saving is roughly one kilogram per kWh, so you save 25 tonnes per year and pay back the embodied carbon in just 14 months – a great start.

17

D The UK government has recently introduced a subsidy for renewable energy that pays individual producers 24p per energy unit on top of all the money they save on their own fuel bill,

and on selling surplus electricity back to the grid at approximately 5p per unit. With all this taken into account, individuals would get back £7,250 per year on their investment. That pays back the costs in about six years. It makes good financial sense and, for people who care about the carbon savings for their own sake, it looks like a fantastic move. The carbon investment pays back in just over a year, and every year after that is a 25-tonne carbon saving. (It's important to remember that all these sums rely on a wind turbine having a favourable location.)

18

E So, at face value, the turbine looks like a great idea environmentally, and a fairly good long-term investment economically for the person installing it. However, there is a crucial perspective missing from the analysis so far. Has the government spent its money wisely? It has invested 24p per unit into each micro-turbine. That works out at a massive £250 per tonne of carbon saved. My calculations tell me that had the government invested its money in offshore wind farms, instead of subsidising smaller domestic turbines, they would have broken even after eight years. In other words, the micro-turbine works out as a good investment for individuals, but only because the government spends, and arguably wastes, so much money subsidising it. Carbon savings are far lower too.

19

F Nevertheless, although the micro-wind turbine subsidy doesn't look like the very best way of spending government resources on climate change mitigation, we are talking about investing only about 0.075 percent per year of the nation's GDP to get a one percent reduction in carbon emissions, which is a worthwhile benefit. In other words, it could be much better, but it could be worse. In addition, such investment helps to promote and sustain developing technology.

20

G There is one extra favourable way of looking at the micro-wind turbine, even if it is not the single best way of investing money in cutting carbon. Input-output modelling has told us that it is actually quite difficult to spend money without having a negative carbon impact. So if the subsidy encourages people to spend their money on a carbon-reducing technology such as a wind turbine, rather than on carbon-producing goods like cars, and services such as overseas holidays, then the reductions in emissions will be greater than my simple sums above have suggested.

* a type of engine

** a unit for measuring electrical power

PART 2 — QUESTIONS

Questions 14-20

Reading Passage 2 has SEVEN paragraphs, A-G.

Choose the correct heading for each paragraph from the list of headings below.

Write the correct number, i-ix.

i. **A better use for large sums of money.**

ii. **The environmental costs of manufacture and installation.**

iii. **Estimates of the number of micro-turbines in use.**

iv. **The environmental benefits of running a micro-turbine.**

v. **The size and output of the largest type of micro-turbine.**

vi. **A limited case for subsidising micro-turbines.**

vii. **Recent improvements in the design of micro-turbines.**

viii. **An indirect method of reducing carbon emissions.**

ix. **The financial benefits of running a micro-turbine.**

Questions 21-22

Choose TWO letters, A-E.

The list below contains some possible statements about micro wind-turbines.

21 **22** Which TWO of these statements are made by the writer of the passage?

A ☐ In certain areas, permission is required to install them.

B ☐ Their exact energy output depends on their position.

C ☐ They probably take less energy to make than other engines.

D ☐ The UK government contributes towards their purchase cost.

E ☐ They can produce more energy than a household needs.

Questions 23-26

Complete the sentences below.

Choose NO MORE THAN THREE WORDS from the passage for each answer.

- **23** _____ would be a more effective target for government investment than micro-turbines.
- An indirect benefit of subsidising micro-turbines is the support it provides for **24** _____.
- Most spending has a **25** _____ effect on the environment.
- If people buy a micro-turbine, they have less money to spend on things like foreign holidays and **26** _____.

PASSAGE 3

You should spend about 20 minutes on Questions 27-40, which are based on Reading Passage 3 below.

Pottery production in ancient Akrotiri

Excavations at the site of prehistoric Akrotiri, on the coast of the Aegean Sea, have revealed much about the technical aspects of pottery manufacture, indisputably one of the basic industries of this Greek city. However, considerably less is known about the socio-economic context and the way production was organised.

The bulk of pottery found at Akrotiri is locally made, and dates from the late fifteenth century BC. It clearly fulfilled a vast range of the settlement's requirements: more than fifty different types of pots can be distinguished. The pottery found includes a wide variety of functional types like storage jars, smaller containers, pouring vessels, cooking pots, drinking vessels and so on, which all relate to specific activities and which would have been made and distributed with those activities in mind. Given the large number of shapes produced and the relatively high degree of standardisation, it has generally been assumed that most, if not all, of Akrotiri pottery was produced by specialised craftsmen in a non-domestic context. Unfortunately neither the potters' workshops nor kilns have been found within the excavated area. The reason may be that the ceramic workshops were located on the periphery of the site, which has not yet been excavated. In any event, the ubiquity of the pottery, and the consistent repetition of the same types in different sizes, suggests production on an industrial scale.

The Akrotirian potters seem to have responded to pressures beyond their households, namely to the increasing complexity of regional distribution and exchange systems. We can imagine them as full-time craftsmen working permanently in a high production-rate craft such as pottery manufacture, and supporting themselves entirely from the proceeds of their craft. In view of the above, one can begin to speak in terms of mass-produced pottery and the existence of organised workshops of craftsmen during the period 1550–1500 BC. Yet, how pottery production was organised at Akrotiri remains an open question, as there is no real documentary evidence. Our entire knowledge comes from the ceramic material itself, and the tentative conclusions which can be drawn from it.

The invention of units of quantity and of a numerical system to count them was of capital importance for an exchange-geared society such as that of Akrotiri. In spite of the absence of any written records, the archaeological evidence reveals that concepts of measurements, both of weight and number, had been formulated. Standard measures may already have been in operation, such as those evidenced by a graduated series of lead weights – made in disc form – found at the site. The existence of units of capacity in Late Bronze Age times is also evidenced, by the notation of units of a liquid measure for wine on excavated containers.

It must be recognised that the function of pottery vessels plays a very important role in determining their characteristics. The intended function affects the choice of clay, the production technique, and the shape and the size of the pots. For example, large storage jars

(pithoi) would be needed to store commodities, whereas smaller containers would be used for transport. In fact, the length of a man's arm limits the size of a smaller pot to a capacity of about twenty litres; that is also the maximum a man can comfortably carry.

The various sizes of container would thus represent standard quantities of a commodity, which is a fundamental element in the function of exchange. Akrotirian merchants handling a commodity such as wine would have been able to determine easily the amount of wine they were transporting from the number of containers they carried in their ships, since the capacity of each container was known to be 14–18 litres. (We could draw a parallel here with the current practice in Greece of selling oil in 17 kilogram tins.)

We may therefore assume that the shape, capacity, and, sometimes decoration of vessels are indicative of the commodity contained by them. Since individual transactions would normally involve different quantities of a given commodity, a range of 'standardised' types of vessel would be needed to meet traders' requirements.

In trying to reconstruct systems of capacity by measuring the volume of excavated pottery, a rather generous range of tolerances must be allowed. It seems possible that the potters of that time had specific sizes of vessel in mind, and tried to reproduce them using a specific type and amount of clay. However, it would be quite difficult for them to achieve the exact size required every time, without any mechanical means of regulating symmetry and wall thickness, and some potters would be more skilled than others. In addition, variations in the repetition of types and size may also occur because of unforeseen circumstances during the throwing process. For instance, instead of destroying the entire pot if the clay in the rim contained a piece of grit, a potter might produce a smaller pot by simply cutting off the rim. Even where there is no noticeable external difference between pots meant to contain the same quantity of a commodity, differences in their capacity can actually reach one or two litres. In one case the deviation from the required size appears to be as much as 10–20 percent.

The establishment of regular trade routes within the Aegean led to increased movement of goods; consequently a regular exchange of local, luxury and surplus goods, including metals, would have become feasible as a result of the advances in transport technology. The increased demand for standardised exchanges, inextricably linked to commercial transactions, might have been one of the main factors which led to the standardisation of pottery production. Thus, the whole network of ceramic production and exchange would have depended on specific regional economic conditions, and would reflect the socio-economic structure of prehistoric Akrotiri.

PART 3 — QUESTIONS

Questions 27-28

Choose the correct letter, A, B, C or D.

27 What does the writer say about items of pottery excavated at Akrotiri?

- **A** ○ There was very little duplication.
- **B** ○ They would have met a big variety of needs.
- **C** ○ Most of them had been imported from other places.
- **D** ○ The intended purpose of each piece was unclear.

28 The assumption that pottery from Akrotiri was produced by specialists is partly based on

- **A** ○ the discovery of kilns.
- **B** ○ the central location of workshops.
- **C** ○ the sophistication of decorative patterns.
- **D** ○ the wide range of shapes represented.

Questions 29-32

Complete each sentence with the correct ending, A-F, below.

Write the correct letter, A-F.

• The assumption that standard units of weight were in use could be based on **29** _____

• Evidence of the use of standard units of volume is provided by **30** _____

• The size of certain types of containers would have been restricted by **31** _____

• Attempts to identify the intended capacity of containers are complicated by **32** _____

A. **the discovery of a collection of metal discs.**

B. **the size and type of the sailing ships in use.**

C. **variations in the exact shape and thickness of similar containers.**

D. **the physical characteristics of workmen.**

E. **marks found on wine containers.**

F. **the variety of commodities for which they would have been used.**

Questions 33-38

Do the following statements agree with the views of the writer in Reading Passage 3?

Write

YES if the statement agrees with the claims of the writer

NO if the statement contradicts the claims of the writer

NOT GIVEN if it is impossible to say what the writer thinks about this

33 There are plans to excavate new areas of the archaeological site in the near future.

A ○ YES

B ○ NO

C ○ NOT GIVEN

34 Some of the evidence concerning pottery production in ancient Akrotiri comes from written records.

A ○ YES

B ○ NO

C ○ NOT GIVEN

35 Pots for transporting liquids would have held no more than about 20 litres.

A ○ YES

B ○ NO

C ○ NOT GIVEN

36 It would have been hard for merchants to calculate how much wine was on their ships.

A ○ YES

B ○ NO

C ○ NOT GIVEN

37 The capacity of containers intended to hold the same amounts differed by up to 20 percent.

A ○ YES

B ○ NO

C ○ NOT GIVEN

38 Regular trading of goods around the Aegean would have led to the general standardisation of quantities.

A ○ YES

B ○ NO

C ○ NOT GIVEN

Questions 39-40

Choose the correct letter, A, B, C or D.

39 What does the writer say about the standardisation of container sizes?

A ○ Containers which looked the same from the outside often varied in capacity.

B ○ The instruments used to control container size were unreliable.

C ○ The unsystematic use of different types of clay resulted in size variations.

D ○ Potters usually discarded containers which were of a non-standard size.

40 What is probably the main purpose of Reading Passage 3?

A ○ To evaluate the quality of pottery containers found in prehistoric Akrotiri.

B ○ To suggest how features of pottery production at Akrotiri reflected other developments in the region.

C ○ To outline the development of pottery-making skills in ancient Greece.

D ○ To describe methods for storing and transporting household goods in prehistoric societies.

Answer Key

#	Answer	Explanation
1	**unfit**	One of the primary motives for these initiatives was the fact that, during the war effort, so many of the men who were assessed for military duty had been declared unfit
2	**schools**	The government saw the solution in the providing of Physical Education programmes in schools, delivered by better prepared and specifically educated PE teachers
3	**PE teachers**	The government saw the solution in the providing of Physical Education programmes in schools, delivered by better prepared and specifically educated PE teachers
4	**surplus**	Later, in the 1970s and early 1980s, the surplus of Australians graduating with a PE degree obliged institutions delivering this qualification to identify new employment opportunities for their graduates, resulting in the first appearance of degrees catering for recreation professionals
5	**employment opportunities/careers/routes**	Later, in the 1970s and early 1980s, the surplus of Australians graduating with a PE degree obliged institutions delivering this qualification to identify new employment opportunities for their graduates, resulting in the first appearance of degrees catering for recreation professionals
6	**TRUE**	From a business perspective, sport is now seen as an area with the potential for high returns
7	**NOT GIVEN**	It is quite significant that the businessman Rupert Murdoch broadened his business base from media to sport, having purchased an American baseball team and an Australian Rugby League competition, as well as seeking opportunities to invest in an English football club. No business person of such international stature would see fit to invest in sport unless he was satisfied that this was a sound business venture with ideal revenue-generating opportunities
8	**TRUE**	The career paths of these graduates are developing at a pace that is not evident in other professions
9	**TRUE**	Business leaders will only continue their enthusiasm for sport if they receive returns for their money. Such returns will only be forthcoming if astute, enthusiastic

#	Answer	Explanation
		and properly educated professionals are delivering the programs that earn appropriate financial returns. The successful universities of the 21st century will be those that have responded to this challenge by delivering such degrees
10	**FALSE**	One of the primary reasons for this problem is the unhelpful emphasis on treatment in medical care programmes
11	**TRUE**	Government focus simply has to change. If the change is not brought about for philosophical reasons, it will occur naturally, because insufficient funding will be available to address the ever-increasing costs of medical support
12	**FALSE**	Graduates of human movement, exercise science and sport science have the potential to become major players in this shift in policy focus. It is these graduates who already have the skills, knowledge and understanding to initiate community health education programmes to reduce cardio-vascular disease, to reduce medical dependency upon diabetes, to improve workplace health leading to increased productivity, to initiate and promote programmes of activity for the elderly that reduce medical dependency, and to maintain an active lifestyle for the unemployed and disadvantaged groups in society
13	**NOT GIVEN**	These developments have confirmed sport as a business with professional management structures, marketing processes, and development strategies in place. They have indicated new and developing career paths for graduates of human movement science, sport science, exercise science and related degrees
14	**v**	In terms of micro-renewable energy sources suitable for private use, a 15-kilowatt (kW) turbine* is at the biggest end of the spectrum. With a nine metre diameter and a pole as high as a four-storey house, this is the most efficient form of wind micro-turbine, and the sort of thing you could install only if you had plenty of space and money. According to one estimate, a 15-kW micro-turbine (that’s one with the maximum output), costing £41,000 to purchase and a further £9,000 to install, is capable of delivering 25,000 kilowatt-hours (kWh)** of electricity each year if placed on a suitably windy site
15	**ii**	That makes the carbon footprint (the total amount of greenhouse gases that installing a turbine creates) 30 tonnes

#	Answer	Explanation
16	**iv**	In this case the carbon saving is roughly one kilogram per kWh, so you save 25 tonnes per year and pay back the embodied carbon in just 14 months – a great start
17	**ix**	The UK government has recently introduced a subsidy for renewable energy that pays individual producers 24p per energy unit on top of all the money they save on their own fuel bill, and on selling surplus electricity back to the grid at approximately 5p per unit. With all this taken into account, individuals would get back £7,250 per year on their investment. That pays back the costs in about six years. It makes good financial sense and, for people who care about the carbon savings for their own sake, it looks like a fantastic move
18	**i**	My calculations tell me that had the government invested its money in offshore wind farms, instead of subsidising smaller domestic turbines, they would have broken even after eight years
19	**vi**	Nevertheless, although the micro-wind turbine subsidy doesn't look like the very best way of spending government resources on climate change mitigation, we are talking about investing only about 0.075 percent per year of the nation's GDP to get a one percent reduction in carbon emissions, which is a worthwhile benefit
20	**viii**	So if the subsidy encourages people to spend their money on a carbon-reducing technology such as a wind turbine, rather than on carbon-producing goods like cars, and services such as overseas holidays, then the reductions in emissions will be greater than my simple sums above have suggested
21	**B / E**	selling surplus electricity back to the grid all these sums rely on a wind turbine having a favourable location
22	**B / E**	selling surplus electricity back to the grid all these sums rely on a wind turbine having a favourable location
23	**offshore wind farms**	My calculations tell me that had the government invested its money in offshore wind farms, instead of subsidising smaller domestic turbines, they would have broken even after eight years
24	**developing technology**	In addition, such investment helps to promote and sustain developing technology
25	**negative**	Input-output modelling has told us that it is actually quite difficult to spend money without having a negative

#	Answer	Explanation
		carbon impact
26	**cars**	So if the subsidy encourages people to spend their money on a carbon-reducing technology such as a wind turbine, rather than on carbon-producing goods like cars, and services such as overseas holidays, then the reductions in emissions will be greater than my simple sums above have suggested
27	**B**	It clearly fulfilled a vast range of the settlement's requirements: more than fifty different types of pots can be distinguished
28	**D**	Given the large number of shapes produced and the relatively high degree of standardisation, it has generally been assumed that most, if not all, of Akrotiri pottery was produced by specialised craftsmen in a non-domestic context
29	**A**	Standard measures may already have been in operation, such as those evidenced by a graduated series of lead weights – made in disc form – found at the site
30	**E**	The existence of units of capacity in Late Bronze Age times is also evidenced, by the notation of units of a liquid measure for wine on excavated containers
31	**D**	In fact, the length of a man's arm limits the size of a smaller pot to a capacity of about twenty litres; that is also the maximum a man can comfortably carry
32	**C**	In trying to reconstruct systems of capacity by measuring the volume of excavated pottery, a rather generous range of tolerances must be allowed. It seems possible that the potters of that time had specific sizes of vessel in mind, and tried to reproduce them using a specific type and amount of clay. However, it would be quite difficult for them to achieve the exact size required every time, without any mechanical means of regulating symmetry and wall thickness, and some potters would be more skilled than others
33	**NOT GIVEN**	The reason may be that the ceramic workshops were located on the periphery of the site, which has not yet been excavated

#	Answer	Explanation
34	**NO**	Yet, how pottery production was organised at Akrotiri remains an open question, as there is no real documentary evidence. Our entire knowledge comes from the ceramic material itself, and the tentative conclusions which can be drawn from it
35	**YES**	In fact, the length of a man's arm limits the size of a smaller pot to a capacity of about twenty litres; that is also the maximum a man can comfortably carry
36	**NO**	Akrotirian merchants handling a commodity such as wine would have been able to determine easily the amount of wine they were transporting from the number of containers they carried in their ships, since the capacity of each container was known to be 14–18 litres
37	**YES**	Even where there is no noticeable external difference between pots meant to contain the same quantity of a commodity, differences in their capacity can actually reach one or two litres. In one case the deviation from the required size appears to be as much as 10–20 percent
38	**YES**	The establishment of regular trade routes within the Aegean led to increased movement of goods; consequently a regular exchange of local, luxury and surplus goods, including metals, would have become feasible as a result of the advances in transport technology. The increased demand for standardised exchanges, inextricably linked to commercial transactions, might have been one of the main factors which led to the standardisation of pottery production
39	**A**	Even where there is no noticeable external difference between pots meant to contain the same quantity of a commodity, differences in their capacity can actually reach one or two litres
40	**B**	Thus, the whole network of ceramic production and exchange would have depended on specific regional economic conditions, and would reflect the socio-economic structure of prehistoric Akrotiri

Test 94

PASSAGE 1

You should spend about 20 minutes on Questions 1–13, which are based on Reading Passage 1 below.

The Rufous Hare-Wallaby

The Rufous Hare-Wallaby is a species of Australian kangaroo, usually known by its Aboriginal name, 'mala'. At one time, there may have been as many as ten million of these little animals across the arid and semi-arid landscape of Australia, but their populations, like those of so many other small endemic species, were devastated when cats and foxes were introduced – indeed, during the 1950s it was thought that the mala was extinct. But in 1964, a small colony was found 450 miles northwest of Alice Springs in the Tanami Desert. And 12 years later, a second small colony was found nearby. Very extensive surveys were made throughout historical mala range – but no other traces were found.

Throughout the 1970s and 1980s, scientists from the Parks and Wildlife Commission of the Northern Territory monitored these two populations. At first it seemed that they were holding their own. Then in late 1987, every one of the individuals of the second and smaller of the wild colonies was killed. From examination of the tracks in the sand, it seemed that just one single fox had been responsible. And then, in October 1991, a wild-fire destroyed the entire area occupied by the remaining colony. Thus the mala was finally pronounced extinct in the wild.

Fortunately, ten years earlier, seven individuals had been captured, and had become the founders of a captive breeding programme at the Arid Zone Research Institute in Alice Springs; and that group had thrived. Part of this success is due to the fact that the female can breed when she is just five months old and can produce up to three young a year. Like other kangaroo species, the mother carries her young – known as a joey – in her pouch for about 15 weeks, and she can have more than one joey at the same time.

In the early 1980s, there were enough mala in the captive population to make it feasible to start a reintroduction programme. But first it was necessary to discuss this with the leaders of the Yapa people. Traditionally, the mala had been an important animal in their culture, with strong medicinal powers for old people. It had also been an important food source, and there were concerns that any mala returned to the wild would be killed for the pot. And so, in 1980, a group of key Yapa men was invited to visit the proposed reintroduction area. The skills and knowledge of the Yapa would play a significant and enduring role in this and all other mala projects.

With the help of the local Yapa, an electric fence was erected around 250 acres of suitable habitat, about 300 miles northwest of Alice Springs so that the mala could adapt while protected from predators. By 1992, there were about 150 mala in their enclosure, which became known as the Mala Paddock. However, all attempts to reintroduce mala from the paddocks into the unfenced wild were unsuccessful, so in the end the reintroduction programme was

abandoned. The team now faced a situation where mala could be bred, but not released into the wild again.

Thus, in 1993, a Mala Recovery Team was established to boost mala numbers, and goals for a new programme were set: the team concentrated on finding suitable predator-free or predator-controlled conservation sites within the mala's known range. Finally, in March 1999, twelve adult females, eight adult males, and eight joeys were transferred from the Mala Paddock to Dryandra Woodland in Western Australia. Then, a few months later, a second group was transferred to Trimouille, an island off the coast of western Australia. First, it had been necessary to rid the island of rats and cats – a task that had taken two years of hard work.

Six weeks after their release into this conservation site, a team returned to the island to find out how things were going. Each of the malas had been fitted with a radio collar that transmits for about 14 months, after which it falls off. The team was able to locate 29 out of the 30 transmitters – only one came from the collar of a mala that had died of unknown causes. So far the recovery programme had gone even better than expected.

Today, there are many signs suggesting that the mala population on the island is continuing to do well.

PART 1 — QUESTIONS

Questions 1-5

Complete the flow chart below.

Choose NO MORE THAN THREE WORDS AND/OR A NUMBER from the passage for each answer.

The Wild Australian mala

Distant past: total population of up to **1** _____ in desert and semi-desert regions.

↓

Populations of malas were destroyed by **2** _____.

↓

1964/1976: two surviving colonies were discovered.

↓

Scientists **3** _____ the colonies.

↓

1987: one of the colonies was completely destroyed.

↓

1991: the other colony was destroyed by **4** _____.

↓

The wild mala was declared **5** _____.

Questions 6-9

Answer the questions below.

Choose NO MORE THAN THREE WORDS AND/OR A NUMBER from the passage for each answer.

6 At what age can female malas start breeding? _____

7 For about how long do young malas stay inside their mother's pouch? _____

8 Apart from being a food source, what value did malas have for the Yapa people?

_____

9 What was the Yapa's lasting contribution to the mala reintroduction programme?

_____

Questions 10-13

Do the following statements agree with the information given in Reading Passage 1?

Write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

10 Natural defences were sufficient to protect the area called Mala Paddock.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

11 Scientists eventually gave up their efforts to release captive mala into the unprotected wild.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

12 The mala population which was transferred to Dryandra Woodland quickly increased in size.

- **A** ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

13 Scientists were satisfied with the initial results of the recovery programme.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

PASSAGE 2

You should spend about 20 minutes on Questions 14–26, which are based on Reading Passage 2 below.

Measures to combat infectious disease in tsarist Russia

14

A In the second half of the seventeenth century, Russian authorities began implementing controls at the borders of their empire to prevent the importation of plague, a highly infectious and dangerous disease. Information on disease outbreak occurring abroad was regularly reported to the tsar's court through various means, including commercial channels (travelling merchants), military personnel deployed abroad, undercover agents, the network of Imperial Foreign Office embassies and representations abroad, and the customs offices. For instance, the heads of customs offices were instructed to question foreigners entering Russia about possible epidemics of dangerous diseases in their respective countries.

15

B If news of an outbreak came from abroad, relations with the affected country were suspended. For instance, foreign vessels were not allowed to dock in Russian ports if there was credible information about the existence of epidemics in countries from whence they had departed. In addition, all foreigners entering Russia from those countries had to undergo quarantine. In 1665, after receiving news about a plague epidemic in England, Tsar Alexei wrote a letter to King Charles II in which he announced the cessation of Russian trade relations with England and other foreign states. These protective measures appeared to have been effective, as the country did not record any cases of plague during that year and in the next three decades. It was not until 1692 that another plague outbreak was recorded in the Russian province of Astrakhan. This epidemic continued for five months and killed 10,383 people, or about 65 percent of the city's population. By the end of the seventeenth century, preventative measures had been widely introduced in Russia, including the isolation of persons ill with plague, the imposition of quarantines, and the distribution of explanatory public health notices about plague outbreaks.

16

C During the eighteenth century, although none of the occurrences was of the same scale as in the past, plague appeared in Russia several times. For instance, from 1703 to 1705, a plague outbreak that had ravaged Istanbul spread to the Podolsk and Kiev provinces in Russia, and then to Poland and Hungary. After defeating the Swedes in the battle of Poltava in 1709, Tsar Peter I (Peter the Great) dispatched part of his army to Poland, where plague had been raging for two years. Despite preventive measures, the disease spread among the Russian troops. In

1710, the plague reached Riga (then part of Sweden, now the capital of Latvia), where it was active until 1711 and claimed 60,000 lives. During this period, the Russians besieged Riga and, after the Swedes had surrendered the city in 1710, the Russian army lost 9,800 soldiers to the plague. Russian military chronicles of the time note that more soldiers died of the disease after the capture of Riga than from enemy fire during the siege of that city.

17

D Tsar Peter I imposed strict measures to prevent the spread of plague during these conflicts. Soldiers suspected of being infected were isolated and taken to areas far from military camps. In addition, camps were designed to separate divisions, detachments, and smaller units of soldiers. When plague reached Narva (located in present-day Estonia) and threatened to spread to St. Petersburg, the newly built capital of Russia, Tsar Peter I ordered the army to cordon off the entire boundary along the Luga River, including temporarily halting all activity on the river. In order to prevent the movement of people and goods from Narva to St Petersburg and Novgorod, roadblocks and checkpoints were set up on all roads. The tsar's orders were rigorously enforced, and those who disobeyed were hung.

18

E However, although the Russian authorities applied such methods to contain the spread of the disease and limit the number of victims, all of the measures had a provisional character: they were intended to respond to a specific outbreak, and were not designed as a coherent set of measures to be implemented systematically at the first sign of plague. The advent of such a standard response system came a few years later.

19

F The first attempts to organise procedures and carry out proactive steps to control plague date to the aftermath of the 1727-1728 epidemic in Astrakhan. In response to this, the Russian imperial authorities issued several decrees aimed at controlling the future spread of plague. Among these decrees, the 'Instructions for Governors and Heads of Townships' required that all governors immediately inform the Senate – a government body created by Tsar Peter I in 1711 to advise the monarch – if plague cases were detected in their respective provinces. Furthermore, the decree required that governors ensure the physical examination of all persons suspected of carrying the disease and their subsequent isolation. In addition, it was ordered that sites where plague victims were found had to be encircled by checkpoints and isolated for the duration of the outbreak. These checkpoints were to remain operational for at least six weeks. The houses of infected persons were to be burned along with all of the personal property they contained, including farm animals and cattle. The governors were instructed to inform the neighbouring provinces and cities about every plague case occurring on their territories. Finally, letters brought by couriers were heated above a fire before being copied.

G The implementation by the authorities of these combined measures demonstrates their intuitive understanding of the importance of the timely isolation of infected people to limit the

spread of plague.

PART 2 — QUESTIONS

Questions 14-19

Reading Passage 2 has SEVEN sections, A-G.

Choose the correct heading for sections A-F from the list of headings below.

Write the correct number, i-viii.

i. **Outbreaks of plague as a result of military campaigns.**

ii. **Systematic intelligence-gathering about external cases of plague.**

iii. **Early forms of treatment for plague victims.**

iv. **The general limitations of early Russian anti-plague measures.**

v. **Partly successful bans against foreign states affected by plague.**

vi. **Hostile reactions from foreign states to Russian anti-plague measures.**

vii. **Various measures to limit outbreaks of plague associated with war.**

viii. **The formulation and publication of preventive strategies.**

Questions 20-21

Choose TWO letters, A-E.

Write the correct letters.

20 **21** Which TWO measures did Russia take in the seventeenth century to avoid plague outbreaks?

- **A** ☐ Cooperation with foreign leaders.
- **B** ☐ Spying.
- **C** ☐ Military campaigns.
- **D** ☐ Restrictions on access to its ports.
- **E** ☐ Expulsion of foreigners.

Questions 22-23

Choose TWO letters, A-E.

Write the correct letters.

22 **23** Which TWO statements are made about Russia in the early eighteenth century?

- **A** ☐ Plague outbreaks were consistently smaller than before.
- **B** ☐ Military casualties at Riga exceeded the number of plague victims.
- **C** ☐ The design of military camps allowed plague to spread quickly.
- **D** ☐ The tsar's plan to protect St Petersburg from plague was not strictly implemented.
- **E** ☐ Anti-plague measures were generally reactive rather than strategic.

Questions 24-26

Complete the sentences below.

Choose ONE WORD ONLY from the passage for each answer.

- An outbreak of plague in **24** _____ prompted the publication of a coherent preventative strategy.
- Provincial governors were ordered to burn the **25** _____ and possessions of plague victims.
- Correspondence was held over a **26** _____ prior to copying it.

PASSAGE 3

You should spend about 20 minutes on Questions 27–40, which are based on Reading Passage 3 below.

Recovering a damaged reputation

In 2009, it was revealed that some of the information published by the University of East Anglia's Climatic Research Unit (CRU) in the UK, concerning climate change, had been inaccurate. Furthermore, it was alleged that some of the relevant statistics had been withheld from publication. The ensuing controversy affected the reputation not only of that institution, but also of the Intergovernmental Panel on Climate Change (IPCC), with which the CRU is closely involved, and of climate scientists in general. Even if the claims of misconduct and incompetence were eventually proven to be largely untrue, or confined to a few individuals, the damage was done. The perceived wrongdoings of a few people had raised doubts about the many.

The response of most climate scientists was to cross their fingers and hope for the best, and they kept a low profile. Many no doubt hoped that subsequent independent inquiries into the IPCC and CRU would draw a line under their problems. However, although these were likely to help, they were unlikely to undo the harm caused by months of hostile news reports and attacks by critics.

The damage that has been done should not be underestimated. As Ralph Cicerone, the President of the US National Academy of Sciences, wrote in an editorial in the journal Science: 'Public opinion has moved toward the view that scientists often try to suppress alternative hypotheses and ideas and that scientists will withhold data and try to manipulate some aspects of peer review to prevent dissent.' He concluded that 'the perceived misbehavior of even a few scientists can diminish the credibility of science as a whole.'

An opinion poll taken at the beginning of 2010 found that the proportion of people in the US who trust scientists as a source of information about global warming had dropped from 83 percent, in 2008, to 74 percent. Another survey carried out by the British Broadcasting Corporation in February 2010 found that just 26 percent of British people now believe that climate change is confirmed as being largely human-made, down from 41 percent in November 2009.

Regaining the confidence and trust of the public is never easy. Hunkering down and hoping for the best – climate science's current strategy – makes it almost impossible. It is much better to learn from the successes and failures of organisations that have dealt with similar blows to their public standing.

In fact, climate science needs professional help to rebuild its reputation. It could do worse than follow the advice given by Leslie Gaines-Ross, a 'reputation strategist' at Public Relations (PR) company Weber Shandwick, in her recent book Corporate Reputation: 12 Steps to Safeguarding and Recovering Reputation. Gaines-Ross's strategy is based on her analysis of how various

organisations responded to crises, such as desktop-printer firm Xerox, whose business plummeted during the 1990s, and the USA's National Aeronautics and Space Administration (NASA) after the Columbia shuttle disaster in 2003.

The first step she suggests is to 'take the heat – leader first'. In many cases, chief executives who publicly accept responsibility for corporate failings can begin to reverse the freefall of their company's reputations, but not always. If the leader is held at least partly responsible for the fall from grace, it can be almost impossible to convince critics that a new direction can be charted with that same person at the helm.

This is the dilemma facing the heads of the IPCC and CRU. Both have been blamed for their organisations' problems, not least for the way in which they have dealt with critics, and both have been subjected to public calls for their removal. Yet both organisations appear to believe they can repair their reputations without a change of leadership.

The second step outlined by Gaines-Ross is to 'communicate tirelessly'. Yet many climate researchers have avoided the media and the public, at least until the official enquiries have concluded their reports. This reaction may be understandable, but it has backfired. Journalists following the story have often been unable to find spokespeople willing to defend climate science. In this case, 'no comment' is commonly interpreted as an admission of silent, collective guilt.

Remaining visible is only a start, though; climate scientists also need to be careful what they say. They must realise that they face doubts not just about their published results, but also about their conduct and honesty. It simply won't work for scientists to continue to appeal to the weight of the evidence, while refusing to discuss the integrity of their profession. The harm has been increased by a perceived reluctance to admit even the possibility of mistakes or wrongdoing.

The third step put forward by Gaines-Ross is 'don't underestimate your critics and competitors'. This means not only recognising the skill with which the opponents of climate research have executed their campaigns through Internet blogs and other media, but also acknowledging the validity of some of their criticisms. It is clear, for instance, that climate scientists need better standards of transparency, to allow for scrutiny not just by their peers, but also by critics from outside the world of research.

It is also important to engage with those critics. That doesn't mean conceding to unfounded arguments which are based on prejudice rather than evidence, but there is an obligation to help the public understand the causes of climate change, as well as the options for avoiding and dealing with the consequences.

To begin the process of rebuilding trust in their profession, climate scientists need to follow these three steps. But that is just the start. Gaines-Ross estimates that it typically takes four years for a company to rescue and restore a broken reputation.

Winning back public confidence is a marathon, not a sprint, but you can't win at all if you don't step up to the starting line.

PART 3 — QUESTIONS

Questions 27-32

Do the following statements agree with the views of the writer in Reading Passage 3?

Write

YES if the statement agrees with the claims of the writer

NO if the statement contradicts the claims of the writer

NOT GIVEN if it is impossible to say what the writer thinks about this

27 If a majority of scientists at the CRU were cleared of misconduct, the public would be satisfied.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

28 In the aftermath of the CRU scandal, most scientists avoided attention.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

29 Journalists have defended the CRU and the IPCC against their critics.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

30 Ralph Cicerone regarded the damage caused by the CRU as extending beyond the field of climate science.

- **A** ○ YES
- **B** ○ NO

C ○ NOT GIVEN

31 Since 2010, confidence in climate science has risen slightly in the US.

A ○ YES

B ○ NO

C ○ NOT GIVEN

32 Climate scientists should take professional advice on regaining public confidence.

A ○ YES

B ○ NO

C ○ NOT GIVEN

Questions 33-36

Choose the correct letter, A, B, C or D.

33 In accordance with Gaines-Ross's views, the heads of the CRU and IPCC should have

A ○ resigned from their posts.

B ○ accepted responsibility and continued in their posts.

C ○ shifted attention onto more junior staff.

D ○ ignored the criticisms directed at them.

34 Which mistake have staff at the CRU and IPCC made?

A ○ They have blamed each other for problems.

B ○ They have publicly acknowledged failings.

C ○ They have avoided interviews with the press.

D ○ They have made conflicting public statements.

35 People who challenge the evidence of climate change have generally

A ○ presented their case poorly.

B ○ missed opportunities for publicity.

C ○ made some criticisms which are justified.

D ○ been dishonest in their statements.

36 What does the reference to 'a marathon' indicate in the final paragraph?

A ○ The rate at which the climate is changing.

B ○ The competition between rival theories of climate change.

C ○ The ongoing need for new climate data.

D ○ The time it might take for scientists to win back confidence.

Questions 37-40

Complete the summary using the list of words/phrases, A-H, below.

Controversy about climate science

The revelation, in 2009, that scientists at the CRU had presented inaccurate information and concealed some of their **37** _____ had a serious effect on their reputation. In order to address the problem, the scientists should turn to experts in **38** _____ .

Leslie Gaines-Ross has published **39** _____ based on studies of crisis management in commercial and public-sector organisations. Amongst other things, Gaines-Ross suggests that climate scientists should confront their **40** _____ .

A. **critics** B. **corruption** C. **statistics** D. **guidelines** E. **managers**

F. **public relations** G. **sources** H. **computer modelling**

Answer Key

#	Answer	Explanation
1	**10 million/ten million**	At one time, there may have been as many as ten million of these little animals across the arid and semi-arid landscape of Australia
2	**cats and foxes/foxes and cats**	but their populations, like those of so many other small endemic species, were devastated when cats and foxes were introduced
3	**monitored**	Throughout the 1970s and 1980s, scientists from the Parks and Wildlife Commission of the Northern Territory monitored these two populations
4	**fire**	And then, in October 1991, a wild-fire destroyed the entire area occupied by the remaining colony
5	**extinct**	Thus the mala was finally pronounced extinct in the wild
6	**5 months/five months**	Part of this success is due to the fact that the female can breed when she is just five months old and can produce up to three young a year
7	**15 week/fifteen weeks**	Like other kangaroo species, the mother carries her young – known as a joey – in her pouch for about 15 weeks, and she can have more than one joey at the same time
8	**(strong) medicinal powers**	Traditionally, the mala had been an important animal in their culture, with strong medicinal powers for old people. It had also been an important food source, and there were concerns that any mala returned to the wild would be killed for the pot
9	**skills and knowledge/knowledge and skills**	The skills and knowledge of the Yapa would play a significant and enduring role in this and all other mala projects
10	**FALSE**	With the help of the local Yapa, an electric fence was erected around 250 acres of suitable habitat, about 300 miles northwest of Alice Springs so that the mala could adapt while protected from predators
11	**TRUE**	However, all attempts to reintroduce mala from the paddocks into the unfenced wild were unsuccessful, so in the end the reintroduction programme was abandoned
12	**NOT GIVEN**	Finally, in March 1999, twelve adult females, eight adult males, and eight joeys were transferred from the Mala Paddock to Dryandra Woodland in Western Australia

#	Answer	Explanation
13	**TRUE**	So far the recovery programme had gone even better than expected
14	**ii**	Information on disease outbreak occurring abroad was regularly reported to the tsar's court through various means, including commercial channels (travelling merchants), military personnel deployed abroad, undercover agents, the network of Imperial Foreign Office embassies and representations abroad, and the customs offices
15	**v**	In 1665, after receiving news about a plague epidemic in England, Tsar Alexei wrote a letter to King Charles II in which he announced the cessation of Russian trade relations with England and other foreign states. These protective measures appeared to have been effective, as the country did not record any cases of plague during that year and in the next three decades
16	**i**	After defeating the Swedes in the battle of Poltava in 1709, Tsar Peter I (Peter the Great) dispatched part of his army to Poland, where plague had been raging for two years. Despite preventive measures, the disease spread among the Russian troops. In 1710, the plague reached Riga (then part of Sweden, now the capital of Latvia), where it was active until 1711 and claimed 60,000 lives
17	**vii**	Tsar Peter I imposed strict measures to prevent the spread of plague during these conflicts. Soldiers suspected of being infected were isolated and taken to areas far from military camps. In addition, camps were designed to separate divisions, detachments, and smaller units of soldiers
18	**iv**	However, although the Russian authorities applied such methods to contain the spread of the disease and limit the number of victims, all of the measures had a provisional character: they were intended to respond to a specific outbreak, and were not designed as a coherent set of measures to be implemented systematically at the first sign of plague
19	**viii**	The first attempts to organise procedures and carry out proactive steps to control plague date to the aftermath of the 1727-1728 epidemic in Astrakhan. In response to this, the Russian imperial authorities issued several decrees aimed at controlling the future spread of plague
20	**B / D**	Information on disease outbreak occurring abroad was regularly reported to the tsar's court through various means, including commercial channels (travelling merchants), military personnel deployed abroad, undercover agents, the network of

#	Answer	Explanation
		Imperial Foreign Office embassies and representations abroad, and the customs offices foreign vessels were not allowed to dock in Russian ports if there was credible information about the existence of epidemics in countries from whence they had departed
21	**B / D**	Information on disease outbreak occurring abroad was regularly reported to the tsar's court through various means, including commercial channels (travelling merchants), military personnel deployed abroad, undercover agents, the network of Imperial Foreign Office embassies and representations abroad, and the customs offices foreign vessels were not allowed to dock in Russian ports if there was credible information about the existence of epidemics in countries from whence they had departed
22	**A / E**	During the eighteenth century, although none of the occurrences was of the same scale as in the past, plague appeared in Russia several times However, although the Russian authorities applied such methods to contain the spread of the disease and limit the number of victims, all of the measures had a provisional character: they were intended to respond to a specific outbreak, and were not designed as a coherent set of measures to be implemented systematically at the first sign of plague
23	**A / E**	During the eighteenth century, although none of the occurrences was of the same scale as in the past, plague appeared in Russia several times However, although the Russian authorities applied such methods to contain the spread of the disease and limit the number of victims, all of the measures had a provisional character: they were intended to respond to a specific outbreak, and were not designed as a coherent set of measures to be implemented systematically at the first sign of plague
24	**Astrakhan**	The first attempts to organise procedures and carry out proactive steps to control plague date to the aftermath of the 1727-1728 epidemic in Astrakhan
25	**houses**	The houses of infected persons were to be burned along with all of the personal property they contained, including farm animals and cattle
26	**fire**	Finally, letters brought by couriers were heated above a fire before being copied
27	**NO**	Even if the claims of misconduct and incompetence were eventually proven to be largely untrue, or confined to a few

#	Answer	Explanation
		individuals, the damage was done. The perceived wrongdoings of a few people had raised doubts about the many
28	**YES**	The response of most climate scientists was to cross their fingers and hope for the best, and they kept a low profile
29	**NO**	However, although these were likely to help, they were unlikely to undo the harm caused by months of hostile news reports and attacks by critics
30	**YES**	He concluded that 'the perceived misbehavior of even a few scientists can diminish the credibility of science as a whole.'
31	**NOT GIVEN**	An opinion poll taken at the beginning of 2010 found that the proportion of people in the US who trust scientists as a source of information about global warming had dropped from 83 percent, in 2008, to 74 percent
32	**YES**	In fact, climate science needs professional help to rebuild its reputation. It could do worse than follow the advice given by Leslie Gaines-Ross, a 'reputation strategist' at Public Relations (PR) company Weber Shandwick, in her recent book Corporate Reputation: 12 Steps to Safeguarding and Recovering Reputation
33	**A**	If the leader is held at least partly responsible for the fall from grace, it can be almost impossible to convince critics that a new direction can be charted with that same person at the helm. This is the dilemma facing the heads of the IPCC and CRU. Both have been blamed for their organisations' problems, not least for the way in which they have dealt with critics, and both have been subjected to public calls for their removal
34	**C**	Yet many climate researchers have avoided the media and the public, at least until the official enquiries have concluded their reports. This reaction may be understandable, but it has backfired. Journalists following the story have often been unable to find spokespeople willing to defend climate science
35	**C**	This means not only recognising the skill with which the opponents of climate research have executed their campaigns through Internet blogs and other media, but also acknowledging the validity of some of their criticisms
36	**D**	Winning back public confidence is a marathon, not a sprint, but you can't win at all if you don't step up to the starting line
37	**C**	Furthermore, it was alleged that some of the relevant statistics had been withheld from publication

#	Answer	Explanation
38	**F**	In fact, climate science needs professional help to rebuild its reputation. It could do worse than follow the advice given by Leslie Gaines-Ross, a ‘reputation strategist’ at Public Relations (PR) company Weber Shandwick, in her recent book Corporate Reputation: 12 Steps to Safeguarding and Recovering Reputation
39	**D**	Gaines-Ross’s strategy is based on her analysis of how various organisations responded to crises, such as desktop-printer firm Xerox, whose business plummeted during the 1990s, and the USA’s National Aeronautics and Space Administration (NASA) after the Columbia shuttle disaster in 2003
40	**A**	The third step put forward by Gaines-Ross is ‘don’t underestimate your critics and competitors’

Test 95

PASSAGE 1

You should spend about 20 minutes on Questions 1-13, which are based on Reading Passage 1 below.

Geoff Brash

Geoff Brash, who died in 2010, was a gregarious Australian businessman and philanthropist who encouraged the young to reach their potential.

Born in Melbourne to Elsa and Alfred Brash, he was educated at Scotch College. His sister, Barbara, became a renowned artist and printmaker. His father, Alfred, ran the Brash retail music business that had been founded in 1862 by his grandfather, the German immigrant Marcus Brasch, specialising in pianos. It carried the slogan 'A home is not a home without a piano.'

In his young days, Brash enjoyed the good life, playing golf and sailing, and spending some months travelling through Europe, having a leisurely holiday. He worked for a time at Myer department stores before joining the family business in 1949, where he quickly began to put his stamp on things. In one of his first management decisions, he diverged from his father's sense of frugal aesthetics by re-carpeting the old man's office while he was away. After initially complaining of his extravagance, his father grew to accept the change and gave his son increasing responsibility in the business.

After World War II (1939–1945), Brash's had begun to focus on white goods, such as washing machines and refrigerators, as the consumer boom took hold. However, while his father was content with the business he had built, the younger Brash viewed expansion as vital. When Geoff Brash took over as managing director in 1957, the company had two stores, but after floating it on the stock exchange the following year, he expanded rapidly and opened suburban stores, as well as buying into familiar music industry names such as Allans, Palings and Suttons. Eventually, 170 stores traded across the continent under the Brash's banner.

Geoff Brash learned from his father's focus on customer service. Alfred Brash had also been a pioneer in introducing a share scheme for his staff, and his son retained and expanded the plan following the float.

Geoff Brash was optimistic and outward looking. As a result, he was a pioneer in both accessing and selling new technology, and developing overseas relationships. He sourced and sold electric guitars, organs, and a range of other modern instruments, as well as state-of-the-art audio and video equipment. He developed a relationship with Taro Kakehashi, the founder of Japan's Roland group, which led to a joint venture that brought electronic musical devices to Australia.

In 1965, Brash and his wife attended a trade fair in Guangzhou, the first of its kind in China; they were one of the first Western business people allowed into the country following Mao Zedong's

Cultural Revolution. He returned there many times, helping advise the Chinese in establishing a high quality piano factory in Beijing; he became the factory's agent in Australia. Brash also took leading jazz musicians Don Burrows and James Morrison to China, on a trip that reintroduced jazz to many Chinese musicians.

He stood down as Executive Chairman of Brash's in 1988, but under the new management debt became a problem, and in 1994 the banks called in administrators. The company was sold to Singaporean interests and continued to trade until 1998, when it again went into administration. The Brash name then disappeared from the retail world. Brash was greatly disappointed by the collapse and the eventual disappearance of the company he had run for so long. But it was not long before he invested in a restructured Allan's music business.

Brash was a committed philanthropist who, in the mid-1980s, established the Brash Foundation, which eventually morphed, with other partners, into the Soundhouse Music Alliance. This was a not-for-profit organisation overseeing and promoting multimedia music making and education for teachers and students. The Soundhouse offers teachers and young people the opportunity to get exposure to the latest music technology, and to use this to compose and record their own music, either alone or in collaboration. The organisation has now also established branches in New Zealand, South Africa and Ireland, as well as numerous sites around Australia.

PART 1 — QUESTIONS

Questions 1-5

Do the following statements agree with the information given in Reading Passage 1?

Write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

1 The Brash business originally sold pianos.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

2 Geoff Brash's first job was with his grandfather's company.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

3 Alfred Brash thought that his son wasted money.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

4 By the time Geoff Brash took control, the Brash business was selling some electrical products.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

5 Geoff Brash had ambitions to open Brash stores in other countries.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

Questions 6-10

Answer the questions below.

Choose NO MORE THAN THREE WORDS OR A NUMBER from the passage for each answer.

6 Which arrangement did Alfred Brash set up for his employees? _____

7 Which Japanese company did Geoff Brash collaborate with? _____

8 What type of event in China marked the beginning of Geoff Brash's relationship with that country? _____

9 What style of music did Geoff Brash help to promote in China? _____

10 When did the Brash company finally stop doing business? _____

Questions 11-13

Complete the notes below.

Choose ONE WORD ONLY from the passage for each answer.

Soundhouse Music Alliance

- Grew out of the Brash Foundation.
- A non-commercial organisation providing support for music and music **11** _____ .
- Allows opportunities for using up-to-date **12** _____ .
- Has **13** _____ in several countries.

PASSAGE 2

You should spend about 20 minutes on Questions 14-26, which are based on Reading Passage 2 below.

Early occupations around the river Thames

14

A In her pioneering survey, Sources of London English, Laura Wright has listed the variety of medieval workers who took their livings from the river Thames. The baillies of Queenhithe and Billingsgate acted as customs officers. There were conservators, who were responsible for maintaining the embankments and the weirs, and there were the garthmen who worked in the fish garths (enclosures). Then there were galleymen and lightermen and shoutmen, called after the names of their boats, and there were hookers who were named after the manner in which they caught their fish. The searcher patrolled the Thames in search of illegal fish weirs, and the tideman worked on its banks and foreshores whenever the tide permitted him to do so.

15

B All of these occupations persisted for many centuries, as did those jobs that depended upon the trade of the river. Yet, it was not easy work for any of the workers. They carried most goods upon their backs, since the rough surfaces of the quays and nearby streets were not suitable for wagons or large carts; the merchandise characteristically arrived in barrels which could be rolled from the ship along each quay. If the burden was too great to be carried by a single man, then the goods were slung on poles resting on the shoulders of two men. It was a slow and expensive method of business.

16

C However, up to the eighteenth century, river work was seen in a generally favourable light. For Langland, writing in the fourteenth century, the labourers working on river merchandise were relatively prosperous. And the porters of the seventeenth and early eighteenth centuries were, if anything, aristocrats of labour, enjoying high status. However, in the years from the late eighteenth to the early nineteenth century, there was a marked change in attitude. This was in part because the working river was within the region of the East End of London, which in this period acquired an unenviable reputation. By now, dockside labour was considered to be the most disreputable, and certainly the least desirable form of work.

17

D It could be said that the first industrial community in England grew up around the Thames. With the host of river workers themselves, as well as the vast assembly of ancillary trades such

as tavern-keepers and laundresses, food-sellers and street-hawkers, shopkeepers and marine store dealers - there was a workforce of many thousands congregated in a relatively small area. There were more varieties of business to be observed by the riverside than in any other part of the city. As a result, with the possible exception of the area known as Seven Dials, the East End was also the most intensively inhabited region of London.

18

E It was a world apart, with its own language and its own laws. From the sailors in the opium dens of Limehouse to the smugglers on the malarial flats of the estuary, the workers of the river were not part of any civilised society. The alien world of the river had entered them. That alienation was also expressed in the slang of the docks, which essentially amounted to backslang, or the reversal of ordinary words. This backslang also helped in the formulation of Cockney rhyming slang*, so that the vocabulary of Londoners was directly affected by the life of the Thames.

19

F The reports in the nineteenth-century press reveal a heterogeneous world of dock labour, in which the crowds of casuals waiting for work at the dock gates at 7.45 a.m. include penniless refugees, bankrupts, old soldiers, broken-down gentlemen, discharged servants, and ex-convicts. There were some 400-500 permanent workers who earned a regular wage and who were considered to be the patricians of dockside labour. However, there were some 2,500 casual workers who were hired by the shift. The work for which they competed fiercely had become ever more unpleasant. Steam power could not be used for the cranes, for example, because of the danger of fire. So the cranes were powered by treadmills. Six to eight men entered a wooden cylinder and, laying hold of ropes, would tread the wheel round. They could lift nearly 20 tonnes to an average height of 27 feet (8.2 metres), forty times in an hour. This was part of the life of the river unknown to those who were intent upon its more picturesque aspects.

* a collection of phrases, based on rhyme, used by people in parts of central London as alternatives to standard English words.

PART 2 — QUESTIONS

Questions 14-19

Reading Passage 2 has SIX paragraphs, A-F.

Choose the correct heading, A-F, from the list of headings below.

Write the correct number, i-ix.

i. **A mixture of languages and nationalities**

ii. **The creation of an exclusive identity**

iii. **The duties involved in various occupations**

iv. **An unprecedented population density**

v. **Imports and exports transported by river**

vi. **Transporting heavy loads manually**

vii. **Temporary work for large numbers of people**

viii. **Hazards associated with riverside work**

ix. **The changing status of riverside occupations**

Questions 20-21

Choose TWO letters, A-E.

Write the correct letters.

20 **21** Which TWO statements are made about work by the River Thames before the eighteenth century?

- **A** ☐ Goods were transported from the river by cart.
- **B** ☐ The workforce was very poorly paid.
- **C** ☐ Occupations were specialised.
- **D** ☐ Workers were generally looked down upon.
- **E** ☐ Physical strength was required.

Questions 22-23

Choose TWO letters, A-E.

Write the correct letters.

22 **23** Which TWO statements are made about life by the River Thames in the early nineteenth century?

- **A** ☐ The area was very crowded.
- **B** ☐ There was an absence of crime.
- **C** ☐ Casual work was in great demand.
- **D** ☐ Several different languages were in use.
- **E** ☐ Inhabitants were known for their friendliness.

Questions 24-26

Complete the sentences below.

Use NO MORE THAN TWO WORDS from the passage for each answer.

- In the nineteenth century, only a minority of dock workers received a **24** _____ .
- Cranes were operated manually because **25** _____ created a risk of fire.
- Observers who were unfamiliar with London's docks found the River Thames **26** _____ .

PASSAGE 3

You should spend about 20 minutes on Questions 27-40, which are based on Reading Passage 3 below.

Video game research

Although video games were first developed for adults, they are no longer exclusively reserved for the grown ups in the home. In 2006, Rideout and Hamel reported that as many as 29 percent of preschool children (children between two and six years old) in the United States had played console video games, and 18 percent had played hand-held ones. Given young children's insatiable eagerness to learn, coupled with the fact that they are clearly surrounded by these media, we predict that preschoolers will both continue and increasingly begin to adopt video games for personal enjoyment. Although the majority of gaming equipment is still designed for a much older target audience, once a game system enters the household it is potentially available for all family members, including the youngest. Portable systems have done a particularly good job of penetrating the younger market.

Research in the video game market is typically done at two stages: some time close to the end of the product cycle, in order to get feedback from consumers, so that a marketing strategy can be developed; and at the very end of the product cycle to 'fix bugs' in the game. While both of those types of research are important, and may be appropriate for dealing with adult consumers, neither of them aids in designing better games, especially when it comes to designing for an audience that may have particular needs, such as preschoolers or senior citizens. Instead, exploratory and formative research has to be undertaken in order to truly understand those audiences, their abilities, their perspective, and their needs. In the spring of 2007, our preschool-game production team at Nickelodeon had a hunch that the Nintendo DS* – with its new features, such as the microphone, small size and portability, and its relatively low price point – was a ripe gaming platform for preschoolers. There were a few games on the market at the time which had characters that appealed to the younger set, but our game producers did not think that the game mechanics or design were appropriate for preschoolers. What exactly preschoolers could do with the system, however, was a bit of a mystery. So we set about doing a study to answer the query: What could we expect preschoolers to be capable of in the context of hand-held game play, and how might the child development literature inform us as we proceeded with the creation of a new outlet for this age group?

Our context in this case was the United States, although the games that resulted were also released in other regions, due to the broad international reach of the characters. In order to design the best possible DS product for a preschool audience we were fully committed to the ideals of a 'user-centered approach', which assumes that users will be at least considered, but ideally consulted during the development process. After all, when it comes to introducing a new interactive product to the child market, and particularly such a young age group within it, we believe it is crucial to assess the range of physical and cognitive abilities associated with their specific developmental stage.

Revelle and Medoff (2002) review some of the basic reasons why home entertainment systems, computers, and other electronic gaming devices, are often difficult for preschoolers to use. In addition to their still developing motor skills (which make manipulating a controller with small buttons difficult), many of the major stumbling blocks are cognitive. Though preschoolers are learning to think symbolically, and understand that pictures can stand for real-life objects, the vast majority are still unable to read and write. Thus, using text-based menu selections is not viable. Mapping is yet another obstacle since preschoolers may be unable to understand that there is a direct link between how the controller is used and the activities that appear before them on screen. Though this aspect is changing, in traditional mapping systems real life movements do not usually translate into game-based activity.

Over the course of our study, we gained many insights into how preschoolers interact with various platforms, including the DS. For instance, all instructions for preschoolers need to be in voiceover, and include visual representations, and this has been one of the most difficult areas for us to negotiate with respect to game design on the DS. Because the game cartridges have very limited memory capacity, particularly in comparison to console or computer games, the ability to capture large amounts of voiceover data via sound files or visual representations of instructions becomes limited. Text instructions take up minimal memory, so they are preferable from a technological perspective. Figuring out ways to maximise sound and graphics files, while retaining the clear visual and verbal cues that we know are critical for our youngest players, is a constant give and take. Another of our findings indicated that preschoolers may use either a stylus, or their fingers, or both although they are not very accurate with either. One of the very interesting aspects of the DS is that the interface, which is designed to respond to stylus interactions, can also effectively be used with the tip of the finger. This is particularly noteworthy in the context of preschoolers for two reasons. Firstly, as they have trouble with fine motor skills and their hand-eye coordination is still in development, they are less exact with their stylus movements; and secondly, their fingers are so small that they mimic the stylus very effectively, and therefore by using their fingers they can often be more accurate in their game interactions.

* a brand of hand-held electronic games

PART 3 — QUESTIONS

Questions 27-31

Do the following statements agree with the claims of the writer in Reading Passage 3?

Write

YES if the statement agrees with the claims of the writer

NO if the statement contradicts the claims of the writer

NOT GIVEN if it is impossible to say what the writer thinks about this

27 Video game use amongst preschool children is higher in the US than in other countries.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

28 The proportion of preschool children using video games is likely to rise.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

29 Parents in the US who own gaming equipment generally allow their children to play with it.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

30 The type of research which manufacturers usually do is aimed at improving game design.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

31 Both old and young games consumers require research which is specifically targeted.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

Questions 32-36

Complete the summary using the list of words/phrases, A-I, below.

Problems for preschool users of video games

Preschool children find many electronic games difficult, because neither their motor skills nor their **32** _____ are sufficiently developed.

Certain types of control are hard for these children to manipulate: for example, **33** _____ can be more effective than styluses. Also, although they already have the ability to relate **34** _____ to real-world objects, preschool children are largely unable to understand the connection between their own **35** _____ and the movements they can see on the screen. Finally, very few preschool children can understand **36** _____ .

A. **actions** B. **buttons** C. **cognitive skills** D. **concentration** E. **fingers**
F. **pictures** G. **sounds** H. **spoken instructions** I. **written menus**

Questions 37-40

Choose the correct letter, A, B, C or D.

37 In 2007, what conclusion did games producers at Nickelodeon come to?

- **A** ○ The preschool market was unlikely to be sufficiently profitable.
- **B** ○ One of their hardware products would probably be suitable for preschoolers.
- **C** ○ Games produced by rival companies were completely inappropriate for preschoolers.

D ○ They should put their ideas for new games for preschoolers into practice.

38 The study carried out by Nickelodeon

A ○ was based on children living in various parts of the world.

B ○ focused on the kinds of game content which interests preschoolers.

C ○ investigated the specific characteristics of the target market.

D ○ led to products which appealed mainly to the US consumers.

39 Which problem do the writers highlight concerning games instructions for young children?

A ○ Spoken instructions take up a lot of the available memory.

B ○ Written instructions have to be expressed very simply.

C ○ The children do not follow instructions consistently.

D ○ The video images distract attention from the instructions.

40 Which is the best title for Reading Passage 3?

A ○ An overview of video games software for the preschool market

B ○ Researching and designing video games for preschool children

C ○ The effects of video games on the behaviour of young children

D ○ Assessing the impact of video games on educational achievement

Answer Key

#	Answer	Explanation
1	**TRUE**	His father, Alfred, ran the Brash retail music business that had been founded in 1862 by his grandfather, the German immigrant Marcus Brasch, specialising in pianos
2	**FALSE**	He worked for a time at Myer department stores before joining the family business in 1949, where he quickly began to put his stamp on things
3	**TRUE**	After initially complaining of his extravagance, his father grew to accept the change and gave his son increasing responsibility in the business
4	**TRUE**	After World War II (1939–1945), Brash's had begun to focus on white goods, such as washing machines and refrigerators, as the consumer boom took hold. However, while his father was content with the business he had built, the younger Brash viewed expansion as vital. When Geoff Brash took over as managing director in 1957
5	**NOT GIVEN**	Eventually, 170 stores traded across the continent under the Brash's banner
6	**(a) share scheme**	Alfred Brash had also been a pioneer in introducing a share scheme for his staff, and his son retained and expanded the plan following the float
7	**Roland/Roland group/the Roland group**	He developed a relationship with Taro Kakehashi, the founder of Japan's Roland group, which led to a joint venture that brought electronic musical devices to Australia
8	**(a) trade fair**	In 1965, Brash and his wife attended a trade fair in Guangzhou, the first of its kind in China; they were one of the first Western business people allowed into the country following Mao Zedong's Cultural Revolution
9	**jazz**	Brash also took leading jazz musicians Don Burrows and James Morrison to China, on a trip that reintroduced jazz to many Chinese musicians
10	**1998**	The company was sold to Singaporean interests and continued to trade until 1998, when it again went into administration. The Brash name then disappeared from the retail world

#	Answer	Explanation
11	**education**	This was a not-for-profit organisation overseeing and promoting multimedia music making and education for teachers and students
12	**technology**	The Soundhouse offers teachers and young people the opportunity to get exposure to the latest music technology, and to use this to compose and record their own music, either alone or in collaboration
13	**branches**	The organisation has now also established branches in New Zealand, South Africa and Ireland, as well as numerous sites around Australia
14	**iii**	The baillies of Queenhithe and Billingsgate acted as customs officers. There were conservators, who were responsible for maintaining the embankments and the weirs, and there were the garthmen who worked in the fish garths (enclosures)
15	**vi**	They carried most goods upon their backs, since the rough surfaces of the quays and nearby streets were not suitable for wagons or large carts; the merchandise characteristically arrived in barrels which could be rolled from the ship along each quay. If the burden was too great to be carried by a single man, then the goods were slung on poles resting on the shoulders of two men
16	**ix**	And the porters of the seventeenth and early eighteenth centuries were, if anything, aristocrats of labour, enjoying high status. However, in the years from the late eighteenth to the early nineteenth century, there was a marked change in attitude. This was in part because the working river was within the region of the East End of London, which in this period acquired an unenviable reputation. By now, dockside labour was considered to be the most disreputable, and certainly the least desirable form of work
17	**iv**	As a result, with the possible exception of the area known as Seven Dials, the East End was also the most intensively inhabited region of London
18	**ii**	It was a world apart, with its own language and its own laws
19	**vii**	However, there were some 2,500 casual workers who were hired by the shift
20	**C / E**	The baillies of Queenhithe and Billingsgate acted as customs officers. There were conservators, who were responsible for maintaining the embankments and the weirs, and there were the garthmen who worked in the fish garths (enclosures) They carried most goods upon their backs, since the rough surfaces of the quays and nearby streets were not suitable for wagons or large carts; the merchandise characteristically arrived in barrels which

#	Answer	Explanation
		could be rolled from the ship along each quay. If the burden was too great to be carried by a single man, then the goods were slung on poles resting on the shoulders of two men
21	**C / E**	The baillies of Queenhithe and Billingsgate acted as customs officers. There were conservators, who were responsible for maintaining the embankments and the weirs, and there were the garthmen who worked in the fish garths (enclosures) They carried most goods upon their backs, since the rough surfaces of the quays and nearby streets were not suitable for wagons or large carts; the merchandise characteristically arrived in barrels which could be rolled from the ship along each quay. If the burden was too great to be carried by a single man, then the goods were slung on poles resting on the shoulders of two men
22	**A / C**	As a result, with the possible exception of the area known as Seven Dials, the East End was also the most intensively inhabited region of London However, there were some 2,500 casual workers who were hired by the shift. The work for which they competed fiercely had become ever more unpleasant
23	**A / C**	As a result, with the possible exception of the area known as Seven Dials, the East End was also the most intensively inhabited region of London However, there were some 2,500 casual workers who were hired by the shift. The work for which they competed fiercely had become ever more unpleasant
24	**regular wage**	There were some 400-500 permanent workers who earned a regular wage and who were considered to be the patricians of dockside labour. However, there were some 2,500 casual workers who were hired by the shift
25	**steam power**	Steam power could not be used for the cranes, for example, because of the danger of fire
26	**picturesque**	This was part of the life of the river unknown to those who were intent upon its more picturesque aspects
27	**NOT GIVEN**	In 2006, Rideout and Hamel reported that as many as 29 percent of preschool children (children between two and six years old) in the United States had played console video games, and 18 percent had played hand-held ones
28	**YES**	Given young children’s insatiable eagerness to learn, coupled with the fact that they are clearly surrounded by these media, we predict that preschoolers will both continue and increasingly begin to adopt video games for personal enjoyment
29	**NOT GIVEN**	once a game system enters the household it is potentially available for all family members, including the youngest

#	Answer	Explanation
30	**NO**	Research in the video game market is typically done at two stages: some time close to the end of the product cycle, in order to get feedback from consumers, so that a marketing strategy can be developed; and at the very end of the product cycle to 'fix bugs' in the game. While both of those types of research are important, and may be appropriate for dealing with adult consumers, neither of them aids in designing better games
31	**YES**	While both of those types of research are important, and may be appropriate for dealing with adult consumers, neither of them aids in designing better games, especially when it comes to designing for an audience that may have particular needs, such as preschoolers or senior citizens. Instead, exploratory and formative research has to be undertaken in order to truly understand those audiences, their abilities, their perspective, and their needs
32	**C**	In addition to their still developing motor skills (which make manipulating a controller with small buttons difficult), many of the major stumbling blocks are cognitive
33	**E**	and secondly, their fingers are so small that they mimic the stylus very effectively, and therefore by using their fingers they can often be more accurate in their game interactions
34	**F**	Though preschoolers are learning to think symbolically, and understand that pictures can stand for real-life objects, the vast majority are still unable to read and write
35	**A**	Mapping is yet another obstacle since preschoolers may be unable to understand that there is a direct link between how the controller is used and the activities that appear before them on screen
36	**I**	Though preschoolers are learning to think symbolically, and understand that pictures can stand for real-life objects, the vast majority are still unable to read and write. Thus, using text-based menu selections is not viable
37	**B**	In the spring of 2007, our preschool-game production team at Nickelodeon had a hunch that the Nintendo DS* – with its new features, such as the microphone, small size and portability, and its relatively low price point – was a ripe gaming platform for preschoolers
38	**C**	So we set about doing a study to answer the query: What could we expect preschoolers to be capable of in the context of hand-held game play, and how might the child development literature inform us as we proceeded with the creation of a new outlet for this age group

#	Answer	Explanation
39	**A**	Because the game cartridges have very limited memory capacity, particularly in comparison to console or computer games, the ability to capture large amounts of voiceover data via sound files or visual representations of instructions becomes limited
40	**B**	So we set about doing a study to answer the query: What could we expect preschoolers to be capable of in the context of hand-held game play, and how might the child development literature inform us as we proceeded with the creation of a new outlet for this age group

Test 96

PASSAGE 1

You should spend about 20 minutes on Questions 1-13, which are based on Reading Passage 1 below.

The economic importance of coral reefs

A lot of people around the world are dependent, or partly dependent, on coral reefs for their livelihoods. They often live adjacent to the reef, and their livelihood revolves around the direct extraction, processing and sale of reef resources such as shell fish and seaweeds. In addition, their homes are sheltered by the reef from wave action.

Reef flats and shallow reef lagoons are accessible on foot, without the need for a boat, and so allow women, children and the elderly to engage directly in manual harvesting, or 'reef-gleaning'. This is a significant factor distinguishing reef-based fisheries from near-shore sea fisheries. Near-shore fisheries are typically the domain of adult males, in particular where they involve the use of boats, with women and children restricted mainly to shore-based activities. However, in a coral-reef fishery the physical accessibility of the reef opens up opportunities for direct participation by women, and consequently increases their independence and the importance of their role in the community. It also provides a place for children to play, and to acquire important skills and knowledge for later in life. For example, in the South West Island of Tobi, in the Pacific Ocean, young boys use simple hand lines with a loop and bait at the end to develop the art of fishing on the reef. Similarly, in the Surin Islands of Thailand, young Moken boys spend much of their time playing, swimming and diving in shallow reef lagoons, and in doing so build crucial skills for their future daily subsistence.

Secondary occupations, such as fish processing and marketing activities, are often dominated by women, and offer an important survival strategy for households with access to few other physical assets (such as boats and gear), for elderly women, widows, or the wives of infirm men. On Ulithi Atoll in the western Pacific, women have a distinct role and rights in the distribution of fish catches. This is because the canoes, made from mahogany logs from nearby Yap Island, are obtained through the exchange of cloth made by the women of Ulithi. Small-scale reef fisheries support the involvement of local women traders and their involvement can give them greater control over the household income, and in negotiating for loans or credit. Thus their role is not only important in providing income for their families, it also underpins the economy of the local village.

Poor people with little access to land, labour and financial resources are particularly reliant on exploiting natural resources, and consequently they are vulnerable to seasonal changes in availability of those resources. The diversity of coral reef fisheries, combined with their physical accessibility and the protection they provide against bad weather, make them relatively stable compared with other fisheries, or land-based agricultural production.

In many places, the reef may even act as a resource bank, used as a means of saving food for future times of need. In Manus, Papua New Guinea, giant clams are collected and held in walled enclosures on the reef, until they are needed during periods of rough weather. In Palau, sea cucumbers are seldom eaten during good weather in an effort to conserve their populations for months during which rough weather prohibits good fishing.

Coral reef resources also act as a buffer against seasonal lows in other sectors, particularly agriculture. For example, in coastal communities in northern Mozambique, reef harvests provide key sources of food and cash when agricultural production is low, with the peak in fisheries production coinciding with the period of lowest agricultural stocks. In Papua New Guinea, while agriculture is the primary means of food production, a large proportion of the coastal population engage in sporadic subsistence fishing.

In many coral-reef areas, tourism is one of the main industries bringing employment, and in many cases is promoted to provide alternatives to fisheries-based livelihoods, and to ensure that local reef resources are conserved. In the Caribbean alone, tours based on scuba-diving have attracted 20 million people in one year. The upgrading of roads and communications associated with the expansion of tourism may also bring benefits to local communities. However, plans for development must be considered carefully. The ability of the poorer members of the community to access the benefits of tourism is far from guaranteed, and requires development guided by social, cultural and environmental principles. There is growing recognition that sustainability is a key requirement, as encompassed in small-scale eco-tourism activities, for instance.

Where tourism development has not been carefully planned, and the needs and priorities of the local community have not been properly recognised, conflict has sometimes arisen between tourism and local, small-scale fishers.

PART 1 — QUESTIONS

Questions 1-7

Do the following statements agree with the information given in Reading Passage 1?

Write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

1 In most places, coral-reef gleaning is normally carried out by men.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

2 Involvement in coral-reef-based occupations raises the status of women.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

3 Coral reefs provide valuable learning opportunities for young children.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

4 The women of Ulithi Atoll have some control over how fish catches are shared out.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

5 Boats for use by the inhabitants of Ulithi are constructed on Yap Island.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

6 In coral reef fisheries, only male traders can apply for finance.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

7 Coral reefs provide a less constant source of income than near-shore seas.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

Questions 8-13

Complete the notes below.

Choose NO MORE THAN TWO WORDS from the passage for each answer.

How coral-reef-based resources protect people during difficult times

Coral reefs can provide

- a resource bank, e.g. for keeping clams and **8** _____
- a seasonal back-up, when **9** _____ products are insufficient, e.g. in northern Mozambique.
- a tourist attraction, e.g. **10** _____ tours in the Caribbean.

Benefits for local people include:

- The creation of jobs.
- Improvements to roads and **11** _____ .

Important considerations:

- Development must be based on appropriate principles.
- Need for **12** _____ .
- Poorly-planned development can create **13** _____ with local fishers.

PASSAGE 2

You should spend about 20 minutes on Questions 14–26, which are based on Reading Passage 2 on pages 105–106.

Acquiring the principles of mathematics and science

14

A It has been pointed out that learning mathematics and science is not so much learning facts as learning ways of thinking. It has also been emphasised that in order to learn science, people often have to change the way they think in ordinary situations. For example, in order to understand even simple concepts such as heat and temperature, ways of thinking of temperature as a measure of heat must be abandoned and a distinction between 'temperature' and 'heat' must be learned. These changes in ways of thinking are often referred to as conceptual changes. But how do conceptual changes happen? How do young people change their ways of thinking as they develop and as they learn in school?

15

B Traditional instruction based on telling students how modern scientists think does not seem to be very successful. Students may learn the definitions, the formulae, the terminology, and yet still maintain their previous conceptions. This difficulty has been illustrated many times, for example, when instructed students are interviewed about heat and temperature. It is often identified by teachers as a difficulty in applying the concepts learned in the classroom; students may be able to repeat a formula but fail to use the concept represented by the formula when they explain observed events.

16

C The psychologist Piaget suggested an interesting hypothesis relating to the process of cognitive change in children. Cognitive change was expected to result from the pupils' own intellectual activity. When confronted with a result that challenges their thinking – that is, when faced with conflict - pupils realise that they need to think again about their own ways of solving problems, regardless of whether the problem is one in mathematics or in science. He hypothesised that conflict brings about disequilibrium, and then triggers equilibration processes that ultimately produce cognitive change. For this reason, according to Piaget and his colleagues, in order for pupils to progress in their thinking they need to be actively engaged in solving problems that will challenge their current mode of reasoning. However, Piaget also pointed out that young children do not always discard their ideas in the face of contradictory evidence. They may actually discard the evidence and keep their theory.

17

D Piaget’s hypothesis about how cognitive change occurs was later translated into an educational approach which is now termed 'discovery learning'. Discovery learning initially took what is now considered the 'lone learner' route. The role of the teacher was to select situations that challenged the pupils’ reasoning; and the pupils’ peers had no real role in this process. However, it was subsequently proposed that interpersonal conflict, especially with peers, might play an important role in promoting cognitive change. This hypothesis, originally advanced by Perret-Clermont (1980) and Doise and Mugny (1984), has been investigated in many recent studies of science teaching and learning.

18

E Christine Howe and her colleagues, for example, have compared children’s progress in understanding several types of science concepts when they are given the opportunity to observe relevant events. In one study, Howe compared the progress of 8 to 12-year-old children in understanding what influences motion down a slope. In order to ascertain the role of conflict in group work, they created two kinds of groups according to a pre-test: one in which the children had dissimilar views, and a second in which the children had similar views. They found support for the idea that children in the groups with dissimilar views progressed more after their training sessions than those who had been placed in groups with similar views. However, they found no evidence to support the idea that the children worked out their new conceptions during their group discussions, because progress was not actually observed in a post-test immediately after the sessions of group work, but rather in a second test given around four weeks after the group work.

19

F In another study, Howe set out to investigate whether the progress obtained through pair work could be a function of the exchange of ideas. They investigated the progress made by 12-15-year-old pupils in understanding the path of falling objects, a topic that usually involves conceptual difficulties. In order to create pairs of pupils with varying levels of dissimilarity in their initial conceptions, the pupils' predictions and explanations of the path of falling objects were assessed before they were engaged in pair work. The work sessions involved solving computer-presented problems, again about predicting and explaining the paths of falling objects. A post-test, given to individuals, assessed the progress made by pupils in their conceptions of what influenced the path of falling objects.

PART 2 — QUESTIONS

Questions 14-19

Reading Passage 2 has SIX paragraphs, A–F.

Choose the correct heading for paragraphs A–F from the list of headings below.

Write the correct number, i–ix.

i. **A suggested modification to a theory about learning.**

ii. **The problem of superficial understanding.**

iii. **The relationship between scientific understanding and age.**

iv. **The rejection of a widely held theory.**

v. **The need to develop new concepts in daily life.**

vi. **The claim that a perceived contradiction can assist mental development.**

vii. **Implications for the training of science teachers.**

viii. **An experiment to assess the benefits of exchanging views with a partner.**

ix. **Evidence for the delayed benefits of disagreement between pupils.**

Questions 20-21

Choose TWO letters, A–E.

The list below contains some possible statements about learning.

20 **21** Which TWO of these statements are attributed to Piaget by the writer of the passage?

A ☐ Teachers can assist learning by explaining difficult concepts.

B ☐ Mental challenge is a stimulus to learning.

C ☐ Repetition and consistency of input aid cognitive development.

D ☐ Children sometimes reject evidence that conflicts with their preconceptions.

E ☐ Children can help each other make cognitive progress.

Questions 22-23

Choose TWO letters, A–E.

22 **23** Which TWO of these statements describe Howe's experiment with 8–12-year-olds?

- **A** ☐ The children were assessed on their ability to understand a scientific problem.
- **B** ☐ All the children were working in mixed-ability groups.
- **C** ☐ The children who were the most talkative made the least progress.
- **D** ☐ The teacher helped the children to understand a scientific problem.
- **E** ☐ The children were given a total of three tests, at different times.

Questions 24-26

Complete the summary below.

Choose NO MORE THAN TWO WORDS from the passage for each answer.

How children learn

Piaget proposed that learning takes place when children encounter ideas that do not correspond to their current beliefs. The application of this theory gave rise to a teaching method known as **24** _____ . At first this approach only focused on the relationship between individual pupils and their **25** _____ . Later, researchers such as Perret-Clermont became interested in the role that interaction with **26** _____ might also play in a pupil's development.

PASSAGE 3

You should spend about 20 minutes on Questions 27–40, which are based on Reading Passage 3 below.

Learning lessons from the past

Many past societies collapsed or vanished, leaving behind monumental ruins such as those that the poet Shelley imagined in his sonnet, Ozymandias. By collapse, I mean a drastic decrease in human population size and/or political/economic/social complexity, over a considerable area, for an extended time. By those standards, most people would consider the following past societies to have been famous victims of full-fledged collapses rather than of just minor declines: the Anasazi and Cahokia within the boundaries of the modern US, the Maya cities in Central America, Moche and Tiwanaku societies in South America, Norse Greenland, Mycenean Greece and Minoan Crete in Europe, Great Zimbabwe in Africa, Angkor Wat and the Harappan Indus Valley cities in Asia, and Easter Island in the Pacific Ocean.

The monumental ruins left behind by those past societies hold a fascination for all of us. We marvel at them when as children we first learn of them through pictures. When we grow up, many of us plan vacations in order to experience them at first hand. We feel drawn to their often spectacular and haunting beauty, and also to the mysteries that they pose. The scales of the ruins testify to the former wealth and power of their builders. Yet these builders vanished, abandoning the great structures that they had created at such effort. How could a society that was once so mighty end up collapsing?

It has long been suspected that many of those mysterious abandonments were at least partly triggered by ecological problems: people inadvertently destroying the environmental resources on which their societies depended. This suspicion of unintended ecological suicide (ecocide) has been confirmed by discoveries made in recent decades by archaeologists, climatologists, historians, paleontologists, and palynologists (pollen scientists). The processes through which past societies have undermined themselves by damaging their environments fall into eight categories, whose relative importance differs from case to case: deforestation and habitat destruction, soil problems, water management problems, overhunting, overfishing, effects of introduced species on native species, human population growth, and increased impact of people.

Those past collapses tended to follow somewhat similar courses constituting variations on a theme. Writers find it tempting to draw analogies between the course of human societies and the course of individual human lives to talk of a society's birth, growth, peak, old age and eventual death. But that metaphor proves erroneous for many past societies: they declined rapidly after reaching peak numbers and power, and those rapid declines must have come as a surprise and shock to their citizens. Obviously, too, this trajectory is one that all past societies followed unvaryingly to completion: different societies collapsed to different degrees and in somewhat different ways, while many societies did not collapse at all.

Today many people feel that environmental problems overshadow all the other threats to global civilisation. These environmental problems include the same eight that undermined past societies, plus four new ones: human-caused climate change, build up of toxic chemicals in the environment, energy shortages, and full human utilisation of the Earth's photosynthetic capacity. But the seriousness of these current environmental problems is vigorously debated. Are the risks greatly exaggerated, or conversely are they underestimated? Will modern technology solve our problems, or is it creating new problems faster than it solves old ones? When we deplete one resource (e.g. wood, oil, or ocean fish), can we count on being able to substitute some new resource (e.g. plastics, wind and solar energy, or farmed fish)? Isn't the rate of human population growth declining, such that we're already on course for the world's population to level off at some manageable number of people?

Questions like this illustrate why those famous collapses of past civilisations have taken on more meaning than just that of a romantic mystery. Perhaps there are some practical lessons that we could learn from all those past collapses. But there are also differences between the modern world and its problems, and those past societies and their problems. We shouldn't be so naïve as to think that study of the past will yield simple solutions, directly transferable to our societies today. We differ from past societies in some respects that put us at lower risk than them; some of those respects often mentioned include our powerful technology (i.e. its beneficial effects), globalisation, modern medicine, and greater knowledge of past societies and of distant modern societies. We also differ from past societies in some respects that put us at greater risk than them: again, our potent technology (i.e., its unintended destructive effects), globalisation (such that now a problem in one part of the world affects all the rest), the dependence of millions of us on modern medicine for our survival, and our much larger human population. Perhaps we can still learn from the past, but only if we think carefully about its lessons.

PART 3 — QUESTIONS

Questions 27-29

Choose the correct letter, A, B, C or D.

27 When the writer describes the impact of monumental ruins today, he emphasises

- **A** ○ the income they generate from tourism.
- **B** ○ the area of land they occupy.
- **C** ○ their archaeological value.
- **D** ○ their romantic appeal.

28 Recent findings concerning vanished civilisations have

- **A** ○ overturned long-held beliefs.
- **B** ○ caused controversy amongst scientists.
- **C** ○ come from a variety of disciplines.
- **D** ○ identified one main cause of environmental damage.

29 What does the writer say about ways in which former societies collapsed?

- **A** ○ The pace of decline was usually similar.
- **B** ○ The likelihood of collapse would have been foreseeable.
- **C** ○ Deterioration invariably led to total collapse.
- **D** ○ Individual citizens could sometimes influence the course of events.

Questions 30-34

Do the following statements agree with the views of the writer in Reading Passage 3?

Write

YES if the statement agrees with the claims of the writer

NO if the statement contradicts the claims of the writer

NOT GIVEN if it is impossible to say what the writer thinks about this

30 It is widely believed that environmental problems represent the main danger faced by the modern world.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

31 The accumulation of poisonous substances is a relatively modern problem.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

32 There is general agreement that the threats posed by environmental problems are very serious.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

33 Some past societies resembled present-day societies more closely than others.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

34 We should be careful when drawing comparisons between past and present

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

Questions 35-39

Complete each sentence with the correct ending, A–F, below.

Write the correct letter, A–F.

• Evidence of the greatness of some former civilisations **35** _____

• The parallel between an individual's life and the life of a society **36** _____

• The number of environmental problems that societies face **37** _____

• The power of technology **38** _____

• A consideration of historical events and trends **39** _____

A. **is not necessarily valid.**

B. **provides grounds for an optimistic outlook.**

C. **exists in the form of physical structures.**

D. **is potentially both positive and negative.**

E. **will not provide direct solutions for present problems.**

F. **is greater now than in the past.**

Questions 40-40

Choose the correct letter, A, B, C or D.

40 What is the main argument of Reading Passage 3?

A ○ There are differences as well as similarities between past and present societies.

B ○ More should be done to preserve the physical remains of earlier civilisations.

C ○ Some historical accounts of great civilisations are inaccurate.

D ○ Modern societies are dependent on each other for their continuing survival.

Answer Key

#	Answer	Explanation
1	**FALSE**	Reef flats and shallow reef lagoons are accessible on foot, without the need for a boat, and so allow women, children and the elderly to engage directly in manual harvesting, or 'reef-gleaning'
2	**TRUE**	However, in a coral-reef fishery the physical accessibility of the reef opens up opportunities for direct participation by women, and consequently increases their independence and the importance of their role in the community
3	**TRUE**	It also provides a place for children to play, and to acquire important skills and knowledge for later in life
4	**TRUE**	On Ulithi Atoll in the western Pacific, women have a distinct role and rights in the distribution of fish catches
5	**NOT GIVEN**	This is because the canoes, made from mahogany logs from nearby Yap Island, are obtained through the exchange of cloth made by the women of Ulithi
6	**FALSE**	Small-scale reef fisheries support the involvement of local women traders and their involvement can give them greater control over the household income, and in negotiating for loans or credit
7	**FALSE**	The diversity of coral reef fisheries, combined with their physical accessibility and the protection they provide against bad weather, make them relatively stable compared with other fisheries, or land-based agricultural production
8	**sea cucumbers**	In many places, the reef may even act as a resource bank, used as a means of saving food for future times of need. In Manus, Papua New Guinea, giant clams are collected and held in walled enclosures on the reef, until they are needed during periods of rough weather. In Palau, sea cucumbers are seldom eaten during good weather in an effort to conserve their populations for months during which rough weather prohibits good fishing
9	**agricultural**	For example, in coastal communities in northern Mozambique, reef harvests provide key sources of food and cash when agricultural production is low, with the peak in fisheries production coinciding with the period of lowest agricultural stocks
10	**scuba-diving**	In the Caribbean alone, tours based on scuba-diving have attracted 20 million people in one year

#	Answer	Explanation
11	**communications**	The upgrading of roads and communications associated with the expansion of tourism may also bring benefits to local communities
12	**sustainability**	There is growing recognition that sustainability is a key requirement, as encompassed in small-scale eco-tourism activities, for instance
13	**conflict**	Where tourism development has not been carefully planned, and the needs and priorities of the local community have not been properly recognised, conflict has sometimes arisen between tourism and local, small-scale fishers
14	**v**	It has also been emphasised that in order to learn science, people often have to change the way they think in ordinary situations
15	**ii**	Students may learn the definitions, the formulae, the terminology, and yet still maintain their previous conceptions
16	**vi**	He hypothesised that conflict brings about disequilibrium, and then triggers equilibration processes that ultimately produce cognitive change
17	**i**	Discovery learning initially took what is now considered the 'lone learner' route. The role of the teacher was to select situations that challenged the pupils' reasoning; and the pupils' peers had no real role in this process. However, it was subsequently proposed that interpersonal conflict, especially with peers, might play an important role in promoting cognitive change
18	**ix**	They found support for the idea that children in the groups with dissimilar views progressed more after their training sessions than those who had been placed in groups with similar views. However, they found no evidence to support the idea that the children worked out their new conceptions during their group discussions, because progress was not actually observed in a post-test immediately after the sessions of group work, but rather in a second test given around four weeks after the group work
19	**viii**	In another study, Howe set out to investigate whether the progress obtained through pair work could be a function of the exchange of ideas
20	**B / D**	in order for pupils to progress in their thinking they need to be actively engaged in solving problems that will challenge their current mode of reasoning. However, Piaget also pointed out that young children do not always discard their ideas in the face of contradictory evidence. They may actually discard the evidence and keep their theory
21	**B / D**	in order for pupils to progress in their thinking they need to be actively engaged in solving problems that will challenge their

#	Answer	Explanation
		current mode of reasoning. However, Piaget also pointed out that young children do not always discard their ideas in the face of contradictory evidence. They may actually discard the evidence and keep their theory
22	**A / E**	In one study, Howe compared the progress of 8 to 12-year-old children in understanding what influences motion down a slope. In order to ascertain the role of conflict in group work, they created two kinds of groups according to a pre-test: one in which the children had dissimilar views, and a second in which the children had similar views. They found support for the idea that children in the groups with dissimilar views progressed more after their training sessions than those who had been placed in groups with similar views. However, they found no evidence to support the idea that the children worked out their new conceptions during their group discussions, because progress was not actually observed in a post-test immediately after the sessions of group work, but rather in a second test given around four weeks after the group work
23	**A / E**	In one study, Howe compared the progress of 8 to 12-year-old children in understanding what influences motion down a slope. In order to ascertain the role of conflict in group work, they created two kinds of groups according to a pre-test: one in which the children had dissimilar views, and a second in which the children had similar views. They found support for the idea that children in the groups with dissimilar views progressed more after their training sessions than those who had been placed in groups with similar views. However, they found no evidence to support the idea that the children worked out their new conceptions during their group discussions, because progress was not actually observed in a post-test immediately after the sessions of group work, but rather in a second test given around four weeks after the group work
24	**discovery learning**	Piaget's hypothesis about how cognitive change occurs was later translated into an educational approach which is now termed 'discovery learning'
25	**teacher**	The role of the teacher was to select situations that challenged the pupils' reasoning; and the pupils' peers had no real role in this process
26	**peers/friends**	However, it was subsequently proposed that interpersonal conflict, especially with peers, might play an important role in promoting cognitive change. This hypothesis, originally advanced by Perret-Clermont (1980) and Doise and Mugny (1984), has been investigated in many recent studies of science teaching and learning

#	Answer	Explanation
27	**D**	We feel drawn to their often spectacular and haunting beauty, and also to the mysteries that they pose
28	**C**	This suspicion of unintended ecological suicide (ecocide) has been confirmed by discoveries made in recent decades by archaeologists, climatologists, historians, paleontologists, and palynologists (pollen scientists)
29	**A**	Those past collapses tended to follow somewhat similar courses constituting variations on a theme they declined rapidly after reaching peak numbers and power
30	**YES**	Today many people feel that environmental problems overshadow all the other threats to global civilisation
31	**YES**	These environmental problems include the same eight that undermined past societies, plus four new ones: human-caused climate change, build up of toxic chemicals in the environment, energy shortages, and full human utilisation of the Earth's photosynthetic capacity
32	**NO**	But the seriousness of these current environmental problems is vigorously debated
33	**NOT GIVEN**	But there are also differences between the modern world and its problems, and those past societies and their problems
34	**YES**	We shouldn't be so naïve as to think that study of the past will yield simple solutions, directly transferable to our societies today Perhaps we can still learn from the past, but only if we think carefully about its lessons
35	**C**	The scales of the ruins testify to the former wealth and power of their builders
36	**A**	Writers find it tempting to draw analogies between the course of human societies and the course of individual human lives to talk of a society's birth, growth, peak, old age and eventual death. But that metaphor proves erroneous for many past societies
37	**F**	These environmental problems include the same eight that undermined past societies, plus four new ones: human-caused climate change, build up of toxic chemicals in the environment, energy shortages, and full human utilisation of the Earth's photosynthetic capacity
38	**D**	We differ from past societies in some respects that put us at lower risk than them; some of those respects often mentioned include our powerful technology (i.e. its beneficial effects), globalisation, modern medicine, and greater knowledge of past societies and of distant modern societies. We also differ from

#	Answer	Explanation
		past societies in some respects that put us at greater risk than them: again, our potent technology (i.e., its unintended destructive effects), globalisation (such that now a problem in one part of the world affects all the rest), the dependence of millions of us on modern medicine for our survival, and our much larger human population
39	**E**	We shouldn't be so naïve as to think that study of the past will yield simple solutions, directly transferable to our societies today
40	**A**	Perhaps there are some practical lessons that we could learn from all those past collapses. But there are also differences between the modern world and its problems, and those past societies and their problems

Test 97

PASSAGE 1

You should spend about 20 minutes on Questions 1-13, which are based on Reading Passage 1 below.

Trends in the Indian fashion and textile industries

During the 1950s, the Indian fashion scene was exciting, stylish and very graceful. There were no celebrity designers or models, nor were there any labels that were widely recognised. The value of a garment was judged by its style and fabric rather than by who made it. It was regarded as perfectly acceptable, even for high-society women, to approach an unknown tailor who could make a garment for a few rupees, providing the perfect fit, finish and style. They were proud of getting a bargain, and of giving their own name to the end result.

The 1960s was an era full of mischievousness and celebration in the arts, music and cinema. The period was characterised by freedom from restrictions and, in the fashion world, an acceptance of innovative types of material such as plastic and coated polyester. Tight-fitting *kurtas** and *churidars*** and high coiffures were a trend among women.

The following decade witnessed an increase in the export of traditional materials, and the arrival in India of international fashion. Synthetics became trendy, and the disco culture affected the fashion scene.

It was in the early 80s when the first fashion store 'Ravissant' opened in Mumbai. At that time garments were retailed for a four-figure price tag. American designers like Calvin Klein became popular. In India too, contours became more masculine, and even the *salwar kameez**** was designed with shoulder pads.

With the evolution of designer stores came the culture of designer fashion, along with its hefty price tags. Whatever a garment was like, consumers were convinced that a higher price tag signified elegant designer fashion, so garments were sold at unbelievable prices. Meanwhile, designers decided to get themselves noticed by making showy outfits and associating with the right celebrities. Soon, fashion shows became competitive, each designer attempting to out-do the other in theme, guest list and media coverage.

In the last decade of the millennium, the market shrank and ethnic wear made a comeback. During the recession, there was a push to sell at any cost. With fierce competition the inevitable occurred: the once hefty price tags began their downward journey, and the fashion-show industry followed suit. However, the liveliness of the Indian fashion scene had not ended - it had merely reached a stable level.

At the beginning of the 21st century, with new designers and models, and more sensible designs, the fashion industry accelerated once again. As far as the global fashion industry is concerned, Indian ethnic designs and materials are currently in demand from fashion houses

and garment manufacturers. India is the third largest producer of cotton, the second largest producer of silk, and the fifth largest producer of man-made fibres in the world.

The Indian garment and fabric industries have many fundamental advantages, in terms of a cheaper, skilled work force, cost-effective production, raw materials, flexibility, and a wide range of designs with sequins, beadwork, and embroidery. In addition, that India provides garments to international fashion houses at competitive prices, with a shorter lead time, and an effective monopoly on certain designs, is accepted the whole world over. India has always been regarded as the default source in the embroidered garments segment, but changes in the rate of exchange between the rupee and the dollar has further depressed prices, thereby attracting more buyers. So the international fashion houses walk away with customised goods, and craftwork is sold at very low rates.

As far as the fabric market is concerned, the range available in India can attract as well as confuse the buyer. Much of the production takes place in the small town of Chapa in the eastern state of Bihar, a name one might never have heard of. Here fabric-making is a family industry; the range and quality of raw silks churned out here belie the crude production methods and equipment. Surat in Gujarat, is the supplier of an amazing set of jacquards, moss crepes and georgette sheers - all fabrics in high demand. Another Indian fabric design that has been adopted by the fashion industry is the 'Madras check', originally utilised for the universal lungi, a simple lower-body wrap worn in southern India. This design has now found its way on to bandannas, blouses, home furnishings and almost anything one can think of.

Ethnic Indian designs with batik and hand-embroidered motifs have also become popular across the world. Decorative bead work is another product in demand in the international market. Beads are used to prepare accessory items like belts and bags, and beadwork is now available for haute couture evening wear too.

* knee-length tunics

** trousers

*** trouser suit

PART 1 — QUESTIONS

Questions 1-7

Complete the notes below.

Choose ONE WORD ONLY from the passage for each answer.

Indian fashion: 1950–2000

1950s

- No well-known designers, models or **1** _____
- Elegant clothing cost little
- Women were pleased to get clothes for a **2** _____ price

1960s

- New materials, e.g. **3** _____ and polyester
- Fitted clothing and tall hairstyles

1970s

- Overseas sales of **4** _____ fabrics rose
- Influence of international fashion

1980s

- Opening of fashion store in Mumbai
- Popularity of American designers
- Clothing had a **5** _____ shape
- Designers tried to attract attention by presenting **6** _____ clothes and mixing with stars

1990s

- Fall in demand for expensive fashion wear
- Return to **7** _____ clothing

Questions 8-13

Do the following statements agree with the information given in Reading Passage 1?

Write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

8 At the start of the 21st century, key elements in the Indian fashion industry changed.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

9 India now exports more than half of the cotton it produces.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

10 Conditions in India are generally well suited to the manufacture of clothing.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

11 Indian clothing exports have suffered from changes in the value of its currency.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

12 Modern machinery accounts for the high quality of Chapa's silk.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

13 Some types of Indian craftwork which are internationally popular had humble origins.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

PASSAGE 2

You should spend about 20 minutes on Questions 14-26, which are based on Reading Passage 2 below.

Sustainable growth at Didcot: the outline of a report by South Oxfordshire District Council

A The UK Government's South East Plan proposes additional housing growth in the town of Didcot, which has been a designated growth area since 1979. We in South Oxfordshire District Council consider that, although Didcot does have potential for further growth, such development should be sustainable, well-planned, and supported by adequate infrastructure and community services.

B Recent experience in Didcot has demonstrated that large greenfield* developments cannot resource all the necessary infrastructure and low-cost housing requirements. The ensuing compromises create a legacy of local transport, infrastructure and community services deficits, with no obvious means of correction. We wish to ensure that there is greater recognition of the cost attached to housing growth, and that a means is found to resource the establishment of sustainable communities in growth areas.

C Until the 1950s, the development of job opportunities in the railway industry, and in a large, military ordnance depot, was the spur to Didcot's expansion. Development at that time was geared to providing homes for the railway and depot workers, with limited investment in shopping and other services for the local population. Didcot failed to develop Broadway as a compact town centre, and achieved only a strip of shops along one side of the main street hemmed in by low density housing and service trade uses.

D From the 1970s, strategic planning policies directed significant new housing development to Didcot. Planners recognised Didcot's potential, with rapid growth in local job opportunities and good rail connections for those choosing to work farther afield. However, the town is bisected by the east-west railway, and people living in Ladygrove, the urban extension to the north which has been built since the 1980s, felt, and still feel, cut off from the town and its community.

E Population growth in the new housing areas failed to spark adequate private-sector investment in town centre uses, and the limited investment which did take place – Didcot Market Place development in 1982, for instance – did not succeed in delivering the number and range of town centre uses needed by the growing population. In 1990, public-sector finance was used to buy the land required for the Orchard Centre development, comprising a superstore, parking and a new street of stores running parallel to Broadway. The development took 13 years to complete.

F The idea that, by obliging developers of new housing to contribute to the cost of infrastructure and service requirements, all the necessary finance could be raised, has proved unachievable. Substantial public finance was still needed to deliver major projects such as the new link road to the A34 on the outskirts of the town at Milton, the improved railway crossing at

Marsh Bridge and new schools. Such projects were delayed due to difficulties in securing public finance. The same problem also held back expansion of health and social services in the town.

G In recent years, government policy, in particular the requirement for developers that forty percent of the units in a new housing development should be low cost homes, has had a major impact on the economics of such development, as it has limited the developers' contribution to the costs of infrastructure. The planning authorities are facing difficult choices in prioritising the items of infrastructure which must be funded by development, and this, in turn, means that from now on public finance will need to provide a greater proportion of infrastructure project costs.

H The Government's Sustainable Communities Plan seeks a holistic approach to new urban development in which housing, employment, services and infrastructure of all kinds are carefully planned and delivered in a way which avoids the infrastructure deficits that have occurred in places like Didcot in the past. This report, therefore, is structured around the individual components of a sustainable community, and shows the baseline position for each component.

I Didcot has been identified as one of the towns with which the Government is working to evaluate whether additional growth will strengthen the economic potential of the town, deliver the necessary infrastructure and improve environmental standards. A programme of work, including discussions with the local community about their aspirations for the town as well as other stakeholders, will be undertaken over the coming months, and will lead to the development of a strategic master plan. The challenge will be in optimising scarce resources to achieve maximum benefits for the town.

* land that has never previously been built on

PART 2 — QUESTIONS

Questions 14-19

Reading Passage 2 has nine paragraphs, A–I.

Which paragraph contains the following information?

Write the correct letter, A–I.

	A	B	C	D	E	F	G	H	I
14 reference to the way the council's report is organised	○	○	○	○	○	○	○	○	○
15 the reason why inhabitants in one part of Didcot are isolated	○	○	○	○	○	○	○	○	○
16 a statement concerning future sources of investment	○	○	○	○	○	○	○	○	○
17 the identification of two major employers at Didcot	○	○	○	○	○	○	○	○	○
18 reference to groups who will be consulted about a new development plan	○	○	○	○	○	○	○	○	○
19 an account of how additional town centre facilities were previously funded	○	○	○	○	○	○	○	○	○

Questions 20-23

Look at the following places and the list of statements below.

Match each place with the correct statement, A–F.

Write the correct letter, A–F.

A. It provided extra facilities for shopping and cars.

B. Its location took a long time to agree.

C. Its layout was unsuitable.

D. Its construction was held up due to funding problems.

E. It was privately funded.

F. It failed to get Council approval at first.

	A	B	C	D	E	F
20 Broadway	○	○	○	○	○	○
21 Market Place	○	○	○	○	○	○
22 Orchard Centre	○	○	○	○	○	○
23 Marsh Bridge	○	○	○	○	○	○

Questions 24-26

Complete the sentences below.

Choose NO MORE THAN THREE WORDS from the passage for each answer.

- A certain proportion of houses in any new development now have to be of the **24** _____ type.
- The government is keen to ensure that adequate **25** _____ will be provided for future housing developments.
- The views of Didcot's inhabitants and others will form the basis of a **26** _____ for the town.

PASSAGE 3

You should spend about 20 minutes on Questions 27-40, which are based on Reading Passage 3 below.

Language diversity

One of the most influential ideas in the study of languages is that of universal grammar (UG). Put forward by Noam Chomsky in the 1960s, it is widely interpreted as meaning that all languages are basically the same, and that the human brain is born language-ready, with an in-built programme that is able to interpret the common rules underlying any mother tongue. For five decades this idea prevailed, and influenced work in linguistics, psychology and cognitive science. To understand language, it implied, you must sweep aside the huge diversity of languages, and find their common human core.

Since the theory of UG was proposed, linguists have identified many universal language rules. However, there are almost always exceptions. It was once believed, for example, that if a language had syllables* that begin with a vowel and end with a consonant (VC), it would also have syllables that begin with a consonant and end with a vowel (CV). This universal lasted until 1999, when linguists showed that Arrernte, spoken by Indigenous Australians from the area around Alice Springs in the Northern Territory, has VC syllables but no CV syllables.

Other non-universal universals describe the basic rules of putting words together. Take the rule that every language contains four basic word classes: nouns, verbs, adjectives and adverbs. Work in the past two decades has shown that several languages lack an open adverb class, which means that new adverbs cannot be readily formed, unlike in English where you can turn any adjective into an adverb, for example 'soft' into 'softly'. Others, such as Lao, spoken in Laos, have no adjectives at all. More controversially, some linguists argue that a few languages, such as Straits Salish, spoken by indigenous people from north-western regions of North America, do not even have distinct nouns or verbs. Instead, they have a single class of words to include events, objects and qualities.

Even apparently indisputable universals have been found lacking. This includes recursion, or the ability to infinitely place one grammatical unit inside a similar unit, such as 'Jack thinks that Mary thinks that ... the bus will be on time'. It is widely considered to be the most essential characteristic of human language, one that sets it apart from the communications of all other animals. Yet Dan Everett at Illinois State University recently published controversial work showing that Amazonian Piraha does not have this quality.

But what if the very diversity of languages is the key to understanding human communication? Linguists Nicholas Evans of the Australian National University in Canberra, and Stephen Levinson of the Max Planck Institute for Psycholinguistics in Nijmegen, the Netherlands, believe that languages do not share a common set of rules. Instead, they say, their sheer variety is a defining feature of human communication – something not seen in other animals. While there is no doubt that human thinking influences the form that language takes, if Evans and Levinson are correct, language in turn shapes our brains. This suggests that humans are more diverse

than we thought, with our brains having differences depending on the language environment in which we grew up. And that leads to a disturbing conclusion: every time a language becomes extinct, humanity loses an important piece of diversity.

If languages do not obey a single set of shared rules, then how are they created? 'Instead of universals, you get standard engineering solutions that languages adopt again and again, and then you get outliers,' says Evans. He and Levinson argue that this is because any given language is a complex system shaped by many factors, including culture, genetics and history. There are no absolutely universal traits of language, they say, only tendencies. And it is a mix of strong and weak tendencies that characterises the 'bio-cultural' mix that we call language.

According to the two linguists, the strong tendencies explain why many languages display common patterns. A variety of factors tend to push language in a similar direction, such as the structure of the brain, the biology of speech, and the efficiencies of communication. Widely shared linguistic elements may also be ones that build on a particularly human kind of reasoning. For example, the fact that before we learn to speak we perceive the world as a place full of things causing actions (agents) and things having actions done to them (patients) explains why most languages deploy these grammatical categories.

Weak tendencies, in contrast, are explained by the idiosyncrasies of different languages. Evans and Levinson argue that many aspects of the particular natural history of a population may affect its language. For instance, Andy Butcher at Flinders University in Adelaide, South Australia, has observed that indigenous Australian children have by far the highest incidence of chronic middle-ear infection of any population on the planet, and that most indigenous Australian languages lack many sounds that are common in other languages, but which are hard to hear with a middle-ear infection. Whether this condition has shaped the sound systems of these languages is unknown, says Evans, but it is important to consider the idea.

Levinson and Evans are not the first to question the theory of universal grammar, but no one has summarised these ideas quite as persuasively, and given them as much reach. As a result, their arguments have generated widespread enthusiasm, particularly among those linguists who are tired of trying to squeeze their findings into the straitjacket of 'absolute universals'. To some, it is the final nail in UG's coffin. Michael Tomasello, co-director of the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany, has been a long-standing critic of the idea that all languages conform to a set of rules. 'Universal grammar is dead,' he says.

* a unit of sound

PART 3 — QUESTIONS

Questions 27-32

Do the following statements agree with the views of the writer in Reading Passage 3?

Write

YES if the statement agrees with the claims of the writer

NO if the statement contradicts the claims of the writer

NOT GIVEN if it is impossible to say what the writer thinks about this

27 In the final decades of the twentieth century, a single theory of language learning was dominant.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

28 The majority of UG rules proposed by linguists do apply to all human languages.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

29 There is disagreement amongst linguists about an aspect of Straits Salish grammar.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

30 The search for new universal language rules has largely ended.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

31 If Evans and Levinson are right, people develop in the same way no matter what language they speak.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

32 The loss of any single language might have implications for the human race.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

Questions 33-37

Choose the correct letter, A, B, C or D.

33 Which of the following views about language are held by Evans and Levinson?

- **A** ○ Each of the world's languages develops independently.
- **B** ○ The differences between languages outweigh the similarities.
- **C** ○ Only a few language features are universal.
- **D** ○ Each language is influenced by the characteristics of other languages.

34 According to Evans and Levinson, apparent similarities between languages could be due to

- **A** ○ close social contact.
- **B** ○ faulty analysis.
- **C** ○ shared modes of perception.
- **D** ○ narrow descriptive systems.

35 In the eighth paragraph, what does the reference to a middle-ear infection serve as?

- **A** ○ A justification for something.

B ○ A contrast with something.

C ○ The possible cause of something.

D ○ The likely result of something.

36 What does the writer suggest about Evans' and Levinson's theory of language development?

A ○ It had not been previously considered.

B ○ It is presented in a convincing way.

C ○ It has been largely rejected by other linguists.

D ○ It is not supported by the evidence.

37 Which of the following best describes the writer's purpose?

A ○ To describe progress in the field of cognitive science.

B ○ To defend a long-held view of language learning.

C ○ To identify the similarities between particular languages.

D ○ To outline opposing views concerning the nature of language.

Questions 38-40

Complete each sentence with the correct ending, A–E, below.

Write the correct letter, A–E.

• The Arrernte language breaks a 'rule' concerning **38** _____

• The Lao language has been identified as lacking **39** _____

• It has now been suggested that Amazonia Piraha does not have **40** _____

A. **words of a certain grammatical type.**

B. **a sequence of sounds predicted by UG.**

C. **words which can have more than one meaning.**

D. **the language feature regarded as the most basic.**

E. **sentences beyond a specified length.**

Answer Key

#	Answer	Explanation
1	**labels**	There were no celebrity designers or models, nor were there any labels that were widely recognised
2	**bargain**	They were proud of getting a bargain, and of giving their own name to the end result
3	**plastic**	The period was characterised by freedom from restrictions and, in the fashion world, an acceptance of innovative types of material such as plastic and coated polyester
4	**traditional**	The following decade witnessed an increase in the export of traditional materials, and the arrival in India of international fashion
5	**masculine**	In India too, contours became more masculine, and even the salwar kameez was designed with shoulder pads
6	**showy**	Meanwhile, designers decided to get themselves noticed by making showy outfits and associating with the right celebrities
7	**ethnic**	In the last decade of the millennium, the market shrank and ethnic wear made a comeback
8	**TRUE**	At the beginning of the 21st century, with new designers and models, and more sensible designs, the fashion industry accelerated once again
9	**NOT GIVEN**	India is the third largest producer of cotton, the second largest producer of silk, and the fifth largest producer of man-made fibres in the world
10	**TRUE**	The Indian garment and fabric industries have many fundamental advantages, in terms of a cheaper, skilled work force, cost-effective production, raw materials, flexibility, and a wide range of designs with sequins, beadwork, and embroidery
11	**FALSE**	India has always been regarded as the default source in the embroidered garments segment, but changes in the rate of exchange between the rupee and the dollar has further depressed prices, thereby attracting more buyers
12	**FALSE**	Here fabric-making is a family industry; the range and quality of raw silks churned out here belie the crude production methods and equipment

#	Answer	Explanation
13	**TRUE**	Another Indian fabric design that has been adopted by the fashion industry is the ‘Madras check’, originally utilised for the universal lungi, a simple lower-body wrap worn in southern India
14	**H**	This report, therefore, is structured around the individual components of a sustainable community, and shows the baseline position for each component
15	**D**	However, the town is bisected by the east-west railway, and people living in Ladygrove, the urban extension to the north which has been built since the 1980s, felt, and still feel, cut off from the town and its community
16	**G**	The planning authorities are facing difficult choices in prioritising the items of infrastructure which must be funded by development, and this, in turn, means that from now on public finance will need to provide a greater proportion of infrastructure project costs
17	**C**	Until the 1950s, the development of job opportunities in the railway industry, and in a large, military ordnance depot, was the spur to Didcot’s expansion
18	**I**	A programme of work, including discussions with the local community about their aspirations for the town as well as other stakeholders, will be undertaken over the coming months, and will lead to the development of a strategic master plan
19	**E**	In 1990, public-sector finance was used to buy the land required for the Orchard Centre development, comprising a superstore, parking and a new street of stores running parallel to Broadway
20	**C**	Didcot failed to develop Broadway as a compact town centre, and achieved only a strip of shops along one side of the main street hemmed in by low density housing and service trade uses
21	**E**	Population growth in the new housing areas failed to spark adequate private-sector investment in town centre uses, and the limited investment which did take place – Didcot Market Place development in 1982, for instance – did not succeed in delivering the number and range of town centre uses needed by the growing population
22	**A**	In 1990, public-sector finance was used to buy the land required for the Orchard Centre development, comprising a superstore, parking and a new street of stores running parallel to Broadway
23	**D**	Substantial public finance was still needed to deliver major projects such as the new link road to the A34 on the outskirts of the town at Milton, the improved railway crossing at Marsh Bridge

#	Answer	Explanation
		and new schools. Such projects were delayed due to difficulties in securing public finance
24	**low cost/affordable**	the requirement for developers that forty percent of the units in a new housing development should be low cost homes
25	**infrastructure**	The Government's Sustainable Communities Plan seeks a holistic approach to new urban development in which housing, employment, services and infrastructure of all kinds are carefully planned and delivered in a way which avoids the infrastructure deficits that have occurred in places like Didcot in the past
26	**strategic master plan**	A programme of work, including discussions with the local community about their aspirations for the town as well as other stakeholders, will be undertaken over the coming months, and will lead to the development of a strategic master plan
27	**YES**	For five decades this idea prevailed, and influenced work in linguistics, psychology and cognitive science
28	**NO**	Since the theory of UG was proposed, linguists have identified many universal language rules. However, there are almost always exceptions
29	**YES**	More controversially, some linguists argue that a few languages, such as Straits Salish, spoken by indigenous people from north-western regions of North America, do not even have distinct nouns or verbs
30	**NOT GIVEN**	Since the theory of UG was proposed, linguists have identified many universal language rules
31	**NO**	This suggests that humans are more diverse than we thought, with our brains having differences depending on the language environment in which we grew up
32	**YES**	And that leads to a disturbing conclusion: every time a language becomes extinct, humanity loses an important piece of diversity
33	**A**	He and Levinson argue that this is because any given language is a complex system shaped by many factors, including culture, genetics and history
34	**C**	Widely shared linguistic elements may also be ones that build on a particularly human kind of reasoning. For example, the fact that before we learn to speak we perceive the world as a place full of things causing actions (agents) and things having actions done to them (patients) explains why most languages deploy these grammatical categories
35	**C**	Whether this condition has shaped the sound systems of these languages is unknown, says Evans, but it is important to consider

#	Answer	Explanation
		the idea
36	**B**	Levinson and Evans are not the first to question the theory of universal grammar, but no one has summarised these ideas quite as persuasively, and given them as much reach
37	**D**	One of the most influential ideas in the study of languages is that of universal grammar (UG). Put forward by Noam Chomsky in the 1960s, it is widely interpreted as meaning that all languages are basically the same, and that the human brain is born language-ready, with an in-built programme that is able to interpret the common rules underlying any mother tongue But what if the very diversity of languages is the key to understanding human communication? Linguists Nicholas Evans of the Australian National University in Canberra, and Stephen Levinson of the Max Planck Institute for Psycholinguistics in Nijmegen, the Netherlands, believe that languages do not share a common set of rules
38	**B**	It was once believed, for example, that if a language had syllables* that begin with a vowel and end with a consonant (VC), it would also have syllables that begin with a consonant and end with a vowel (CV). This universal lasted until 1999, when linguists showed that Arrernte, spoken by Indigenous Australians from the area around Alice Springs in the Northern Territory, has VC syllables but no CV syllables
39	**A**	Others, such as Lao, spoken in Laos, have no adjectives at all
40	**D**	It is widely considered to be the most essential characteristic of human language, one that sets it apart from the communications of all other animals. Yet Dan Everett at Illinois State University recently published controversial work showing that Amazonian Piraha does not have this quality

Test 98

PASSAGE 1

You should spend about 20 minutes on Questions 1–13, which are based on Reading Passage 1 below.

The construction of roads and bridges

Roads

Although there were highway links in Mesopotamia from as early as 3500 BC, the Romans were probably the first road-builders with fixed engineering standards. At the peak of the Roman Empire in the first century AD, Rome had road connections totalling about 85,000 kilometres.

Roman roads were constructed with a deep stone surface for stability and load-bearing. They had straight alignments and therefore were often hilly. The Roman roads remained the main arteries of European transport for many centuries, and even today many roads follow the Roman routes. New roads were generally of inferior quality, and the achievements of Roman builders were largely unsurpassed until the resurgence of road-building in the eighteenth century.

With horse-drawn coaches in mind, eighteenth-century engineers preferred to curve their roads to avoid hills. The road surface was regarded as merely a face to absorb wear, the load-bearing strength being obtained from a properly prepared and well-drained foundation. Immediately above this, the Scottish engineer John McAdam (1756–1836) typically laid crushed stone, to which stone dust mixed with water was added, and which was compacted to a thickness of just five centimetres, and then rolled. McAdam's surface layer – hot tar onto which a layer of stone chips was laid – became known as 'tarmacadam', or tarmac. Roads of this kind were known as flexible pavements.

By the early nineteenth century – the start of the railway age – men such as John McAdam and Thomas Telford had created a British road network totalling some 200,000 km, of which about one sixth was privately owned toll roads called turnpikes. In the first half of the nineteenth century, many roads in the US were built to the new standards, of which the National Pike from West Virginia to Illinois was perhaps the most notable.

In the twentieth century, the ever-increasing use of motor vehicles threatened to break up roads built to nineteenth-century standards, so new techniques had to be developed.

On routes with heavy traffic, flexible pavements were replaced by rigid pavements, in which the top layer was concrete, 15 to 30 centimetres thick, laid on a prepared bed. Nowadays steel bars are laid within the concrete. This not only restrains shrinkage during setting, but also reduces expansion in warm weather. As a result, it is possible to lay long slabs without danger of cracking.

The demands of heavy traffic led to the concept of high-speed, long-distance roads, with access – or slip-lanes – spaced widely apart. The US Bronx River Parkway of 1925 was followed by several variants – Germany's autobahns and the Pan American Highway. Such roads – especially the intercity autobahns with their separate multi-lane carriageways for each direction – were the predecessors of today's motorways.

Bridges

The development by the Romans of the arched bridge marked the beginning of scientific bridge-building; hitherto, bridges had generally been crossings in the form of felled trees or flat stone blocks. Absorbing the load by compression, arched bridges are very strong. Most were built of stone, but brick and timber were also used. A fine early example is at Alcantara in Spain, built of granite by the Romans in AD 105 to span the River Tagus. In modern times, metal and concrete arched bridges have been constructed. The first significant metal bridge, built of cast iron in 1779, still stands at Ironbridge in England.

Steel, with its superior strength-to-weight ratio, soon replaced iron in metal bridge-work. In the railway age, the truss (or girder) bridge became popular. Built of wood or metal, the truss beam consists of upper and lower horizontal booms joined by vertical or inclined members.

The suspension bridge has a deck supported by suspenders that drop from one or more overhead cables. It requires strong anchorage at each end to resist the inward tension of the cables, and the deck is strengthened to control distortion by moving loads or high winds. Such bridges are nevertheless light, and therefore the most suitable for very long spans. The Clifton Suspension Bridge in the UK, designed by Isambard Kingdom Brunel (1806–59) to span the Avon Gorge in England, is famous both for its beautiful setting and for its elegant design. The 1998 Akashi Kaikyo Bridge in Japan has a span of 1,991 metres, which is the longest to date.

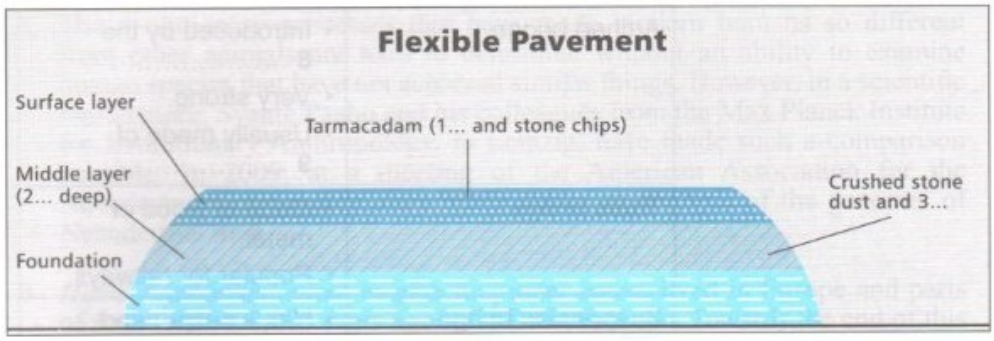
Cantilever bridges, such as the 1889 Forth Rail Bridge in Scotland, exploit the potential of steel construction to produce a wide clearwater space. The spans have a central supporting pier and meet midstream. The downward thrust, where the spans meet, is countered by firm anchorage of the spans at their other ends. Although the suspension bridge can span a wider gap, the cantilever is relatively stable, and this was important for nineteenth-century railway builders. The world's longest cantilever span – 549 metres – is that of the Quebec rail bridge in Canada, constructed in 1918.

PART 1 — QUESTIONS

Questions 1-3

Label the diagram below.

Choose NO MORE THAN TWO WORDS AND/OR A NUMBER from the passage for each answer.



1 _____

2 _____

3 _____

Questions 4-7

Do the following statements agree with the information given in Reading Passage 1?

Write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

4 Road construction improved continuously between the first and eighteenth centuries.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

5 In Britain, during the nineteenth century, only the very rich could afford to use toll roads.

- **A** ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

6 Nineteenth-century road surfaces were inadequate for heavy motor traffic.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

7 Traffic speeds on long-distance highways were unregulated in the early part of the twentieth century.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

Questions 8-13

Complete the table below.

Use ONE WORD ONLY from the passage for each answer.

Type of bridge	Features	Example(s)
Arched bridge	• Introduced by the 8 _____ • Very strong. • Usually made of 9 _____	Alcantara, Spain Ironbridge, UK
Truss bridge	• Made of wood or metal. • Popular for railways.	
Suspension bridge	• Has a suspended deck. • Strong but 10 _____	Clifton, UK Akashi Kaikyo, Japan

		(currently the **11** _____ span)
Cantilever bridge	• Made of **12** _____ • More **13** _____ than the suspension bridge.	Quebec, Canada

PASSAGE 2

You should spend about 20 minutes on Questions 14–26, which are based on Reading Passage 2 below.

Neanderthals and modern humans

A The evolutionary processes that have made modern humans so different from other animals are hard to determine without an ability to examine human species that have not achieved similar things. However, in a scientific masterpiece, Svante Paabo and his colleagues from the Max Planck Institute for Evolutionary Anthropology, in Leipzig, have made such a comparison possible. In 2009, at a meeting of the American Association for the Advancement of Science, they made public an analysis of the genome* of Neanderthal man.

B *Homo neanderthalensis*, to give its proper name, lived in Europe and parts of Asia from 400,000 years ago to 30,000 years ago. Towards the end of this period it shared its range with interlopers in the form of *Homo sapiens***, who were spreading out from Africa. However, the two species did not settle down to a stable cohabitation. For reasons which are as yet unknown, the arrival of *Homo sapiens* in a region was always quickly followed by the disappearance of Neanderthals.

C Before 2009, Dr Paabo and his team had conducted only a superficial comparison between the DNA of Neanderthals and modern humans. Since then, they have performed a more thorough study and, in doing so, have shed a fascinating light on the intertwined history of the two species. That history turns out to be more intertwined than many had previously believed.

D Dr Paabo and his colleagues compared their Neanderthal genome (painstakingly reconstructed from three bone samples collected from a cave in Croatia) with that of five living humans from various parts of Africa and Eurasia. Previous genetic analysis, which had only examined DNA passed from mother to child in cellular structures called mitochondria, had suggested no interbreeding between Neanderthals and modern humans. The new, more extensive examination, which looks at DNA in the cell nucleus rather than in the mitochondria, shows this conclusion is wrong. By comparing the DNA in the cell nucleus of Africans (whose ancestors could not have crossbred with Neanderthals, since they did not overlap with them) and various Eurasians (whose ancestors could have crossbred with Neanderthals), Dr Paabo has shown that Eurasians are between one percent and four percent Neanderthal.

E That is intriguing. It shows that even after several hundred thousand years of separation, the two species were inter-fertile. It is strange, though, that no Neanderthal mitochondrial DNA has turned up in modern humans, since the usual pattern of invasion in historical times was for the invaders' males to mate with the invaded's females. One piece of self-knowledge, then – at least for non-Africans – is that they have a dash of Neanderthal in them. But Dr Paabo's work also illuminates the differences between the species. By comparing modern humans, Neanderthals, and chimpanzees, it is possible to distinguish genetic changes which are shared by several species of human in their evolution away from the great-ape lineage, from those which are unique to *Homo sapiens*.

F More than 90 percent of the ‘human accelerated regions’*** that have been identified in modern people are found in Neanderthals too. However, the rest are not. Dr Paabo has identified 212 parts of the genome that seem to have undergone significant evolution since the species split. The state of genome science is still quite primitive, and it is often unclear what any given bit of DNA is actually doing. But an examination of the 20 largest regions of DNA that have evolved in this way shows that they include several genes which are associated with cognitive ability, and whose malfunction causes serious mental problems. These genes therefore look like good places to start the search for modern humanity’s essence.

G The newly evolved regions of DNA also include a gene called RUNX2, which controls bone growth. That may account for differences in the shape of the skull and the rib cage between the two species. By contrast an earlier phase of the study had already shown that Neanderthals and moderns share the same version of a gene called FOXP2, which is involved in the ability to speak, and which differs in chimpanzees. It is all, then, very promising – and a second coup in quick succession for Dr Paabo. Another of his teams has revealed the existence of a hitherto unsuspected species of human, using mitochondrial DNA found in a little-finger bone. If that species, too, could have its full genome read, humanity’s ability to know itself would be enhanced even further.

---

* an individual's complete set of genes

** the scientific name for modern humans

*** parts of the human brain which evolved very rapidly

PART 2 — QUESTIONS

Questions 14-18

Look at the following characteristics and the list of species below.

Match each feature with the correct species, A, B or C.

Write the correct letter, A, B or C.

NB You may use any letter more than once.

A. Homo neanderthalensis

B. Homo sapiens

C. both Homo neanderthalensis and Homo sapiens

	A	B	C
14 Once lived in Europe and Asia.	○	○	○
15 Originated in Africa.	○	○	○
16 Did not survive long after the arrival of immigrants.	○	○	○
17 Interbred with another species.	○	○	○
18 Appears not to have passed on mitochondrial DNA to another species.	○	○	○

Questions 19-23

Reading Passage 2 has seven paragraphs, A–G.

Which paragraph contains the following information?

Write the correct letter, A–G.

	A	B	C	D	E	F	G
19 an account of the rejection of a theory	○	○	○	○	○	○	○
20 reference to an unexplained link between two events	○	○	○	○	○	○	○

	A	B	C	D	E	F	G
21 the identification of a skill-related gene common to both Neanderthals and modern humans	○	○	○	○	○	○	○
22 the announcement of a scientific breakthrough	○	○	○	○	○	○	○
23 an interesting gap in existing knowledge	○	○	○	○	○	○	○

Questions 24-26

Complete the summary below.

Choose NO MORE THAN THREE WORDS from the passage for each answer.

The nature of modern humans

Recent work in the field of evolutionary anthropology has made it possible to compare modern humans with other related species. Genetic analysis resulted in several new findings. First, despite the length of time for which *Homo sapiens* and *Homo neanderthalensis* had developed separately, **24** _____ did take place. Secondly, genes which evolved after modern humans split from Neanderthals are connected with cognitive ability and skeletal **25** _____.

The potential for this line of research to shed light on the nature of modern humans was further strengthened when analysis of a **26** _____ led to the discovery of a new human species.

PASSAGE 3

You should spend about 20 minutes on Questions 27–40, which are based on Reading Passage 3 below.

The Future of fish

The face of the ocean has changed completely since the first commercial fishers cast their nets and hooks over a thousand years ago. Fisheries intensified over the centuries, but even by the nineteenth century it was still felt, justifiably, that the plentiful resources of the sea were for the most part beyond the reach of fishing, and so there was little need to restrict fishing or create protected areas. The twentieth century heralded an escalation in fishing intensity that is unprecedented in the history of the oceans, and modern fishing technologies leave fish no place to hide. Today, the only refuges from fishing are those we deliberately create. Unhappily, the sea trails far behind the land in terms of the area and the quality of protection given.

For centuries, as fishing and commerce have expanded, we have held onto the notion that the sea is different from the land. We still view it as a place where people and nations should be free to come and go at will, as well as somewhere that should be free for us to exploit. Perhaps this is why we have been so reluctant to protect the sea. On land, protected areas have proliferated as human populations have grown. Here, compared to the sea, we have made greater headway in our struggle to maintain the richness and variety of wildlife and landscape. Twelve percent of the world's land is now contained in protected areas, whereas the corresponding figure for the sea is but three-fifths of one percent. Worse still, most marine protected areas allow some fishing to continue. Areas off-limits to all exploitation cover something like one five-thousandth of the total area of the world's seas.

Today, we are belatedly coming to realise that 'natural refuges' from fishing have played a critical role in sustaining fisheries, and maintaining healthy and diverse marine ecosystems. This does not mean that marine reserves can rebuild fisheries on their own – other management measures are also required for that. However, places that are off-limits to fishing constitute the last and most important part of our package of reform for fisheries management. They underpin and enhance all our other efforts. There are limits to protection though.

Reserves cannot bring back what has died out. We can never resurrect globally extinct species, and restoring locally extinct animals may require reintroductions from elsewhere, if natural dispersal from remaining populations is insufficient. We are also seeing, in cases such as northern cod in Canada, that fishing can shift marine ecosystems into different states, where different mixes of species prevail. In many cases, these species are less desirable, since the prime fishing targets have gone or are much reduced in numbers, and changes may be difficult to reverse, even with a complete moratorium on fishing. The Mediterranean sailed by Ulysses, the legendary king of ancient Greece, supported abundant monk seals, loggerhead turtles and porpoises. Their disappearance through hunting and overfishing has totally restructured food webs, and recovery is likely to be much harder to achieve than their destruction was. This means that the sooner we act to protect marine life, the more certain will be our success.

To some people, creating marine reserves is an admission of failure. According to their logic, reserves should not be necessary if we have done our work properly in managing the uses we make of the sea. Many fisheries managers are still wedded to the idea that one day their models will work, and politicians will listen to their advice. Just give the approach time, and success will be theirs. How much time have we got? This approach has been tried and refined for the last 50 years. There have been few successes with which to feather the managers' caps, but a growing litany of failure. The Common Fisheries Policy, the European Union's instrument for the management of fisheries and aquaculture, exemplifies the worst pitfalls: flawed models, flawed advice, watered-down recommendations from government bureaucrats and then the disregard of much of this advice by politicians. When it all went wrong, as it inevitably had to, Europe sent its boats to other countries in order to obtain fish for far less than they were actually worth.

We are squandering the wealth of oceans. If we don't break out of this cycle of failure, humanity will lose a key source of protein, and much more besides. Disrupting natural ecosystem processes, such as water purification, nutrient cycling, and carbon storage, could have ramifications for human life itself. We can go a long way to avoiding this catastrophic mistake with simple common sense management. Marine reserves lie at the heart of the reform. But they will not be sufficient if they are implemented only here and there to shore up the crumbling edifice of the 'rational fisheries management' envisioned by scientists in the 1940s and 1950s. They have to be placed centre stage as a fundamental underpinning for everything we do in the oceans. Reserves are a first resort, not a final resort when all else fails.

PART 3 — QUESTIONS

Questions 27-31

Do the following statements agree with the views of the writer in Reading Passage 3?

Write

YES if the statement agrees with the claims of the writer

NO if the statement contradicts the claims of the writer

NOT GIVEN if it is impossible to say what the writer thinks about this

27 It is more than a thousand years since people started to catch fish for commercial use.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

28 In general, open access to the oceans is still regarded as desirable.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

29 Sea fishing is now completely banned in the majority of protected areas.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

30 People should be encouraged to reduce the amount of fish they eat.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

31 The re-introduction of certain mammals to the Mediterranean is a straightforward task.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

Questions 32-34

Choose the correct letter, A, B, C or D.

32 What does the writer mean with the question, 'How much time have we got?' in the fifth paragraph?

- **A** ○ Fisheries policies are currently based on uncertain estimates.
- **B** ○ Accurate predictions will allow governments to plan properly.
- **C** ○ Fisheries managers should provide clearer information.
- **D** ○ Action to protect fish stocks is urgently needed.

33 What is the writer's comment on the Common Fisheries Policy?

- **A** ○ Measures that it advocated were hastily implemented.
- **B** ○ Officials exaggerated some of its recommendations.
- **C** ○ It was based on predictions which were inaccurate.
- **D** ○ The policy makers acquired a good reputation.

34 What is the writer's conclusion concerning the decline of marine resources?

- **A** ○ The means of avoiding the worst outcomes needs to be prioritised.
- **B** ○ Measures already taken to avoid a crisis are probably sufficient.
- **C** ○ The situation is now so severe that there is no likely solution.
- **D** ○ It is no longer clear which measures would be most effective.

Questions 35-40

Complete the summary using the list of words/phrases, A–J, below.

Measures to protect the oceans

Up till the twentieth century the world's supply of fish was sufficient for its needs. It was unnecessary to introduce **35** _____ of any kind, because large areas of the oceans were inaccessible. However, as **36** _____ improved, this situation changed, and in the middle of the twentieth century, policies were introduced to regulate **37** _____ .

These policies have not succeeded. Today, by comparison with **38** _____ , the oceans have very little legal protection.

Despite the doubts that many officials have about the concept of **39** _____ , these should be at the heart of any action taken. The consequences of further **40** _____ are very serious, and may even affect our continuing existence.

A. **action** B. **controls** C. **failure** D. **fish catches** E. **fish processing**
F. **fishing techniques** G. **large boats** H. **marine reserves** I. **the land**
J. **the past**

Answer Key

#	Answer	Explanation
1	**hot tar**	McAdam's surface layer – hot tar onto which a layer of stone chips was laid – became known as 'tarmacadam', or tarmac
2	**5 centimetres/five centimetres**	Immediately above this, the Scottish engineer John McAdam (1756–1836) typically laid crushed stone, to which stone dust mixed with water was added, and which was compacted to a thickness of just five centimetres, and then rolled
3	**water**	Immediately above this, the Scottish engineer John McAdam (1756–1836) typically laid crushed stone, to which stone dust mixed with water was added, and which was compacted to a thickness of just five centimetres, and then rolled
4	**FALSE**	New roads were generally of inferior quality, and the achievements of Roman builders were largely unsurpassed until the resurgence of road-building in the eighteenth century
5	**NOT GIVEN**	By the early nineteenth century – the start of the railway age – men such as John McAdam and Thomas Telford had created a British road network totalling some 200,000 km, of which about one sixth was privately owned toll roads called turnpikes
6	**TRUE**	In the twentieth century, the ever-increasing use of motor vehicles threatened to break up roads built to nineteenth-century standards, so new techniques had to be developed
7	**NOT GIVEN**	The demands of heavy traffic led to the concept of high-speed, long-distance roads, with access – or slip-lanes – spaced widely apart
8	**Romans**	The development by the Romans of the arched bridge marked the beginning of scientific bridge-building
9	**stone**	Most were built of stone, but brick and timber were also used
10	**light**	Such bridges are nevertheless light, and therefore the most suitable for very long spans
11	**longest**	The 1998 Akashi Kaikyo Bridge in Japan has a span of 1,991 metres, which is the longest to date
12	**steel**	Cantilever bridges, such as the 1889 Forth Rail Bridge in Scotland, exploit the potential of steel construction to produce a wide clearwater space

#	Answer	Explanation
13	**stable**	Although the suspension bridge can span a wider gap, the cantilever is relatively stable, and this was important for nineteenth-century railway builders
14	**C**	Homo neanderthalensis, to give its proper name, lived in Europe and parts of Asia from 400,000 years ago to 30,000 years ago. Towards the end of this period it shared its range with interlopers in the form of Homo sapiens**, who were spreading out from Africa
15	**B**	Homo sapiens**, who were spreading out from Africa
16	**A**	For reasons which are as yet unknown, the arrival of Homo sapiens in a region was always quickly followed by the disappearance of Neanderthals
17	**C**	Previous genetic analysis, which had only examined DNA passed from mother to child in cellular structures called mitochondria, had suggested no interbreeding between Neanderthals and modern humans. The new, more extensive examination, which looks at DNA in the cell nucleus rather than in the mitochondria, shows this conclusion is wrong
18	**A**	It is strange, though, that no Neanderthal mitochondrial DNA has turned up in modern humans, since the usual pattern of invasion in historical times was for the invaders' males to mate with the invaded's females
19	**D**	Previous genetic analysis, which had only examined DNA passed from mother to child in cellular structures called mitochondria, had suggested no interbreeding between Neanderthals and modern humans. The new, more extensive examination, which looks at DNA in the cell nucleus rather than in the mitochondria, shows this conclusion is wrong
20	**B**	For reasons which are as yet unknown, the arrival of Homo sapiens in a region was always quickly followed by the disappearance of Neanderthals
21	**G**	By contrast an earlier phase of the study had already shown that Neanderthals and moderns share the same version of a gene called FOXP2, which is involved in the ability to speak, and which differs in chimpanzees
22	**A**	In 2009, at a meeting of the American Association for the Advancement of Science, they made public an analysis of the genome* of Neanderthal man
23	**E**	It is strange, though, that no Neanderthal mitochondrial DNA has turned up in modern humans, since the usual pattern of

#	Answer	Explanation
		invasion in historical times was for the invaders' males to mate with the invaded's females
24	**inter-breeding/crossbreeding**	Previous genetic analysis, which had only examined DNA passed from mother to child in cellular structures called mitochondria, had suggested no interbreeding between Neanderthals and modern humans. The new, more extensive examination, which looks at DNA in the cell nucleus rather than in the mitochondria, shows this conclusion is wrong
25	**shape/growth**	The newly evolved regions of DNA also include a gene called RUNX2, which controls bone growth. That may account for differences in the shape of the skull and the rib cage between the two species
26	**little-finger bone**	Another of his teams has revealed the existence of a hitherto unsuspected species of human, using mitochondrial DNA found in a little-finger bone
27	**YES**	The face of the ocean has changed completely since the first commercial fishers cast their nets and hooks over a thousand years ago
28	**YES**	We still view it as a place where people and nations should be free to come and go at will, as well as somewhere that should be free for us to exploit
29	**NO**	Worse still, most marine protected areas allow some fishing to continue
30	**NOT GIVEN**	If we don't break out of this cycle of failure, humanity will lose a key source of protein, and much more besides
31	**NO**	The Mediterranean sailed by Ulysses, the legendary king of ancient Greece, supported abundant monk seals, loggerhead turtles and porpoises. Their disappearance through hunting and overfishing has totally restructured food webs, and recovery is likely to be much harder to achieve than their destruction was
32	**D**	This approach has been tried and refined for the last 50 years. There have been few successes with which to feather the managers' caps, but a growing litany of failure
33	**C**	The Common Fisheries Policy, the European Union's instrument for the management of fisheries and aquaculture, exemplifies the worst pitfalls: flawed models, flawed advice, watered-down recommendations from government bureaucrats and then the disregard of much of this advice by politicians

#	Answer	Explanation
34	**A**	They have to be placed centre stage as a fundamental underpinning for everything we do in the oceans. Reserves are a first resort, not a final resort when all else fails
35	**B**	Fisheries intensified over the centuries, but even by the nineteenth century it was still felt, justifiably, that the plentiful resources of the sea were for the most part beyond the reach of fishing, and so there was little need to restrict fishing or create protected areas
36	**F**	The twentieth century heralded an escalation in fishing intensity that is unprecedented in the history of the oceans, and modern fishing technologies leave fish no place to hide
37	**D**	the 'rational fisheries management' envisioned by scientists in the 1940s and 1950s
38	**I**	Unhappily, the sea trails far behind the land in terms of the area and the quality of protection given
39	**H**	To some people, creating marine reserves is an admission of failure. According to their logic, reserves should not be necessary if we have done our work properly in managing the uses we make of the sea Marine reserves lie at the heart of the reform
40	**C**	If we don't break out of this cycle of failure, humanity will lose a key source of protein, and much more besides. Disrupting natural ecosystem processes, such as water purification, nutrient cycling, and carbon storage, could have ramifications for human life itself

Test 99

PASSAGE 1

You should spend about 20 minutes on Questions 1–13, which are based on Reading Passage 1 below.

The Dover Bronze-Age Boat

A beautifully preserved boat, made around 3,000 years ago and discovered by chance in a muddy hole, has had a profound impact on archaeological research.

It was 1992. In England, workmen were building a new road through the heart of Dover, to connect the ancient port and the Channel Tunnel, which, when it opened just two years later, was to be the first land link between Britain and Europe for over 10,000 years. A small team from the Canterbury Archaeological Trust (CAT) worked alongside the workmen, recording new discoveries brought to light by the machines.

At the base of a deep shaft six metres below the modern streets a wooden structure was revealed. Cleaning away the waterlogged site overlying the timbers, archaeologists realised its true nature. They had found a prehistoric boat, preserved by the type of sediment in which it was buried. It was then named the Dover Bronze-Age Boat.

About nine metres of the boat's length was recovered; one end lay beyond the excavation and had to be left. What survived consisted essentially of four intricately carved oak planks: two on the bottom, joined along a central seam by a complicated system of wedges and timbers, and two at the side, curved and stitched to the others. The seams had been made watertight by pads of moss, fixed by wedges and yew stitches.

The timbers that closed the recovered end of the boat had been removed in antiquity when it was abandoned, but much about its original shape could be deduced. There was also evidence for missing upper side planks. The boat was not a wreck, but had been deliberately discarded, dismantled and broken. Perhaps it had been 'ritually killed' at the end of its life, like other Bronze-Age objects.

With hindsight, it was significant that the boat was found and studied by mainstream archaeologists who naturally focused on its cultural context. At the time, ancient boats were often considered only from a narrower technological perspective, but news about the Dover boat reached a broad audience. In 2002, on the tenth anniversary of the discovery, the Dover Bronze-Age Boat Trust hosted a conference, where this meeting of different traditions became apparent. Alongside technical papers about the boat, other speakers explored its social and economic contexts, and the religious perceptions of boats in Bronze-Age societies. Many speakers came from overseas, and debate about cultural connections was renewed.

Within seven years of excavation, the Dover boat had been conserved and displayed, but it was apparent that there were issues that could not be resolved simply by studying the old wood.

Experimental archaeology seemed to be the solution: a boat reconstruction, half-scale or full-sized, would permit assessment of the different hypotheses regarding its build and the missing end. The possibility of returning to Dover to search for the boat's unexcavated northern end was explored, but practical and financial difficulties were insurmountable – and there was no guarantee that the timbers had survived the previous decade in the changed environment.

Detailed proposals to reconstruct the boat were drawn up in 2004. Archaeological evidence was beginning to suggest a Bronze-Age community straddling the Channel, brought together by the sea, rather than separated by it. In a region today divided by languages and borders, archaeologists had a duty to inform the general public about their common cultural heritage.

The boat project began in England but it was conceived from the start as a European collaboration. Reconstruction was only part of a scheme that would include a major exhibition and an extensive educational and outreach programme. Discussions began early in 2005 with archaeological bodies, universities and heritage organisations either side of the Channel. There was much enthusiasm and support, and an official launch of the project was held at an international seminar in France in 2007. Financial support was confirmed in 2008 and the project then named BOAT 1550BC got under way in June 2011.

A small team began to make the boat at the start of 2012 on the Roman Lawn outside Dover museum. A full-scale reconstruction of a mid-section had been made in 1996, primarily to see how Bronze-Age replica tools performed. In 2012, however, the hull shape was at the centre of the work, so modern power tools were used to carve the oak planks, before turning to prehistoric tools for finishing. It was decided to make the replica half-scale for reasons of cost and time, and synthetic materials were used for the stitching, owing to doubts about the scaling and tight timetable.

Meanwhile, the exhibition was being prepared ready for opening in July 2012 at the Castle Museum in Boulogne-sur-Mer. Entitled ‘Beyond the Horizon: Societies of the Channel & North Sea 3,500 years ago', it brought together for the first time a remarkable collection of Bronze-Age objects, including many new discoveries for commercial archaeology and some of the great treasure of the past. The reconstructed boat, as a symbol of the maritime connections that bound together the communities either side of the Channel, was the centrepiece.

PART 1 — QUESTIONS

Questions 1-5

Complete the flow-chart below.

Choose ONE WORD ONLY from the text for each answer.

Key events

1992 - the boat was discovered during the construction of a **1** _____

↓

2002 – an international **2** _____ was held to gather information

↓

2004 – **3** _____ for the reconstruction were produced

↓

2007 – the **4** _____ of BOAT 1550BC took place

↓

2012 – the Bronze-Age **5** _____ featured the boat and other objects

Questions 6-9

Do the following statements agree with the information given in the text?

write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

6 Archaeologists realised that the boat had been damaged on purpose.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

7 Initially, only the technological aspects of the boat were examined.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

8 Archaeologists went back to the site to try and find the missing northern end of the boat.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

9 Evidence found in 2004 suggested that the Bronze-Age Boat had been used for trade.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

Questions 10-13

Answer the questions below.

Choose NO MORE THAN THREE WORDS AND/OR A NUMBER from the text for each answer.

10 How far under the ground was the boat found? _____

11 What natural material had been secured to the boat to prevent water entering?

_____

12 What aspect of the boat was the focus of the 2012 reconstruction? _____

13 Which two factors influenced the decision not to make a full-scale reconstruction of the boat? _____

PASSAGE 2

You should spend about 20 minutes on Questions 14–26, which are based on Reading Passage 2 below.

The changing role of airports

Airports continue to diversify their role in an effort to generate income. Are business meeting facilities the next step? Nigel Halpern, Anne Graham and Rob Davidson investigate.

A In recent times developing commercial revenues has become more challenging for airports due to a combination of factors, such as increased competition from Internet shopping, restrictions on certain sales, such as tobacco, and new security procedures that have had an impact on the dwell time of passengers. Moreover, the global economic downturn has caused a reduction in passenger numbers while those that are travelling generally have less money to spend. This has meant that the share of revenue from non-aeronautical revenues actually peaked at 54% at the turn of the century and has subsequently declined slightly. Meanwhile, the pressures to control the level of aeronautical revenues are as strong as ever due to the poor financial health of many airlines and the rapid rise of the low-cost carrier sector.

B Some of the more obvious solutions to growing commercial revenues, such as extending the merchandising space or expanding the variety of shopping opportunities, have already been tried to their limit at many airports. A more radical solution is to find new sources of commercial revenue within the terminal, and this has been explored by many airports over the last decade or so. As a result, many terminals are now much more than just shopping malls and offer an array of entertainment, leisure, and beauty and wellness facilities. At this stage of facilities provision, the airport also has the possibility of taking on the role of the final destination rather than merely a facilitator of access.

C At the same time, airports have been developing and expanding the range of services that they provide specifically for the business traveller in the terminal. This includes offering business centres that supply support services, meeting or conference rooms and other space for special events. Within this context, Jarach (2001) discusses how dedicated meetings facilities located within the terminal and managed directly by the airport operator may be regarded as an expansion of the concept of airline lounges or as a way to reconvert abandoned or underused areas of terminal buildings. Previously it was primarily airport hotels and other facilities offered in the surrounding area of the airport that had the potential to take on this role and become active as a business space (McNeill, 2009).

D When an airport location can be promoted as a business venue, this may increase the overall appeal of the airport and help it become more competitive in both attracting and retaining airlines and their passengers. In particular, the presence of meeting facilities could become one of the determining factors taken into consideration when business people are choosing airlines and where they change their planes. This enhanced attractiveness itself may help to improve the airport operator's financial position and future prospects, but clearly this will be dependent

on the competitive advantage that the airport is able to achieve in comparison with other venues.

E In 2011, an online airport survey was conducted and some of the areas investigated included the provision and use of meeting facilities at airports and the perceived role and importance of these facilities in generating income and raising passenger numbers. In total, there were responses from staff at 154 airports and 68% of these answered 'yes' to the question: Does your airport own and have meetings facilities available for hire? The existence of meeting facilities therefore seems high at airports. In addition, 28% of respondents that did not have meeting facilities stated that they were likely to invest in them during the next five years. The survey also asked to what extent respondents agreed or disagreed with a number of statements about the meeting facilities at their airport. 49% of respondents agreed that they have put more investment into them during recent years; 41% agreed that they would invest more in the immediate future. These are fairly high proportions considering the recent economic climate.

F The survey also asked airports with meeting facilities to estimate what proportion of users are from the local area, i.e. within a 90-minute drive from the airport, or from abroad. Their findings show that meeting facilities provided by the majority of respondents tend to serve local versus non-local or foreign needs. 63% of respondents estimated that over 60% of users are from the local area. Only 3% estimated that over 80% of users are from abroad. It is therefore not surprising that the facilities are of limited importance when it comes to increasing use of flights at the airport: 16% of respondents estimated that none of the users of their meeting facilities use flights when travelling to or from them, while 56% estimated that 20% or fewer of the users of their facilities use flights.

G The survey asked respondents with meeting facilities to estimate how much revenue their airport earned from its meeting facilities during the last financial year. Average revenue per airport was just $12,959. Meeting facilities are effectively a non-aeronautical source of airport revenue. Only 1% of respondents generated more than 20% non-aeronautical revenue from their meetings facilities; none generated more than 40%. Given the focus on local demand, it is not surprising that less than a third of respondents agreed that their meeting facilities support business and tourism development in their home region or country.

H The findings of this study suggest that few airports provide meetings facilities as a serious commercial venture. It may be that, as owners of large property, space is available for meeting facilities at airports and could play an important role in serving the needs of the airport, its partners, and stakeholders such as government and the local community. Thus, while the local orientation means that competition with other airports is likely to be minimal, competition with local providers of meetings facilities is likely to be much greater.

PART 2 — QUESTIONS

Questions 14-18

The text has eight paragraphs, A–H.

Which paragraph contains the following information?

Write the correct letter, A–H.

N.B. You may use any letter more than once.

	A	B	C	D	E	F	G	H
14 evidence that a significant number of airports provide meeting facilities	○	○	○	○	○	○	○	○
15 a statement regarding the fact that no further developments are possible in some areas of airport trade	○	○	○	○	○	○	○	○
16 reference to the low level of income that meeting facilities produce for airports	○	○	○	○	○	○	○	○
17 mention of the impact of budget airlines on airport income	○	○	○	○	○	○	○	○
18 examples of airport premises that might be used for business purposes	○	○	○	○	○	○	○	○

Questions 19-22

Complete the sentences below.

Choose NO MORE THAN TWO WORDS from the text for each answer.

- The length of time passengers spend shopping at airports has been affected by updated **19** _____.
- Airports with a wide range of recreational facilities can become a **20** _____ for people rather than a means to travel.
- Both passengers and **21** _____ may feel encouraged to use and develop a sense of loyalty towards airports that market their business services.

- Airports that supply meeting facilities may need to develop a **22** _____ over other venues.

Questions 23-26

Complete the summary below.

Choose NO MORE THAN TWO WORDS from the text for each answer.

Survey Findings

Despite financial constraints due to the **23** _____, a significant percentage of airports provide and wish to further support business meeting facilities. Also, just under 30% of the airports surveyed plan to provide these facilities within **24** _____.

However, the main users of the facilities are **25** _____ and as many as 16% of respondents to the survey stated that their users did not take any **26** _____ at the airport.

PASSAGE 3

You should spend about 20 minutes on Questions 27–40, which are based on Reading Passage 3 below.

IS PHOTOGRAPHY ART?

This may seem a pointless question today. Surrounded as we are by thousands of photographs, most of us take for granted that, in addition to supplying information and seducing customers, camera images also serve as decoration, afford spiritual enrichment, and provide significant insights into the passing scene. But in the decades following the discovery of photography, this question reflected the search for ways to fit the mechanical medium into the traditional schemes of artistic expression.

The much-publicized pronouncement by painter Paul Delaroche that the daguerreotype* signalled the end of painting is perplexing because this clever artist also forecast the usefulness of the medium for graphic artists in a letter written in 1839. Nevertheless, it is symptomatic of the swing between the outright rejection and qualified acceptance of the medium that was fairly typical of the artistic establishment. Discussion of the role of photography in art was especially spirited in France, where the internal policies of the time had created a large pool of artists, but it was also taken up by important voices in England. In both countries, public interest in this topic was a reflection of the belief that national stature and achievement in the arts were related.

From the maze of conflicting statements and heated articles on the subject, three main positions about the potential of camera art emerged. The simplest, entertained by many painters and a section of the public, was that photographs should not be considered 'art' because they were made with a mechanical device and by physical and chemical phenomena instead of by human hand and spirit; to some, camera images seemed to have more in common with fabric produced by machinery in a mill than with handmade creations fired by inspiration. The second widely held view, shared by painters, some photographers, and some critics, was that photographs would be useful to art but should not be considered equal in creativeness to drawing and painting. Lastly, by assuming that the process was comparable to other techniques such as etching and lithography, a fair number of individuals realized that camera images were or could be as significant as handmade works of art and that they might have a positive influence on the arts and on culture in general.

Artists reacted to photography in various ways. Many portrait painters – miniaturists in particular – who realized that photography represented the ‘handwriting on the wall' became involved with daguerreotyping or paper photography in an effort to save their careers; some incorporated it with painting, while others renounced painting altogether. Still other painters, the most prominent among them the French painter, Jean-Auguste-Dominique Ingres, began almost immediately to use photography to make a record of their own output and also to provide themselves with source material for poses and backgrounds, vigorously denying at the same time its influence on their vision or its claims as art.

The view that photographs might be worthwhile to artists was enunciated in considerable detail by Lacan and Francis Wey. The latter, an art and literary critic, who eventually recognised that camera images could be inspired as well as informative, suggested that they would lead to greater naturalness in the graphic depiction of anatomy, clothing, likeness, expression, and landscape. By studying photographs, true artists, he claimed, would be relieved of menial tasks and become free to devote themselves to the more important spiritual aspects of their work.

Wey left unstated what the incompetent artist might do as an alternative, but according to the influential French critic and poet Charles Baudelaire, writing in response to an exhibition of photography in 1859, lazy and untalented painters would become photographers. Fired by a belief in art as an imaginative embodiment of cultivated ideas and dreams, Baudelaire regarded photography as 'a very humble servant of art and science'; a medium largely unable to transcend 'external reality'. For this critic, photography was linked with 'the great industrial madness' of the time, which in his eyes exercised disastrous consequences on the spiritual qualities of life and art.

Eugene Delacroix was the most prominent of the French artists who welcomed photography as help-mate but recognized its limitations. Regretting that ‘such a wonderful invention' had arrived so late in his lifetime, he still took lessons in daguerreotyping, and both commissioned and collected photographs. Delacroix's enthusiasm for the medium can be sensed in a journal entry noting that if photographs were used as they should be, an artist might 'raise himself to heights that we do not yet know’.

The question of whether the photograph was document or art aroused interest in England also. The most important statement on this matter was an unsigned article that concluded that while photography had a role to play, it should not be ‘constrained' into 'competition' with art; a more stringent viewpoint led critic Philip Gilbert Hamerton to dismiss camera images as 'narrow in range, emphatic in assertion, telling one truth for ten falsehoods'.

These writers reflected the opposition of a section of the cultural elite in England and France to the ‘cheapening of art' which the growing acceptance and purchase of camera pictures by the middle class represented. Technology made photographic images a common sight in the shop windows of Regent Street and Piccadilly in London and the commercial boulevards of Paris. In London, for example, there were at the time some 130 commercial establishments where portraits, landscapes, and photographic reproductions of works of art could be bought. This appeal to the middle class convinced the elite that photographs would foster a desire for realism instead of idealism, even though some critics recognized that the work of individual photographers might display an uplifting style and substance that was consistent with the defining characteristics of art.

* the name given to the first commercially successful photographic images

PART 3 — QUESTIONS

Questions 27-30

Choose the correct letter, A, B, C or D.

27 What is the writer's main point in the first paragraph?

- **A** ○ Photography is used for many different purposes.
- **B** ○ Photographers and artists have the same principal aims.
- **C** ○ Photography has not always been a readily accepted art form.
- **D** ○ Photographers today are more creative than those of the past.

28 What public view about artists was shared by the French and the English?

- **A** ○ that only artists could reflect a culture's true values
- **B** ○ that only artists were qualified to judge photography
- **C** ○ that artists could lose work as a result of photography
- **D** ○ that artistic success raised a country's international profile

29 What does the writer mean in line 59 by 'the handwriting on the wall'?

- **A** ○ an example of poor talent
- **B** ○ a message that cannot be trusted
- **C** ○ an advertisement for something new
- **D** ○ a signal that something bad will happen

30 What was the result of the widespread availability of photographs to the middle classes?

- **A** ○ The most educated worried about its impact on public taste.
- **B** ○ It helped artists appreciate the merits of photography.
- **C** ○ Improvements were made in photographic methods.
- **D** ○ It led to a reduction in the price of photographs.

Questions 31-34

Complete the summary of Paragraph 3 using the list of words, A–G, below.

Camera art

In the early days of photography, opinions on its future were **31** _____, but three clear views emerged. A large number of artists and ordinary people saw photographs as **32** _____ to paintings because of the way they were produced. Another popular view was that photographs could have a role to play in the art world, despite the photographer being less **33** _____. Finally, a smaller number of people suspected that the impact of photography on art and society could be **34** _____.

A. **inventive** B. **similar** C. **beneficial** D. **next** E. **mixed** F. **justified** G. **inferior**

Questions 35-40

Look at the following statements and the list of people, A–E, below.

Match each statement with the correct person.

Write the correct letter, A–E.

A. Jean-Auguste-Dominique Ingres

B. Francis Wey

C. Charles Baudelaire

D. Eugene Delacroix

E. Philip Gilbert Hamerton

	A	B	C	D	E
35 He claimed that photography would make paintings more realistic.	○	○	○	○	○
36 He highlighted the limitations and deceptions of the camera.	○	○	○	○	○

	A	B	C	D	E
37 He documented his production of artwork by photographing his works.	○	○	○	○	○
38 He noted the potential for photography to enrich artistic talent.	○	○	○	○	○
39 He based some of the scenes in his paintings on photographs.	○	○	○	○	○
40 He felt photography was part of the trend towards greater mechanisation.	○	○	○	○	○

Answer Key

#	Answer	Explanation
1	**road**	In England, workmen were building a new road through the heart of Dover, to connect the ancient port and the Channel Tunnel, which, when it opened just two years later, was to be the first land link between Britain and Europe for over 10,000 years
2	**conference**	In 2002, on the tenth anniversary of the discovery, the Dover Bronze-Age Boat Trust hosted a conference, where this meeting of different traditions became apparent Many speakers came from overseas, and debate about cultural connections was renewed
3	**proposals**	Detailed proposals to reconstruct the boat were drawn up in 2004
4	**launch**	There was much enthusiasm and support, and an official launch of the project was held at an international seminar in France in 2007
5	**exhibition**	Meanwhile, the exhibition was being prepared ready for opening in July 2012 at the Castle Museum in Boulogne-sur-Mer. Entitled 'Beyond the Horizon: Societies of the Channel & North Sea 3,500 years ago', it brought together for the first time a remarkable collection of Bronze-Age objects, including many new discoveries for commercial archaeology and some of the great treasure of the past
6	**TRUE**	The boat was not a wreck, but had been deliberately discarded, dismantled and broken
7	**FALSE**	With hindsight, it was significant that the boat was found and studied by mainstream archaeologists who naturally focused on its cultural context
8	**FALSE**	The possibility of returning to Dover to search for the boat's unexcavated northern end was explored, but practical and financial difficulties were insurmountable – and there was no guarantee that the timbers had survived the previous decade in the changed environment
9	**NOT GIVEN**	Detailed proposals to reconstruct the boat were drawn up in 2004. Archaeological evidence was beginning to suggest a Bronze-Age community straddling the Channel, brought together by the sea, rather than separated by it
10	**six metres/six meters/6 metres/6**	At the base of a deep shaft six metres below the modern streets a wooden structure was revealed

#	Answer	Explanation
	meters	
11	**(pads of) moss**	The seams had been made watertight by pads of moss, fixed by wedges and yew stitches
12	**(the) hull (shape)**	In 2012, however, the hull shape was at the centre of the work, so modern power tools were used to carve the oak planks, before turning to prehistoric tools for finishing
13	**cost and time/cost time/time cost**	It was decided to make the replica half-scale for reasons of cost and time, and synthetic materials were used for the stitching, owing to doubts about the scaling and tight timetable
14	**E**	In total, there were responses from staff at 154 airports and 68% of these answered 'yes' to the question: Does your airport own and have meetings facilities available for hire
15	**B**	Some of the more obvious solutions to growing commercial revenues, such as extending the merchandising space or expanding the variety of shopping opportunities, have already been tried to their limit at many airports
16	**G**	Average revenue per airport was just $12,959. Meeting facilities are effectively a non-aeronautical source of airport revenue. Only 1% of respondents generated more than 20% non-aeronautical revenue from their meetings facilities; none generated more than 40%
17	**A**	Meanwhile, the pressures to control the level of aeronautical revenues are as strong as ever due to the poor financial health of many airlines and the rapid rise of the low-cost carrier sector
18	**C**	This includes offering business centres that supply support services, meeting or conference rooms and other space for special events. Within this context, Jarach (2001) discusses how dedicated meetings facilities located within the terminal and managed directly by the airport operator may be regarded as an expansion of the concept of airline lounges or as a way to reconvert abandoned or underused areas of terminal buildings
19	**security procedures**	new security procedures that have had an impact on the dwell time of passengers
20	**final destination**	At this stage of facilities provision, the airport also has the possibility of taking on the role of the final destination rather than merely a facilitator of access
21	**airlines**	When an airport location can be promoted as a business venue, this may increase the overall appeal of the airport and help it become more competitive in both attracting and retaining airlines and their passengers

#	Answer	Explanation
22	**competitive advantage**	This enhanced attractiveness itself may help to improve the airport operator's financial position and future prospects, but clearly this will be dependent on the competitive advantage that the airport is able to achieve in comparison with other venues
23	**economic downturn/economic climate**	These are fairly high proportions considering the recent economic climate
24	**five years**	In addition, 28% of respondents that did not have meeting facilities stated that they were likely to invest in them during the next five years
25	**local (people)**	63% of respondents estimated that over 60% of users are from the local area
26	**flights**	16% of respondents estimated that none of the users of their meeting facilities use flights when travelling to or from them
27	**C**	But in the decades following the discovery of photography, this question reflected the search for ways to fit the mechanical medium into the traditional schemes of artistic expression
28	**D**	In both countries, public interest in this topic was a reflection of the belief that national stature and achievement in the arts were related
29	**D**	Many portrait painters – miniaturists in particular – who realized that photography represented the 'handwriting on the wall' became involved with daguerreotyping or paper photography in an effort to save their careers; some incorporated it with painting, while others renounced painting altogether
30	**A**	These writers reflected the opposition of a section of the cultural elite in England and France to the 'cheapening of art' which the growing acceptance and purchase of camera pictures by the middle class represented This appeal to the middle class convinced the elite that photographs would foster a desire for realism instead of idealism, even though some critics recognized that the work of individual photographers might display an uplifting style and substance that was consistent with the defining characteristics of art
31	**E**	From the maze of conflicting statements and heated articles on the subject, three main positions about the potential of camera art emerged
32	**G**	The simplest, entertained by many painters and a section of the public, was that photographs should not be considered 'art' because they were made with a mechanical device and by physical and chemical phenomena instead of by human hand and

#	Answer	Explanation
		spirit; to some, camera images seemed to have more in common with fabric produced by machinery in a mill than with handmade creations fired by inspiration
33	**A**	The second widely held view, shared by painters, some photographers, and some critics, was that photographs would be useful to art but should not be considered equal in creativeness to drawing and painting
34	**C**	they might have a positive influence on the arts and on culture in general
35	**B**	The latter, an art and literary critic, who eventually recognised that camera images could be inspired as well as informative, suggested that they would lead to greater naturalness in the graphic depiction of anatomy, clothing, likeness, expression, and landscape
36	**E**	a more stringent viewpoint led critic Philip Gilbert Hamerton to dismiss camera images as ‘narrow in range, emphatic in assertion, telling one truth for ten falsehoods’
37	**A**	Still other painters, the most prominent among them the French painter, Jean-Auguste-Dominique Ingres, began almost immediately to use photography to make a record of their own output and also to provide themselves with source material for poses and backgrounds, vigorously denying at the same time its influence on their vision or its claims as art
38	**D**	Delacroix’s enthusiasm for the medium can be sensed in a journal entry noting that if photographs were used as they should be, an artist might ‘raise himself to heights that we do not yet know’
39	**A**	Still other painters, the most prominent among them the French painter, Jean-Auguste-Dominique Ingres, began almost immediately to use photography to make a record of their own output and also to provide themselves with source material for poses and backgrounds, vigorously denying at the same time its influence on their vision or its claims as art
40	**C**	For this critic, photography was linked with ‘the great industrial madness’ of the time, which in his eyes exercised disastrous consequences on the spiritual qualities of life and art

Test 100

PASSAGE 1

You should spend about 20 minutes on Questions 1–13, which are based on Reading Passage 1 below.

The Flavor of Pleasure

When it comes to celebrating the flavor of food, our mouth gets all the credit. But in truth, it is the nose that knows.

No matter how much we talk about tasting our favorite flavors, relishing them really depends on a combined input from our senses that we experience through mouth, tongue and nose. The taste, texture, and feel of food are what we tend to focus on, but most important are the slight puffs of air as we chew our food what scientists call 'retronasal smell'.

Certainly, our mouths and tongues have taste buds, which are receptors for the five basic flavors: sweet, salty, sour, bitter, and umami, or what is more commonly referred to as savory. But our tongues are inaccurate instruments as far as flavor is concerned. They evolved to recognise only a few basic tastes in order to quickly identify toxins, which in nature are often quite bitter or acidly sour.

All the complexity, nuance, and pleasure of flavor come from the sense of smell operating in the back of the nose. It is there that a kind of alchemy occurs when we breathe up and out the passing whiffs of our chewed food. Unlike a hound's skull with its extra long nose, which evolved specifically to detect external smells, our noses have evolved to detect internal scents. Primates specialise in savoring the many millions of flavor combinations that they can create for their mouths.

Taste without retronasal smell is not much help in recognising flavor. Smell has been the most poorly understood of our senses, and only recently has neuroscience, led by Yale University's Gordon Shepherd, begun to shed light on its workings. Shepherd has come up with the term 'neurogastronomy' to link the disciplines of food science, neurology, psychology, and anthropology with the savory elements of eating, one of the most enjoyed of human experiences.

In many ways, he is discovering that smell is rather like face recognition. The visual system detects patterns of light and dark and, building on experience, the brain creates a spatial map. It uses this to interpret the interrelationship of the patterns and draw conclusions that allow us to identify people and places. In the same way, we use patterns and ratios to detect both new and familiar flavors. As we eat, specialised receptors in the back of the nose detect the air molecules in our meals. From signals sent by the receptors, the brain understands smells as complex spatial patterns. Using these, as well as input from the other senses, it constructs the idea of specific flavors.

This ability to appreciate specific aromas turns out to be central to the pleasure we get from food, much as our ability to recognise individuals is central to the pleasures of social life. The process is so embedded in our brains that our sense of smell is critical to our enjoyment of life at large. Recent studies show that people who lose the ability to smell become socially insecure, and their overall level of happiness plummets.

Working out the role of smell in flavor interests food scientists, psychologists, and cooks alike. The relatively new discipline of molecular gastronomy, especially, relies on understanding the mechanics of aroma to manipulate flavor for maximum impact. In this discipline, chefs use their knowledge of the chemical changes that take place during cooking to produce eating pleasures that go beyond the 'ordinary.

However, whereas molecular gastronomy is concerned primarily with the food or 'smell' molecules, neurogastronomy is more focused on the receptor molecules and the brain's spatial images for smell. Smell stimuli form what Shepherd terms 'odor objects', stored as memories, and these have a direct link with our emotions. The brain creates images of unfamiliar smells by relating them to other more familiar smells. Go back in history and this was part of our survival repertoire; like most animals, we drew on our sense of smell, when visual information was scarce, to single out prey.

Thus the brain's flavor-recognition system is a highly complex perceptual mechanism that puts all five senses to work in various combinations. Visual and sound cues contribute, such as crunching, as does touch, including the texture and feel of food on our lips and in our mouths. Then there are the taste receptors, and finally, the smell, activated when we inhale. The engagement of our emotions can be readily illustrated when we picture some of the wide-ranging facial expressions that are elicited by various foods - many of them hard-wired into our brains at birth. Consider the response to the sharpness of a lemon and compare that with the face that is welcoming the smooth wonder of chocolate.

The flavor-sensing system, ever receptive to new combinations, helps to keep our brains active and flexible. It also has the power to shape our desires and ultimately our bodies. On the horizon we have the positive application of neurogastronomy: manipulating flavor to curb our appetites.

PART 1 — QUESTIONS

Questions 1-5

Complete the sentences below.

Choose NO MORE THAN TWO WORDS from the text for each answer.

- According to scientists, the term **1** _____ characterises the most critical factor in appreciating flavour.
- 'Savoury' is a better-known word for **2** _____.
- The tongue was originally developed to recognise the unpleasant taste of **3** _____.
- Human nasal cavities recognise **4** _____ much better than external ones.
- Gordon Shepherd uses the word 'neurogastronomy' to draw together a number of **5** _____ related to the enjoyment of eating.

Questions 6-9

Complete the notes below.

Choose NO MORE THAN TWO WORDS from the text for each answer.

Face recognition	patterns of dark and light are used to put together a **6** _____	→	the brain identifies faces	facial recognition is key to our enjoyment of **7** _____
Smell	receptors recognise the **8** _____ in food	→	the brain identifies certain **9** _____	smell is key to our enjoyment of food

Questions 10-13

Answer the questions below.

Choose NO MORE THAN ONE WORD from the text for each answer.

10 In what form does the brain store 'odor objects'? _____

11 When seeing was difficult, what did we use our sense of smell to find? _____

12 Which food item illustrates how flavour and positive emotion are linked? _____

13 What could be controlled in the future through flavour manipulation? _____

PASSAGE 2

You should spend about 20 minutes on Questions 14–26, which are based on Reading Passage 2 on the following pages.

Dawn of the robots

They're already here – driving cars, vacuuming carpets and feeding hospital patients. They may not be walking, talking, human-like sentient beings, but they are clever... and a little creepy.

14

A At first sight it looked like a typical suburban road accident. A Land Rover approached a Chevy Tahoe estate car that had stopped at a kerb; the Land Rover pulled out and tried to pass the Tahoe just as it started off again. There was a crack of fenders and the sound of paintwork being scraped, the kind of minor mishap that occurs on roads thousands of times every day. Normally drivers get out, gesticulate, exchange insurance details and then drive off. But not on this occasion. No one got out of the cars for the simple reason that they had no humans inside them; the Tahoe and Land Rover were being controlled by computers competing in November's DARPA (the U.S. Defence Advanced Research Projects Agency) Urban Challenge.

15

B The idea that machines could perform to such standards is startling. Driving is a complex task that takes humans a long time to perfect. Yet here, each car had its on-board computer loaded with a digital map and route plans, and was instructed to negotiate busy roads; differentiate between pedestrians and stationary objects; determine whether other vehicles were parked or moving off; and handle various parking manoeuvres, which robots turn out to be unexpectedly adept at. Even more striking was the fact that the collision between the robot Land Rover, built by researchers at the Massachusetts Institute of Technology, and the Tahoe, fitted out by Cornell University Artificial Intelligence (AI) experts, was the only scrape in the entire competition. Yet only three years earlier, at DARPA's previous driverless car race, every robot competitor – directed to navigate across a stretch of open desert – either crashed or seized up before getting near the finishing line.

16

C It is a remarkable transition that has clear implications for the car of the future. More importantly, it demonstrates how robotics sciences and Artificial Intelligence have progressed in the past few years – a point stressed by Bill Gates, the Microsoft boss who is a convert to these causes. 'The robotics industry is developing in much the same way the computer business did 30 years ago,' he argues. As he points out, electronics companies make toys that mimic pets and children with increasing sophistication. 'I can envision a future in which robotic devices will become a nearly ubiquitous part of our day-to-day lives,' says Gates. 'We may be on the verge

of a new era, when the PC will get up off the desktop and allow us to see, hear, touch and manipulate objects in places where we are not physically present.'

17

D What is the potential for robots and computers in the near future? 'The fact is we still have a way to go before real robots catch up with their science fiction counterparts,' Gates says. So what are the stumbling blocks? One key difficulty is getting robots to know their place. This has nothing to do with class or etiquette, but concerns the simple issue of positioning. Humans orient themselves with other objects in a room very easily. Robots find the task almost impossible. 'Even something as simple as telling the difference between an open door and a window can be tricky for a robot,' says Gates. This has, until recently, reduced robots to fairly static and cumbersome roles.

18

E For a long time, researchers tried to get round the problem by attempting to re-create the visual processing that goes on in the human cortex. However, that challenge has proved to be singularly exacting and complex. So scientists have turned to simpler alternatives: 'We have become far more pragmatic in our work,' says Nello Cristianini, Professor of Artificial Intelligence at the University of Bristol in England and associate editor of the Journal of Artificial Intelligence Research. 'We are no longer trying to re-create human functions. Instead, we are looking for simpler solutions with basic electronic sensors, for example.' This approach is exemplified by vacuuming robots such as the Electrolux Trilobite. The Trilobite scuttles around homes emitting ultrasound signals to create maps of rooms, which are remembered for future cleaning. Technology like this is now changing the face of robotics, says philosopher Ron Chrisley, director of the Centre for Research in Cognitive Science at the University of Sussex in England.

19

F Last year, a new Hong Kong restaurant, Robot Kitchen, opened with a couple of sensor-laden humanoid machines directing customers to their seats. Each possesses a touch-screen on which orders can be keyed in. The robot then returns with the correct dishes. In Japan, University of Tokyo researchers recently unveiled a kitchen 'android' that could wash dishes, pour tea and make a few limited meals. The ultimate aim is to provide robot home helpers for the sick and the elderly, a key concern in a country like Japan where 22 per cent of the population is 65 or older. Over US$1 billion a year is spent on research into robots that will be able to care for the elderly. 'Robots first learn basic competence – how to move around a house without bumping into things. Then we can think about teaching them how to interact with humans,' Chrisley said. Machines such as these take researchers into the field of socialised robotics: how to make robots act in a way that does not scare or offend individuals. 'We need to study how robots should approach people, how they should appear. That is going to be a key area for future research,' adds Chrisley.

PART 2 — QUESTIONS

Questions 14-19

The text on the following pages has six paragraphs, A–F.

Choose the correct heading for each paragraph from the list of headings (i-ix) below.

Write the correct number, i–ix.

i. **Tackling the issue using a different approach**

ii. **A significant improvement on last time**

iii. **How robots can save human lives**

iv. **Examples of robots at work**

v. **Not what it seemed to be**

vi. **Why timescales are impossible to predict**

vii. **The reason why robots rarely move**

viii. **Following the pattern of an earlier development**

ix. **The ethical issues of robotics**

Questions 20-23

Look at the following statements (Questions 20–23) and the list of people below.

Match each statement with the correct person, A, B or C.

NB You may use any letter more than once.

A. Bill Gates

B. Nello Cristianini

C. Ron Chrisley

	A	B	C
20 An important concern for scientists is to ensure that robots do not seem frightening.	○	○	○
21 We have stopped trying to enable robots to perceive objects as humans do.	○	○	○

	A	B	C
22 It will take considerable time for modern robots to match the ones we have created in films and books.	○	○	○
23 We need to enable robots to move freely before we think about trying to communicate with them.	○	○	○

Questions 24-26

Complete the notes below.

Choose NO MORE THAN THREE WORDS from the text for each answer.

Robot features

DARPA race cars:	**24** _____ provides maps and plans for route
Electrolux Trilobite:	builds an image of a room by sending out **25** _____
Robot Kitchen humanoids:	have a **26** _____ to take orders

PASSAGE 3

You should spend about 20 minutes on Questions 27–40, which are based on Reading Passage 3 below.

It's your choice! – Or is it really?

As we move from the industrial age to the information age, societal demands on our mental capabilities are no less taxing ...

We are constantly required to process a wide range of information to make decisions. Sometimes, these decisions are trivial, such as what marmalade to buy. At other times, the stakes are higher, such as deciding which symptoms to report to the doctor. However, the fact that we are accustomed to processing large amounts of information does not mean that we are better at it (Chabris & Simons, 2009). Our sensory and cognitive systems have systematic ways of failing of which we are often, perhaps blissfully, unaware.

Imagine that you are taking a walk in your local city park when a tourist approaches you asking for directions. During the conversation, two men carrying a door pass between the two of you. If the person asking for directions had changed places with one of the people carrying the door, would you notice? Research suggests that you might not. Harvard psychologists Simons and Levi (1998) conducted a field study using this exact set-up and found that the change in identity went unnoticed by 7 (46.6%) of the 15 participants. This phenomenon has been termed 'change blindness' and refers to the difficulty that observers have in noticing changes to visual scenes (e.g. the person swap), when the changes are accompanied by some other visual disturbance (e.g. the passing of the door).

Over the past decade, the change blindness phenomenon has been replicated many times. Especially noteworthy is an experiment by Davies and Hine (2007) who studied whether change blindness affects eyewitness identification. Specifically, participants were presented with a video enactment of a burglary. In the video, a man entered a house, walking through the different rooms and putting valuables into a knapsack. However, the identity of the burglar changed after the first half of the film while the initial burglar was out of sight. Out of the 80 participants, 49 (61%) did not notice the change of the burglar's identity, suggesting that change blindness may have serious implications for criminal proceedings.

To most of us, it seems bizarre that people could miss such obvious changes while they are paying active attention. However, to catch those changes, attention must be targeted to the changing feature. In the study described above, participants were likely not to have been expecting the change to happen, and so their attention may have been focused on the valuables the burglar was stealing, rather than the burglar.

Drawing from change blindness research, scientists have come to the conclusion that we perceive the world in much less detail than previously thought (Johansson, Hall, & Sikström, 2008). Rather than monitoring all of the visual details that surround us, we seem to focus our attention only on those features that are currently meaningful or important, ignoring those that

are irrelevant to our current needs and goals. Thus at any given time, our representation of the world surrounding us is crude and incomplete, making it possible for changes or manipulations to go undetected (Chabris & Simons, 2010).

Given the difficulty people have in noticing changes to visual stimuli, one may wonder what would happen if these changes concerned the decisions people make. To examine choice blindness, Hall and colleagues (2010) invited supermarket customers to sample two different kinds of jams and teas. After participants had tasted or smelled both samples, they indicated which one they preferred. Subsequently, they were purportedly given another sample of their preferred choice. On half of the trials, however, these were samples of the non-chosen jam or tea. As expected, only about one-third of the participants detected this manipulation. Based on these findings, Hall and colleagues proposed that choice blindness is a phenomenon that occurs not only for choices involving visual material, but also for choices involving gustatory and olfactory information.

Recently, the phenomenon has also been replicated for choices involving auditory stimuli (Sauerland, Sagana, & Otgaar, 2012). Specifically, participants had to listen to three pairs of voices and decide for each pair which voice they found more sympathetic or more criminal. The voice was then presented again; however, the outcome was manipulated for the second voice pair and participants were presented with the non-chosen voice. Replicating the findings by Hall and colleagues, only 29% of the participants detected this change.

Merckelbach, Jelicic, and Pieters (2011) investigated choice blindness for intensity ratings of one's own psychological symptoms. Their participants had to rate the frequency with which they experienced 90 common symptoms (e.g. anxiety, lack of concentration, stress, headaches etc.) on a 5-point scale. Prior to a follow-up interview, the researchers inflated ratings for two symptoms by two points. For example, when participants had rated their feelings of shyness, as 2 (i.e. occasionally), it was changed to 4 (i.e. all the time). This time, more than half (57%) of the 28 participants were blind to the symptom rating escalation and accepted it as their own symptom intensity rating. This demonstrates that blindness is not limited to recent preference selections, but can also occur for intensity and frequency.

Together, these studies suggest that choice blindness can occur in a wide variety of situations and can have serious implications for medical and judicial outcomes. Future research is needed to determine how, in those situations, choice blindness can be avoided.

PART 3 — QUESTIONS

Questions 27-31

Do the following statements agree with the claims of the writer in the text?

Write

YES if the statement agrees with the claims of the writer

NO if the statement contradicts the claims of the writer

NOT GIVEN if it is impossible to say what the writer thinks about this

27 Doctors make decisions according to the symptoms that a patient describes.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

28 Our ability to deal with a lot of input material has improved over time.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

29 We tend to know when we have made an error of judgement.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

30 A legal trial could be significantly affected by change blindness.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

31 Scientists have concluded that we try to take in as much detail as possible from our surroundings.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

Questions 32-36

Complete the table below.

Choose NO MORE THAN TWO WORDS from the text for each answer.

Experiments in change blindness				
Researchers	**Purpose of experiment**	**Situation for participants**	**Focus of participants' attention**	**Percentage unaware of identity change**
Simons & Levi, 1998	to illustrate change blindness caused by a **32** _____ such as an object	giving **33** _____ to a stranger	the movement of **34** _____	46.6%
Davies & Hine, 2007	to assess the impact of change blindness on **35** _____ by eyewitnesses	watching a burglary	the collection of **36** _____	61%

Questions 37-38

Choose TWO letters, A–E.

37 **38** Which TWO statements are true for both the supermarket and voice experiments?

- **A** ☐ The researchers focused on non-visual material.
- **B** ☐ The participants were asked to explain their preferences.
- **C** ☐ Some of the choices made by participants were altered.

D ☐ The participants were influenced by each other's choices.

E ☐ Percentage results were surprisingly low.

Questions 39-40

Choose TWO letters, A-E.

39 **40** Which TWO statements are true for the psychology experiment conducted by Merckelbach, Jelicic, and Pieters?

A ☐ The participants had to select their two most common symptoms.

B ☐ The participants gave each symptom a 1–5 rating.

C ☐ Shyness proved to be the most highly rated symptom.

D ☐ The participants changed their minds about some of their ratings.

E ☐ The researchers focused on the strength and regularity of symptoms.

Answer Key

#	Answer	Explanation
1	**(retronasal) smell**	The taste, texture, and feel of food are what we tend to focus on, but most important are the slight puffs of air as we chew our food what scientists call ‘retronasal smell’
2	**umami**	Certainly, our mouths and tongues have taste buds, which are receptors for the five basic flavors: sweet, salty, sour, bitter, and umami, or what is more commonly referred to as savory
3	**toxins**	They evolved to recognise only a few basic tastes in order to quickly identify toxins, which in nature are often quite bitter or acidly sour
4	**internal scents/smells**	Unlike a hound’s skull with its extra long nose, which evolved specifically to detect external smells, our noses have evolved to detect internal scents
5	**disciplines**	Shepherd has come up with the term ‘neurogastronomy’ to link the disciplines of food science, neurology, psychology, and anthropology with the savory elements of eating, one of the most enjoyed of human experiences
6	**spatial map**	The visual system detects patterns of light and dark and, building on experience, the brain creates a spatial map
7	**social life**	This ability to appreciate specific aromas turns out to be central to the pleasure we get from food, much as our ability to recognise individuals is central to the pleasures of social life
8	**(air) molecules**	As we eat, specialised receptors in the back of the nose detect the air molecules in our meals
9	**flavors/flavours**	Using these, as well as input from the other senses, it constructs the idea of specific flavors
10	**memories**	Smell stimuli form what Shepherd terms ‘odor objects’, stored as memories, and these have a direct link with our emotions
11	**prey**	Go back in history and this was part of our survival repertoire; like most animals, we drew on our sense of smell, when visual information was scarce, to single out prey
12	**chocolate**	Consider the response to the sharpness of a lemon and compare that with the face that is welcoming the smooth wonder of chocolate

#	Answer	Explanation
13	**appetites**	On the horizon we have the positive application of neurogastronomy: manipulating flavor to curb our appetites
14	**v**	At first sight it looked like a typical suburban road accident No one got out of the cars for the simple reason that they had no humans inside them; the Tahoe and Land Rover were being controlled by computers competing in November's DARPA (the U.S. Defence Advanced Research Projects Agency) Urban Challenge
15	**ii**	Even more striking was the fact that the collision between the robot Land Rover, built by researchers at the Massachusetts Institute of Technology, and the Tahoe, fitted out by Cornell University Artificial Intelligence (AI) experts, was the only scrape in the entire competition. Yet only three years earlier, at DARPA's previous driverless car race, every robot competitor – directed to navigate across a stretch of open desert – either crashed or seized up before getting near the finishing line
16	**viii**	'The robotics industry is developing in much the same way the computer business did 30 years ago,' he argues
17	**vii**	One key difficulty is getting robots to know their place. This has nothing to do with class or etiquette, but concerns the simple issue of positioning. Humans orient themselves with other objects in a room very easily. Robots find the task almost impossible. 'Even something as simple as telling the difference between an open door and a window can be tricky for a robot,' says Gates. This has, until recently, reduced robots to fairly static and cumbersome roles
18	**i**	For a long time, researchers tried to get round the problem by attempting to re-create the visual processing that goes on in the human cortex. However, that challenge has proved to be singularly exacting and complex. So scientists have turned to simpler alternatives: 'We have become far more pragmatic in our work,' says Nello Cristianini, Professor of Artificial Intelligence at the University of Bristol in England and associate editor of the Journal of Artificial Intelligence Research. 'We are no longer trying to re-create human functions. Instead, we are looking for simpler solutions with basic electronic sensors, for example.'
19	**iv**	Last year, a new Hong Kong restaurant, Robot Kitchen, opened with a couple of sensor-laden humanoid machines directing customers to their seats In Japan, University of Tokyo researchers recently unveiled a kitchen 'android' that could wash dishes, pour tea and make a few limited meals
20	**C**	Machines such as these take researchers into the field of socialised robotics: how to make robots act in a way that does not

#	Answer	Explanation
		scare or offend individuals. ‘We need to study how robots should approach people, how they should appear. That is going to be a key area for future research,’ adds Chrisley
21	**B**	‘We are no longer trying to re-create human functions. Instead, we are looking for simpler solutions with basic electronic sensors, for example.’
22	**A**	‘The fact is we still have a way to go before real robots catch up with their science fiction counterparts,’ Gates says
23	**C**	‘Robots first learn basic competence – how to move around a house without bumping into things. Then we can think about teaching them how to interact with humans,’ Chrisley said
24	**on(-)board computer**	Yet here, each car had its on-board computer loaded with a digital map and route plans, and was instructed to negotiate busy roads; differentiate between pedestrians and stationary objects; determine whether other vehicles were parked or moving off; and handle various parking manoeuvres, which robots turn out to be unexpectedly adept at
25	**ultrasound signals**	The Trilobite scuttles around homes emitting ultrasound signals to create maps of rooms, which are remembered for future cleaning
26	**touch(-)screen**	Each possesses a touch-screen on which orders can be keyed in
27	**NOT GIVEN**	At other times, the stakes are higher, such as deciding which symptoms to report to the doctor
28	**NO**	However, the fact that we are accustomed to processing large amounts of information does not mean that we are better at it (Chabris & Simons, 2009)
29	**NO**	Our sensory and cognitive systems have systematic ways of failing of which we are often, perhaps blissfully, unaware
30	**YES**	Out of the 80 participants, 49 (61%) did not notice the change of the burglar’s identity, suggesting that change blindness may have serious implications for criminal proceedings
31	**NO**	Rather than monitoring all of the visual details that surround us, we seem to focus our attention only on those features that are currently meaningful or important, ignoring those that are irrelevant to our current needs and goals

#	Answer	Explanation
32	**visual disturbance**	This phenomenon has been termed ‘change blindness’ and refers to the difficulty that observers have in noticing changes to visual scenes (e.g. the person swap), when the changes are accompanied by some other visual disturbance (e.g. the passing of the door)
33	**(some) directions**	Imagine that you are taking a walk in your local city park when a tourist approaches you asking for directions
34	**a door/the door**	During the conversation, two men carrying a door pass between the two of you
35	**identification**	Especially noteworthy is an experiment by Davies and Hine (2007) who studied whether change blindness affects eyewitness identification
36	**(the/some) valuables**	In the study described above, participants were likely not to have been expecting the change to happen, and so their attention may have been focused on the valuables the burglar was stealing, rather than the burglar
37	**A / C**	On half of the trials, however, these were samples of the non-chosen jam or tea. As expected, only about one-third of the participants detected this manipulation. Based on these findings, Hall and colleagues proposed that choice blindness is a phenomenon that occurs not only for choices involving visual material, but also for choices involving gustatory and olfactory information. Recently, the phenomenon has also been replicated for choices involving auditory stimuli (Sauerland, Sagana, & Otgaar, 2012). Specifically, participants had to listen to three pairs of voices and decide for each pair which voice they found more sympathetic or more criminal. The voice was then presented again; however, the outcome was manipulated for the second voice pair and participants were presented with the non-chosen voice

#	Answer	Explanation
38	**A / C**	On half of the trials, however, these were samples of the non-chosen jam or tea. As expected, only about one-third of the participants detected this manipulation. Based on these findings, Hall and colleagues proposed that choice blindness is a phenomenon that occurs not only for choices involving visual material, but also for choices involving gustatory and olfactory information. Recently, the phenomenon has also been replicated for choices involving auditory stimuli (Sauerland, Sagana, & Otgaar, 2012). Specifically, participants had to listen to three pairs of voices and decide for each pair which voice they found more sympathetic or more criminal. The voice was then presented again; however, the outcome was manipulated for the second voice pair and participants were presented with the non-chosen voice
39	**B / E**	Merckelbach, Jelicic, and Pieters (2011) investigated choice blindness for intensity ratings of one's own psychological symptoms. Their participants had to rate the frequency with which they experienced 90 common symptoms (e.g. anxiety, lack of concentration, stress, headaches etc.) on a 5-point scale
40	**B / E**	Merckelbach, Jelicic, and Pieters (2011) investigated choice blindness for intensity ratings of one's own psychological symptoms. Their participants had to rate the frequency with which they experienced 90 common symptoms (e.g. anxiety, lack of concentration, stress, headaches etc.) on a 5-point scale

Test 101

PASSAGE 1

You should spend about 20 minutes on Questions 1-13, which are based on Reading Passage 1 below.

SECRETS OF THE SWARM

Insects, birds and fish tend to be the creatures that humans feel furthest from. Unlike many mammals they do not engage in human-like behaviour. The way they swarm or flock together does not usually get good press coverage either: marching like worker ants might be a common simile for city commuters, but it's a damning, not positive, image. Yet a new school of scientific theory suggests that these swarms might have a lot to teach us.

American author Peter Miller explains, 'I used to think that individual ants knew where they were going, and what they were supposed to do when they got there. But Deborah Gordon, a biologist at Stanford University, showed me that nothing an ant does makes any sense except in terms of the whole colony. Which makes you wonder if, as individuals, we don't serve a similar function for the companies where we work or the communities where we live.' Ants are not intelligent by themselves. Yet as a colony, they make wise decisions. And as Gordon discovered during her research, there's no one ant making decisions or giving orders.

Take food collecting, for example. No ant decides, 'There's lots of food around today; lots of ants should go out to collect it.' Instead, some forager ants go out, and as soon as they find food, they pick it up and come back to the nest. At the entrance, they brush past reserve foragers, sending a 'go out' signal. The faster the foragers come back, the more food there is and the faster other foragers go out, until gradually the amount of food being brought back diminishes. An organic calculation has been made to answer the question, 'How many foragers does the colony need today?' And if something goes wrong – a hungry lizard prowling around for an ant snack, for instance – then a rush of ants returning without food sends waiting reserves a 'Don't go out' signal.

But could such decentralised control work in a human organisation? Miller visited a Texas gas company that has successfully applied formulas based on ant colony behaviour to 'optimise its factories and route its trucks'. He explains, 'If ant colonies had worked out a reliable way to identify the best routes between their nest and food sources, the company managers figured, why not take advantage of that knowledge?' So they came up with a computer model, based on the self-organising principles of an ant colony. Data is fed into the model about deliveries needing to be made the next day, as well as things like weather conditions, and it produces a simulation determining the best route for the delivery lorries to take.

Miller explains that he first really understood the impact that swarm behaviour could have on humans when he read a study of honeybees by Tom Seeley, a biologist at Cornell University. The honeybees choose as a group which new nest to move to. First, scouts fly off to investigate

multiple sites. When they return they do a 'waggle dance' for their spot, and other scouts will then fly off and investigate it. Many bees go out, but none tries to compare all sites. Each reports back on just one. The more they liked their nest, the more vigorous and lengthy their waggle dance and the more bees will choose to visit it. Gradually the volume of bees builds up towards one site; it's a system that ensures that support for the best site snowballs and the decision is made in the most democratic way.

Humans, too, can make clever decisions through diversity of knowledge and a little friendly competition. 'The best example of shared decision-making that I witnessed during my research was a town meeting I attended in Vermont, where citizens met face-to-face to debate their annual budget,' explains Miller. 'For group decision-making to work well, you need a way to sort through the various options they propose; and you need a mechanism to narrow down these options.' Citizens in Vermont control their municipal affairs by putting forward proposals, or backing up others' suggestions, until a consensus is reached through a vote. As with the bees, the broad sampling of options before a decision is made will usually result in a compromise acceptable to all. The 'wisdom of the crowd' makes clever decisions for the good of the group – and leaves citizens feeling represented and respected.

The Internet is also an area where we are increasingly exhibiting swarm behaviour, without any physical contact. Miller compares a wiki website, for example, to a termite mound. Indirect collaboration is the key principle behind information-sharing web sites, just as it underlies the complex constructions that termites build. Termites do not have an architect's blueprint or a grand construction scheme. They simply sense changes in their environment, as for example when the mound's wall has been damaged, altering the circulation of air. They go to the site of the change and drop a grain of soil. When the next termite finds that grain, they drop theirs too. Slowly, without any kind of direct decision-making, a new wall is built. A termite mound, in this way, is rather like a wiki website. Rather than meeting up and talking about what we want to post online, we just add to what someone – maybe a stranger on the other side of the world – already wrote. This indirect knowledge and skill-sharing is now finding its way into the corridors of power.

PART 1 — QUESTIONS

Questions 1-6

Do the following statements agree with the information in the text?

In boxes 1-6 on your answer sheet, write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

1 Commuters are often compared favourably with worker ants.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

2 Some ants within a colony have leadership roles.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

3 Forager ants tell each other how far away the food source is.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

4 Forager ants are able to react quickly to a dangerous situation.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

5 Termite mounds can be damaged by the wind.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

6 Termites repair their mounds without directly communicating with each other.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

Questions 7-9

Complete each sentence with the correct ending, A-F, below.

Write the correct letter, A-F, in boxes 7-9 on your answer sheet.

• Managers working for a Texas gas company **7** _____

• Citizens in an annual Vermont meeting **8** _____

• Some Internet users **9** _____

A. **provide support for each other's ideas in order to reach the best outcome.**

B. **use detailed comments to create large and complicated systems.**

C. **use decision-making strategies based on insect communities to improve their service.**

D. **communicate with each other to decide who the leader will be.**

E. **contribute independently to the ideas of others they do not know.**

F. **repair structures they have built without directly communicating with each other.**

Questions 10-13

Complete the flow-chart below.

Choose NO MORE THAN TWO WORDS from the text for each answer.

Write your answers in boxes 10-13 on your answer sheet.

How honeybees choose a new nest

Honeybee **10** _____ explore possible nest sites

↓

they perform what is known as a **11** _____ on their return

↓

other bees go out and report back

↓

enthusiasm and **12** _____ increase for one particular site

↓

a final choice is reached using a **13** _____ process

PASSAGE 2

You should spend about 20 minutes on Questions 14-26, which are based on Reading Passage 2 on the following pages.

High Speed, High Rise

A Chinese entrepreneur has figured out a way to manufacture 30-story, earthquake-proof skyscrapers that snap together in just 15 days.

14

A Zhang Yue is founder and chairman of Broad Sustainable Building (otherwise known as 'Broad') who, on 1 January, 2012, released a time-lapse video of its 30-story achievement. It shows construction workers buzzing around like gnats while a clock in the corner of the screen marks the time. In just 360 hours, a 100-metre-tall tower called the T30 rises from an empty site to overlook Hunan's Xiang River. At the end of the video, the camera spirals around the building overhead as the Broad logo appears on the screen: a lowercase b that wraps around itself in an imitation of the @ symbol. The company is in the process of franchising its technology to partners in India, Brazil, and Russia. What it is selling is the world's first standardized skyscraper and with it, Zhang aims to turn Broad into the McDonald's of the sustainable building industry. When asked why he decided to start a construction company, Zhang replies, 'It's not a construction company. It's a structural revolution.'

15

B So far, Broad has built 16 structures in China, plus another in Cancun. They are fabricated at two factories in Hunan, roughly an hour's drive from Broad Town, the sprawling headquarters. The floors and ceilings of the skyscrapers are built in sections, each measuring 15.6 by 3.9 meters with a depth of 45 centimeters. Pipes and ducts for electricity, water and waste are threaded through each floor module while it is still in the factory. The client's choice of flooring is also pre-installed on top. Standardized truckloads carry two modules each to the site with the necessary columns, bolts and tools to connect them stacked on top of each other. Once they arrive at the location, each section is lifted by crane directly to the top of the building, which is assembled like toy Lego bricks. Workers use the materials on the module to quickly connect the pipes and wires. The unique column design has diagonal bracing at each end and tabs that bolt into the floors above and below. In the final step, heavily insulated exterior walls and windows are slotted in by crane. The result is far from pretty but the method is surprisingly safe – and phenomenally fast.

16

C Zhang attributes his success to his creativity and to his outsider perspective on technology. He started out as an art student in the 1980s, but in 1988, Zhang left the art world to found

Broad. The company started out as a maker of non-pressurized boilers. His senior vice-president, Juliet Jiang, says, 'He made his fortune on boilers. He could have kept doing this business, but ... he saw the need for nonelectric air-conditioning.' Towards the end of the decade, China's economy was expanding past the capacity of the nation's electricity grid, she explains. Power shortages were becoming a serious obstacle to growth. Large air-conditioning (AC) units fueled by natural gas could help companies ease their electricity load, reduce overheads, and enjoy more reliable climate control into the bargain. Today, Broad has units operating in more than 70 countries, in some of the largest buildings and airports on the planet.

17

D For two decades, Zhang's AC business boomed. But a couple of events conspired to change his course. The first was that Zhang became an environmentalist. The second was the earthquake that hit China's Sichuan Province in 2008, causing the collapse of poorly constructed buildings. Initially, he says, he tried to convince developers to refit existing buildings to make them both more stable and more sustainable, but he had little success. So Zhang drafted his own engineers and started researching how to build cheap, environmentally friendly structures that could also withstand an earthquake. Within six months of starting his research, Zhang had given up on traditional methods. He was frustrated by the cost of hiring designers and specialists for each new structure. The best way to cut costs, he decided, was to take building to the factory. But to create a factory-built skyscraper, Broad had to abandon the principles by which skyscrapers are typically designed. The whole load-bearing structure had to be different. To reduce the overall weight of the building, it used less concrete in the floors; that in turn enabled it to cut down on structural steel.

18

E Around the world, prefabricated and modular buildings are gaining in popularity. But modular and prefabricated buildings elsewhere are, for the most part, low-rise. Broad is alone in applying these methods to skyscrapers. For Zhang, the environmental savings alone justify the effort. According to Broad's numbers, a traditional high-rise will produce about 3,000 tons of construction waste, while a Broad building will produce only 25 tons. Traditional buildings also require 5,000 tons of water onsite to build, while Broad buildings use none. The building process is also less dangerous. Elevator systems – the base, rails, and machine room – can be installed at the factory, eliminating the risk of injury. And instead of shipping an elevator car to the site in pieces, Broad orders a finished car and drops it into the shaft by crane. In the future, elevator manufacturers are hoping to preinstall the doors, completely eliminating any chance that a worker might fall. 'Traditional construction is chaotic,' he says. 'We took construction and moved it into the factory.' According to Zhang, his buildings will help solve the many problems of the construction industry and what's more, they will be quicker and cheaper to build.

PART 2 — QUESTIONS

Questions 14-18

The text on the following pages has five paragraphs, A-E.

Choose the correct heading for each paragraph from the list of headings below.

Write the correct number, i-viii, in boxes 14-18 on your answer sheet.

i. **A joint business project**

ii. **Other engineering achievements**

iii. **Examining the overall benefits**

iv. **A building like no other**

v. **Some benefits of traditional methods**

vi. **A change of direction**

vii. **Examples of similar global brands**

viii. **From factory to building site**

Questions 19-22

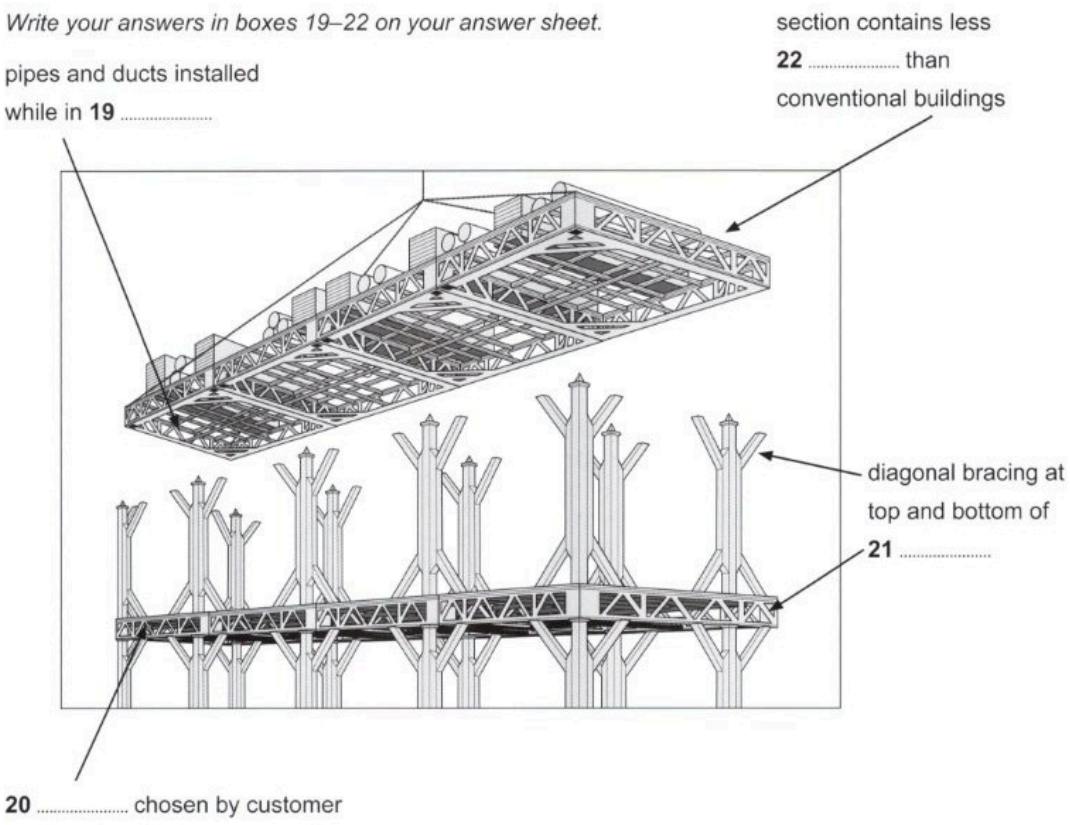
Label the diagram below.

Choose ONE WORD ONLY from the text for each answer.

Write your answers in boxes 19-22 on your answer sheet.

*Choose **ONE WORD ONLY** from the text for each answer.*

Write your answers in boxes 19–22 on your answer sheet.



19 _____

20 _____

21 _____

22 _____

Questions 23-26

Complete the sentences below.

Choose NO MORE THAN TWO WORDS from the text for each answer.

Write your answers in boxes 23-26 on your answer sheet.

- Zhang refers to his business as a **23** _____.
- The first products Broad manufactured were **24** _____.
- In the late eighties, **25** _____ were holding back industrial progress in China.

- In addition to power and cost benefits, Broad's AC units improve **26** _____.

PASSAGE 3

You should spend about 20 minutes on Questions 27-40, which are based on Reading Passage 3 below.

When conversations flow

We spend a large part of our daily life talking with other people and, consequently, we are very accustomed to the art of conversing. But why do we feel comfortable in conversations that have flow, but get nervous and distressed when a conversation is interrupted by unexpected silences? To answer this question we will first look at some of the effects of conversational flow. Then we will explain how flow can serve different social needs.

The positive consequences of conversational flow show some similarities with the effects of 'processing fluency'. Research has shown that processing fluency – the ease with which people process information – influences people's judgments across a broad range of social dimensions. For instance, people feel that when something is easily processed, it is more true or accurate. Moreover, they have more confidence in their judgments regarding information that came to them fluently, and they like things that are easy to process more than things that are difficult to process. Research indicates that a speaker is judged to be more knowledgeable when they answer questions instantly; responding with disfluent speech markers such as 'uh' or 'um' or simply remaining silent for a moment too long can destroy that positive image.

One of the social needs addressed by conversational flow is the human need for 'synchrony' – to be 'in sync' or in harmony with one another. Many studies have shown how people attempt to synchronize with their partners, by coordinating their behavior. This interpersonal coordination underlies a wide array of human activities, ranging from more complicated ones like ballroom dancing to simply walking or talking with friends.

In conversations, interpersonal coordination is found when people adjust the duration of their utterances and their speech rate to one another so that they can enable turn-taking to occur, without talking over each other or experiencing awkward silences. Since people are very well-trained in having conversations, they are often able to take turns within milliseconds, resulting in a conversational flow of smoothly meshed behaviors. A lack of flow is characterized by interruptions, simultaneous speech or mutual silences. Avoiding these features is important for defining and maintaining interpersonal relationships.

The need to belong has been identified as one of the most basic of human motivations and plays a role in many human behaviors. That conversational flow is related to belonging may be most easily illustrated by the consequences of flow disruptions. What happens when the positive experience of flow is disrupted by, for instance, a brief silence? We all know that silences can be pretty awkward, and research shows that even short disruptions in conversational flow can lead to a sharp rise in distress levels. In movies, silences are often used to signal non-compliance or confrontation (Piazza, 2006). Some researchers even argue that 'silencing someone' is one of the most serious forms of exclusion. Group membership is of elementary importance to our wellbeing and because humans are very sensitive to signals of

exclusion, a silence is generally taken as a sign of rejection. In this way, a lack of flow in a conversation may signal that our relationship is not as solid as we thought it was.

Another aspect of synchrony is that people often try to validate their opinions to those of others. That is, people like to see others as having similar ideas or worldviews as they have themselves, because this informs people that they are correct and their worldviews are justified. One way in which people can justify their worldviews is by assuming that, as long as their conversations run smoothly, their interaction partners probably agree with them. This idea was tested by researchers using video observations. Participants imagined being one out of three people in a video clip who had either a fluent conversation or a conversation in which flow was disrupted by a brief silence. Except for the silence, the videos were identical. After watching the video, participants were asked to what extent the people in the video agreed with each other. Participants who watched the fluent conversation rated agreement to be higher than participants watching the conversation that was disrupted by a silence, even though participants were not consciously aware of the disruption. It appears that the subjective feeling of being out of sync informs people of possible disagreements, regardless of the content of the conversation.

Because people are generally so well-trained in having smooth conversations, any disruption of this flow indicates that something is wrong, either interpersonally or within the group as a whole. Consequently, people who do not talk very easily may be incorrectly understood as being less agreeable than those who have no difficulty keeping up a conversation. On a societal level, one could even imagine that a lack of conversational flow may hamper the integration of immigrants who have not completely mastered the language of their new country yet. In a similar sense, the ever-increasing number of online conversations may be disrupted by misinterpretations and anxiety that are produced by insuperable delays in the Internet connection. Keeping in mind the effects of conversational flow for feelings of belonging and validation may help one to be prepared to avoid such misunderstandings in future conversations.

PART 3 — QUESTIONS

Questions 27-32

Do the following statements agree with the claims of the writer in the text?

In boxes 27-32 on your answer sheet, write

YES if the statement agrees with the claims of the writer

NO if the statement contradicts the claims of the writer

NOT GIVEN if it is impossible to say what the writer thinks about this

27 Conversation occupies much of our time.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

28 People assess information according to how readily they can understand it.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

29 A quick response to a question is thought to show a lack of knowledge.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

30 Video observations have often been used to assess conversational flow.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

31 People who talk less often have clearer ideas than those who talk a lot.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

32 Delays in online chat fail to have the same negative effect as disruptions that occur in natural conversation.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

Questions 33-40

Complete the summary below.

Choose NO MORE THAN TWO WORDS from the text for each answer.

Write your answers in boxes 33-40 on your answer sheet.

Synchrony

There is a human desire to co-ordinate **33** _____ in an effort to be 'in harmony'. This co-ordination can be seen in conversations when speakers alter the speed and extent of their speech in order to facilitate **34** _____ . This is often achieved within milliseconds: only tiny pauses take place when a conversation flows; when it doesn't, there are **35** _____ and silences, or people talk at the same time.

Our desire to **36** _____ is also an important element of conversation flow. According to research, our **37** _____ increase even if silences are brief. Humans have a basic need to be part of a group, and they experience a sense of **38** _____ if silences exclude them.

People also attempt to co-ordinate their opinions in conversation. In an experiment, participants' judgement of the overall **39** _____ among speakers was tested using videos of a fluent and a slightly disrupted conversation. The results showed that the

40 _____ of the speakers' discussion was less important than the perceived synchrony of the speakers.

Answer Key

#	Answer	Explanation
1	**FALSE**	marching like worker ants might be a common simile for city commuters, but it's a damning, not positive, image
2	**FALSE**	And as Gordon discovered during her research, there's no one ant making decisions or giving orders
3	**NOT GIVEN**	Instead, some forager ants go out, and as soon as they find food, they pick it up and come back to the nest. At the entrance, they brush past reserve foragers, sending a 'go out' signal
4	**TRUE**	And if something goes wrong – a hungry lizard prowling around for an ant snack, for instance – then a rush of ants returning without food sends waiting reserves a 'Don't go out' signal
5	**NOT GIVEN**	They simply sense changes in their environment, as for example when the mound's wall has been damaged, altering the circulation of air
6	**TRUE**	Termites do not have an architect's blueprint or a grand construction scheme. They simply sense changes in their environment, as for example when the mound's wall has been damaged, altering the circulation of air. They go to the site of the change and drop a grain of soil. When the next termite finds that grain, they drop theirs too. Slowly, without any kind of direct decision-making, a new wall is built
7	**C**	Miller visited a Texas gas company that has successfully applied formulas based on ant colony behaviour to 'optimise its factories and route its trucks'
8	**A**	Citizens in Vermont control their municipal affairs by putting forward proposals, or backing up others' suggestions, until a consensus is reached through a vote
9	**E**	Rather than meeting up and talking about what we want to post online, we just add to what someone – maybe a stranger on the other side of the world – already wrote
10	**scouts**	First, scouts fly off to investigate multiple sites
11	**waggle dance**	When they return they do a 'waggle dance' for their spot, and other scouts will then fly off and investigate it
12	**volume**	Gradually the volume of bees builds up towards one site; it's a system that ensures that support for the best site snowballs and the decision is made in the most democratic way

#	Answer	Explanation
13	**democratic**	Gradually the volume of bees builds up towards one site; it's a system that ensures that support for the best site snowballs and the decision is made in the most democratic way
14	**iv**	What it is selling is the world's first standardized skyscraper and with it, Zhang aims to turn Broad into the McDonald's of the sustainable building industry. When asked why he decided to start a construction company, Zhang replies, 'It's not a construction company. It's a structural revolution.'
15	**viii**	They are fabricated at two factories in Hunan, roughly an hour's drive from Broad Town, the sprawling headquarters Standardized truckloads carry two modules each to the site with the necessary columns, bolts and tools to connect them stacked on top of each other
16	**ii**	The company started out as a maker of non-pressurized boilers. His senior vice-president, Juliet Jiang, says, 'He made his fortune on boilers. He could have kept doing this business, but he saw the need for nonelectric air-conditioning.' Towards the end of the decade, China's economy was expanding past the capacity of the nation's electricity grid, she explains. Power shortages were becoming a serious obstacle to growth. Large air-conditioning (AC) units fueled by natural gas could help companies ease their electricity load, reduce overheads, and enjoy more reliable climate control into the bargain
17	**vi**	For two decades, Zhang's AC business boomed. But a couple of events conspired to change his course
18	**iii**	According to Zhang, his buildings will help solve the many problems of the construction industry and what's more, they will be quicker and cheaper to build
19	**factory**	Elevator systems – the base, rails, and machine room – can be installed at the factory, eliminating the risk of injury
20	**flooring/floor**	The client's choice of flooring is also pre-installed on top
21	**column(s)**	Standardized truckloads carry two modules each to the site with the necessary columns, bolts and tools to connect them stacked on top of each other
22	**concrete**	To reduce the overall weight of the building, it used less concrete in the floors; that in turn enabled it to cut down on structural steel
23	**structural revolution**	'It's not a construction company. It's a structural revolution.'
24	**(non-pressurized) boilers**	The company started out as a maker of non-pressurized boilers

#	Answer	Explanation
25	**power shortages**	Towards the end of the decade, China’s economy was expanding past the capacity of the nation’s electricity grid, she explains. Power shortages were becoming a serious obstacle to growth
26	**climate control**	Large air-conditioning (AC) units fueled by natural gas could help companies ease their electricity load, reduce overheads, and enjoy more reliable climate control into the bargain
27	**YES**	We spend a large part of our daily life talking with other people and, consequently, we are very accustomed to the art of conversing
28	**YES**	Research has shown that processing fluency – the ease with which people process information – influences people’s judgments across a broad range of social dimensions
29	**NO**	Research indicates that a speaker is judged to be more knowledgeable when they answer questions instantly
30	**NOT GIVEN**	This idea was tested by researchers using video observations
31	**NOT GIVEN**	Consequently, people who do not talk very easily may be incorrectly understood as being less agreeable than those who have no difficulty keeping up a conversation
32	**NO**	In a similar sense, the ever-increasing number of online conversations may be disrupted by misinterpretations and anxiety that are produced by insuperable delays in the Internet connection
33	**(their) behavio(u)r/activities**	Many studies have shown how people attempt to synchronize with their partners, by coordinating their behavior. This interpersonal coordination underlies a wide array of human activities, ranging from more complicated ones like ballroom dancing to simply walking or talking with friends
34	**turn-taking**	In conversations, interpersonal coordination is found when people adjust the duration of their utterances and their speech rate to one another so that they can enable turn-taking to occur, without talking over each other or experiencing awkward silences
35	**interruptions**	A lack of flow is characterized by interruptions, simultaneous speech or mutual silences
36	**belong**	The need to belong has been identified as one of the most basic of human motivations and plays a role in many human behaviors. That conversational flow is related to belonging may be most easily illustrated by the consequences of flow disruptions

#	Answer	Explanation
37	**distress levels**	research shows that even short disruptions in conversational flow can lead to a sharp rise in distress levels
38	**rejection**	Group membership is of elementary importance to our wellbeing and because humans are very sensitive to signals of exclusion, a silence is generally taken as a sign of rejection
39	**agreement**	Participants who watched the fluent conversation rated agreement to be higher than participants watching the conversation that was disrupted by a silence, even though participants were not consciously aware of the disruption
40	**content**	It appears that the subjective feeling of being out of sync informs people of possible disagreements, regardless of the content of the conversation

Test 102

PASSAGE 1

You should spend about 20 minutes on Questions 1-13, which are based on Reading Passage 1 below.

South Pole Adventurer

In the race to the South Pole, there was a Japanese team attempting to be first, led by heroic explorer Nobu Shirase

FOR a few weeks in January 1912, Antarctica was full of explorers. Norwegian Roald Amundsen had reached the South Pole on 14 December and was speeding back to the coast. On 17 January, Robert Scott and the men of the British Antarctic expedition had arrived at the pole to find they had been beaten to it. Just then, a third man arrived; Japanese explorer Nobu Shirase. However, his part in one of the greatest adventure stories of the 20th century is hardly known outside his own country, even by fellow explorers. Yet as Scott was nearing the pole and with the rest of the world still unaware of Amundsen's triumph, Shirase and his team sailed into Antarctica's Bay of Whales in the smallest ship ever to try its luck in these dangerous waters.

Since boyhood Shirase had dreamed of becoming a polar explorer. Like Amundsen, he initially set his sights on the North Pole. But after the American Robert Peary claimed to have reached it in 1909, both men hastily altered their plans. Instead they would aim for the last big prize: the South Pole. In January 1910, Shirase put his plans before Japanese government officials, promising to raise the flag at the South Pole within three years. For many of them, the question wasn't could he do it but why would it be worth doing? 15 years earlier the International Geographical Congress had said that as the last unknown continent the Antarctic offered the chance to add to knowledge in almost every branch of science. So, like the British, Shirase presented his expedition as a search for knowledge: he would bring back fossils, make meteorological measurements and explore unknown parts of the continent.

The response from the government was cool, however, and Shirase struggled to raise funds. Fortunately, a few months later, Japan's former prime minister Shigenobu Okuma came to Shirase's rescue. With Okuma's backing, Shirase got together just enough money to buy and equip a small ship. He eventually acquired a scientist, too, called Terutaro Takeda. At the end of November 1910, his ship the *Kainan Maru* finally left Tokyo with 27 men and 28 Siberian dogs on board. Before leaving, Shirase confidently outlined his plans to the media. He would sail to New Zealand, then reach Antarctica in February, during the southern summer, and then proceed to the pole the following spring. This was not to be, however. Bad weather delayed the expedition and they didn't reach New Zealand until 8 February; Amundsen and Scott had already been in Antarctica for a month, preparing for winter.

In New Zealand local reporters were astonished: the ship was half the size of Amundsen's ship. True, it was reinforced with iron plate and extra wood, but the ship had only the feeblest engine

to help force its way through ice. Few doubted Shirase's courage, but most reckoned the expedition to be ill-prepared as the Japanese had only lightweight sledges for transport across the ice, made of bamboo and wood.

But Shirase's biggest challenge was time. Antarctica is only accessible by sea for a few weeks in summer and expeditions usually aimed to arrive in January or February. 'Even with their determination and daring, our Japanese friends are running it rather fine,' wrote local reporters. Nevertheless, on 11 February the *Kainan Maru* left New Zealand and sailed straight into the worst weather the captain had ever seen. Then, on 6 March, they approached the coastline of Antarctica's Ross Sea, looking for a place to land. The ice began to close in, threatening to trap them for the winter, an experience no one was likely to survive. With a remarkable piece of seamanship, the captain steered the ship out of the ice and turned north. They would have to wait out the winter in a warmer climate.

A year later than planned, Shirase and six men finally reached Antarctica. Catching up with Scott or Amundsen was out of the question and he had said he would stick to science this time. Yet Shirase still felt the pull of the pole and eventually decided he would head southward to experience the thrills and hardships of polar exploration he had always dreamed of. With provisions for 20 days, he and four men would see how far they could get.

Shirase set off on 20 January 1912 with Takeda and two dog handlers, leaving two men at the edge of the ice shelf to make meteorological measurements. For a week they struggled through one blizzard after another, holing up in their tents during the worst of the weather. The temperature fell to -25°C, and frostbite claimed some of the dogs. On 26 January, Shirase estimated there were enough provisions to continue for two more days. Two days later, he announced it was time to turn back. Takeda calculated they had reached 80° 5 south and had travelled 250 kilometres. The men hoisted the Japanese flag.

On 3 February, all the men were heading home. The ship reached Tokyo in June 1912 - and Shirase was greeted like a hero despite the fact that he never reached the pole. Nor did he contribute much to science - but then nor did Amundsen, whose only interest was in being first to the pole. Yet Shirase's expedition was heroic. They travelled beyond 80° south, one of only four teams to have gone so far south at the time. Furthermore, they did it all without the advantages of the other teams and with no previous experience.

PART 1 — QUESTIONS

Questions 1-8

Do the following statements agree with the information given in Reading Passage 1?

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

1 Shirase's trip to the South Pole is well-known to other explorers.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

2 Since Shirase arrived in Antarctica, smaller ships have also made the journey.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

3 Shirase's original ambition was to travel to the North Pole.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

4 Some Japanese officials thought Shirase's intention to travel to the South Pole was pointless.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

5 The British team announced their decision to carry out scientific research in Antarctica before Shirase.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

6 Shirase found it easy to raise the money he needed for his trip to the South Pole.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

7 A previous prime minister of Japan persuaded a scientist to go with Shirase.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

8 The weather that slowed down Shirase's progress to New Zealand was unusually bad for the season.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

Questions 9-13

Choose the correct letter, A, B, C or D.

9 When reporters in New Zealand met Shirase, they were

- **A** ○ concerned about the quality of his equipment.
- **B** ○ impressed with the design of his ship.
- **C** ○ certain he was unaware of the dangers ahead.

D ○ surprised by the bravery he demonstrated.

10 What are we told about the captain of the Kainan Maru in the fifth paragraph?

A ○ He had given Shirase some poor advice.

B ○ His skill at sailing saved the boat and crew.

C ○ He refused to listen to the warnings of others.

D ○ He was originally confident they could reach Antarctica.

11 After Shirase finally reached Antarctica he realised that

A ○ he was unsure of the direction he should follow.

B ○ he would have to give up on fulfilling his personal ambition.

C ○ he might not have enough food to get to the South Pole.

D ○ he still wanted to compete in the race against the other teams.

12 What is the writer doing in the seventh paragraph?

A ○ criticising a decision concerning scientific research.

B ○ explaining why a particular mistake had occurred.

C ○ describing the conditions that the expedition faced.

D ○ rejecting the idea that Shirase was poorly prepared.

13 What is the writer's main point in the final paragraph?

A ○ Considering the problems Shirase had to deal with, his achievement was incredible.

B ○ In Japan, the reaction to Shirase's adventure in Antarctica came as a surprise to him.

C ○ It was obvious that Amundsen would receive more attention as an explorer than Shirase.

D ○ Shirase had achieved more on the Antarctic expedition than even he had expected.

PASSAGE 2

You should spend about 20 minutes on Questions 14-26, which are based on Reading Passage 2 below.

The rise of the agribots

The use of robots and automation in the farming industry

The next time you stand at the supermarket checkout, spare a thought for the farmers who helped fill your shopping basket as life is hard for them right now. This, in turn, inevitably means bigger grocery bills for consumers, and greater hardship for the millions in countries where food shortages are a matter of life and death. Worse, studies suggest that the world will need twice as much food by 2050. Yet while farmers must squeeze more out of the land, they must also address the necessity of reducing their impact on the soil, waterways and atmosphere. All this means rethinking how agriculture is practiced, and taking automation to a whole new level. On the new model farms of the future, precision will be key. Why dose a whole field with chemicals if you can spray only where they are needed? Each plant could get exactly the right amount of everything, no more or less, an approach that could slash chemical use and improve yields in one move. But this is easier said than done; the largest farms in Europe and the U.S. can cover thousands of acres. That's why automation is key to precision farming. Specifically, say agricultural engineers, precision farming needs robot farmers.

One day, we might see fields with 'agribots' (agricultural robots) that can identify individual seedlings and encourage them along with drops of fertilizer. Other machines would distinguish problem weeds from crops and eliminate them with shots from high-power lasers or a microdot of pesticide. These machines will also be able to identify and harvest all kinds of vegetables. More than a century of mechanization has already turned farming into an industrial-scale activity in much of the world, with farms that grow cereals being the most heavily automated.

But a variety of other crops, including oranges and tomatoes destined to become processed foods, are also picked mechanically, albeit to a slightly lesser extent. Yet the next wave of autonomous farm machinery is already at work. You probably haven't even noticed, for these robots are disguised as tractors. Many are self-steering, use GPS to cross a field, and can even 'talk' to their implements – a plough or sprayer, for example. And the implements can talk back, telling the tractor that it's going too fast or needs to move to the left. This kind of communication is also being developed in other farm vehicles. A new system allows a combine harvester, say, to send a call over to a tractor-trailer so the driver can unload the grain as and when necessary.

However, when fully autonomous systems take to the field, they'll look nothing like tractors. With their enormous size and weight, today's farm machines have significant downsides: they compact the soil, reducing porosity and killing beneficial life, meaning crops don't grow so well. Simon Blackmore, who researches agricultural technology at Harper Adams University College in England believes that fleets of lightweight autonomous robots have the potential to solve this problem and that replacing brute force with precision is key. 'A seed only needs one cubic

centimeter of soil to grow. If we cultivate just that we only put tiny amounts of energy in and the plants still grow nicely.' There is another reason why automation may be the way forward according to Eldert van Henten, a robotics researcher at Wageningen University in the Netherlands. 'While the population is growing and needs to be fed, a rapidly shrinking number of people are willing to work in agriculture,' he points out.

Other researchers such as Linda Calvin, an economist at the U.S. Department of Agriculture, and Philip Martin at the University of California, Davis, have studied trends in mechanization to predict how US farms might fare. Calvin and Martin have observed how rising employment costs have led to the adoption of labour-saving farm technology in the past, citing the raisin industry as an example. In 2000, a bumper harvest crashed prices and, with profits squeezed, farmers looked for a solution. With labour one of their biggest costs – 42 percent of production expenses on U.S. farms, on average – they started using a mechanical harvester adapted from a machine used by wine makers. By 2007, almost half of California's raisins were mechanically harvested and a labour force once numbering 50,000 had shrunk to 30,000.

As well as having an impact on the job market, the widespread adoption of agribots might bring changes at the supermarket. Lewis Holloway, who studies agriculture at the University of Hull, UK, says that robotic milking is likely to influence the genetics of dairy herds as farmers opt for 'robot-friendly' cows, with udder shape, and even attitudes, suited to automated milking. Similarly, he says, it's conceivable that agribots could influence what fruit or vegetable varieties get to the shops, since farmers may prefer to grow those with, say, leaf shapes that are easier for their robots to discriminate from weeds. Almost inevitably, these machines will eventually alter the landscape, too. The real tipping point for robot agriculture will come when farms are being designed with agribots in mind, says Salah Sukkarieh, a robotics researcher at the Australian Center for Field Robotics, Sydney. This could mean a return to smaller fields, with crops planted in grids rather than rows and fruit trees pruned into two-dimensional shapes to make harvesting easier. This alien terrain tended by robots is still a while away, he says 'but it will happen.'

PART 2 — QUESTIONS

Questions 14-17

Do the following statements agree with the claims of the writer in Reading Passage 2?

YES if the statement agrees with the claims of the writer

NO if the statement contradicts the claims of the writer

NOT GIVEN if it is impossible to say what the writer thinks about this

14 Governments should do more to ensure that food is generally affordable.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

15 Farmers need to reduce the harm they do to the environment.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

16 In the future, farmers are likely to increase their dependency on chemicals.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

17 Farms in Europe and the US may find it hard to adapt to precision farming.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

Questions 18-21

Complete the sentences below.

Choose ONE WORD ONLY from the passage for each answer.

- In the future, agribots will provide **18** _____ to young plants.
- Some machines will use chemicals or **19** _____ to get rid of unwanted plants.
- It is the production of **20** _____ which currently uses most machinery on farms.
- **21** _____ between machines such as tractors is making farming more efficient.

Questions 22-26

Look at the following researchers (Questions 22-26) and the list of statements below.

Match each researcher with the correct statement, A-H.

A. The use of automation might impact on the development of particular animal and plant species.

B. We need to consider the effect on employment that increased automation will have.

C. We need machines of the future to be exact, not more powerful.

D. As farming becomes more automated the appearance of farmland will change.

E. New machinery may require more investment than certain farmers can afford.

F. There is a shortage of employees in the farming industry.

G. There are limits to the environmental benefits of automation.

H. Economic factors are often the driving force behind the development of machinery.

	A	B	C	D	E	F	G	H
22 Simon Blackmore	○	○	○	○	○	○	○	○
23 Eldert van Henten	○	○	○	○	○	○	○	○
24 Linda Calvin and Philip Martin	○	○	○	○	○	○	○	○
25 Lewis Holloway	○	○	○	○	○	○	○	○

	A	B	C	D	E	F	G	H
26 Salah Sukkarieh	○	○	○	○	○	○	○	○

PASSAGE 3

You should spend about 20 minutes on Questions 27-40, which are based on Reading Passage 3 below.

Homer's Literary Legacy

Why was the work of Homer, famous author of ancient Greece, so full of clichés?

A Until the last tick of history's clock, cultural transmission meant oral transmission and poetry, passed from mouth to ear, was the principal medium of moving information across space and from one generation to the next. Oral poetry was not simply a way of telling lovely or important stories, or of flexing the imagination. It was, argues the classicist Eric Havelock, a "massive repository of useful knowledge, a sort of encyclopedia of ethics, politics, history and technology which the effective citizen was required to learn as the core of his educational equipment". The great oral works transmitted a shared cultural heritage, held in common not on bookshelves, but in brains. In India, an entire class of priests was charged with memorizing the Vedas with perfect fidelity. In pre-Islamic Arabia, people known as Rawis were often attached to poets as official memorizers. The Buddha's teachings were passed down in an unbroken chain of oral tradition for four centuries until they were committed to writing in Sri Lanka in the first century B.C.

B The most famous of the Western tradition's oral works, and the first to have been systematically studied, were Homer's *Odyssey* and *Iliad*. These two poems – possibly the first to have been written down in the Greek alphabet – had long been held up as literary archetypes. However, even as they were celebrated as the models to which all literature should aspire, Homer's masterworks had also long been the source of scholarly unease. The earliest modern critics sensed that they were somehow qualitatively different from everything that came after – even a little strange. For one thing, both poems were oddly repetitive in the way they referred to characters. Odysseus was always "clever Odysseus". Dawn was always "rosy-fingered". Why would someone write that? Sometimes the epithets seemed completely off-key. Why call the murderer of Agamemnon "blameless Aegisthos"? Why refer to "swift-footed Achilles" even when he was sitting down? Or to "laughing Aphrodite" even when she was in tears? In terms of both structure and theme, the *Odyssey* and *Iliad* were also oddly formulaic, to the point of predictability. The same narrative units – gathering armies, heroic shields, challenges between rivals – pop up again and again, only with different characters and different circumstances. In the context of such finely spun, deliberate masterpieces, these quirks* seemed hard to explain.

C At the heart of the unease about these earliest works of literature were two fundamental questions: first, how could Greek literature have been born ex nihilo* with two masterpieces? Surely a few less perfect stories must have come before, and yet these two were among the first on record. And second, who exactly was their author? Or was it authors? There were no historical records of Homer, and no trustworthy biography of the man exists beyond a few self-referential hints embedded in the texts themselves.

D Jean-Jacques Rousseau was one of the first modern critics to suggest that Homer might not have been an author in the contemporary sense of a single person who sat down and wrote a story and then published it for others to read. In his 1781 Essay on the Origin of Languages, the Swiss philosopher suggested that the *Odyssey* and *Iliad* might have been "written only in men's memories. Somewhat later they were laboriously collected in writing" – though that was about as far as his enquiry into the matter went.

E In 1795, the German philologist Friedrich August Wolf argued for the first time that not only were Homer's works not written down by Homer, but they weren't even by Homer. They were, rather, a loose collection of songs transmitted by generations of Greek bards*, and only redacted* in their present form at some later date. In 1920, an eighteen-year-old scholar named Milman Parry took up the question of Homeric authorship as his Master's thesis at the University of California, Berkeley. He suggested that the reason Homer's epics seemed unlike other literature was because they were unlike other literature. Parry had discovered what Wood and Wolf had missed: the evidence that the poems had been transmitted orally was right there in the text itself. All those stylistic quirks, including the formulaic and recurring plot elements and the bizarrely repetitive epithets – "clever Odysseus" and "gray-eyed Athena" – that had always perplexed readers were actually like thumbprints left by a potter: material evidence of how the poems had been crafted. They were mnemonic* aids that helped the bard(s) fit the meter and pattern of the line, and remember the essence of the poems.

F The greatest author of antiquity was actually, Parry argued, just "one of a long tradition of oral poets that ... composed wholly without the aid of writing". Parry realised that if you were setting out to create memorable poems, the *Odyssey* and the *Iliad* were exactly the kind of poems you'd create. It's said that clichés* are the worst sin a writer can commit, but to an oral bard, they were essential. The very reason that clichés so easily seep into our speech and writing – their insidious memorability – is exactly why they played such an important role in oral storytelling. The principles that the oral bards discovered as they sharpened their stories through telling and retelling were the same mnemonic principles that psychologists rediscovered when they began conducting their first scientific experiments on memory around the turn of the twentieth century. Words that rhyme are much more memorable than words that don't, and concrete nouns are easier to remember than abstract ones. Finding patterns and structure in information is how our brains extract meaning from the world, and putting words to music and rhyme is a way of adding extra levels of pattern and structure to language.

Glossary

quirk: behaviour or a habit which seems to be unique to one person

ex nihilo: a Latin phrase used to express the idea of 'creation out of nothing'

bard: a person who composed and recited long, heroic poems

redacted: published

mnemonic: a sentence or short poem used for helping someone to remember something

cliché: a phrase or idea that is unoriginal because people use it very frequently

PART 3 — QUESTIONS

Questions 27-32

Reading Passage 3 has six paragraphs, A-F.

Which paragraph contains the following information?

NB You may use any letter more than once.

	A	B	C	D	E	F
27 the claim that the Odyssey and Iliad were not poems in their original form.	○	○	○	○	○	○
28 a theory involving the reinterpretation of the term 'author'	○	○	○	○	○	○
29 references to the fact that little is known about Homer's life	○	○	○	○	○	○
30 a comparison between the construction of Homer's poems and another art form	○	○	○	○	○	○
31 examples of the kinds of people employed to recall language	○	○	○	○	○	○
32 doubts regarding Homer's apparently inappropriate descriptions	○	○	○	○	○	○

Questions 33-34

Choose TWO letters, A-E.

33 **34** Which TWO of these points are made by the writer of the text about the Odyssey and the Iliad?

A ☐ They are sometimes historically inaccurate.

B ☐ It is uncertain which century they were written in.

C ☐ Their content is very similar.

D ☐ Later writers referred to them as ideal examples of writing.

E ☐ There are stylistic differences between them.

Questions 35-36

Choose TWO letters, A-E.

35 **36** Which TWO of the following theories does the writer of the text refer to?

A ☐ Homer wrote his work during a period of captivity.

B ☐ Neither the Odyssey nor the Iliad were written by Homer.

C ☐ Homer created the Odyssey and Iliad without writing them down.

D ☐ Homer may have suffered from a failing memory in later life.

E ☐ The oral and written versions of Homer's work may not be identical.

Questions 37-40

Complete the summary below.

Choose ONE WORD ONLY from the passage for each answer.

The importance of the spoken word and how words are remembered

Spoken poetry was once the means by which each **37** _____ of a particular culture or community could pass on its knowledge. Indeed, it has been suggested that it was the duty of a **38** _____ to know poetry so they would be informed about subjects such as politics and history.

Psychologists now know that when people are trying to remember information, they may find it difficult to remember words that express **39** _____ ideas. It is easier to remember words which sound similar or go together with **40** _____ .

Answer Key

#	Answer	Explanation
1	**FALSE**	However, his part in one of the greatest adventure stories of the 20th century is hardly known outside his own country, even by fellow explorers
2	**FALSE**	Shirase and his team sailed into Antarctica's Bay of Whales in the smallest ship ever to try its luck in these dangerous waters
3	**TRUE**	Like Amundsen, he initially set his sights on the North Pole
4	**TRUE**	For many of them, the question wasn't could he do it but why would it be worth doing
5	**NOT GIVEN**	So, like the British, Shirase presented his expedition as a search for knowledge: he would bring back fossils, make meteorological measurements and explore unknown parts of the continent
6	**FALSE**	The response from the government was cool, however, and Shirase struggled to raise funds
7	**NOT GIVEN**	Fortunately, a few months later, Japan's former prime minister Shigenobu Okuma came to Shirase's rescue. With Okuma's backing, Shirase got together just enough money to buy and equip a small ship. He eventually acquired a scientist, too, called Terutaro Takeda
8	**NOT GIVEN**	Bad weather delayed the expedition and they didn't reach New Zealand until 8 February; Amundsen and Scott had already been in Antarctica for a month, preparing for winter
9	**A**	Few doubted Shirase's courage, but most reckoned the expedition to be ill-prepared as the Japanese had only lightweight sledges for transport across the ice, made of bamboo and wood
10	**B**	The ice began to close in, threatening to trap them for the winter, an experience no one was likely to survive. With a remarkable piece of seamanship, the captain steered the ship out of the ice and turned north
11	**C**	With provisions for 20 days, he and four men would see how far they could get
12	**C**	For a week they struggled through one blizzard after another, holing up in their tents during the worst of the weather. The temperature fell to -25°C, and frostbite claimed some of the dogs

#	Answer	Explanation
13	**A**	Furthermore, they did it all without the advantages of the other teams and with no previous experience
14	**NOT GIVEN**	The next time you stand at the supermarket checkout, spare a thought for the farmers who helped fill your shopping basket as life is hard for them right now. This, in turn, inevitably means bigger grocery bills for consumers, and greater hardship for the millions in countries where food shortages are a matter of life and death
15	**YES**	Yet while farmers must squeeze more out of the land, they must also address the necessity of reducing their impact on the soil, waterways and atmosphere
16	**NO**	Each plant could get exactly the right amount of everything, no more or less, an approach that could slash chemical use and improve yields in one move
17	**NOT GIVEN**	But this is easier said than done; the largest farms in Europe and the U.S. can cover thousands of acres
18	**fertiliser / fertilizer**	One day, we might see fields with ‘agribots’ (agricultural robots) that can identify individual seedlings and encourage them along with drops of fertilizer
19	**lasers**	Other machines would distinguish problem weeds from crops and eliminate them with shots from high-power lasers or a microdot of pesticide
20	**cereals**	More than a century of mechanization has already turned farming into an industrial-scale activity in much of the world, with farms that grow cereals being the most heavily automated
21	**Communication**	This kind of communication is also being developed in other farm vehicles
22	**C**	Simon Blackmore, who researches agricultural technology at Harper Adams University College in England believes that fleets of lightweight autonomous robots have the potential to solve this problem and that replacing brute force with precision is key
23	**F**	‘While the population is growing and needs to be fed, a rapidly shrinking number of people are willing to work in agriculture,’ he points out
24	**H**	Calvin and Martin have observed how rising employment costs have led to the adoption of labour-saving farm technology in the past, citing the raisin industry as an example
25	**A**	Lewis Holloway, who studies agriculture at the University of Hull, UK, says that robotic milking is likely to influence the genetics of

#	Answer	Explanation
		dairy herds as farmers opt for ‘robot-friendly’ cows, with udder shape, and even attitudes, suited to automated milking. Similarly, he says, it’s conceivable that agribots could influence what fruit or vegetable varieties get to the shops, since farmers may prefer to grow those with, say, leaf shapes that are easier for their robots to discriminate from weeds
26	**D**	Almost inevitably, these machines will eventually alter the landscape, too. The real tipping point for robot agriculture will come when farms are being designed with agribots in mind, says Salah Sukkarieh, a robotics researcher at the Australian Center for Field Robotics, Sydney. This could mean a return to smaller fields, with crops planted in grids rather than rows and fruit trees pruned into two-dimensional shapes to make harvesting easier
27	**E**	They were, rather, a loose collection of songs transmitted by generations of Greek bards, and only redacted in their present form at some later date
28	**D**	Jean-Jacques Rousseau was one of the first modern critics to suggest that Homer might not have been an author in the contemporary sense of a single person who sat down and wrote a story and then published it for others to read
29	**C**	There were no historical records of Homer, and no trustworthy biography of the man exists beyond a few self-referential hints embedded in the texts themselves
30	**E**	All those stylistic quirks, including the formulaic and recurring plot elements and the bizarrely repetitive epithets – “clever Odysseus” and “gray-eyed Athena” – that had always perplexed readers were actually like thumbprints left by a potter: material evidence of how the poems had been crafted
31	**A**	In India, an entire class of priests was charged with memorizing the Vedas with perfect fidelity. In pre-Islamic Arabia, people known as Rawis were often attached to poets as official memorizers
32	**B**	Sometimes the epithets seemed completely off-key. Why call the murderer of Agamemnon “blameless Aegisthos”? Why refer to “swift-footed Achilles” even when he was sitting down? Or to “laughing Aphrodite” even when she was in tears
33	**C / D**	However, even as they were celebrated as the models to which all literature should aspire, Homer’s masterworks had also long been the source of scholarly unease The same narrative units – gathering armies, heroic shields, challenges between rivals – pop up again and again, only with different characters and different circumstances

#	Answer	Explanation
34	**C / D**	However, even as they were celebrated as the models to which all literature should aspire, Homer’s masterworks had also long been the source of scholarly unease The same narrative units – gathering armies, heroic shields, challenges between rivals – pop up again and again, only with different characters and different circumstances
35	**B / C**	In 1795, the German philologist Friedrich August Wolf argued for the first time that not only were Homer’s works not written down by Homer, but they weren’t even by Homer The greatest author of antiquity was actually, Parry argued, just “one of a long tradition of oral poets that composed wholly without the aid of writing”
36	**B / C**	In 1795, the German philologist Friedrich August Wolf argued for the first time that not only were Homer’s works not written down by Homer, but they weren’t even by Homer The greatest author of antiquity was actually, Parry argued, just “one of a long tradition of oral poets that composed wholly without the aid of writing”
37	**generation**	Until the last tick of history’s clock, cultural transmission meant oral transmission and poetry, passed from mouth to ear, was the principal medium of moving information across space and from one generation to the next
38	**citizen**	“massive repository of useful knowledge, a sort of encyclopedia of ethics, politics, history and technology which the effective citizen was required to learn as the core of his educational equipment”
39	**abstract**	Words that rhyme are much more memorable than words that don’t, and concrete nouns are easier to remember than abstract ones
40	**music**	Finding patterns and structure in information is how our brains extract meaning from the world, and putting words to music and rhyme is a way of adding extra levels of pattern and structure to language

Test 103

PASSAGE 1

You should spend about 20 minutes on Questions 1–13, which are based on Reading Passage 1 on the following pages.

Trees in trouble

What is causing the decline of the world's giant forests?

1

A Big trees are incredibly important ecologically. For a start, they sustain countless other species. They provide shelter for many animals, and their trunks and branches can become gardens, hung with green ferns, orchids and bromeliads, coated with mosses and draped with vines. With their tall canopies* basking in the sun, they capture vast amounts of energy. This allows them to produce massive crops of fruit, flowers and foliage that sustain much of the animal life in the forest.

2

B Only a small number of tree species have the genetic capacity to grow really big. The mightiest are native to North America, but big trees grow all over the globe, from the tropics to the boreal forests of the high latitudes. To achieve giant stature, a tree needs three things: the right place to establish its seedling, good growing conditions and lots of time with low adult mortality*. Disrupt any of these, and you can lose your biggest trees.

3

C In some parts of the world, populations of big trees are dwindling because their seedlings cannot survive or grow. In southern India, for instance, an aggressive non-native shrub, Lantana camara, is invading the floor of many forests. Lantana grows so thickly that young trees often fail to take root. With no young trees to replace them, it is only a matter of time before most of the big trees disappear. Across much of northern Australia, gamba grass from Africa is overrunning native savannah woodlands. The grass grows up to four metres tall and burns fiercely, creating super-hot fires that cause catastrophic tree mortality.

4

D Without the right growing conditions trees cannot get really big, and there is some evidence to suggest tree growth could slow in a warmer world, particularly in environments that are

already warm. Having worked for decades at La Selva Biological Station in Puerto Viejo de Sarapiqui, Costa Rica, David and Deborah Clark and colleagues have shown that tree growth there declines markedly in warmer years. “During the day, their photosynthesis* shuts down when it gets too warm, and at night they consume more energy because their metabolic rate increases, much as a reptile's would when it gets warmer,” explains David Clark. With less energy produced in warmer years and more being consumed just to survive, there is even less energy available for growth.

5

E The Clarks' hypothesis, if correct, means tropical forests would shrink over time. The largest, oldest trees would progressively die off and tend not to be replaced. According to the Clarks, this might trigger a destabilisation of the climate; as older trees die, forests would release some of their stored carbon into the atmosphere, prompting a vicious cycle of further warming, forest shrinkage and carbon emissions.

6

F Big trees face threats from elsewhere. The most serious is increasing mortality, especially of mature trees. Across much of the planet, forests of slow-growing ancient trees have been cleared for human use. In western North America, most have been replaced by monocultures of fast-growing conifers. Siberia's forests are being logged at an incredible rate. Logging in tropical forests is selective but the timber cutters usually prioritise the biggest and oldest trees. In the Amazon, my colleagues and I found the mortality rate for the biggest trees had tripled in small patches of rainforest surrounded by pasture land. This happens for two reasons. First, as they grow taller, big trees become thicker and less flexible: when winds blow across the surrounding cleared land, there is nothing to stop their acceleration. When they hit the trees, the impact can snap them in half. Second, rainforest fragments dry out when surrounded by dry, hot pastures and the resulting drought can have devastating consequences: one four-year study has shown that death rates will double for smaller trees but will increase 4.5 times for bigger trees.

7

G Particular enemies to large trees are insects and disease. Across vast areas of western North America, increasingly mild winters are causing massive outbreaks of bark beetle. These tiny creatures can kill entire forests as they tunnel their way through the inside of trees. In both North America and Europe, fungus-causing diseases such as Dutch elm disease have killed off millions of stately trees that once gave beauty to forests and cities. As a result of human activity, such enemies reach even the remotest corners of the world, threatening to make the ancient giants a thing of the past.

PART 1 — QUESTIONS

Questions 1-7

Reading Passage 1 has seven paragraphs, A–G.

Choose the correct heading for each paragraph from the list of headings below.

Write the correct number, i–x.

i. **How deforestation harms isolated trees**

ii. **How other plants can cause harm**

iii. **Which big trees support the most diverse species**

iv. **Impact of big tree loss on the wider environment**

v. **Measures to prevent further decline in big tree populations**

vi. **How wildlife benefits from big trees**

vii. **Risk from pests and infection**

viii. **Ways in which industry uses big tree products**

ix. **How higher temperatures slow the rate of tree growth**

x. **Factors that enable trees to grow to significant heights**

Questions 8-13

Complete the sentences below.

Choose NO MORE THAN TWO WORDS from the passage for each answer.

- The biggest trees in the world can be found in **8** _____.
- Some trees in northern Australia die because of **9** _____ made worse by gamba grass.
- The Clarks believe that the release of **10** _____ from dead trees could lead to the death of more trees.
- Strong **11** _____ are capable of damaging tall trees in the Amazon.
- **12** _____ has a worse impact on tall trees than smaller ones.
- In western Northern America, a species of **13** _____ has destroyed many trees.

PASSAGE 2

You should spend about 20 minutes on Questions 14–26, which are based on Reading Passage 2 below.

Whale Strandings

Why do whales leave the ocean and become stuck on beaches?

When the last stranded whale of a group eventually dies, the story does not end there. A team of researchers begins to investigate, collecting skin samples for instance, recording anything that could help them answer the crucial question: why? Theories abound, some more convincing than others. In recent years, navy sonar has been accused of causing certain whales to strand. It is known that noise pollution from offshore industry, shipping and sonar can impair underwater communication, but can it really drive whales onto our beaches?

In 1998, researchers at the Pelagos Cetacean Research Institute, a Greek non-profit scientific group, linked whale strandings with low-frequency sonar tests being carried out by the North Atlantic Treaty Organisation (NATO). They recorded the stranding of 12 Cuvier's beaked whales over 38.2 kilometres of coastline. NATO later admitted it had been testing new sonar technology in the same area at the time as the strandings had occurred. 'Mass' whale strandings involve four or more animals. Typically they all wash ashore together, but in mass atypical strandings (such as the one in Greece), the whales don't strand as a group; they are scattered over a larger area.

For humans, hearing a sudden loud noise might prove frightening, but it does not induce mass fatality. For whales, on the other hand, there is a theory on how sonar can kill. The noise can surprise the animal, causing it to swim too quickly to the surface. The result is decompression sickness, a hazard human divers know all too well. If a diver ascends too quickly from a high-pressure underwater environment to a lower-pressure one, gases dissolved in blood and tissue expand and form bubbles. The bubbles block the flow of blood to vital organs, and can ultimately lead to death.

Plausible as this seems, it is still a theory and based on our more comprehensive knowledge of land-based animals. For this reason, some scientists are wary. Whale expert Karen Evans is one such scientist. Another is Rosemary Gales, a leading expert on whale strandings. She says sonar technology cannot always be blamed for mass strandings. "It's a case-by-case situation. Whales have been stranding for a very long time – pre-sonar." And when 80% of all Australian whale strandings occur around Tasmania, Gales and her team must continue in the search for answers.

When animals beach next to each other at the same time, the most common cause has nothing to do with humans at all. “They're highly social creatures," says Gales. “When they mass strand – it's complete panic and chaos. If one of the group strands and sounds the alarm, others will try to swim to its aid, and become stuck themselves.”

Activities such as sonar testing can hint at when a stranding may occur, but if conservationists are to reduce the number of strandings, or improve rescue operations, they need information on where strandings are likely to occur as well. With this in mind, Ralph James, physicist at the University of Western Australia in Perth, thinks he may have discovered why whales turn up only on some beaches. In 1986 he went to Augusta, Western Australia, where more than 100 false killer whales had beached. "I found out from chatting to the locals that whales had been stranding there for decades. So I asked myself, what is it about this beach?" From this question that James pondered over 20 years ago, grew the university's Whale Stranding Analysis Project.

Data has since revealed that all mass strandings around Australia occur on gently sloping sandy beaches, some with inclines of less than 0.5%. For whale species that depend on an echolocation system to navigate, this kind of beach spells disaster. Usually, as they swim, they make clicking noises, and the resulting sound waves are reflected in an echo and travel back to them. However, these just fade out on shallow beaches, so the whale doesn't hear an echo and it crashes onto the shore.

But that is not all. Physics, it appears, can help with the when as well as the where. The ocean is full of bubbles. Larger ones rise quickly to the surface and disappear, whilst smaller ones – called microbubbles – can last for days. It is these that absorb whale ‘clicks’. “Rough weather generates more bubbles than usual,” James adds. So, during and after a storm, echolocating whales are essentially swimming blind.

Last year was a bad one for strandings in Australia. Can we predict if this – or any other year – will be any better? Some scientists believe we can. They have found trends which could be used to forecast 'bad years' for strandings in the future. In 2005, a survey by Klaus Vanselow and Klaus Ricklefs of sperm whale strandings in the North Sea even found a correlation between these and the sunspot cycle, and suggested that changes in the Earth's magnetic field might be involved. But others are sceptical. "Their study was interesting ... but the analyses they used were flawed on a number of levels,” says Evans. In the same year, she co-authored a study on Australian strandings that uncovered a completely different trend. "We analysed data from 1920 to 2002 ... and observed a clear periodicity in the number of whales stranded each year that coincides with a major climatic cycle." To put it more simply, she says, in the years when strong westerly and southerly winds bring cool water rich in nutrients closer to the Australia coast, there is an increase in the number of fish. The whales follow.

So what causes mass strandings? “It's probably many different components,” says James. And he is probably right. But the point is we now know what many of those components are.

PART 2 — QUESTIONS

Questions 14-17

Choose NO MORE THAN TWO WORDS from the passage for each answer.

14 What do researchers often take from the bodies of whales? _____

15 What do some industries and shipping create that is harmful to whales? _____

16 In which geographical region do most whale strandings in Australia happen?

_____

17 Which kind of whale was the subject of a study in the North Sea? _____

Questions 18-21

Label the diagram below.

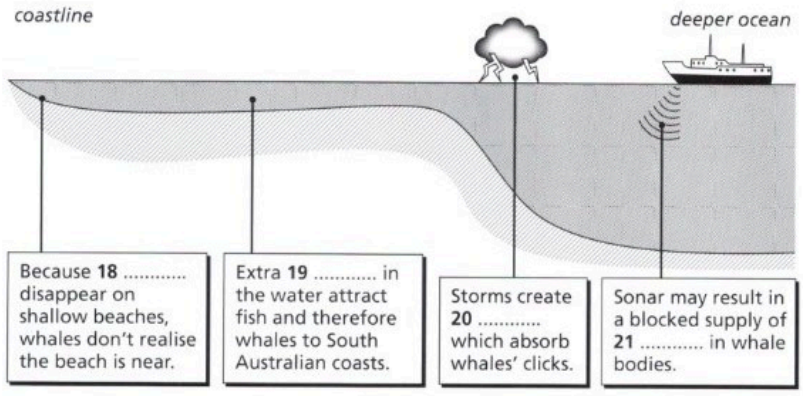
Choose NO MORE THAN TWO WORDS from the passage for each answer.

Questions 18–21

Label the diagram below.

*Choose **NO MORE THAN TWO WORDS** from the passage for each answer.*

Write your answers in boxes 18–21 on your answer sheet.



18 _____

19 _____

20 _____

21 _____

Questions 22-26

Do the following statements agree with the information given in Reading Passage 2?

Write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

22 The aim of the research by the Pelagos Institute in 1998 was to prove that navy sonar was responsible for whale strandings.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

23 The whales stranded in Greece were found at different points along the coast.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

24 Rosemary Gales has questioned the research techniques used by the Greek scientists.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

25 According to Gales, whales are likely to try to help another whale in trouble.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

26 There is now agreement amongst scientists that changes in the Earth's magnetic fields contribute to whale strandings.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

PASSAGE 3

You should spend about 20 minutes on Questions 27–40, which are based on Reading Passage 3 below.

Science in Space

How will NASA transform the International Space Station from a building site into a cutting-edge research laboratory?

A premier, world-class laboratory in low Earth orbit. That was how the National Aeronautics and Space Administration agency (NASA) sold the International Space Station (ISS) to the US Congress in 2001. Today no one can doubt the agency's technological ambition. The most complex engineering project ever attempted has created an enormous set of interlinked modules that orbits the planet at more than 27,000 kilometres per hour. It might be travelling fast but, say critics, as a lab it is going nowhere. So far, it has gone through $150 billion.

So where should its future priorities lie? This question was addressed at the recent 1st annual ISS research and development conference in Colorado. Among the presenters was Satoshi Iwase of Aichi Medical University in Japan who has spent several years developing an experiment that could help solve one of the key problems that humans will face in space: keeping our bodies healthy in weightlessness. One thing that physiologists have learned is that without gravity our bodies begin to lose strength, leaving astronauts with weakened bones, muscles and cardiovascular systems. To counter these effects on a long-duration mission to, say, Mars, astronauts will almost certainly need to create their own artificial gravity. This is where Iwase comes in. He leads a team designing a centrifuge for humans. In their preliminary design, an astronaut is strapped into the seat of a machine that resembles an exercise bike. Pedalling provides a workout for the astronaut's muscles and cardiovascular system, but it also causes the seat to rotate vertically around a central axis so the rider experiences artificial gravity while exercising.

The centrifuge project highlights the station's potential as a research lab. Similar machines have flown in space aboard NASA's shuttles, but they couldn't be tested for long enough to prove whether they were effective. It's been calculated that to properly assess a centrifuge's impact on human physiology, astronauts would have to ride it for 30 minutes a day for at least two months. 'The only way to test this is in weightlessness, and the only time we have to do that is on the space station,' says Laurence Young, a space medicine expert at the Massachusetts Institute of Technology.

There are certainly plenty of ideas for other experiments: but many projects have yet to fly. Even if the centrifuge project gets the green light, it will have to wait another five years before the station's crew can take a spin. Lengthy delays like this are one of the key challenges for NASA, according to an April 2011 report from the US National Academy of Sciences. Its authors said they were 'deeply concerned' about the state of NASA's science research, and made a number of recommendations. Besides suggesting that the agency reduces the time between

approving experiments and sending them into space, it also recommended setting clearer research priorities.

NASA has already begun to take action, hiring management consultants ProOrbis to develop a plan to cut through the bureaucracy. And Congress also directed NASA to hire an independent organisation, the Centre for the Advancement of Science in Space (CASIS), to help manage the station's US lab facilities. One of CASIS's roles is to convince public and private investors that science on the station is worth the spend because judged solely by the number of papers published, the ISS certainly seems poor value: research on the station has generated about 3,100 papers since 1998. The Hubble Space Telescope, meanwhile, has produced more than 11,300 papers in just over 20 years, yet it cost less than one-tenth of the price of the space station.

Yet Mark Uhran, assistant associate administrator for the ISS, refutes the criticism that the station hasn't done any useful research. He points to progress made on a salmonella vaccine, for example. To get the ISS research back on track, CASIS has examined more than 100 previous microgravity experiments to identify promising research themes. From this, it has opted to focus on life science and medical research, and recently called for proposals for experiments on muscle wasting, osteoporosis and the immune system. The organisation also maintains that the ISS should be used to develop products with commercial application and to test those that are either close to or already on the market. Investment from outside organisations is vital, says Uhran, and a balance between academic and commercial research will help attract this.

The station needs to attract cutting-edge research, yet many scientists seem to have little idea what goes on aboard it. Jeanne DiFrancesco at ProOrbis conducted more than 200 interviews with people from organisations with potential interests in low gravity studies. Some were aware of the ISS but they didn't know what's going on up there, she says. 'Others know there's science, but they don't know what kind.'

According to Alan Stern, planetary scientist, the biggest public relations boost for the ISS may come from the privately funded space flight industry. Companies like SpaceX could help NASA and its partners when it comes to resupplying the ISS, as it suggests it can reduce launch costs by two-thirds. Virgin Atlantic's SpaceShipTwo or Zero2Infinity's high-altitude balloon could also boost the space station's fortunes. They might not come close to the ISS's orbit, yet Stern believes they will revolutionise the way we, the public, see space. Soon everyone will be dreaming of interplanetary travel again, he predicts. More importantly, scientists are already queuing for seats on these low-gravity space-flight services so they can collect data during a few minutes of weightlessness. This demand for low-cost space flight could eventually lead to a service running on a more frequent basis, giving researchers the chance to test their ideas before submitting a proposal for experiments on the ISS. Getting flight experience should help them win a slot on the station, says Stern.

PART 3 — QUESTIONS

Questions 27-30

Choose the correct letter, A, B, C or D.

27 What does the writer state about the ISS in the first paragraph?

- **A** ○ Its manufacture has remained within the proposed budget.
- **B** ○ It is a great example of technological achievement.
- **C** ○ There are doubts about the speed it has attained.
- **D** ○ NASA should have described its purpose more accurately.

28 What are we told about Satoshi Iwase's experimental machine?

- **A** ○ It is based on conventional exercise equipment.
- **B** ○ It was originally commissioned by NASA.
- **C** ○ It is designed only to work in low-gravity environments.
- **D** ○ It has benefits that Iwase did not anticipate.

29 The writer refers to the Hubble Space Telescope in order to

- **A** ○ show why investment in space technology has decreased.
- **B** ○ highlight the need to promote the ISS in a positive way.
- **C** ○ explain which kind of projects are more likely to receive funding.
- **D** ○ justify the time required for a space project to produce results.

30 In the sixth paragraph, we are told that CASIS has

- **A** ○ rejected certain applications for experiments on the ISS.
- **B** ○ expressed concern about testing products used for profit.
- **C** ○ questioned the benefits of some of the projects currently on the ISS.
- **D** ○ invited researchers to suggest certain health-based projects.

Questions 31-35

Look at the following opinions and the list of people below.

Match each opinion with the correct person, A, B, C or D.

NB You may use any letter more than once.

A. Laurence Young

B. Authors of the US National Academy of Sciences report

C. Mark Uhran

D. Jeanne DiFrancesco

	A	B	C	D
31 The ISS should be available for business-related ventures.	○	○	○	○
32 There is general ignorance about what kinds of projects are possible on the ISS.	○	○	○	○
33 The process of getting accepted projects onto the ISS should be speeded up.	○	○	○	○
34 Some achievements of the ISS are underrated.	○	○	○	○
35 To properly assess new space technology, there has to be an absence of gravity.	○	○	○	○

Questions 36-39

Complete the summary using the lists of words, A–H, below.

Write the correct letter, A–H.

The influence of commercial space flight on the ISS

According to Alan Stern, private space companies could affect the future of the ISS. He believes they could change its image; firstly because sending food and equipment there would be more **36** _____ if a commercial craft were used, and secondly, because commercial flights might make the whole idea of space exploration seem **37** _____ to ordinary people. Another point is that as the demand for space

flights increases, there is a chance of them becoming more **38** _____ . And by working on a commercial flight first, scientists would be more **39** _____ if an ISS position came up.

A. **safe** B. **competitive** C. **flexible** D. **real** E. **rapid** F. **regular** G. **suitable** H. **economical**

Questions 40-40

Choose the correct letter, A, B, C or D.

40 The writer's purpose in writing this article is to

A ○ promote the advantages of space flight in general.

B ○ illustrate how the ISS could become more effective.

C ○ criticise the ISS for its narrow-minded attitude.

D ○ contrast useful and worthless space projects.

Answer Key

#	Answer	Explanation
1	**vi**	They provide shelter for many animals, and their trunks and branches can become gardens, hung with green ferns, orchids and bromeliads, coated with mosses and draped with vines. With their tall canopies* basking in the sun, they capture vast amounts of energy. This allows them to produce massive crops of fruit, flowers and foliage that sustain much of the animal life in the forest
2	**x**	To achieve giant stature, a tree needs three things: the right place to establish its seedling, good growing conditions and lots of time with low adult mortality
3	**ii**	In southern India, for instance, an aggressive non-native shrub, Lantana camara, is invading the floor of many forests. Lantana grows so thickly that young trees often fail to take root. With no young trees to replace them, it is only a matter of time before most of the big trees disappear. Across much of northern Australia, gamba grass from Africa is overrunning native savannah woodlands
4	**ix**	Without the right growing conditions trees cannot get really big, and there is some evidence to suggest tree growth could slow in a warmer world, particularly in environments that are already warm
5	**iv**	According to the Clarks, this might trigger a destabilisation of the climate; as older trees die, forests would release some of their stored carbon into the atmosphere, prompting a vicious cycle of further warming, forest shrinkage and carbon emissions
6	**i**	First, as they grow taller, big trees become thicker and less flexible: when winds blow across the surrounding cleared land, there is nothing to stop their acceleration. When they hit the trees, the impact can snap them in half. Second, rainforest fragments dry out when surrounded by dry, hot pastures and the resulting drought can have devastating consequences: one four-year study has shown that death rates will double for smaller trees but will increase 4.5 times for bigger trees
7	**vii**	Particular enemies to large trees are insects and disease
8	**North America**	The mightiest are native to North America, but big trees grow all over the globe, from the tropics to the boreal forests of the high latitudes

#	Answer	Explanation
9	**(super-hot) fires**	Across much of northern Australia, gamba grass from Africa is overrunning native savannah woodlands. The grass grows up to four metres tall and burns fiercely, creating super-hot fires that cause catastrophic tree mortality
10	**(stored) carbon**	According to the Clarks, this might trigger a destabilisation of the climate; as older trees die, forests would release some of their stored carbon into the atmosphere, prompting a vicious cycle of further warming, forest shrinkage and carbon emissions
11	**winds**	In the Amazon, my colleagues and I found the mortality rate for the biggest trees had tripled in small patches of rainforest surrounded by pasture land. This happens for two reasons. First, as they grow taller, big trees become thicker and less flexible: when winds blow across the surrounding cleared land, there is nothing to stop their acceleration. When they hit the trees, the impact can snap them in half
12	**Drought**	Second, rainforest fragments dry out when surrounded by dry, hot pastures and the resulting drought can have devastating consequences: one four-year study has shown that death rates will double for smaller trees but will increase 4.5 times for bigger trees
13	**beetle**	Across vast areas of western North America, increasingly mild winters are causing massive outbreaks of bark beetle. These tiny creatures can kill entire forests as they tunnel their way through the inside of trees
14	**skin/skin samples**	A team of researchers begins to investigate, collecting skin samples for instance, recording anything that could help them answer the crucial question: why
15	**noise/noise pollution**	It is known that noise pollution from offshore industry, shipping and sonar can impair underwater communication, but can it really drive whales onto our beaches
16	**(around) Tasmania**	And when 80% of all Australian whale strandings occur around Tasmania, Gales and her team must continue in the search for answers
17	**sperm/sperm whale(s)**	In 2005, a survey by Klaus Vanselow and Klaus Ricklefs of sperm whale strandings in the North Sea even found a correlation between these and the sunspot cycle, and suggested that changes in the Earth’s magnetic field might be involved
18	**sound waves**	Usually, as they swim, they make clicking noises, and the resulting sound waves are reflected in an echo and travel back to them

#	Answer	Explanation
19	**nutrients**	To put it more simply, she says, in the years when strong westerly and southerly winds bring cool water rich in nutrients closer to the Australia coast, there is an increase in the number of fish
20	**microbubbles**	The ocean is full of bubbles. Larger ones rise quickly to the surface and disappear, whilst smaller ones – called microbubbles – can last for days. It is these that absorb whale 'clicks'
21	**blood**	If a diver ascends too quickly from a high-pressure underwater environment to a lower-pressure one, gases dissolved in blood and tissue expand and form bubbles. The bubbles block the flow of blood to vital organs, and can ultimately lead to death
22	**NOT GIVEN**	In 1998, researchers at the Pelagos Cetacean Research Institute, a Greek non-profit scientific group, linked whale strandings with low-frequency sonar tests being carried out by the North Atlantic Treaty Organisation (NATO)
23	**TRUE**	Typically they all wash ashore together, but in mass atypical strandings (such as the one in Greece), the whales don't strand as a group; they are scattered over a larger area
24	**NOT GIVEN**	In 1998, researchers at the Pelagos Cetacean Research Institute, a Greek non-profit scientific group, linked whale strandings with low-frequency sonar tests being carried out by the North Atlantic Treaty Organisation (NATO) Another is Rosemary Gales, a leading expert on whale strandings. She says sonar technology cannot always be blamed for mass strandings
25	**TRUE**	If one of the group strands and sounds the alarm, others will try to swim to its aid, and become stuck themselves
26	**FALSE**	But others are sceptical. "Their study was interesting but the analyses they used were flawed on a number of levels," says Evans
27	**B**	Today no one can doubt the agency's technological ambition. The most complex engineering project ever attempted has created an enormous set of interlinked modules that orbits the planet at more than 27,000 kilometres per hour
28	**A**	In their preliminary design, an astronaut is strapped into the seat of a machine that resembles an exercise bike

#	Answer	Explanation
29	**B**	One of CASIS's roles is to convince public and private investors that science on the station is worth the spend because judged solely by the number of papers published, the ISS certainly seems poor value: research on the station has generated about 3,100 papers since 1998. The Hubble Space Telescope, meanwhile, has produced more than 11,300 papers in just over 20 years, yet it cost less than one-tenth of the price of the space station
30	**D**	From this, it has opted to focus on life science and medical research, and recently called for proposals for experiments on muscle wasting, osteoporosis and the immune system
31	**C**	Investment from outside organisations is vital, says Uhran, and a balance between academic and commercial research will help attract this
32	**D**	Some were aware of the ISS but they didn't know what's going on up there, she says. 'Others know there's science, but they don't know what kind.'
33	**B**	Besides suggesting that the agency reduces the time between approving experiments and sending them into space, it also recommended setting clearer research priorities
34	**C**	Yet Mark Uhran, assistant associate administrator for the ISS, refutes the criticism that the station hasn't done any useful research
35	**A**	'The only way to test this is in weightlessness, and the only time we have to do that is on the space station,' says Laurence Young, a space medicine expert at the Massachusetts Institute of Technology
36	**H**	Companies like SpaceX could help NASA and its partners when it comes to resupplying the ISS, as it suggests it can reduce launch costs by two-thirds
37	**D**	Stern believes they will revolutionise the way we, the public, see space. Soon everyone will be dreaming of interplanetary travel again, he predicts
38	**F**	This demand for low-cost space flight could eventually lead to a service running on a more frequent basis
39	**G**	Getting flight experience should help them win a slot on the station, says Stern
40	**B**	How will NASA transform the International Space Station from a building site into a cutting-edge research laboratory

Test 104

PASSAGE 1

Read the text below and answer questions 1-13.

Why Are Finland’s Schools Successful?

The country’s achievements in education have other nations doing their homework

1

A. At Kirkkojarvi Comprehensive School in Espoo, a suburb west of Helsinki, Kari Louhivuori, the school’s principal, decided to try something extreme by Finnish standards. One of his sixth-grade students, a recent immigrant, was falling behind, resisting his teacher’s best efforts. So he decided to hold the boy back a year. Standards in the country have vastly improved in reading, math and science literacy over the past decade, in large part because its teachers are trusted to do whatever it takes to turn young lives around. ‘I took Besart on that year as my private student,' explains Louhivuori. When he was not studying science, geography and math, Besart was seated next to Louhivuori's desk, taking books from a tall stack, slowly reading one, then another, then devouring them by the dozens. By the end of the year, he had conquered his adopted country’s vowel-rich language and arrived at the realization that he could, in fact, learn.

2

B. This tale of a single rescued child hints at some of the reasons for Finland’s amazing record of education success. The transformation of its education system began some 40 years ago but teachers had little idea it had been so successful until 2000. In this year, the first results from the Programme for International Student Assessment (PISA), a standardized test given to 15yearolds in more than 40 global venues, revealed Finnish youth to be the best at reading in the world. Three years later, they led in math. By 2006, Finland was first out of the 57 nations that participate in science. In the latest PISA scores, the nation came second in science, third in reading and sixth in math among nearly half a million students worldwide.

3

C. In the United States, government officials have attempted to improve standards by introducing marketplace competition into public schools. In recent years, a group of Wall Street financiers and philanthropists such as Bill Gates have put money behind private sector ideas, such as charter schools, which have doubled in number in the past decade. President Obama, too, apparently thought competition was the answer. One policy invited states to compete for federal dollars using tests and other methods to measure teachers, a philosophy that would not

be welcome in Finland. ‘I think, in fact, teachers would tear off their shirts,’ said Timo Heikkinen, a Helsinki principal with 24 years of teaching experience. ‘If you only measure the statistics, you miss the human aspect.’

4

D. There are no compulsory standardized tests in Finland, apart from one exam at the end of students’ senior year in high school. There is no competition between students, schools or regions. Finland’s schools are publicly funded. The people in the government agencies running them, from national officials to local authorities, are educators rather than business people or politicians. Every school has the same national goals and draws from the same pool of university trained educators. The result is that a Finnish child has a good chance of getting the same quality education no matter whether he or she lives in a rural village or a university town.

5

E. It’s almost unheard of for a child to show up hungry to school. Finland provides three years of maternity leave and subsidized day care to parents, and preschool for all five-year-olds, where the emphasis is on socializing. In addition, the state subsidizes parents, paying them around 150 euros per month for every child until he or she turns 17. Schools provide food, counseling and taxi service if needed. Health care Is even free for students taking degree courses.

6

F. Finland’s schools were not always a wonder. For the first half of the twentieth century, only the privileged got a quality education. But In 1963, the Finnish Parliament made the bold decision to choose public education as the best means of driving the economy forward and out of recession. Public schools were organized into one system of comprehensive schools for ages 7 through 16. Teachers from all over the nation contributed to a national curriculum that provided guidelines, not prescriptions, for them to refer to. Besides Finnish and Swedish (the country’s second official language), children started learning a third language (English Is a favorite) usually beginning at age nine. The equal distribution of equipment was next, meaning that all teachers had their fair share of teaching resources to aid learning. As the comprehensive schools Improved, so did the upper secondary schools (grades 10 through 12). The second critical decision came In 1979, when it was required that every teacher gain a fifth-year Master’s degree In theory and practice, paid for by the state. From then on, teachers were effectively granted equal status with doctors and lawyers. Applicants began flooding teaching programs, not because the salaries were so high but because autonomous decision-making and respect made the job desirable. And as Louhivuori explains, ‘We have our own motivation to succeed because we love the work.’

PART 1 — QUESTIONS

Questions 1-6

Choose the correct heading for each paragraph from the list of headings below.

Write the correct number, i-ix.

i. **A business-model approach to education**

ii. **The reforms that improved education in Finland**

iii. **Educational challenges of the future**

iv. **Ways in which equality is maintained in the Finnish education system**

v. **The benefits of the introduction of testing**

vi. **An approach that helped a young learner**

vii. **Statistical proof of education success**

viii. **Support for families working and living in Finland**

ix. **The impact of the education system on Finland's economy**

Questions 7-13

Complete the notes below.

Choose NO MORE THAN TWO WORDS AND/OR A NUMBER from the passage for each answer.

PISA tests

- In the most recent tests, Finland's top subject was **7** _____ .

History

1963:

- A new school system was needed to improve Finland's **8** _____ .
- Schools followed **9** _____ that were created partly by teachers.
- Young pupils had to study an additional **10** _____ .
- All teachers were given the same **11** _____ to use.

1979:

- Teachers had to get a **12** _____ but they did not have to pay for this.
- Applicants were attracted to the **13** _____ that teaching received.

PASSAGE 2

Read the text below and answer questions 14-26.

Australia's Lost Giants

A. The Victorian Cave was explored by a fossil hunter named Rod Wells, who came to Naracoorte, South Australia, in 1969. The narrow passages, which were distinctly clawed, led to huge chambers. The ground had red soil, and the floor was bedraggled with strange objects. It took Wells a moment to acknowledge that what he was checking out were the bones of thousands of animals that might have fallen from openings in the ground above and gotten stuck. Compared to the mammals found today in Australia, some of the oldest were far more sizable. These bones belonged to Australian megafauna—giant mammals of the Pleistocene epoch. Across the continent, in boneyards, fossils of a giant snake, a huge flightless bird, and a seven-foot kangaroo, to give some examples, were discovered by scientists. Considering the amount of light cast on the extinction of the dinosaurs, it's surprising that a little has been discovered about megafauna. Prehistoric humans never harmed Tyrannosaurus rex with spears, although they did hunt mammoths and mastodons.

B. Soon after the arrival of humans, the extinction of megafauna in America, including mammoths, saber-toothed cats, and gigantic sloths, occurred around 13,000 years ago. A paleoecologist named Paul Martin published a hypothesis known as the "blitzkrieg hypothesis" in the 1960s. Modern people caused chaos in the Americas by killing animals with spears. These animals had never seen a smart predator before, so they couldn't defend themselves.But this period of extinction was not complete. On the continent, North America retained its deer, black bears, and a small type of bison, and on the continent, South America had its jaguars and llamas.

C. It is confounding to witness the melancholy of Australia's large animals. For quite a long time, researchers put aside any other causes for extinction other than environmental changes. To be sure, Australia has been drying out for more than 1,000,000 years, and the megafauna were confronted with a landmass where vegetation had started to vanish. Tim Flannery, an Australian paleontologist, proposed that people who moved onto the continent around 50 centuries ago used fire to hunt. This was accompanied by deforestation. Something worrisome occurred to Australia's predominant land animals-somewhere around 46,000 years ago, not long after the intrusion of a profoundly wise hunter with excellent tools.

D. The controversy over megafauna revolves around the methods for dating old bones and the sediments in which they are buried. Only if scholars can demonstrate that the extinction of megafauna occurred within a few centuries, or possibly a couple thousand years, of the emergence of humans would the argument be strengthened-regardless of whether it was merely coincidental. Cuddie Springs in New South Wales can demonstrate this case without a shadow of a doubt. Judith Field, an archaeologist, is currently the most vocal. In 1991, she discovered megafauna bones as well as stone tools. This was a significant discovery. She claims there are two strata displaying the affiliation, one around 30,000 years old and the other around 35,000 years old. This suggests that people and megafauna coexisted in Australia for at

least 20 thousand years. "What Cuddie Springs reveals is that you have a long cross-over of people and megafauna that existed together," Field added. Critics argue that the original locations of fossils were altered and were replaced by younger sediments.

E. Another renowned boneyard in a similar area is a spot called Wellington Caverns,Diprotodon, the largest known marsupial (an animal that, like kangaroos and koalas, bears its young in a pouch), was discovered.In 1830 a regional officer, George Rankin lowered down himself into the cave utilizing a rope snared to a hole in a cave wall. The hole was actually a bone. 12 months later a surveyor, Thomas Mitchell examined the caves in the area and gave Richard Owen, British paleontologist , who was recognised later for unraveling the existence of dinosaurs. extinct marsupial's cave bones were found in Wellington. In 1909 and 1915 sediments in Mammoth Cave that consisted of fossils were dug out and studied in haphazard manner as a result of this no scolar agreed with these findings. Yet, a single bone particularly captured dramatic attention : a femur with a wound in it, possibly left there by a sharp tool.

F. Sadly, the Earth conserves its history in a chaotic manner.Bones degrade , the land erodes, the climate changes, the mere existence of forests is uncertain , rivers change their course and the history slowly gets disguised. Sadly, the Earth conserves its history in a chaotic manner. The storys constructed from time to time have limited information. Various rock art portrayed Australia's first people. The paintings of Palorchestes, a megafauna marsupial , on rock, in far northern Australia, was examined by Peter Murray, a Paleontologist. In Western Australia another site shows what seems to be a hunter with either a marsupial lion ; in the more recent historical era, the marsupial lion went extinct as they were bigger. "Every stage of the procedure requires analysis. The information does not speak for itself." said Murray .

PART 2 — QUESTIONS

Questions 14-18

Which paragraphs contain the following information? Every question has only one answer but you may use any of the letters A-F for more than one question. Circle the correct letters in your answer sheet.

	A	B	C	D	E	F
14 descriptions of naturally occurring events that make the past hard to trace	○	○	○	○	○	○
15 an account of the discovery of a particular animal which had died out	○	○	○	○	○	○
16 the reason why a variety of animals all died in the same small area	○	○	○	○	○	○
17 the suggestion that a procedure to uncover fossilized secrets was inappropriate	○	○	○	○	○	○
18 examples of the kinds of animals that did not die out as a result of hunting	○	○	○	○	○	○

Questions 19-20

Choose TWO letters from A-E

19 **20** Which TWO of these possible reasons for Australian megafauna extinction are mentioned in the text?Choose TWO letters from A-E

- **A** ☐ human activity
- **B** ☐ disease
- **C** ☐ loss of habitat
- **D** ☐ a drop in temperature
- **E** ☐ the introduction of new animal species

Questions 21-22

Choose TWO letters A-E.

21 **22** The list below shows possible forms of proof for humans having contact with Australian megafauna. Which TWO possible forms of proof does the writer say have been found in Australia?

- **A** ☐ bone injury caused by a man-made object
- **B** ☐ bones near to early types of weapons
- **C** ☐ man-made holes designed for trapping animals
- **D** ☐ preserved images of megafauna species
- **E** ☐ animal remains at camp fires

Questions 23-26

Do the following statements agree with the information given in the Reading Passage?

TRUE if the statement agrees with the information

FALSE if the statement contradicts the informations

NOT GIVEN if there is no information on this

23 Extinct megafauna should receive more attention than the extinction of the dinosaurs.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

24 There are problems with Paul Martin's 'blitzkrieg' hypothesis for the Americas.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

25 The Aborigines should have found a more effective way to protest about Flannery's book.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

26 There is sufficient evidence to support Tim Flannery's ideas about megafauna extinction.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

PASSAGE 3

Read the text below and answer questions 27-40.

The Swiffer

For a fascinating tale about creativity, look at a cleaning product called the Swiffer and how it came about, urges writer Jonah Lehrer. In the story of the Swiffer, he argues, we have the key elements in producing breakthrough ideas: frustration, moments of insight and sheer hard work. The story starts with a multinational company which had invented products for keeping homes spotless, and couldn't come up with better ways to clean floors, so it hired designers to watch how people cleaned. Frustrated after hundreds of hours of observation, they one day noticed a woman do with a paper towel what people do all the time: wipe something up and throw it away. An idea popped into lead designer Harry West's head: the solution to their problem was a floor mop with a disposable cleaning surface. Mountains of prototypes and years of teamwork later, they unveiled the Swiffer, which quickly became a commercial success.

Lehrer, the author of Imagine, a new book that seeks to explain how creativity works, says this study of the imagination started from a desire to understand what happens in the brain at the moment of sudden insight. 'But the book definitely spiraled out of control,' Lehrer says. 'When you talk to creative people, they'll tell you about the 'eureka'* moment, but when you press them they also talk about the hard work that comes afterwards, so I realised I needed to write about that, too. And then I realised I couldn't just look at creativity from the perspective of the brain, because it's also about the culture and context, about the group and the team and the way we collaborate.'

When it comes to the mysterious process by which inspiration comes into your head as if from nowhere, Lehrer says modern neuroscience has produced a 'first draft' explanation of what is happening in the brain. He writes of how burnt out American singer Bob Dylan decided to walk away from his musical career in 1965 and escape to a cabin in the woods, only to be overcome by a desire to write. Apparently 'Like a Rolling Stone' suddenly flowed from his pen. 'It's like a ghost is writing a song,' Dylan has reportedly said. 'It gives you the song and it goes away.' But it's no ghost, according to Lehrer.

Instead, the right hemisphere of the brain is assembling connections between past influences and making something entirely new. Neuroscientists have roughly charted this process by mapping the brains of people doing word puzzles solved by making sense of remotely connecting information For instance, subjects are given three words such as 'age', 'mile' and 'sand' and asked to come up with a single word that can precede or follow each of them to form a compound word. (It happens to be 'stone'.) Using brain imaging equipment, researchers discovered that when people get the answer in an apparent flash of insight, a small fold of tissue called the anterior superior temporal gyrus suddenly lights up just beforehand. This stays silent when the word puzzle is solved through careful analysis. Lehrer says that this area of the brain lights up only after we've hit the wall on a problem. Then the brain starts hunting through the 'filing cabinets of the right hemisphere' to make the connections that produce the right answer.

Studies have demonstrated it's possible to predict a moment of insight up to eight seconds before it arrives. The predictive signal is a steady rhythm of alpha waves emanating from the brain's right hemisphere, which are closely associated with relaxing activities. 'When our minds are at ease when those alpha waves are rippling through the brain we're more likely to direct the spotlight of attention towards that stream of remote associations emanating from the right hemisphere,' Lehrer writes. 'In contrast, when we are diligently focused, our attention tends to be towards the details of the problems we are trying to solve.' In other words, then we are less likely to make those vital associations. So, heading out for a walk or lying down are important phases of the creative process, and smart companies know this. Some now have a policy of encouraging staff to take time out during the day and spend time on things that at first glance are unproductive (like playing a PC game), but daydreaming has been shown to be positively correlated with problem-solving. However, to be more imaginative, says Lehrer, it's also crucial to collaborate with people from a wide range of backgrounds because if colleagues are too socially intimate, creativity is stifled.

Creativity, it seems, thrives on serendipity. American entrepreneur Steve Jobs believed so. Lehrer describes how at Pixar Animation, Jobs designed the entire workplace to maximise the chance of strangers bumping into each other, striking up conversations and learning from one another. He also points to a study of 766 business graduates who had gone on to own their own companies. Those with the greatest diversity of acquaintances enjoyed far more success. Lehrer says he has taken all this on board, and despite his inherent shyness, when he's sitting next to strangers on a plane or at a conference, forces himself to initiate conversations. As for predictions that the rise of the Internet would make the need for shared working space obsolete, Lehrer says research shows the opposite has occurred; when people meet face-to-face, the level of creativity increases. This is why the kind of place we live in is so important to innovation. According to theoretical physicist Geoffrey West, when corporate institutions get bigger, they often become less receptive to change. Cities, however, allow our ingenuity to grow by pulling huge numbers of different people together, who then exchange ideas. Working from the comfort of our homes may be convenient, therefore, but it seems we need the company of others to achieve our finest 'eureka' moments.

Glossary:

Eureka: In ancient Greek, the meaning was ‘I have found!’. Now it can be used when people suddenly find the solution to a difficult problem and want to celebrate

PART 3 — QUESTIONS

Questions 27-30

Choose appropriate options A, B, C or D.

27 What are we told about the product called a 'Swifter'?

- **A** ○ Its designers had little experience working with household objects.
- **B** ○ Once the idea for it was conceived, it did not take long to develop.
- **C** ○ It achieved profits beyond the manufacturer's expectations.
- **D** ○ Its design was inspired by a common housework habit.

28 When Jonah Lehrer began writing his book,

- **A** ○ he had not intended to focus on creativity.
- **B** ○ he ended up revising his plans for the content.
- **C** ○ he was working in a highly creative environment.
- **D** ○ he was driven by his own experience of the 'eureka' moment.

29 Lehrer refers to the singer Bob Dylan in order to

- **A** ○ illustrate how ideas seem spontaneous.
- **B** ○ exemplify ways in which we might limit our inventiveness.
- **C** ○ contrast different approaches to stimulating the imagination.
- **D** ○ propose particular approaches to regaining lost creativity.

30 What did neuroscientists discover from the word puzzle experiment?

- **A** ○ Memories are easier to retrieve when they are more meaningful.
- **B** ○ An analytical approach to problem-solving is not necessarily effective.
- **C** ○ One part of the brain only becomes active when a connection is made suddenly.

D ○ Creative people tend to take a more instinctive approach to solving language problems.

Questions 31-34

Complete each sentence with the correct ending, A-G, below.

• Scientists know a moment of insight is coming **31** _____

• Mental connections are much harder to make **32** _____

• Some companies require their employees to stop working **33** _____

• A team will function more successfully **34** _____

A. **when people are not too familiar with one another.**

B. **because there is greater activity in the right side of the brain.**

C. **if people are concentrating on the specifics of a problem.**

D. **so they can increase the possibility of finding answers.**

E. **when people lack the experience required for problem-solving.**

F. **when the brain shows strong signs of distraction.**

G. **when both hemispheres of the brain show activity.**

Questions 35-39

Complete the notes below.

Choose ONE WORD ONLY from the passage for each answer.

How other people influence our creativity

- Steve Jobs: made changes to the **35** _____ to encourage interaction at Pixar.
- Lehrer: company owners must have a wide range of **36** _____ to do well.

  it's important to start **37** _____ with new people the **38** _____ has not replaced the need for physical contact.

- Geoffrey West: living in **39** _____ encourages creativity.

Questions 40-40

Choose appropriate options A, B, C or D.

40 Which of the following is the most suitable title for Reading Passage?

A ○ Understanding what drives our moments of inspiration

B ○ Challenging traditional theories of human creativity

C ○ Creative solutions for enhancing professional relationships

D ○ How the future is shaped by innovative ideas and inspired people

Answer Key

#	Answer	Explanation
1	**vi**	‘I took Besart on that year as my private student,’ explains Louhivuori. When he was not studying science, geography and math, Besart was seated next to Louhivuori’s desk, taking books from a tall stack, slowly reading one, then another, then devouring them by the dozens. By the end of the year, he had conquered his adopted country’s vowel-rich language and arrived at the realization that he could, in fact, learn
2	**vii**	In this year, the first results from the Programme for International Student Assessment (PISA), a standardized test given to 15yearolds in more than 40 global venues, revealed Finnish youth to be the best at reading in the world. Three years later, they led in math. By 2006, Finland was first out of the 57 nations that participate in science
3	**i**	In the United States, government officials have attempted to improve standards by introducing marketplace competition into public schools. In recent years, a group of Wall Street financiers and philanthropists such as Bill Gates have put money behind private sector ideas, such as charter schools, which have doubled in number in the past decade
4	**iv**	The result is that a Finnish child has a good chance of getting the same quality education no matter whether he or she lives in a rural village or a university town
5	**viii**	Finland provides three years of maternity leave and subsidized day care to parents, and preschool for all five-year-olds, where the emphasis is on socializing. In addition, the state subsidizes parents, paying them around 150 euros per month for every child until he or she turns 17. Schools provide food, counseling and taxi service if needed
6	**ii**	But In 1963, the Finnish Parliament made the bold decision to choose public education as the best means of driving the economy forward and out of recession The second critical decision came In 1979, when it was required that every teacher gain a fifth-year Master’s degree In theory and practice, paid for by the state
7	**science**	In the latest PISA scores, the nation came second in science, third in reading and sixth in math among nearly half a million students worldwide

#	Answer	Explanation
8	**economy**	But In 1963, the Finnish Parliament made the bold decision to choose public education as the best means of driving the economy forward and out of recession
9	**guidelines**	Teachers from all over the nation contributed to a national curriculum that provided guidelines, not prescriptions, for them to refer to
10	**language**	Besides Finnish and Swedish (the country's second official language), children started learning a third language (English Is a favorite) usually beginning at age nine
11	**equipment/resources**	The equal distribution of equipment was next, meaning that all teachers had their fair share of teaching resources to aid learning
12	**Master's degree/Masters degree**	The second critical decision came In 1979, when it was required that every teacher gain a fifth-year Master's degree In theory and practice, paid for by the state
13	**respect/status**	From then on, teachers were effectively granted equal status with doctors and lawyers. Applicants began flooding teaching programs, not because the salaries were so high but because autonomous decision-making and respect made the job desirable
14	**F**	Bones degrade , the land erodes, the climate changes, the mere existence of forests is uncertain , rivers change their course and the history slowly gets disguised
15	**E**	Another renowned boneyard in a similar area is a spot called Wellington Caverns,Diprotodon, the largest known marsupial (an animal that, like kangaroos and koalas, bears its young in a pouch), was discovered.In 1830 a regional officer, George Rankin lowered down himself into the cave utilizing a rope snared to a hole in a cave wall. The hole was actually a bone
16	**A**	It took Wells a moment to acknowledge that what he was checking out were the bones of thousands of animals that might have fallen from openings in the ground above and gotten stuck
17	**E**	In 1909 and 1915 sediments in Mammoth Cave that consisted of fossils were dug out and studied in haphazard manner as a result of this no scolar agreed with these findings
18	**B**	But this period of extinction was not complete. On the continent, North America retained its deer, black bears, and a small type of bison, and on the continent, South America had its jaguars and llamas

#	Answer	Explanation
19	**A / C**	To be sure, Australia has been drying out for more than 1,000,000 years, and the megafauna were confronted with a landmass where vegetation had started to vanish. Tim Flannery, an Australian paleontologist, proposed that people who moved onto the continent around 50 centuries ago used fire to hunt
20	**A / C**	To be sure, Australia has been drying out for more than 1,000,000 years, and the megafauna were confronted with a landmass where vegetation had started to vanish. Tim Flannery, an Australian paleontologist, proposed that people who moved onto the continent around 50 centuries ago used fire to hunt
21	**A / D**	Yet, a single bone particularly captured dramatic attention : a femur with a wound in it, possibly left there by a sharp tool The paintings of Palorchestes, a megafauna marsupial , on rock, in far northern Australia, was examined by Peter Murray, a Paleontologist
22	**A / D**	Yet, a single bone particularly captured dramatic attention : a femur with a wound in it, possibly left there by a sharp tool The paintings of Palorchestes, a megafauna marsupial , on rock, in far northern Australia, was examined by Peter Murray, a Paleontologist
23	**TRUE**	Considering the amount of light cast on the extinction of the dinosaurs, it’s surprising that a little has been discovered about megafauna
24	**NOT GIVEN**	A paleoecologist named Paul Martin published a hypothesis known as the “blitzkrieg hypothesis” in the 1960s. Modern people caused chaos in the Americas by killing animals with spears. These animals had never seen a smart predator before, so they couldn’t defend themselves.But this period of extinction was not complete. On the continent, North America retained its deer, black bears, and a small type of bison, and on the continent, South America had its jaguars and llamas
25	**NOT GIVEN**	Tim Flannery, an Australian paleontologist, proposed that people who moved onto the continent around 50 centuries ago used fire to hunt
26	**FALSE**	The storys constructed from time to time have limited information
27	**D**	Frustrated after hundreds of hours of observation, they one day noticed a woman do with a paper towel what people do all the time: wipe something up and throw it away. An idea popped into lead designer Harry West’s head: the solution to their problem was a floor mop with a disposable cleaning surface

#	Answer	Explanation
28	**B**	‘But the book definitely spiraled out of control,’ Lehrer says. ‘When you talk to creative people, they’ll tell you about the ‘eureka’* moment, but when you press them they also talk about the hard work that comes afterwards, so I realised I needed to write about that, too. And then I realised I couldn’t just look at creativity from the perspective of the brain, because it’s also about the culture and context, about the group and the team and the way we collaborate.’
29	**A**	When it comes to the mysterious process by which inspiration comes into your head as if from nowhere, Lehrer says modern neuroscience has produced a ‘first draft’ explanation of what is happening in the brain. He writes of how burnt out American singer Bob Dylan decided to walk away from his musical career in 1965 and escape to a cabin in the woods, only to be overcome by a desire to write. Apparently ‘Like a Rolling Stone’ suddenly flowed from his pen. ‘It’s like a ghost is writing a song,’ Dylan has reportedly said. ‘It gives you the song and it goes away.’
30	**C**	Using brain imaging equipment, researchers discovered that when people get the answer in an apparent flash of insight, a small fold of tissue called the anterior superior temporal gyrus suddenly lights up just beforehand. This stays silent when the word puzzle is solved through careful analysis
31	**B**	Studies have demonstrated it’s possible to predict a moment of insight up to eight seconds before it arrives. The predictive signal is a steady rhythm of alpha waves emanating from the brain’s right hemisphere, which are closely associated with relaxing activities
32	**C**	In contrast, when we are diligently focused, our attention tends to be towards the details of the problems we are trying to solve.’ In other words, then we are less likely to make those vital associations
33	**D**	Some now have a policy of encouraging staff to take time out during the day and spend time on things that at first glance are unproductive (like playing a PC game), but daydreaming has been shown to be positively correlated with problem-solving
34	**A**	However, to be more imaginative, says Lehrer, it’s also crucial to collaborate with people from a wide range of backgrounds because if colleagues are too socially intimate, creativity is stifled
35	**workplace**	Lehrer describes how at Pixar Animation, Jobs designed the entire workplace to maximise the chance of strangers bumping into each other, striking up conversations and learning from one another

#	Answer	Explanation
36	**acquaintances**	He also points to a study of 766 business graduates who had gone on to own their own companies. Those with the greatest diversity of acquaintances enjoyed far more success
37	**conversations**	Lehrer says he has taken all this on board, and despite his inherent shyness, when he's sitting next to strangers on a plane or at a conference, forces himself to initiate conversations
38	**Internet**	As for predictions that the rise of the Internet would make the need for shared working space obsolete, Lehrer says research shows the opposite has occurred; when people meet face-to-face, the level of creativity increases
39	**cities**	According to theoretical physicist Geoffrey West, when corporate institutions get bigger, they often become less receptive to change. Cities, however, allow our ingenuity to grow by pulling huge numbers of different people together, who then exchange ideas
40	**A**	Lehrer, the author of Imagine, a new book that seeks to explain how creativity works, says this study of the imagination started from a desire to understand what happens in the brain at the moment of sudden insight

Test 105

PASSAGE 1

You should spend about 20 minutes on Questions 1–13, which are based on Reading Passage 1 below.

The Hidden Histories of Exploration Exhibition

A We have all heard tales of lone, heroic explorers, but what about the local individuals who guided and protected European explorers in many different parts of the globe? Or the go-betweens – including interpreters and traders – who translated the needs and demands of explorers into a language that locals could understand? Such questions have received surprisingly little attention in standard histories, where European explorers are usually the heroes, sometimes the villains. The Hidden Histories of Exploration exhibition at Britain's Royal Geographical Society in London sets out to present an alternative view, in which exploration is a fundamentally collective experience of work, involving many different people. Many of the most famous examples of explorers said to have been 'lone travellers' – say, Mungo Park or David Livingstone in Africa – were anything but 'alone' on their travels. They depended on local support of various kinds - for food, shelter, protection, information, guidance and solace – as well as on other resources from elsewhere.

B The Royal Geographical Society (RGS) seeks to record this story in its Hidden Histories project, using its astonishingly rich collections. The storage of geographical information was one of the main rationales for the foundation of the RGS in 1830, and the Society's collections now contain more than two million individual items, including books, manuscripts, maps, photographs, art-works, artefacts and film – a rich storehouse of material reflecting the wide geographical extent of British interest across the globe. In addition to their remarkable scope and range, these collections contain a striking visual record of exploration: the impulse to collect the world is reflected in a large and diverse image archive. For the researcher, this archive can yield many surprises: materials gathered for one purpose – say, maps relating to an international boundary dispute or photographs taken on a scientific expedition - may today be put to quite different uses.

C In their published narratives, European explorers rarely portrayed themselves as vulnerable or dependent on others, despite the fact that without this support they were quite literally lost. Archival research confirms that Europeans were not merely dependent on the work of porters, soldiers, translators, cooks, pilots, guides, hunters and collectors: they also relied on local expertise. Such assistance was essential in identifying potential dangers – poisonous species, unpredictable rivers, uncharted territories - which could mean the difference between life and death. The assistants themselves were usually in a strong bargaining position. In the Amazon, for example, access to entire regions would depend on the willingness of local crew members and other assistants to enter areas inhabited by relatively powerful Amerindian groups. In an account of his journey across South America, published in 1836, William Smyth thus complained of frequent 'desertion' by his helpers: 'without them it was impossible to get on'.

D Those providing local support and information to explorers were themselves often not ‘locals’. For example, the history of African exploration in the nineteenth century is dominated by the use of Zanzibar as a recruiting station for porters, soldiers and guides who would then travel thousands of miles across the continent. In some accounts, the leading African members of expedition parties – the ‘officers' or 'foremen' - are identified, and their portraits published alongside those of European explorers.

E The information provided by locals and intermediaries was of potential importance to geographical science. How was this evidence judged? The formal procedures of scientific evaluation provided one framework. Alongside these were more ‘common sense' notions of veracity and reliability, religiously-inspired judgments about the authenticity of testimony, and the routine procedures for cross-checking empirical observations developed in many professions.

F Given explorers' need for local information and support, it was in their interests to develop effective working partnerships with knowledgeable intermediaries who could act as brokers in their dealings with local inhabitants. Many of these people acquired far more experience of exploration than most Europeans could hope to attain. Some managed large groups of men and women, piloted the explorers' river craft, or undertook mapping work. The tradition was continued with the Everest expeditions in the 1920s and 1930s, which regularly employed the Tibetan interpreter Karma Paul. In Europe, exploration was increasingly thought of as a career; the same might be said of the non-Europeans on whom their expeditions depended.

G These individuals often forged close working relationships with European explorers. Such partnerships depended on mutual respect, though they were not always easy or intimate, as is particularly clear from the history of the Everest expeditions depicted in the Hidden Histories exhibition. The entire back wall is covered by an enlarged version of a single sheet of photographs of Sherpas taken during the 1936 Everest expedition. The document is a powerful reminder of the manpower on which European mountaineering expeditions depended, and also of the importance of local knowledge and assistance. Transformed from archive to wall display, it tells a powerful story through the medium of individual portraits – including Karma Paul, veteran of previous expeditions, and the young Tensing Norgay, 17 years before his successful 1953 ascent. This was a highly charged and transitional moment as the contribution of the Sherpas, depicted here with identity tags round their necks, was beginning to be much more widely recognised. These touching portraits encourage us to see them as agents rather than simply colonial subjects or paid employees. Here is a living history, which looks beyond what we already know about exploration: a larger history in which we come to recognise the contribution of everyone involved.

PART 1 — QUESTIONS

Questions 1-7

Do the following statements agree with the information given in Reading Passage 1?

1 The Hidden Histories of Exploration exhibition aims to show the wide range of people involved in expeditions.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

2 The common belief about how Park and Livingstone travelled is accurate.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

3 The RGS has organised a number of exhibitions since it was founded.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

4 Some of the records in the RGS archives are more useful than others.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

5 Materials owned by the RGS can be used in ways that were not originally intended.

- **A** ○ TRUE
- **B** ○ FALSE

C ○ NOT GIVEN

6 In their publications, European explorers often describe their dependence on their helpers.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

7 Local helpers refused to accompany William Smyth during parts of his journey.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

Questions 8-13

Reading Passage 1 has seven paragraphs, A–G.

Which paragraph contains the following information?

	A	B	C	D	E	F	G
8 reference to the distances that some non-European helpers travelled	○	○	○	○	○	○	○
9 description of a wide range of different types of documents	○	○	○	○	○	○	○
10 belief about the effect of an exhibition on people seeing it	○	○	○	○	○	○	○
11 examples of risks explorers might have been unaware of without local help	○	○	○	○	○	○	○
12 reference to various approaches to assessing data from local helpers	○	○	○	○	○	○	○
13 reference to people whose long-term occupation was to organise local assistance for	○	○	○	○	○	○	○

	A	B	C	D	E	F	G
European explorers							

PASSAGE 2

You should spend about 20 minutes on Questions 14–26, which are based on Reading Passage 2 below.

Fatal Attraction

Evolutionist Charles Darwin first marvelled at flesh-eating plants in the mid-19th century. Today, biologists, using 21st-century tools to study cells and DNA, are beginning to understand how these plants hunt, eat and digest – and how such bizarre adaptations arose in the first place.

A The leaves of the Venus flytrap plant are covered in hairs. When an insect brushes against them, this triggers a tiny electric charge, which travels down tunnels in the leaf and opens up pores in the leaf's cell membranes. Water surges from the cells on the inside of the leaf to those on the outside, causing the leaf to rapidly flip in shape from convex to concave, like a soft contact lens. As the leaves flip, they snap together, trapping the insect in their sharp-toothed jaws.

B The bladderwort has an equally sophisticated way of setting its underwater trap. It pumps water out of tiny bag-like bladders, making a vacuum inside. When small creatures swim past, they bend the hairs on the bladder, causing a flap to open. The low pressure sucks water in, carrying the animal along with it. In one five-hundredth of a second, the door swings shut again. The Drosera sundew, meanwhile, has a thick, sweet liquid oozing from its leaves, which first attracts insects, then holds them fast before the leaves snap shut. Pitcher plants use yet another strategy, growing long tube-shaped leaves to imprison their prey. Raffles' pitcher plant, from the jungles of Borneo, produces nectar that both lures insects and forms a slick surface on which they can't get a grip. Insects that land on the rim of the pitcher slide on the liquid and tumble in.

C Many carnivorous plants secrete enzymes to penetrate the hard exoskeleton of insects so they can absorb nutrients from inside their prey. But the purple pitcher plant, which lives in bogs and infertile sandy soils in North America, enlists other organisms to process its food. It is home to an intricate food web of mosquito larvae, midges and bacteria, many of which can survive only in this unique habitat. These animals shred the prey that fall into the pitcher, and the smaller organisms feed on the debris. Finally, the plant absorbs the nutrients released.

D While such plants clearly thrive on being carnivorous, the benefits of eating flesh are not the ones you might expect. Carnivorous animals such as ourselves use the carbon in protein and the fat in meat to build muscles and store energy. Carnivorous plants instead draw nitrogen, phosphorus, and other critical nutrients from their prey in order to build light-harvesting enzymes. Eating animals, in other words, lets carnivorous plants do what all plants do: carry out photosynthesis, that is, grow by harnessing energy directly from the sun.

E Carnivorous plants are, in fact, very inefficient at converting sunlight into tissue. This is because of all the energy they expend to make the equipment to catch animals - the enzymes, the pumps, and so on. A pitcher or a flytrap cannot carry out much photosynthesis because,

unlike plants with ordinary leaves, they do not have flat solar panels that can grab lots of sunlight. There are, however, some special conditions in which the benefits of being carnivorous do outweigh the costs. The poor soil of bogs, for example, offers little nitrogen and phosphorus, so carnivorous plants enjoy an advantage over plants that obtain these nutrients by more conventional means. Bogs are also flooded with sunshine, so even an inefficient carnivorous plant can photosynthesise enough light to survive.

F Evolution has repeatedly made this trade-off. By comparing the DNA of carnivorous plants with other species, scientists have found that they evolved independently on at least six separate occasions. Some carnivorous plants that look nearly identical turn out to be only distantly related. The two kinds of pitcher plants – the tropical genus Nepenthes and the North American Sarracenia – have, surprisingly, evolved from different ancestors, although both grow deep pitcher-shaped leaves and employ the same strategy for capturing prey.

G In several cases, scientists can see how complex carnivorous plants evolved from simpler ones. Venus flytraps, for example, share an ancestor with Portuguese sundews, which only catch prey passively, via 'flypaper' glands on their stems. They share a more recent ancestor with Drosera sundews, which can also curl their leaves over their prey. Venus flytraps appear to have evolved an even more elaborate version of this kind of trap, complete with jaw-like leaves.

H Unfortunately, the adaptations that enable carnivorous plants to thrive in marginal habitats also make them exquisitely sensitive. Agricultural run-off and pollution from power plants are adding extra nitrogen to many bogs in North America. Carnivorous plants are so finely tuned to low levels of nitrogen that this extra fertilizer is overloading their systems, and they eventually burn themselves out and die.

I Humans also threaten carnivorous plants in other ways. The black market trade in exotic carnivorous plants is so vigorous now that botanists are keeping the location of some rare species a secret. But even if the poaching of carnivorous plants can be halted, they will continue to suffer from other assaults. In the pine savannah of North Carolina, the increasing suppression of fires is allowing other plants to grow too quickly and outcompete the flytraps in their native environment. Good news, perhaps, for flies. But a loss for all who, like Darwin, delight in the sheer inventiveness of evolution.

PART 2 — QUESTIONS

Questions 14-18

Complete the notes below.

Choose NO MORE THAN TWO WORDS from the passage for each answer.

How a Venus flytrap traps an insect

- insect touches **14** _____ on leaf of plant
- small **15** _____ passes through leaf
- **16** _____ in cell membrane open
- outside cells of leaves fill with **17** _____
- leaves change so that they have a **18** _____ shape and snap shut

Questions 19-22

Look at the following statements and the list of plants.

Match each statement with the correct plant, A, B, C, D or E.

A. Venus flytrap

B. bladderwort

C. Drosera sundew

D. Raffles' pitcher plant

E. purple pitcher plant

	A	B	C	D	E
19 It uses other creatures to help it digest insects.	○	○	○	○	○
20 It produces a slippery substance to make insects fall inside it.	○	○	○	○	○
21 It creates an empty space into which insects are sucked.	○	○	○	○	○

	A	B	C	D	E
22 It produces a sticky substance which traps insects on its surface.	○	○	○	○	○

Questions 23-26

Reading Passage 2 has nine paragraphs, A–I.

Which paragraph contains the following information?

	A	B	C	D	E	F	G	H	I
23 a mention of a disadvantage of the leaf shape of some carnivorous plants	○	○	○	○	○	○	○	○	○
24 an example of an effort made to protect carnivorous plants	○	○	○	○	○	○	○	○	○
25 unexpected information about the origins of certain carnivorous plants	○	○	○	○	○	○	○	○	○
26 an example of environmental changes that shorten the life cycles of carnivorous plants	○	○	○	○	○	○	○	○	○

PASSAGE 3

You should spend about 20 minutes on Questions 27–40, which are based on Reading Passage 3 on the following pages.

WANT TO BE FRIENDS? Could the benefits of online social networking be too good to miss out on?

A For many hundreds of thousands of people worldwide, online networking has become enmeshed in our daily lives. However, it is a decades-old insight from a study of traditional social networks that best illuminates one of the most important aspects of today's online networking. In 1973 sociologist Mark Granovetter showed how the loose acquaintances, or 'weak ties', in our social network exert a disproportionate influence over our behaviour and choices. Granovetter's research showed that a significant percentage of people get their jobs as a result of recommendations or advice provided by a weak tie. Today our number of weak-tie contacts has exploded via online social networking. 'You couldn't maintain all of those weak ties on your own,' says Jennifer Golbeck of the University of Maryland. 'Online sites, such as Facebook, give you a way of cataloguing them.' The result? It's now significantly easier for the schoolfriend you haven't seen in years to pass you a tip that alters your behaviour, from recommendation of a low-cholesterol breakfast cereal to a party invite where you meet your future wife or husband.

27

B The explosion of weak ties could have profound consequences for our social structures too, according to Judith Donath of the Berkman Center for Internet and Society at Harvard University. 'We're already seeing changes,' she says. For example, many people now turn to their online social networks ahead of sources such as newspapers and television for trusted and relevant news or information. What they hear could well be inaccurate, but the change is happening nonetheless. If these huge 'supernets' - some of them numbering up to 5,000 people - continue to thrive and grow, they could fundamentally change the way we share information and transform our notions of relationships.

28

C But are these vast networks really that relevant to us on a personal level? Robin Dunbar, an evolutionary anthropologist at the University of Oxford, believes that our primate brains place a cap on the number of genuine social relationships we can actually cope with: roughly 150. According to Dunbar, online social networking appears to be very good for 'servicing' relationships, but not for establishing them. He argues that our evolutionary roots mean we still depend heavily on physical and face-to-face contact to be able to create ties.

29

D Nonetheless, there is evidence that online networking can transform our daily interactions. In an experiment at Cornell University, psychologist Jeff Hancock asked participants to try to encourage other participants to like them via instant messaging conversation. Beforehand, some members of the trial were allowed to view the Facebook profile of the person they were trying to win over. He found that those with Facebook access asked questions to which they already knew the answers or raised things they had in common, and as result were much more successful in their social relationships. Hancock concluded that people who use these sites to keep updated on the activities of their acquaintances are more likely to be liked in subsequent social interactions.

30

E Online social networking may also have tangible effects on our well-being. Nicole Ellison of Michigan State University found that the frequency of networking site use correlates with greater self-esteem. Support and affirmation from the weak ties could be the explanation, says Ellison. 'Asking your close friends for help or advice is nothing new, but we are seeing a lowering of barriers among acquaintances,' she says. People are readily sharing personal feelings and experiences to a wider circle than they might once have done. Sandy Pentland at the Massachusetts Institute of Technology agrees. 'The ability to broadcast to our social group means we need never feel alone,' he says. 'The things that befall us are often due to a lack of social support. There's more of a safety net now.'

31

F Henry Holzman, also at MIT, who studies the interface between online social networking and the real world, points out that increased visibility also means our various social spheres – family, work, friends – are merging, and so we will have to prepare for new societal norms. 'We'll have to learn how to live a more transparent life,' he says. 'We may have to give up some ability to show very limited glimpses of ourselves to others.'

32

G Another way that online networking appears to be changing our social structures is through dominance. In one repeated experiment, Michael Kearns of the University of Pennsylvania asked 30 volunteers to quickly reach consensus in an online game over a choice between two colours. Each person was offered a cash reward if they succeeded in persuading the group to pick one or other colour. All participants could see the colour chosen by some of the other people, but certain participants had an extra advantage: the ability to see more of the participants' chosen colours than others. Every time Kearns found that those who could see the choices of more participants (in other words, were better connected) persuaded the group to pick their colour, even when they had to persuade the vast majority to give up their financial incentive. While

Kearns warns that the setting was artificial, he says it's possible that greater persuasive power could lie with well-connected individuals in the everyday online world too.

PART 3 — QUESTIONS

Questions 27-32

Reading Passage 3 has seven paragraphs, A–G.

Choose the correct heading for paragraphs B–G from the list of headings below.

i. **A shift in our fact-finding habits**

ii. **How to be popular**

iii. **More personal information being known**

iv. **The origins of online social networks**

v. **The link between knowledge and influence**

vi. **Information that could change how you live**

vii. **The emotional benefits of online networking**

viii. **A change in how we view our online friendships**

ix. **The future of networking**

x. **Doubts about the value of online socialising**

Questions 33-36

Look at the following findings and the list of researchers below.

Match each finding with the correct researcher, A–F.

A. Mark Granovetter

B. Judith Donath

C. Robin Dunbar

D. Jeff Hancock

E. Nicole Ellison

F. Michael Kearns

	A	B	C	D	E	F
33 People who network widely may be more able to exert pressure on others.	○	○	○	○	○	○

	A	B	C	D	E	F
34 We have become more willing to confide in an extensive number of people.	○	○	○	○	○	○
35 There is a limit to how many meaningful relationships we can maintain.	○	○	○	○	○	○
36 There is a social advantage in knowing about the lives of our online contacts.	○	○	○	○	○	○

Questions 37-38

Choose TWO answers, A–E.

37 **38** Which TWO of these advantages of online social networking are mentioned in Reading Passage 3?

- **A** ☐ Social networking sites can be accessed on any day and at any time.
- **B** ☐ Online socialising is an efficient way of keeping in touch with a lot of people.
- **C** ☐ It is very easy to establish new friendships online.
- **D** ☐ Online social networking can solve problems in real-world relationships.
- **E** ☐ It can be reassuring to be part of an online social network.

Questions 39-40

Choose TWO answers, A–E.

39 **40** Which TWO of these disadvantages of online social networking are mentioned in Reading Passage 3?

- **A** ☐ Information from online social contacts may be unreliable.
- **B** ☐ We may become jealous of people who seem to have a wide circle of friends.
- **C** ☐ We may lose the ability to relate to people face-to-face.
- **D** ☐ It is easy to waste a lot of time on social networking sites.
- **E** ☐ Using social networking sites may result in a lack of privacy.

Answer Key

#	Answer	Explanation
1	**TRUE**	The Hidden Histories of Exploration exhibition at Britain's Royal Geographical Society in London sets out to present an alternative view, in which exploration is a fundamentally collective experience of work, involving many different people
2	**FALSE**	Many of the most famous examples of explorers said to have been 'lone travellers' – say, Mungo Park or David Livingstone in Africa – were anything but 'alone' on their travels
3	**NOT GIVEN**	The Hidden Histories of Exploration exhibition at Britain's Royal Geographical Society in London sets out to present an alternative view The storage of geographical information was one of the main rationales for the foundation of the RGS in 1830
4	**NOT GIVEN**	For the researcher, this archive can yield many surprises: materials gathered for one purpose – say, maps relating to an international boundary dispute or photographs taken on a scientific expedition – may today be put to quite different uses
5	**TRUE**	For the researcher, this archive can yield many surprises: materials gathered for one purpose – say, maps relating to an international boundary dispute or photographs taken on a scientific expedition – may today be put to quite different uses
6	**FALSE**	In their published narratives, European explorers rarely portrayed themselves as vulnerable or dependent on others, despite the fact that without this support they were quite literally lost
7	**TRUE**	In an account of his journey across South America, published in 1836, William Smyth thus complained of frequent 'desertion' by his helpers: 'without them it was impossible to get on'
8	**D**	For example, the history of African exploration in the nineteenth century is dominated by the use of Zanzibar as a recruiting station for porters, soldiers and guides who would then travel thousands of miles across the continent
9	**B**	the Society's collections now contain more than two million individual items, including books, manuscripts, maps, photographs, art-works, artefacts and film – a rich storehouse of material reflecting the wide geographical extent of British interest across the globe
10	**G**	These touching portraits encourage us to see them as agents rather than simply colonial subjects or paid employees

#	Answer	Explanation
11	**C**	Such assistance was essential in identifying potential dangers – poisonous species, unpredictable rivers, uncharted territories – which could mean the difference between life and death
12	**E**	The information provided by locals and intermediaries was of potential importance to geographical science. How was this evidence judged? The formal procedures of scientific evaluation provided one framework. Alongside these were more 'common sense' notions of veracity and reliability, religiously-inspired judgments about the authenticity of testimony, and the routine procedures for cross-checking empirical observations developed in many professions
13	**F**	In Europe, exploration was increasingly thought of as a career; the same might be said of the non-Europeans on whom their expeditions depended
14	**(the) hairs**	The leaves of the Venus flytrap plant are covered in hairs. When an insect brushes against them, this triggers a tiny electric charge
15	**(electric) charge**	When an insect brushes against them, this triggers a tiny electric charge, which travels down tunnels in the leaf and opens up pores in the leaf's cell membranes
16	**pores**	When an insect brushes against them, this triggers a tiny electric charge, which travels down tunnels in the leaf and opens up pores in the leaf's cell membranes
17	**water**	Water surges from the cells on the inside of the leaf to those on the outside, causing the leaf to rapidly flip in shape from convex to concave, like a soft contact lens
18	**concave**	Water surges from the cells on the inside of the leaf to those on the outside, causing the leaf to rapidly flip in shape from convex to concave, like a soft contact lens
19	**E**	But the purple pitcher plant, which lives in bogs and infertile sandy soils in North America, enlists other organisms to process its food
20	**D**	Raffles' pitcher plant, from the jungles of Borneo, produces nectar that both lures insects and forms a slick surface on which they can't get a grip. Insects that land on the rim of the pitcher slide on the liquid and tumble in
21	**B**	It pumps water out of tiny bag-like bladders, making a vacuum inside. When small creatures swim past, they bend the hairs on the bladder, causing a flap to open. The low pressure sucks water in, carrying the animal along with it

#	Answer	Explanation
22	**C**	The Drosera sundew, meanwhile, has a thick, sweet liquid oozing from its leaves, which first attracts insects, then holds them fast before the leaves snap shut
23	**E**	A pitcher or a flytrap cannot carry out much photosynthesis because, unlike plants with ordinary leaves, they do not have flat solar panels that can grab lots of sunlight
24	**I**	The black market trade in exotic carnivorous plants is so vigorous now that botanists are keeping the location of some rare species a secret
25	**F**	The two kinds of pitcher plants – the tropical genus Nepenthes and the North American Sarracenia – have, surprisingly, evolved from different ancestors, although both grow deep pitcher-shaped leaves and employ the same strategy for capturing prey
26	**H**	Agricultural run-off and pollution from power plants are adding extra nitrogen to many bogs in North America. Carnivorous plants are so finely tuned to low levels of nitrogen that this extra fertilizer is overloading their systems, and they eventually burn themselves out and die
27	**i**	For example, many people now turn to their online social networks ahead of sources such as newspapers and television for trusted and relevant news or information
28	**x**	Robin Dunbar, an evolutionary anthropologist at the University of Oxford, believes that our primate brains place a cap on the number of genuine social relationships we can actually cope with: roughly 150. According to Dunbar, online social networking appears to be very good for 'servicing' relationships, but not for establishing them
29	**ii**	Hancock concluded that people who use these sites to keep updated on the activities of their acquaintances are more likely to be liked in subsequent social interactions
30	**vii**	Online social networking may also have tangible effects on our well-being. Nicole Ellison of Michigan State University found that the frequency of networking site use correlates with greater self-esteem
31	**iii**	Henry Holzman, also at MIT, who studies the interface between online social networking and the real world, points out that increased visibility also means our various social spheres – family, work, friends – are merging, and so we will have to prepare for new societal norms. 'We'll have to learn how to live a more transparent life,' he says. 'We may have to give up some ability to show very limited glimpses of ourselves to others.'

#	Answer	Explanation
32	**v**	Every time Kearns found that those who could see the choices of more participants (in other words, were better connected) persuaded the group to pick their colour, even when they had to persuade the vast majority to give up their financial incentive
33	**F**	Every time Kearns found that those who could see the choices of more participants (in other words, were better connected) persuaded the group to pick their colour, even when they had to persuade the vast majority to give up their financial incentive. While Kearns warns that the setting was artificial, he says it's possible that greater persuasive power could lie with well-connected individuals in the everyday online world too
34	**E**	People are readily sharing personal feelings and experiences to a wider circle than they might once have done
35	**C**	Robin Dunbar, an evolutionary anthropologist at the University of Oxford, believes that our primate brains place a cap on the number of genuine social relationships we can actually cope with: roughly 150
36	**D**	Hancock concluded that people who use these sites to keep updated on the activities of their acquaintances are more likely to be liked in subsequent social interactions
37	**B / E**	'You couldn't maintain all of those weak ties on your own,' says Jennifer Golbeck of the University of Maryland. 'Online sites, such as Facebook, give you a way of cataloguing them.' 'The ability to broadcast to our social group means we need never feel alone,' he says. 'The things that befall us are often due to a lack of social support. There's more of a safety net now.'
38	**B / E**	'You couldn't maintain all of those weak ties on your own,' says Jennifer Golbeck of the University of Maryland. 'Online sites, such as Facebook, give you a way of cataloguing them.' 'The ability to broadcast to our social group means we need never feel alone,' he says. 'The things that befall us are often due to a lack of social support. There's more of a safety net now.'
39	**A / E**	What they hear could well be inaccurate, but the change is happening nonetheless 'We'll have to learn how to live a more transparent life,' he says. 'We may have to give up some ability to show very limited glimpses of ourselves to others.'
40	**A / E**	What they hear could well be inaccurate, but the change is happening nonetheless 'We'll have to learn how to live a more transparent life,' he says. 'We may have to give up some ability to show very limited glimpses of ourselves to others.'

Test 106

PASSAGE 1

You should spend about 20 minutes on Questions 1–13, which are based on Reading Passage 1 below.

The Phoenicians: an almost forgotten people

The Phoenicians inhabited the region of modern Lebanon and Syria from about 3000 BC. They became the greatest traders of the pre-classical world, and were the first people to establish a large colonial network. Both of these activities were based on seafaring, an ability the Phoenicians developed from the example of their maritime predecessors, the Minoans of Crete.

An Egyptian narrative of about 1080 BC, the *Story of Wen-Amen*, provides an insight into the scale of their trading activity. One of the characters is Wereket-El, a Phoenician merchant living at Tanis in Egypt's Nile delta. As many as 50 ships carry out his business, plying back and forth between the Nile and the Phoenician port of Sidon.

The most prosperous period for Phoenicia was the 10th century BC, when the surrounding region was stable. Hiram, the king of the Phoenician city of Tyre, was an ally and business partner of Solomon, King of Israel. For Solomon's temple in Jerusalem, Hiram provided craftsmen with particular skills that were needed for this major construction project. He also supplied materials – particularly timber, including cedar from the forests of Lebanon. And the two kings went into trade in partnership. They sent out Phoenician vessels on long expeditions (of up to three years for the return trip) to bring back gold, sandalwood, ivory, monkeys and peacocks from Ophir. This is an unidentified place, probably on the east coast of Africa or the west coast of India.

Phoenicia was famous for its luxury goods. The cedar wood was not only exported as top-quality timber for architecture and shipbuilding. It was also carved by the Phoenicians, and the same skill was adapted to even more precious work in ivory. The rare and expensive dye for cloth, Tyrian purple, complemented another famous local product, fine linen. The metalworkers of the region, particularly those working in gold, were famous. Tyre and Sidon were also known for their glass.

These were the main products which the Phoenicians exported. In addition, as traders and middlemen, they took a commission on a much greater range of precious goods that they transported from elsewhere.

The extensive trade of Phoenicia required much book-keeping and correspondence, and it was in the field of writing that the Phoenicians made their most lasting contribution to world history. The scripts in use in the world up to the second millennium BC (in Egypt, Mesopotamia or China) all required the writer to learn a large number of separate characters – each of them expressing either a whole word or an element of its meaning. By contrast, the Phoenicians, in about 1500 BC, developed an entirely new approach to writing. The marks made (with a pointed

tool called a stylus, on damp clay) now attempted to capture the sound of a word. This required an alphabet of individual letters.

The trading and seafaring skills of the Phoenicians resulted in a network of colonies, spreading westwards through the Mediterranean. The first was probably Citium, in Cyprus, established in the 9th century BC. But the main expansion came from the 8th century BC onwards, when pressure from Assyria to the east disrupted the patterns of trade on the Phoenician coast.

Trading colonies were developed on the string of islands in the centre of the Mediterranean – Crete, Sicily, Malta, Sardinia, Ibiza – and also on the coast of north Africa. The African colonies clustered in particular around the great promontory which, with Sicily opposite, forms the narrowest channel on the main Mediterranean sea route. This is the site of Carthage.

Carthage was the largest of the towns founded by the Phoenicians on the north African coast, and it rapidly assumed a leading position among the neighbouring colonies. The traditional date of its founding is 814 BC, but archaeological evidence suggests that it was probably settled a little over a century later.

The subsequent spread and growth of Phoenician colonies in the western Mediterranean, and even out to the Atlantic coasts of Africa and Spain, was as much the achievement of Carthage as of the original Phoenician trading cities such as Tyre and Sidon. But no doubt links were maintained with the homeland, and new colonists continued to travel west.

From the 8th century BC, many of the coastal cities of Phoenicia came under the control of a succession of imperial powers, each of them defeated and replaced in the region by the next: first the Assyrians, then the Babylonians, Persians and Macedonian Greeks.

In 64 BC, the area of Phoenicia became part of the Roman province of Syria. The Phoenicians as an identifiable people then faded from history, merging into the populations of modern Lebanon and northern Syria.

PART 1 — QUESTIONS

Questions 1-8

Complete the sentences below.

Choose ONE WORD ONLY from the passage for each answer.

The Phoenicians' trading activities

The Phoenicians' skill at **1** _____ helped them to trade.

In an ancient story, a **2** _____ from Phoenicia, who lived in Egypt, owned 50 ships.

A king of Israel built a **3** _____ using supplies from Phoenicia.

Phoenicia supplied Solomon with skilled **4** _____ .

The main material that Phoenicia sent to Israel was **5** _____ .

The kings of Phoenicia and Israel formed a business **6** _____ in order to carry out trade.

Phoenicians carved **7** _____ , as well as cedar.

The Phoenicians also earned a **8** _____ for shipping goods.

Questions 9-13

Do the following statements agree with the information given in Reading Passage 1?

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

9 Problems with Assyria led to the establishment of a number of Phoenician colonies.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

10 Carthage was an enemy town which the Phoenicians won in battle.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

11 Phoenicians reached the Atlantic ocean.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

12 Parts of Phoenicia were conquered by a series of empires.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

13 The Phoenicians welcomed Roman control of the area.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

PASSAGE 2

You should spend about 20 minutes on Questions 14–26, which are based on Reading Passage 2 on the following pages.

The Hollywood Film Industry

14

A This chapter examines the 'Golden Age' of the Hollywood film studio system and explores how a particular kind of filmmaking developed during this period in US film history. It also focuses on the two key elements which influenced the emergence of the classic Hollywood studio system: the advent of sound and the business ideal of vertical integration. In addition to its historical interest, inspecting the growth of the studio system may offer clues regarding the kinds of struggles that accompany the growth of any new medium. It might, in fact, be intriguing to examine which changes occurred during the growth of the Hollywood studio, and compare those changes to contemporary struggles in which production companies are trying to define and control emerging industries, such as online film and interactive television.

15

B The shift of the industry away from 'silent' films began during the late 1920s. Warner Bros.' 1927 film *The Jazz Singer* was the first to feature synchronized speech, and with it came a period of turmoil for the industry. Studios now had proof that 'talkie' films would make them money, but the financial investment this kind of filmmaking would require, from new camera equipment to new projection facilities, made the studios hesitant to invest at first. In the end, the power of cinematic sound to both move audiences and enhance the story persuaded studios that talkies were worth investing in. Overall, the use of sound in film was well-received by audiences, but there were still many technical factors to consider. Although full integration of sound into movies was complete by 1930, it would take somewhat longer for them to regain their stylistic elegance and dexterity. The camera now had to be encased in a big, clumsy, unmoveable soundproof box. In addition, actors struggled, having to direct their speech to awkwardly-hidden microphones in huge plants, telephones or even costumes.

16

C Vertical integration is the other key component in the rise of the Hollywood studio system. The major studios realized they could increase their profits by handling each stage of a film's life: production (making the film), distribution (getting the film out to people) and exhibition (owning the theaters in major cities where films were shown first). Five studios, 'The Big Five', worked to achieve vertical integration through the late 1940s, owning vast real estate on which to construct elaborate sets. In addition, these studios set the exact terms of films' release dates and patterns. Warner Bros., Paramount, 20th Century Fox, MGM and RKO formed this exclusive

club. 'The Little Three' studios – Universal, Columbia and United Artists – also made pictures, but each lacked one of the crucial elements of vertical integration. Together these eight companies operated as a mature oligopoly, essentially running the entire market.

17

D During the Golden Age, the studios were remarkably consistent and stable enterprises, due in large part to long-term management heads – the infamous 'movie moguls' who ruled their kingdoms with iron fists. At MGM, Warner Bros. and Columbia, the same men ran their studios for decades. The rise of the studio system also hinges on the treatment of stars, who were constructed and exploited to suit a studio's image and schedule. Actors were bound up in seven-year contracts to a single studio, and the studio boss generally held all the options. Stars could be loaned out to other production companies at any time. Studio bosses could also force bad roles on actors, and manipulate every single detail of stars' images with their mammoth in-house publicity departments. Some have compared the Hollywood studio system to a factory, and it is useful to remember that studios were out to make money first and art second.

18

E On the other hand, studios also had to cultivate flexibility, in addition to consistent factory output. Studio heads realized that they couldn't make virtually the same film over and over again with the same cast of stars and still expect to keep turning a profit. They also had to create product differentiation. Examining how each production company tried to differentiate itself has led to loose characterizations of individual studios' styles. MGM tended to put out a lot of all-star productions while Paramount excelled in comedy and Warner Bros. developed a reputation for gritty social realism. 20th Century Fox forged the musical and a great deal of prestige biographies, while Universal specialized in classic horror movies.

19

F In 1948, struggling independent movie producers and exhibitors finally triumphed in their battle against the big studios' monopolistic behavior. In the United States versus Paramount federal decree of that year, the studios were ordered to give up their theaters in what is commonly referred to as 'divestiture' – opening the market to smaller producers. This, coupled with the advent of television in the 1950s, seriously compromised the studio system's influence and profits. Hence, 1930 and 1948 are generally considered bookends to Hollywood's Golden Age.

PART 2 — QUESTIONS

Questions 14-19

Reading Passage 2 has six paragraphs, A-F.

Choose the correct heading for each paragraph from the list of headings below.

i. **The power within each studio**

ii. **The movie industry adapts to innovation**

iii. **Contrasts between cinema and other media of the time**

iv. **The value of studying Hollywood's Golden Age**

v. **Distinguishing themselves from the rest of the market**

vi. **A double attack on film studios' power**

vii. **Gaining control of the industry**

viii. **The top movies of Hollywood's Golden Age**

Questions 20-23

Do the following statements agree with the information given in Reading Passage 2?

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

20 After The Jazz Singer came out, other studios immediately began making movies with synchronized sound.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

21 There were some drawbacks to recording movie actors' voices in the early 1930s.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

22 There was intense competition between actors for contracts with the leading studios.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

23 Studios had total control over how their actors were perceived by the public.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

Questions 24-26

Complete the summary below.

Choose NO MORE THAN TWO WORDS from the passage for each answer.

THE HOLLYWOOD STUDIOS

Throughout its Golden Age, the Hollywood movie industry was controlled by a handful of studios. Using a system known as **24** _____ , the biggest studios not only made movies, but handled their distribution and then finally showed them in their own theaters. These studios were often run by autocratic bosses – men known as **25** _____ , who often remained at the head of organisations for decades. However, the domination of the industry by the leading studios came to an end in 1948, when they were forced to open the market to smaller producers – a process known as **26** _____ .

PASSAGE 3

You should spend about 20 minutes on Questions 27–40, which are based on Reading Passage 3 below.

Left or right?

An overview of some research into lateralisation: the dominance of one side of the body over the other

A Creatures across the animal kingdom have a preference for one foot, eye or even antenna. The cause of this trait, called lateralisation, is fairly simple: one side of the brain, which generally controls the opposite side of the body, is more dominant than the other when processing certain tasks. This does, on some occasions, let the animal down: such as when a toad fails to escape from a snake approaching from the right, just because its right eye is worse at spotting danger than its left. So why would animals evolve a characteristic that seems to endanger them?

B For many years it was assumed that lateralisation was a uniquely human trait, but this notion rapidly fell apart as researchers started uncovering evidence of lateralisation in all sorts of animals. For example, in the 1970s, Lesley Rogers, now at the University of New England in Australia, was studying memory and learning in chicks. She had been injecting a chemical into chicks' brains to stop them learning how to spot grains of food among distracting pebbles, and was surprised to observe that the chemical only worked when applied to the left hemisphere of the brain. That strongly suggested that the right side of the chick's brain played little or no role in the learning of such behaviours. Similar evidence appeared in songbirds and rats around the same time, and since then, researchers have built up an impressive catalogue of animal lateralisation.

C In some animals, lateralisation is simply a preference for a single paw or foot, while in others it appears in more general patterns of behaviour. The left side of most vertebrate brains, for example, seems to process and control feeding. Since the left hemisphere processes input from the right side of the body, that means animals as diverse as fish, toads and birds are more likely to attack prey or food items viewed with their right eye. Even humpback whales prefer to use the right side of their jaws to scrape sand eels from the ocean floor.

D Genetics plays a part in determining lateralisation, but environmental factors have an impact too. Rogers found that a chick's lateralisation depends on whether it is exposed to light before hatching from its egg – if it is kept in the dark during this period, neither hemisphere becomes dominant. In 2004, Rogers used this observation to test the advantages of brain bias in chicks faced with the challenge of multitasking. She hatched chicks with either strong or weak lateralisation, then presented the two groups with food hidden among small pebbles and the threatening shape of a fake predator flying overhead. As predicted, the birds incubated in the light looked for food mainly with their right eye, while using the other to check out the predator. The weakly-lateralised chicks, meanwhile, had difficulty performing these two activities simultaneously.

E Similar results probably hold true for many other animals. In 2006, Angelo Bisazza at the University of Padua set out to observe the differences in feeding behaviour between strongly-lateralised and weakly-lateralised fish. He found that strongly-lateralised individuals were able to feed twice as fast as weakly-lateralised ones when there was a threat of a predator looming above them. Assigning different jobs to different brain halves may be especially advantageous for animals such as birds or fish, whose eyes are placed on the sides of their heads. This enables them to process input from each side separately, with different tasks in mind.

F And what of those animals who favour a specific side for almost all tasks? In 2009, Maria Magat and Culum Brown at Macquarie University in Australia wanted to see if there was general cognitive advantage in lateralisation. To investigate, they turned to parrots, which can be either strongly right- or left-footed, or ambidextrous (without dominance). The parrots were given the intellectually demanding task of pulling a snack on a string up to their beaks, using a co-ordinated combination of claws and beak. The results showed that the parrots with the strongest foot preferences worked out the puzzle far more quickly than their ambidextrous peers.

G A further puzzle is why are there always a few exceptions, like left-handed humans, who are wired differently from the majority of the population? Giorgio Vallortigara and Stefano Ghirlanda of Stockholm University seem to have found the answer via mathematical models. These have shown that a group of fish is likely to survive a shark attack with the fewest casualties if the majority turn together in one direction while a very small proportion of the group escape in the direction that the predator is not expecting.

H This imbalance of lateralisation within populations may also have advantages for individuals. Whereas most co-operative interactions require participants to react similarly, there are some situations – such as aggressive interactions – where it can benefit an individual to launch an attack from an unexpected quarter. Perhaps this can partly explain the existence of left-handers in human societies. It has been suggested that when it comes to hand-to-hand fighting, left-handers may have the advantage over the right-handed majority. Where survival depends on the element of surprise, it may indeed pay to be different.

PART 3 — QUESTIONS

Questions 27-30

Complete each sentence with the correct ending, A–F, below.

- In the 1970s, Lesley Rogers discovered that **27** _____
- Angelo Bisazza's experiments revealed that **28** _____
- Magat and Brown's studies show that **29** _____
- Vallortigara and Ghirlanda's research findings suggest that **30** _____

A. **lateralisation is more common in some species than in others.**

B. **it benefits a population if some members have a different lateralisation than the majority.**

C. **lateralisation helps animals do two things at the same time.**

D. **lateralisation is not confined to human beings.**

E. **the greater an animal's lateralisation, the better it is at problem-solving.**

F. **strong lateralisation may sometimes put groups of animals in danger.**

Questions 31-35

Complete the summary below.

Choose ONE WORD ONLY from the passage for each answer.

Lesley Rogers' 2004 Experiment

Lateralisation is determined by both genetic and **31** _____ influences. Rogers found that chicks whose eggs are given **32** _____ during the incubation period tend to have a stronger lateralisation. Her 2004 experiment set out to prove that these chicks were better at **33** _____ than weakly lateralised chicks. As expected, the strongly lateralised birds in the experiment were more able to locate **34** _____ using their right eye, while using their left eye to monitor an imitation **35** _____ located above them.

Questions 36-40

Reading Passage 3 has eight paragraphs, A–H.

Which paragraph contains the following information?

NB You may use any letter more than once.

	A	B	C	D	E	F	G	H
36 description of a study which supports another scientist's findings	○	○	○	○	○	○	○	○
37 the suggestion that a person could gain from having an opposing lateralisation to most of the population	○	○	○	○	○	○	○	○
38 reference to the large amount of knowledge of animal lateralisation that has accumulated	○	○	○	○	○	○	○	○
39 research findings that were among the first to contradict a previous belief	○	○	○	○	○	○	○	○
40 a suggestion that lateralisation would seem to disadvantage animals	○	○	○	○	○	○	○	○

Answer Key

#	Answer	Explanation
1	**seafaring**	Both of these activities were based on seafaring, an ability the Phoenicians developed from the example of their maritime predecessors, the Minoans of Crete
2	**merchant**	One of the characters is Wereket-El, a Phoenician merchant living at Tanis in Egypt's Nile delta. As many as 50 ships carry out his business, plying back and forth between the Nile and the Phoenician port of Sidon
3	**temple**	For Solomon's temple in Jerusalem, Hiram provided craftsmen with particular skills that were needed for this major construction project
4	**craftsmen**	For Solomon's temple in Jerusalem, Hiram provided craftsmen with particular skills that were needed for this major construction project
5	**timber/wood/cedar**	He also supplied materials – particularly timber, including cedar from the forests of Lebanon
6	**partnership**	And the two kings went into trade in partnership
7	**ivory**	It was also carved by the Phoenicians, and the same skill was adapted to even more precious work in ivory
8	**commission**	In addition, as traders and middlemen, they took a commission on a much greater range of precious goods that they transported from elsewhere
9	**TRUE**	But the main expansion came from the 8th century BC onwards, when pressure from Assyria to the east disrupted the patterns of trade on the Phoenician coast
10	**FALSE**	Carthage was the largest of the towns founded by the Phoenicians on the north African coast, and it rapidly assumed a leading position among the neighbouring colonies
11	**TRUE**	The subsequent spread and growth of Phoenician colonies in the western Mediterranean, and even out to the Atlantic coasts of Africa and Spain, was as much the achievement of Carthage as of the original Phoenician trading cities such as Tyre and Sidon
12	**TRUE**	From the 8th century BC, many of the coastal cities of Phoenicia came under the control of a succession of imperial powers, each of them defeated and replaced in the region by the next: first the

#	Answer	Explanation
		Assyrians, then the Babylonians, Persians and Macedonian Greeks
13	**NOT GIVEN**	In 64 BC, the area of Phoenicia became part of the Roman province of Syria. The Phoenicians as an identifiable people then faded from history, merging into the populations of modern Lebanon and northern Syria
14	**iv**	This chapter examines the ‘Golden Age’ of the Hollywood film studio system and explores how a particular kind of filmmaking developed during this period in US film history In addition to its historical interest, inspecting the growth of the studio system may offer clues regarding the kinds of struggles that accompany the growth of any new medium
15	**ii**	The shift of the industry away from ‘silent’ films began during the late 1920s. Warner Bros.’ 1927 film The Jazz Singer was the first to feature synchronized speech, and with it came a period of turmoil for the industry. Studios now had proof that ‘talkie’ films would make them money, but the financial investment this kind of filmmaking would require, from new camera equipment to new projection facilities, made the studios hesitant to invest at first
16	**vii**	Together these eight companies operated as a mature oligopoly, essentially running the entire market
17	**i**	During the Golden Age, the studios were remarkably consistent and stable enterprises, due in large part to long-term management heads – the infamous ‘movie moguls’ who ruled their kingdoms with iron fists
18	**v**	They also had to create product differentiation. Examining how each production company tried to differentiate itself has led to loose characterizations of individual studios’ styles
19	**vi**	In the United States versus Paramount federal decree of that year, the studios were ordered to give up their theaters in what is commonly referred to as ‘divestiture’ – opening the market to smaller producers. This, coupled with the advent of television in the 1950s, seriously compromised the studio system’s influence and profits
20	**FALSE**	Studios now had proof that ‘talkie’ films would make them money, but the financial investment this kind of filmmaking would require, from new camera equipment to new projection facilities, made the studios hesitant to invest at first

#	Answer	Explanation
21	**TRUE**	The camera now had to be encased in a big, clumsy, unmoveable soundproof box. In addition, actors struggled, having to direct their speech to awkwardly-hidden microphones in huge plants, telephones or even costumes
22	**NOT GIVEN**	Actors were bound up in seven-year contracts to a single studio, and the studio boss generally held all the options
23	**TRUE**	Studio bosses could also force bad roles on actors, and manipulate every single detail of stars' images with their mammoth in-house publicity departments
24	**vertical integration**	Vertical integration is the other key component in the rise of the Hollywood studio system. The major studios realized they could increase their profits by handling each stage of a film's life: production (making the film), distribution (getting the film out to people) and exhibition (owning the theaters in major cities where films were shown first)
25	**movie moguls**	During the Golden Age, the studios were remarkably consistent and stable enterprises, due in large part to long-term management heads – the infamous 'movie moguls' who ruled their kingdoms with iron fists
26	**divestiture**	In 1948, struggling independent movie producers and exhibitors finally triumphed in their battle against the big studios' monopolistic behavior. In the United States versus Paramount federal decree of that year, the studios were ordered to give up their theaters in what is commonly referred to as 'divestiture' — opening the market to smaller producers
27	**D**	For many years it was assumed that lateralisation was a uniquely human trait, but this notion rapidly fell apart as researchers started uncovering evidence of lateralisation in all sorts of animals. For example, in the 1970s, Lesley Rogers, now at the University of New England in Australia, was studying memory and learning in chicks
28	**C**	He found that strongly-lateralised individuals were able to feed twice as fast as weakly-lateralised ones when there was a threat of a predator looming above them. Assigning different jobs to different brain halves may be especially advantageous for animals such as birds or fish, whose eyes are placed on the sides of their heads. This enables them to process input from each side separately, with different tasks in mind
29	**E**	The results showed that the parrots with the strongest foot preferences worked out the puzzle far more quickly than their ambidextrous peers

#	Answer	Explanation
30	**B**	These have shown that a group of fish is likely to survive a shark attack with the fewest casualties if the majority turn together in one direction while a very small proportion of the group escape in the direction that the predator is not expecting
31	**environmental**	Genetics plays a part in determining lateralisation, but environmental factors have an impact too
32	**light**	Rogers found that a chick's lateralisation depends on whether it is exposed to light before hatching from its egg – if it is kept in the dark during this period, neither hemisphere becomes dominant
33	**multitasking**	In 2004, Rogers used this observation to test the advantages of brain bias in chicks faced with the challenge of multitasking
34	**food**	As predicted, the birds incubated in the light looked for food mainly with their right eye, while using the other to check out the predator
35	**predator**	She hatched chicks with either strong or weak lateralisation, then presented the two groups with food hidden among small pebbles and the threatening shape of a fake predator flying overhead. As predicted, the birds incubated in the light looked for food mainly with their right eye, while using the other to check out the predator
36	**E**	Similar results probably hold true for many other animals. In 2006, Angelo Bisazza at the University of Padua set out to observe the differences in feeding behaviour between strongly-lateralised and weakly-lateralised fish
37	**H**	It has been suggested that when it comes to hand-to-hand fighting, left-handers may have the advantage over the right-handed majority
38	**B**	and since then, researchers have built up an impressive catalogue of animal lateralisation
39	**B**	For many years it was assumed that lateralisation was a uniquely human trait, but this notion rapidly fell apart as researchers started uncovering evidence of lateralisation in all sorts of animals
40	**A**	This does, on some occasions, let the animal down: such as when a toad fails to escape from a snake approaching from the right, just because its right eye is worse at spotting danger than its left. So why would animals evolve a characteristic that seems to endanger them

Test 107

PASSAGE 1

You should spend about 20 minutes on Questions 1–14, which are based on Reading Passage 1.

Space travel AND health

A Space biomedicine is a relatively new area of research both in the USA and in Europe. Its main objectives are to study the effects of space travel on the human body, identifying the most critical medical problems and finding solutions to those problems. Space biomedicine centres are receiving increasing direct support from NASA and/or the European Space Agency (ESA).

1

B This involvement of NASA and the ESA reflects growing concern that the feasibility of travel to other planets, and beyond, is no longer limited by engineering constraints but by what the human body can actually withstand. The discovery of ice on Mars, for instance, means that there is now no necessity to design and develop a spacecraft large and powerful enough to transport the vast amounts of water needed to sustain the crew throughout journeys that may last many years. Without the necessary protection and medical treatment, however, their bodies would be devastated by the unremittingly hostile environment of space.

2

C The most obvious physical changes undergone by people in zero gravity are essentially harmless; in some cases they are even amusing. The blood and other fluids are no longer dragged down towards the feet by the gravity of Earth, so they accumulate higher up in the body, creating what is sometimes called 'fat face', together with the contrasting 'chicken legs' syndrome as the lower limbs become thinner.

3

D Much more serious are the unseen consequences after months or years in space. With no gravity, there is less need for a sturdy skeleton to support the body, with the result that the bones weaken, releasing calcium into the bloodstream. This extra calcium can overload the kidneys, leading ultimately to renal failure. Muscles too lose strength through lack of use. The heart becomes smaller, losing the power to pump oxygenated blood to all parts of the body, while the lungs lose the capacity to breathe fully. The digestive system becomes less efficient, a weakened immune system is increasingly unable to prevent diseases and the high levels of solar and cosmic radiation can cause various forms of cancer.

4

E To make matters worse, a wide range of medical difficulties can arise in the case of an accident or serious illness when the patient is millions of kilometres from Earth. There is simply not enough room available inside a space vehicle to include all the equipment from a hospital's casualty unit, some of which would not work properly in space anyway. Even basic things such as a drip depend on gravity to function, while standard resuscitation techniques become ineffective if sufficient weight cannot be applied. The only solution seems to be to create extremely small medical tools and 'smart' devices that can, for example, diagnose and treat internal injuries using ultrasound. The cost of designing and producing this kind of equipment is bound to be, well, astronomical.

F Such considerations have led some to question the ethics of investing huge sums of money to help a handful of people who, after all, are willingly risking their own health in outer space, when so much needs to be done a lot closer to home. It is now clear, however, that every problem of space travel has a parallel problem on Earth that will benefit from the knowledge gained and the skills developed from space biomedical research. For instance, the very difficulty of treating astronauts in space has led to rapid progress in the field of telemedicine, which in turn has brought about developments that enable surgeons to communicate with patients in inaccessible parts of the world. To take another example, systems invented to sterilize waste water on board spacecraft could be used by emergency teams to filter contaminated water at the scene of natural disasters such as floods and earthquakes. In the same way, miniature monitoring equipment, developed to save weight in space capsules, will eventually become tiny monitors that patients on Earth can wear without discomfort wherever they go.

5

G Nevertheless, there is still one major obstacle to carrying out studies into the effects of space travel: how to do so without going to the enormous expense of actually working in space. To simulate conditions in zero gravity, one tried and tested method is to work under water, but the space biomedicine centres are also looking at other ideas. In one experiment, researchers study the weakening of bones that results from prolonged inactivity. This would involve volunteers staying in bed for three months, but the centre concerned is confident there should be no great difficulty in finding people willing to spend twelve weeks lying down. All in the name of science, of course.

PART 1 — QUESTIONS

Questions 1-5

Reading Passage 1 has seven paragraphs A–G.

Choose the correct heading for paragraphs B–E and G from the list of headings below.

Write the correct number (i–x).

i. **The problem of dealing with emergencies in space**

ii. **How space biomedicine can help patients on Earth**

iii. **Why accidents are so common in outer space**

iv. **What is space biomedicine?**

v. **The psychological problems of astronauts**

vi. **Conducting space biomedical research on Earth**

vii. **The internal damage caused to the human body by space travel**

viii. **How space biomedicine first began**

ix. **The visible effects of space travel on the human body**

x. **Why space biomedicine is now necessary**

Questions 6-7

Answer the question below using NO MORE THAN THREE WORDS for each answer.

6 Where, apart from Earth, can space travellers find water? _____

7 What happens to human legs during space travel? _____

Questions 8-12

Do the following statements agree with the writer's views in Reading Passage 1?

YES if the statement agrees with the views of the writer

NO if the statement does not agree with the views of the writer

NOT GIVEN if there is no information about this in the passage

8 The obstacles to going far into space are now medical, not technological.

A ○ YES

B ○ NO

C ○ NOT GIVEN

9 Astronauts cannot survive more than two years in space.

A ○ YES

B ○ NO

C ○ NOT GIVEN

10 It is morally wrong to spend so much money on space biomedicine.

A ○ YES

B ○ NO

C ○ NOT GIVEN

11 Some kinds of surgery are more successful when performed in space.

A ○ YES

B ○ NO

C ○ NOT GIVEN

12 Space biomedical research can only be done in space.

A ○ YES

B ○ NO

C ○ NOT GIVEN

Questions 13-14

Complete the table below

Choose NO MORE THAN THREE WORDS from the passage for each answer.

Research area	Application in space	Application on Earth
Telemedicine	treating astronauts	**13** _____ in remote areas
Sterilization	sterilizing waste water	**14** _____ in disaster zones
Miniaturization	saving weight	wearing small monitors comfortably

PASSAGE 2

You should spend about 20 minutes on Questions 15–27, which are based on Reading Passage 2.

VANISHED Who pulled the plug on the Mediterranean? And could it happen again?

Cannes. Monte Carlo. St Tropez. Magic names all. And much of the enchantment comes from the deep blue water that laps their shores. But what if somebody pulled the plug? Suppose the Mediterranean Sea were to vanish, leaving behind an expanse of salt desert the size of India. Hard to imagine? It happened.

'It would have looked like Death Valley,' says Bill Ryan, from the Lamont-Doherty Earth Observatory in New York, one of the leaders of the team that discovered the Mediterranean had once dried up, then refilled in a deluge of Biblical proportions. Between five and six million years ago, the great desiccation touched off what scientists call the Messinian Salinity Crisis – a global chemical imbalance that triggered a wrenching series of extinctions and plunged the Earth into an ice age.

The first indications of some extraordinary past events came in the 1960s, when geologists discovered that major rivers flowing into the Mediterranean had eroded deep canyons in the rock at the bottom of the sea. River erosion of bedrock cannot occur below sea level, yet somehow the River Rhone in the South of France had managed to create a channel 1000 metres deep in the sea floor, while the Nile had cut nearly 1500 metres into the rock off the North African coast. There was more: despite the fact that the formation of caves can only take place above water, scientists discovered a whole network beneath the island of Malta that reached an astonishing depth of 2000 metres below sea level.

Further evidence came to light in 1970, when an international team chugged across the Mediterranean in a drilling ship to study the sea floor near the Spanish island of Majorca. Strange things started turning up in core samples: layers of microscopic plants and soil sandwiched between beds of salt more than two kilometres below today's sea level. The plants had grown in sunlight. Also discovered inside the rock were fossilized shallow-water shellfish, together with salt and silt: particles of sand and mud that had once been carried by river water. Could the sea floor once have been near a shoreline?

That question led Ryan and his fellow team leader, Kenneth Hsü, to piece together a staggering chain of events. About 5.8 million years ago, they concluded, the Mediterranean was gradually cut off from the Atlantic Ocean when continental drift pinned Morocco against Spain. As the opening became both narrower and shallower, the deep outward flow from sea to ocean was progressively cut off, leaving only the shallow inward flow of ocean water into the Mediterranean. As this water evaporated, the sea became more saline and creatures that couldn't handle the rising salt content perished. 'The sea's interior was dead as a door nail, except for bacteria,' says Ryan. When the shallow opening at Gibraltar finally closed completely, the Mediterranean, with only rivers to feed it, dried up and died.

Meanwhile, the evaporated water was falling back to Earth as rain. When the fresh water reached the oceans, it made them less saline. With less salt in it to act as an antifreeze, parts of the ocean that would not normally freeze began to turn to ice. 'The ice reflects sunlight into space,' says Ryan. 'The planet cools. You drive yourself into an ice age.'

Eventually, a small breach in the Gibraltar dam sent the process into reverse. Ocean water cut a tiny channel to the Mediterranean. As the gap enlarged, the water flowed faster and faster, until the torrent ripped through the emerging Straits of Gibraltar at more than 100 knots. 'The Gibraltar Falls were 100 times bigger than Victoria Falls and a thousand times grander than Niagara,' Hsü wrote in his book *The Mediterranean was a Desert* (Princeton University Press, 1983).

In the end the rising waters of the vast inland sea drowned the falls and warm water began to escape to the Atlantic, reheating the oceans and the planet. The salinity crisis ended about 5.4 million years ago. It had lasted roughly 400,000 years.

Subsequent drilling expeditions have added a few wrinkles to Ryan and Hsü's scenario. For example, researchers have found salt deposits more than two kilometres thick – so thick, some believe, that the Mediterranean must have dried up and refilled many times. But those are just geological details. For tourists the crucial question is, could it happen again? Should Malaga start stockpiling dynamite?

Not yet, says Ryan. If continental drift does reseal the Mediterranean, it won't be for several million years. 'Some future creatures may face the issue of how to respond to nature's closure. It's not something our species has to worry about.'

PART 2 — QUESTIONS

Questions 15-19

Complete the summary below.

Choose NO MORE THAN THREE WORDS from the passage for each answer.

The 1960s discovery of **15** _____ in the bedrock of the Mediterranean, as well as deep caves beneath Malta, suggested something strange had happened in the region, as these features must have been formed **16** _____ sea level. Subsequent examination of the **17** _____ off Majorca provided more proof. Rock samples from 2000 metres down contained both vegetation and **18** _____ that could not have lived in deep water, as well as **19** _____ originally transported by river.

Questions 20-22

Complete each of the following statements with the best ending from the box below.

Write the appropriate letters A–G.

- The extra ice did not absorb the heat from the sun, so ... **20** _____
- The speed of the water from the Atlantic increased as ... **21** _____
- The Earth and its oceans became warmer when ... **22** _____

A. **Africa and Europe crashed into each other.**

B. **water started flowing from the Mediterranean.**

C. **the sea was cut off from the ocean.**

D. **all the fish and plant life in the Mediterranean died.**

E. **the Earth started to become colder.**

F. **the channel grew bigger, creating the waterfalls.**

G. **all the ice on earth melted.**

Questions 23-27

Choose the appropriate letters A, B, C or D.

23 What, according to Ryan and Hsü, happened about 5.8 million years ago?

- **A** ○ Movement of the continents suddenly closed the Straits of Gibraltar.
- **B** ○ The water level of the Atlantic Ocean gradually fell.
- **C** ○ The flow of water into the Mediterranean was immediately cut off.
- **D** ○ Water stopped flowing from the Mediterranean to the Atlantic.

24 Why did most of the animal and plant life in the Mediterranean die?

- **A** ○ The water became too salty.
- **B** ○ There was such a lot of bacteria in the water.
- **C** ○ The rivers did not provide salt water.
- **D** ○ The sea became a desert.

25 According to the text, the events at Gibraltar led to

- **A** ○ a permanent cooling of the Earth.
- **B** ○ the beginning and the end of an ice age.
- **C** ○ the formation of waterfalls elsewhere in the world.
- **D** ○ a lack of salt in the oceans that continues to this day.

26 More recent studies show that

- **A** ○ Ryan and Hsü's theory was correct in every detail.
- **B** ○ the Mediterranean was never cut off from the Atlantic.
- **C** ○ it may have been cut off more than once.
- **D** ○ it might once have been a freshwater lake.

27 At the end of the article, Ryan suggests that

- **A** ○ the Mediterranean will never dry up again.

B ○ humans will have the technology to prevent it drying up again.

C ○ the Mediterranean is certain to dry up again one day.

D ○ humans will never see the Mediterranean dry up.

PASSAGE 3

You should spend about 20 minutes on Questions 28–40, which are based on Reading Passage 3.

Dogs: a love story

A Genetic studies show that dogs evolved from wolves and remain as similar to the creatures from which they came as humans with different physical characteristics are to each other, which is to say not much different at all. 'Even in the most changeable mitochondrial DNA markers – DNA handed down on the mother's side – dogs and wolves differ by not much more than one per cent,' says Robert Wayne, a geneticist at the University of California at Los Angeles.

B Wolf-like species go back one to two million years, says Wayne, whose genetic work suggests dogs of some sort began breaking away about 100,000 years ago. Wolf and early human fossils have been found close together from as far back as 400,000 years ago, but dog and human fossils date back only about 14,000 years, all of which puts wolves and/or dogs in the company of man or his progenitors before the development of farming and permanent human settlements, at a time when both species survived on what they could scratch out hunting or scavenging.

C Why would these competitors cooperate? The answer probably lies in the similar social structure and size of wolf packs and early human clans, the compatibility of their hunting objectives and range, and the willingness of humans to accept into camp the most suppliant wolves, the young or less threatening ones.

D Certain wolves or protodogs may have worked their way close to the fire ring after smelling something good to eat, then into early human gatherings by proving helpful or unthreatening. As wandering packs of twenty-five or thirty wolves and clans of like-numbered nomadic humans roamed the landscape in tandem, hunting big game, the animals hung around campsites scavenging leftovers, and the humans might have used the wolves' superior scenting ability and speed to locate and track prospective kills. At night, wolves with their keen senses could warn humans of danger approaching.

E Times might not have been as hard back then as is commonly thought. In many instances food would have been plentiful, predators few, and the boundaries between humans and wildlife porous. Through those pores slipped smaller or less threatening wolves, which from living in packs where alpha bosses reigned would know the tricks of subservience and could adapt to humans in charge. Puppies in particular would be hard to resist, as they are today. Thus was a union born and a process of domestication begun.

F Over the millennia, admission of certain wolves and protodogs into human camps and exclusion of larger, more threatening ones led to the development of people-friendly breeds distinguishable from wolves by size, shape, coat, ears and markings. Dogs were generally smaller than wolves, their snouts proportionally reduced. They would assist in the hunt, clean

up camp by eating garbage, warn of danger, keep humans warm, and serve as food. Native Americans among others ate puppies, and in some societies it remains accepted practice.

G By the fourth millennium BC Egyptian rock and pottery drawings show dogs being put to work by men. Then, as now, the relationship was not without drawbacks. Feral dogs roamed city streets, stealing food from people returning from market. Despite their penchant for misbehaviour, and sometimes because of it, dogs keep turning up at all the important junctures in human history.

H In ancient Greece, 350 years before Christ, Aristotle described three types of domesticated dogs, including speedy Laconians used by the rich to chase and kill rabbits and deer. Three hundred years later, Roman warriors trained large dogs for battle. The brutes could knock an armed man from his horse and dismember him.

I In seventeenth-century England, dogs still worked, pulling carts, sleds, and ploughs, herding livestock, or working as turn-spits, powering wheels that turned beef and venison over open fires. But working dogs were not much loved and were usually hanged or drowned when they got old. 'Unnecessary' dogs meanwhile gained status among English royalty. King James I was said to love his dogs more than his subjects. Charles II was famous for playing with his dog at Council table, and his brother James had dogs at sea in 1682 when his ship was caught in a storm. As sailors drowned, he allegedly cried out, 'Save the dogs and Colonel Churchill!'

J By the late nineteenth century the passion for breeding led to the creation of private registries to protect prized bloodlines. The Kennel Club was formed in England in 1873, and eleven years later the American Kennel Club (AKC) was formed across the Atlantic. Today the AKC registers 150 breeds, the Kennel Club lists 196, and the Europe-based Fédération Cynologique Internationale recognizes many more. Dog shows sprouted in the mid-1800s when unnecessary dogs began vastly to outnumber working ones, as they do to this day. Unless, that is, you count companionship as a job.

PART 3 — QUESTIONS

Questions 28-31

Reading Passage 3 has ten paragraphs labelled A–J.

Write the correct letters A–J.

	A	B	C	D	E	F	G	H	I	J
28 Which paragraph explains how dogs became different in appearance from wolves?	○	○	○	○	○	○	○	○	○	○
29 Which paragraph describes the classification of dogs into many different types?	○	○	○	○	○	○	○	○	○	○
30 Which paragraph states the basic similarity between wolves and dogs?	○	○	○	○	○	○	○	○	○	○
31 Which paragraph gives examples of greater human concern for animals than for people?	○	○	○	○	○	○	○	○	○	○

Questions 32-35

Choose FOUR letters from A–H.

32 **33** **34** **35** Which FOUR of the following statements are made in the text?

- **A** ☐ In a typical camp there were many more wolves than humans.
- **B** ☐ Neither the wolves nor the humans lived in one place for long.
- **C** ☐ Some wolves learned to obey human leaders.
- **D** ☐ Humans chose the most dangerous wolves to help them hunt.
- **E** ☐ There was very little for early humans to eat.
- **F** ☐ Wolves got food from early humans.

G ☐ Wolves started living with humans when agriculture began.

H ☐ Early humans especially liked very young wolves.

Questions 36-40

From the information in the text, indicate who used dogs in the ways listed below.

Write the correct letters A–F.

NB You may use any letter more than once.

A. the Greeks

B. the French

C. the Egyptians

D. the Romans

E. the English

F. the Native Americans

	A	B	C	D	E	F
36 in war	○	○	○	○	○	○
37 as a source of energy	○	○	○	○	○	○
38 as food	○	○	○	○	○	○
39 to hunt other animals	○	○	○	○	○	○
40 to work with farm animals	○	○	○	○	○	○

Answer Key

#	Answer	Explanation
1	x	This involvement of NASA and the ESA reflects growing concern that the feasibility of travel to other planets, and beyond, is no longer limited by engineering constraints but by what the human body can actually withstand
2	ix	The most obvious physical changes undergone by people in zero gravity are essentially harmless; in some cases they are even amusing. The blood and other fluids are no longer dragged down towards the feet by the gravity of Earth, so they accumulate higher up in the body, creating what is sometimes called ‘fat face’, together with the contrasting ‘chicken legs’ syndrome as the lower limbs become thinner
3	vii	Much more serious are the unseen consequences after months or years in space. With no gravity, there is less need for a sturdy skeleton to support the body, with the result that the bones weaken, releasing calcium into the bloodstream. This extra calcium can overload the kidneys, leading ultimately to renal failure. Muscles too lose strength through lack of use. The heart becomes smaller, losing the power to pump oxygenated blood to all parts of the body, while the lungs lose the capacity to breathe fully. The digestive system becomes less efficient, a weakened immune system is increasingly unable to prevent diseases and the high levels of solar and cosmic radiation can cause various forms of cancer
4	i	To make matters worse, a wide range of medical difficulties can arise in the case of an accident or serious illness when the patient is millions of kilometres from Earth. There is simply not enough room available inside a space vehicle to include all the equipment from a hospital’s casualty unit, some of which would not work properly in space anyway
5	vi	Nevertheless, there is still one major obstacle to carrying out studies into the effects of space travel: how to do so without going to the enormous expense of actually working in space. To simulate conditions in zero gravity, one tried and tested method is to work under water, but the space biomedicine centres are also looking at other ideas. In one experiment, researchers study the weakening of bones that results from prolonged inactivity. This would involve volunteers staying in bed for three months

#	Answer	Explanation
6	**(on/from) Mars**	The discovery of ice on Mars, for instance, means that there is now no necessity to design and develop a spacecraft large and powerful enough to transport the vast amounts of water needed to sustain the crew throughout journeys that may last many years
7	**become thinner / (they become) thinner**	together with the contrasting 'chicken legs' syndrome as the lower limbs become thinner
8	**YES**	the feasibility of travel to other planets, and beyond, is no longer limited by engineering constraints but by what the human body can actually withstand
9	**NOT GIVEN**	The discovery of ice on Mars, for instance, means that there is now no necessity to design and develop a spacecraft large and powerful enough to transport the vast amounts of water needed to sustain the crew throughout journeys that may last many years
10	**NO**	It is now clear, however, that every problem of space travel has a parallel problem on Earth that will benefit from the knowledge gained and the skills developed from space biomedical research
11	**NOT GIVEN**	For instance, the very difficulty of treating astronauts in space has led to rapid progress in the field of telemedicine, which in turn has brought about developments that enable surgeons to communicate with patients in inaccessible parts of the world
12	**NO**	To simulate conditions in zero gravity, one tried and tested method is to work under water, but the space biomedicine centres are also looking at other ideas. In one experiment, researchers study the weakening of bones that results from prolonged inactivity. This would involve volunteers staying in bed for three months
13	**communicating with patients/communicate with patients**	developments that enable surgeons to communicate with patients in inaccessible parts of the world
14	**filtering contaminated water/filter contaminated water**	To take another example, systems invented to sterilize waste water on board spacecraft could be used by emergency teams to filter contaminated water at the scene of natural disasters such as floods and earthquakes
15	**(deep) canyons**	The first indications of some extraordinary past events came in the 1960s, when geologists discovered that major rivers flowing into the Mediterranean had eroded deep canyons in the rock at the bottom of the sea

#	Answer	Explanation
16	**above**	River erosion of bedrock cannot occur below sea level, yet somehow the River Rhone in the South of France had managed to create a channel 1000 metres deep in the sea floor, while the Nile had cut nearly 1500 metres into the rock off the North African coast. There was more: despite the fact that the formation of caves can only take place above water, scientists discovered a whole network beneath the island of Malta that reached an astonishing depth of 2000 metres below sea level
17	**sea floor**	Further evidence came to light in 1970, when an international team chugged across the Mediterranean in a drilling ship to study the sea floor near the Spanish island of Majorca
18	**(shallow-water) shellfish**	Also discovered inside the rock were fossilized shallow-water shellfish, together with salt and silt: particles of sand and mud that had once been carried by river water
19	**salt and silt / silt / sand and mud**	Also discovered inside the rock were fossilized shallow-water shellfish, together with salt and silt: particles of sand and mud that had once been carried by river water
20	**E**	‘The ice reflects sunlight into space,’ says Ryan. ‘The planet cools. You drive yourself into an ice age.’
21	**F**	As the gap enlarged, the water flowed faster and faster, until the torrent ripped through the emerging Straits of Gibraltar at more than 100 knots. ‘The Gibraltar Falls were 100 times bigger than Victoria Falls and a thousand times grander than Niagara,’ Hsü wrote in his book The Mediterranean was a Desert (Princeton University Press, 1983)
22	**B**	In the end the rising waters of the vast inland sea drowned the falls and warm water began to escape to the Atlantic, reheating the oceans and the planet
23	**D**	About 5.8 million years ago, they concluded, the Mediterranean was gradually cut off from the Atlantic Ocean when continental drift pinned Morocco against Spain. As the opening became both narrower and shallower, the deep outward flow from sea to ocean was progressively cut off, leaving only the shallow inward flow of ocean water into the Mediterranean
24	**A**	As this water evaporated, the sea became more saline and creatures that couldn’t handle the rising salt content perished
25	**B**	‘The planet cools. You drive yourself into an ice age.’ Eventually, a small breach in the Gibraltar dam sent the process into reverse warm water began to escape to the Atlantic, reheating the oceans and the planet

#	Answer	Explanation
26	**C**	Subsequent drilling expeditions have added a few wrinkles to Ryan and Hsü's scenario. For example, researchers have found salt deposits more than two kilometres thick – so thick, some believe, that the Mediterranean must have dried up and refilled many times
27	**D**	If continental drift does reseal the Mediterranean, it won't be for several million years. 'Some future creatures may face the issue of how to respond to nature's closure. It's not something our species has to worry about.'
28	**F**	Over the millennia, admission of certain wolves and protodogs into human camps and exclusion of larger, more threatening ones led to the development of people-friendly breeds distinguishable from wolves by size, shape, coat, ears and markings. Dogs were generally smaller than wolves, their snouts proportionally reduced
29	**J**	Today the AKC registers 150 breeds, the Kennel Club lists 196, and the Europe-based Fédération Cynologique Internationale recognizes many more
30	**A**	Genetic studies show that dogs evolved from wolves and remain as similar to the creatures from which they came as humans with different physical characteristics are to each other, which is to say not much different at all
31	**I**	King James I was said to love his dogs more than his subjects. Charles II was famous for playing with his dog at Council table, and his brother James had dogs at sea in 1682 when his ship was caught in a storm. As sailors drowned, he allegedly cried out, 'Save the dogs and Colonel Churchill!'
32	**B / C / F / H**	As wandering packs of twenty-five or thirty wolves and clans of like-numbered nomadic humans roamed the landscape in tandem, hunting big game, the animals hung around campsites scavenging leftovers Through those pores slipped smaller or less threatening wolves, which from living in packs where alpha bosses reigned would know the tricks of subservience and could adapt to humans in charge. Puppies in particular would be hard to resist, as they are today
33	**B / C / F / H**	As wandering packs of twenty-five or thirty wolves and clans of like-numbered nomadic humans roamed the landscape in tandem, hunting big game, the animals hung around campsites scavenging leftovers Through those pores slipped smaller or less threatening wolves, which from living in packs where alpha bosses reigned would know the tricks of subservience and could adapt to humans in charge. Puppies in particular would be hard to resist, as they are today

#	Answer	Explanation
34	**B / C / F / H**	As wandering packs of twenty-five or thirty wolves and clans of like-numbered nomadic humans roamed the landscape in tandem, hunting big game, the animals hung around campsites scavenging leftovers Through those pores slipped smaller or less threatening wolves, which from living in packs where alpha bosses reigned would know the tricks of subservience and could adapt to humans in charge. Puppies in particular would be hard to resist, as they are today
35	**B / C / F / H**	As wandering packs of twenty-five or thirty wolves and clans of like-numbered nomadic humans roamed the landscape in tandem, hunting big game, the animals hung around campsites scavenging leftovers Through those pores slipped smaller or less threatening wolves, which from living in packs where alpha bosses reigned would know the tricks of subservience and could adapt to humans in charge. Puppies in particular would be hard to resist, as they are today
36	**D**	Roman warriors trained large dogs for battle
37	**E**	In seventeenth-century England, dogs still worked, pulling carts, sleds, and ploughs, herding livestock, or working as turn-spits, powering wheels that turned beef and venison over open fires
38	**F**	Native Americans among others ate puppies, and in some societies it remains accepted practice
39	**A**	In ancient Greece, 350 years before Christ, Aristotle described three types of domesticated dogs, including speedy Laconians used by the rich to chase and kill rabbits and deer
40	**E**	In seventeenth-century England, dogs still worked, pulling carts, sleds, and ploughs, herding livestock, or working as turn-spits, powering wheels that turned beef and venison over open fires

Test 108

PASSAGE 1

You should spend about 20 minutes on Questions 1–14, which are based on Reading Passage 1.

Scratching the surface

They are insidious skin parasites, infesting the occupants of factories and offices. They cause itching, prickling and crawling sensations in the skin that are almost untreatable. These creatures may only exist in the mind, but their effects are real and infectious.

The classic case occurred in a US laboratory in 1966. After new equipment was installed, workers started to suffer from itching and sensations of insects crawling over them. Complaints multiplied and the problem, attributed to 'cable mites', started to spread to relatives of the victims. A concerted effort was made to exterminate the mites using everything from DDT and mothballs to insecticide and rat poison.

Nothing worked. Thorough examination by scientific investigators could not locate any pests, or even signs of actual parasite attacks. However, they did find small particles of rockwool insulation in the air, which could cause skin irritation. A cleaning programme was introduced and staff were assured the problem had been solved. The cable mite infestation disappeared.

Another 1960s case occurred in a textile factory, where workers complained of being bitten by insects brought into the factory in imported cloth. Dermatitis swept through the workforce, but it followed a curious pattern. Instead of affecting people in one particular part of the factory, the bugs seemed to be transmitted through employees' social groups. No parasites could be found.

A third infestation spread through office staff going through dusty records that had lain untouched for decades. They attributed their skin problems to 'paper mites', but the cause was traced to irritation from paper splinters.

These are all cases of illusions of parasitosis, where something in the environment is misinterpreted as an insect or other pest. Everyone has heard of delirium tremens, when alcoholics or amphetamine users experience the feeling of insects crawling over their skin, but other factors can cause the same illusion. Static electricity, dust, fibres, and chemical solvents can all give rise to imaginary insects. The interesting thing is that they spread. The infectious nature of this illusion seems to be a type of reflex contagion. Yawn, and others start yawning. If everyone around you laughs, you laugh. Start scratching, and colleagues will scratch, too.

* Dr Paul Marsden is managing editor of the *Journal of Memetics*, the study of infectious ideas. He suggests that this type of group behaviour may have had a role to play in human evolution. In our distant past, one individual scratching would have alerted others that there were biting insects or parasites present. This would prime them to scratch itches of their own. Anyone who has been bitten several times by mosquitoes before they realized it will recognize the

evolutionary value of this kind of advance warning. The outbreak of mass scratching may also promote mutual grooming, which is important in the necessary bonding of primate groups.

The problem comes when the reflex contagion is not related to a real threat. Normally, everyone would soon stop scratching, but people may unconsciously exaggerate symptoms to gain attention, or because it gets them a break from unappealing work. The lab workers were scanners, who spent the day laboriously examining the results of bubble-chamber tests; textile workers and clerical staff poring over records would also have found what they had to do quite tedious. Add the factor that skin conditions are notoriously susceptible to psychological influence, and it is easy to see how a group dynamic can keep the illusory parasites going.

Treatment of the condition is difficult, since few will accept that their misreading of the symptoms is the result of what psychologists call a hysterical condition. In the past, the combination of removal of irritants and expert reassurance was enough. However, these days, there is a mistrust of conventional medicine and easier access to support groups.

Sufferers can reinforce each other's illusions over the Internet, swapping tales of elusive mites that baffle science. This could give rise to an epidemic of mystery parasites, spreading from mind to mind like a kind of super virus. Only an awareness of the power of the illusion can stop it.

You can stop scratching now ...

PART 1 — QUESTIONS

Questions 1-5

Classify statements 1–5 according to whether they apply to

A the laboratory

B the factory

C the office

A. the laboratory

B. the factory

C. the office

	A	B	C
1 Workers who met each other socially suffered from the condition.	○	○	○
2 The victims were all working with old documents.	○	○	○
3 They tried to kill the insects they thought were responsible.	○	○	○
4 They said the creatures had come in material from abroad.	○	○	○
5 Employees' families were affected by the condition.	○	○	○

Questions 6-8

Complete the notes below with words taken from Reading Passage 1.

Use NO MORE THAN TWO WORDS for each answer.

Evolutionary purpose theory

parasite / insect bite

↓

6 _____ → benefit to group: 7 _____ to presence of pests

↓

group scratching

↓

group grooming → benefit to group: **8** _____

Questions 9-13

Do the following statements agree with the information given in Reading Passage 1?

TRUE if the statement is true according to the passage

FALSE if the statement is false according to the passage

NOT GIVEN if the statement is not given in the passage

9 Some keep scratching because they know it will enable them to stop work.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

10 The laboratory, factory and office employees all had boring jobs.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

11 The human skin is extremely sensitive to irritants.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

12 In many cases, people no longer believe what medical professionals say.

- **A** ○ TRUE
- **B** ○ FALSE

C ○ NOT GIVEN

13 It is impossible to prevent the condition becoming an Internet epidemic.

A ○ TRUE

B ○ FALSE

C ○ NOT GIVEN

Questions 14-14

Write the appropriate letter A–E in box 14 on your answer sheet.

14 From the list below choose the most suitable alternative title for Reading Passage 1.

A ○ The benefits of itching and scratching

B ○ Increasing complaints about insects

C ○ Scratching, yawning and laughing

D ○ Imaginary bites and parasites

E ○ Computer bites and Internet itches

PASSAGE 2

You should spend about 20 minutes on Questions 15–27, which are based on Reading Passage 2.

The Anderton Boat Lift

Section I

When the Trent and Mersey Canal opened in 1777, the Cheshire town of Anderton was the obvious place to transfer goods to and from the nearby River Weaver. There was just one problem: the canal was fifteen metres above the river.

Pathways, inclined planes, and chutes were constructed to ease the task of moving cargo by hand. Primitive railways were laid to move cargoes, cranes were built, and steam engines were later installed to power lifting. In the early 1870s, however, the Weaver Navigation Trustees decided to eliminate the cost, effort, and wastage involved in hand transportation when the engineers Edward Leader Williams and Edwin Clarke suggested a 'boat carrying lift'.

Section II

Their design was a unique and magnificent example of the Victorians' mastery of cast iron and hydraulics. Completed in 1875, graceful in appearance, simple in use, and above all efficient, the lift was hailed as a marvel of the era, and became a prototype for larger versions on the waterways of France and Belgium.

The operating mechanism consisted of two vertical sets of interconnected hydraulic cylinders and pistons set into the bed of the river and each piston supported a boat-carrying tank 22.86 metres long and 4.72 metres wide. At rest, one tank was level with the canal and the other level with the river and to move the tanks, a small amount of water was removed from the bottom tank making it lighter than the top tank.

Because the two hydraulic cylinders were connected, the heavier top tank moved down and forced hydraulic liquid through the connecting pipe into the other cylinder pushing that piston and the lighter tank upwards. Watertight gates both on the tanks and at the entrance to the canal contained the water while the tanks were moving. A hydraulic pump driven by steam supplied the small amount of additional energy required to effect a reasonably rapid movement and to enable the tanks to be precisely levelled at the end of their journey.

Section III

All went well for the first ten years, then pitting and grooving of the cylinders and pistons occurred. Investigations showed that the canal water used as the hydraulic liquid was contaminated by chemicals and was corrosive, therefore causing the damage.

It was immediately changed to distilled water from the steam engine powering the hydraulic pump. Corrosion was dramatically reduced but the damage had been done.

In addition, the boiler for the steam engine needed renewing, so in 1906 the Trustees ordered the construction of a new lift, to a design by their engineer J A Saner.

Section IV

The new lift was built over the top of the Victorian structure, utilizing the Victorian front and rear columns. The main structure had strong A-frames at either side of the new lift to support the enormous weight of the platform that now formed the top of the framework: on it was located the new operating mechanism, which included seventy-two pulleys weighing up to 35 tonnes each.

Each of the boat-carrying tanks was now suspended on wire ropes which ran from the tank to the top of the lift, around pulleys, and down to cast-iron weights at the side of the structure. These were equal to the weight of the water-filled tank. Turning the pulleys one way or the other moved the ropes, so that one tank was raised or lowered independently of the other tank. Because the tanks were counterbalanced by the weights, only a small electrical motor was required to turn the pulleys and so move the tanks up or down.

Completed in 1908 the lift was reliable, cheap and easy to operate. Unlike the Victorian lift it was not the least bit elegant, but it was functional and it worked.

Section V

Both the 1875 the 1908 versions carried large volumes of commercial traffic and the principal cargoes transported were coal, china clay, salt, manufactured goods, including china ware, and agricultural produce.

Sadly, trade on inland waterways in Britain declined dramatically in the 1950s, and goods traffic via the lift effectively ended in the 1960s. The 1970s increase in pleasure boating briefly prolonged its active life, but in 1982 the 'Cathedral of the Canals' was finally closed.

Section VI

Demolition seemed inevitable, but, after a long campaign by concerned groups, British Waterways agreed, in 1999, to save the lift.

Some wanted it 'conserved as found', but that would entail replacing much of the existing structure, virtually creating a replica lift. The steel of the 1908 structure had been badly corroded by pollutants from the local chemical industries and would need replacing if it were to support the overhead machinery and 500-tonne counterweights. In addition, safety considerations would require the installation of a back-up braking system.

It was decided, therefore, to revert to the 1875 hydraulically-operated system, using the original cast-iron structure. Although the counterweights had to be removed, the 1908 framework and pulleys would be retained as a static monument.

It was a huge and expensive project, and not without difficulties. Eventually, in 2002, the Anderton Boat Lift was officially reopened. Boat owners and visitors alike can once again ride 'the world's first boat lift'.

PART 2 — QUESTIONS

Questions 15-19

Reading Passage 2 has six sections I–VI.

Choose the most suitable heading for each section II–VI from the list below. Write the appropriate letters (a–j) in boxes 15–19 on your answer sheet.

a. The lift in use

b. The first and second lifts

c. Restoring the lift

d. The new canal

e. Mechanical problems

f. Why the lift was needed

g. The supports of the second lift

h. A new framework and machinery

i. How the original lift worked

j. A completely new lift

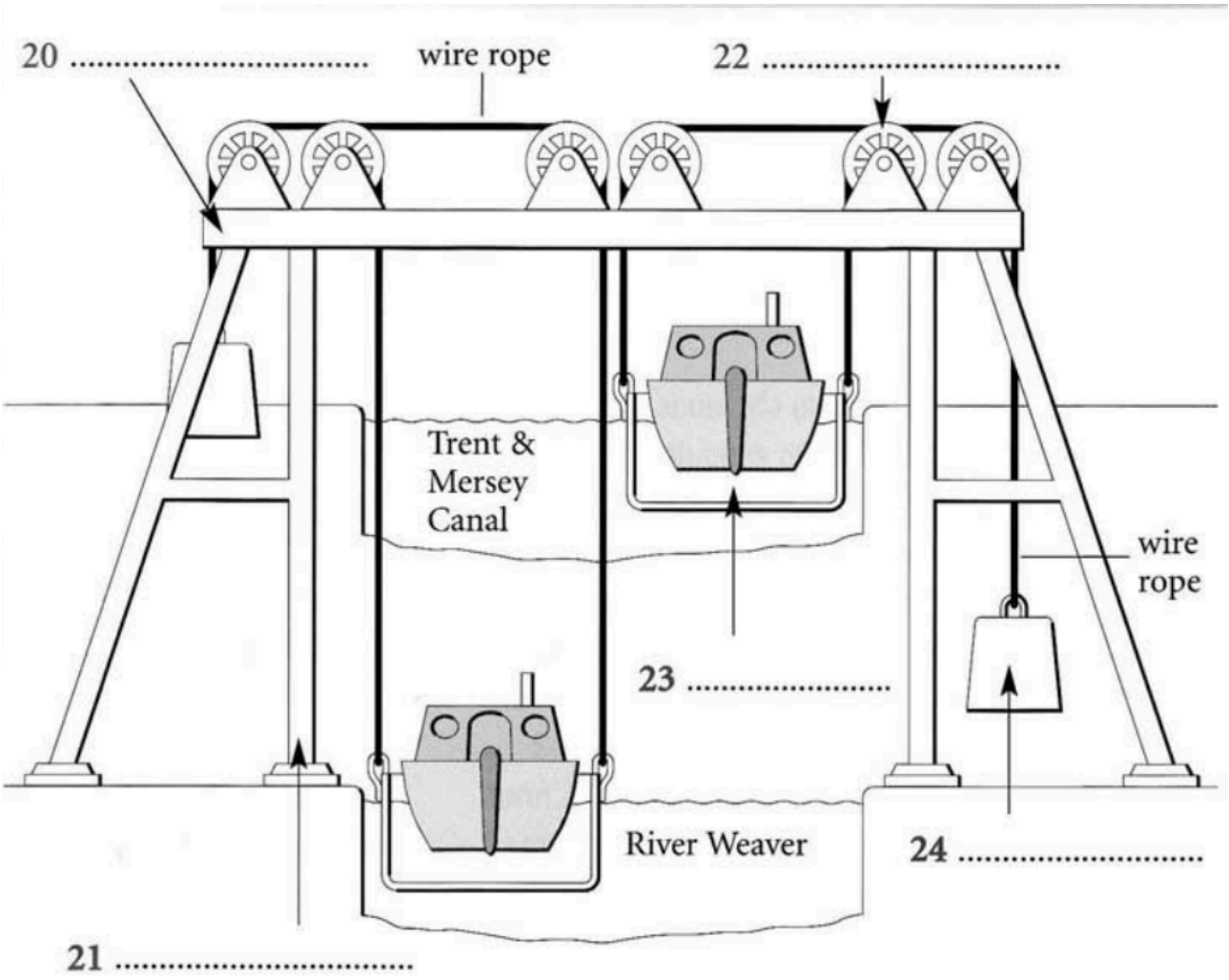
	a	b	c	d	e	f	g	h	i	j
15 Section II	○	○	○	○	○	○	○	○	○	○
16 Section III	○	○	○	○	○	○	○	○	○	○
17 Section IV	○	○	○	○	○	○	○	○	○	○
18 Section V	○	○	○	○	○	○	○	○	○	○
19 Section VI	○	○	○	○	○	○	○	○	○	○

Questions 20-24

Complete the diagram below.

Choose NO MORE THAN THREE WORDS from the passage for each answer.

Write your answers in boxes 20–24 on your answer sheet.



20 _____

21 _____

22 _____

23 _____

24 _____

Questions 25-27

Complete the notes below

Choose NO MORE THAN THREE WORDS from Reading Passage 2 for each answer.

Write your answers in boxes 25–27 on your answer sheet.

- Similar lifts to the Anderton were later built in **25** _____
- Extra power to move the tanks came from **26** _____
- Using water from the canal harmed the **27** _____

PASSAGE 3

You should spend about 20 minutes on Questions 28–40, which are based on Reading Passage 3.

Life, but not as we know it

Astrobiology is arguably the trendiest buzzword in science after genomics. Like genomics, it is as hip as it is hard to define. Broadly speaking, it is an umbrella term for the efforts of many scientists working in diverse fields to understand the conditions of life in the universe, whether on Earth or elsewhere.

The canvas is, in fact, so broad that many scientists might be astrobiologists without knowing it: astrobiology adds glamour to all science, from astronomy to zoology. Those with long memories and a cynical mien will have seen all this before. Once upon a time, there was a research programme called exobiology. Is astrobiology a new name for repackaged goods?

No, for two reasons. First, many discoveries made in the past decade have set people thinking, once again, about life elsewhere. For example, hardly a month goes by without the discovery of yet another planet orbiting a distant star. And whatever the truth about the much-disputed claims for fossils in martian meteorites, the controversy has rehabilitated the idea of panspermia: that life can spread between planets.

Second, astrobiology is almost a trademarked term. The Nasa Astrobiology Institute is a virtual campus linking research centres with universities, all devoted to learning more about the general principles governing the origin of life in the universe. Significantly, *Nature* magazine recently looked at astrobiology in all its forms, from the quest to understand how life began on Earth to the prospects of finding intelligent life elsewhere in the universe.

Not that this should be a cause for wide-eyed celebration, say its critics. Ironically, the most vociferous of these come not from the world of science but from science fiction. Brian Aldiss, veteran writer, critic, and leading light of the genre, dismisses our current obsession with life elsewhere, however much it is justified by science, as an expensively scratched itch.

Aliens, he argues, are a manifestation of a fundamental human urge to populate the universe with 'others', whether gods, ghosts, little green men, or cartoon characters. Scientists should beware of taking science fiction too seriously: aliens are useful as plot devices, but this does not make them real.

A rather different criticism comes from scientists-turned-science fiction writers Jack Cohen and Ian Stewart. Both are academics – Cohen is a biologist, Stewart is a mathematician – but they have worked in SF, most recently on their novel *Wheelers*. Their argument with astrobiology is not that aliens might not exist, but that we cannot help be constrained in our search.

All organisms on Earth, from the tiniest bacterium to the biggest whales, are constructed according to the same rules. Earthly genetic information is carried in genes made of DNA,

earthly life is based on polymers of carbon, and its chemistry happens in liquid water. Because this kind of life is all we know, we tend to think that the same rules need apply everywhere. So, when probes land on Mars, or scientists look at martian meteorites, they tend to look for the kinds of vital signs that betray earthly organisms when we have absolutely no reason for thinking that life elsewhere should be earthlike, or that our definition of life cannot be based more broadly. When the Mars Rover sat and stared at a rock, how do we know that the rock was not staring right back?

It is a fairly simple matter to come up with a definition of life that is based on what it does, rather than what it is made of. It is much more difficult, however, to make such a definition stick, preventing the term from becoming so inclusive as to be meaningless.

You might start by positing three rules. The first is that life requires the existence of information that can be reproduced and inherited, with variation. Second, that living systems seem to create order and structure and maintain it in the face of chaos. Third, that a living system has to work hard to maintain its structure, and as soon as it stops doing this it degenerates.

These rules seem, at first, to be fairly precise, in as much they weed out quietly observant martian surface rocks. But as Cohen and Stewart show in their novel, it is possible to imagine entities that follow all three rules and which appear to be alive, but which bear absolutely no resemblance to terrestrial organisms. In *Wheelers*, they describe civilizations of floating, methane-breathing balloons in the atmosphere of Jupiter and organisms made of magnetically-confined plasma, living in the outer layers of the sun.

Other science fiction writers have imagined life on the surfaces of neutron stars, inside computers, or even in interstellar space. In his latest novel, *Look to Windward*, Iain M Banks describes organisms the size of continents, supporting entire civilizations as their intestinal parasites. All could be said to constitute life, but in Dr McCoy's immortal phrase from *Star Trek*, 'not as we know it'.

Could this mean that astrobiology, the aims of which are universal, is really no more than a parochial exercise? We might never know – perhaps even when we are visited by aliens from the other side of the galaxy who try, frantically, to gain our attention, by waving under our noses whatever it is they wave under such circumstances. It will not be their fault that they will be microscopic and destroyed by a single sneeze. As Cohen and Stewart conclude in *Wheelers*: 'Life goes on everywhere.'

PART 3 — QUESTIONS

Questions 28-34

Complete the summary below. Choose the answers from the box and write the corresponding words in boxes 28–34 on your answer sheet. There are more choices than spaces, so you will not need to use all of them.

location | principles | previous

narrow | galaxy | frequently

discussing | rarely | defining

never | composition | size

definition | planet | extending

mistake | breakthrough | basing

regulations

The same biological and chemical **principles** determine the make-up of all terrestrial life forms, whatever their **28** _____. We often assume that this is the case throughout the universe, as we have **29** _____ observed other kinds of organism. Scientists therefore make the **30** _____ of searching for indications of Earth-style living things when examining material from another **31** _____, where the nature of any life may lie far outside their own **32** _____ definition. On the other hand, if the focus is not on **33** _____ but on behaviour, there is a risk of **34** _____ life much too broadly.

Questions 35-38

The text refers to the ideas of various science fiction writers. Match writers A–C with the points in 35–38

Write your answers in boxes 35–38 on your answer sheet.

You many use any of the writers more than once.

A. Aldiss

B. Banks

C. Cohen & Stewart

	A	B	C
35 Other life forms may fit a definition of life but be quite unlike anything on Earth.	○	○	○
36 People instinctively want to believe in extraterrestrial life forms.	○	○	○
37 There could be life within life on an immense scale.	○	○	○
38 Humans are inevitably limited in their ability to find life beyond Earth.	○	○	○

Questions 39-40

Choose the appropriate letters A–D and write them in boxes 39–40 on your answer sheet.

39 The writer believes that astrobiology

- **A** ○ may now be the second most fashionable science.
- **B** ○ is very similar to exobiology.
- **C** ○ has proved that a meteorite from Mars contains fossils.
- **D** ○ is not taken seriously by scientific publications.

40 Which of the following statements best describes the writer's main purpose in Reading passage 3?

- **A** ○ to describe the latest scientific developments in the study of the universe
- **B** ○ to explain why there is growing interest in the study of astrobiology
- **C** ○ to show that science fiction writers have nothing useful to say about aliens
- **D** ○ to suggest that astrobiology may not help us find extraterrestrial life

Answer Key

#	Answer	Explanation
1	**B**	Another 1960s case occurred in a textile factory, where workers complained of being bitten by insects brought into the factory in imported cloth. Dermatitis swept through the workforce, but it followed a curious pattern. Instead of affecting people in one particular part of the factory, the bugs seemed to be transmitted through employees' social groups
2	**C**	A third infestation spread through office staff going through dusty records that had lain untouched for decades
3	**A**	The classic case occurred in a US laboratory in 1966. After new equipment was installed, workers started to suffer from itching and sensations of insects crawling over them. Complaints multiplied and the problem, attributed to 'cable mites', started to spread to relatives of the victims. A concerted effort was made to exterminate the mites using everything from DDT and mothballs to insecticide and rat poison
4	**B**	Another 1960s case occurred in a textile factory, where workers complained of being bitten by insects brought into the factory in imported cloth
5	**A**	The classic case occurred in a US laboratory in 1966. After new equipment was installed, workers started to suffer from itching and sensations of insects crawling over them. Complaints multiplied and the problem, attributed to 'cable mites', started to spread to relatives of the victims
6	**individual scratching**	In our distant past, one individual scratching would have alerted others that there were biting insects or parasites present
7	**alerted others**	In our distant past, one individual scratching would have alerted others that there were biting insects or parasites present
8	**(necessary) bonding**	The outbreak of mass scratching may also promote mutual grooming, which is important in the necessary bonding of primate groups
9	**FALSE**	Normally, everyone would soon stop scratching, but people may unconsciously exaggerate symptoms to gain attention, or because it gets them a break from unappealing work
10	**TRUE**	The lab workers were scanners, who spent the day laboriously examining the results of bubble-chamber tests; textile workers

#	Answer	Explanation
		and clerical staff poring over records would also have found what they had to do quite tedious
11	**NOT GIVEN**	However, they did find small particles of rockwool insulation in the air, which could cause skin irritation
12	**TRUE**	However, these days, there is a mistrust of conventional medicine and easier access to support groups
13	**FALSE**	Only an awareness of the power of the illusion can stop it
14	**D**	These are all cases of illusions of parasitosis, where something in the environment is misinterpreted as an insect or other pest
15	**i**	The operating mechanism consisted of two vertical sets of interconnected hydraulic cylinders and pistons set into the bed of the river and each piston supported a boat-carrying tank 22.86 metres long and 4.72 metres wide
16	**e**	All went well for the first ten years, then pitting and grooving of the cylinders and pistons occurred. Investigations showed that the canal water used as the hydraulic liquid was contaminated by chemicals and was corrosive, therefore causing the damage
17	**h**	The main structure had strong A-frames at either side of the new lift to support the enormous weight of the platform that now formed the top of the framework: on it was located the new operating mechanism, which included seventy-two pulleys weighing up to 35 tonnes each
18	**a**	Both the 1875 the 1908 versions carried large volumes of commercial traffic and the principal cargoes transported were coal, china clay, salt, manufactured goods, including china ware, and agricultural produce
19	**c**	Demolition seemed inevitable, but, after a long campaign by concerned groups, British Waterways agreed, in 1999, to save the lift
20	**(the) platform**	The main structure had strong A-frames at either side of the new lift to support the enormous weight of the platform that now formed the top of the framework: on it was located the new operating mechanism, which included seventy-two pulleys weighing up to 35 tonnes each
21	**(strong) A-frame(s)**	The main structure had strong A-frames at either side of the new lift to support the enormous weight of the platform that now formed the top of the framework: on it was located the new operating mechanism, which included seventy-two pulleys weighing up to 35 tonnes each

#	Answer	Explanation
22	**pulley(s)**	Each of the boat-carrying tanks was now suspended on wire ropes which ran from the tank to the top of the lift, around pulleys, and down to cast-iron weights at the side of the structure
23	**(boat-carrying) tank**	The operating mechanism consisted of two vertical sets of interconnected hydraulic cylinders and pistons set into the bed of the river and each piston supported a boat-carrying tank 22.86 metres long and 4.72 metres wide
24	**(cast-iron) weights**	Each of the boat-carrying tanks was now suspended on wire ropes which ran from the tank to the top of the lift, around pulleys, and down to cast-iron weights at the side of the structure
25	**France and Belgium**	Completed in 1875, graceful in appearance, simple in use, and above all efficient, the lift was hailed as a marvel of the era, and became a prototype for larger versions on the waterways of France and Belgium
26	**a hydraulic pump**	A hydraulic pump driven by steam supplied the small amount of additional energy required to effect a reasonably rapid movement and to enable the tanks to be precisely levelled at the end of their journey
27	**cylinders and pistons**	then pitting and grooving of the cylinders and pistons occurred. Investigations showed that the canal water used as the hydraulic liquid was contaminated by chemicals and was corrosive, therefore causing the damage
28	**size**	All organisms on Earth, from the tiniest bacterium to the biggest whales, are constructed according to the same rules
29	**never**	Because this kind of life is all we know, we tend to think that the same rules need apply everywhere
30	**mistake**	So, when probes land on Mars, or scientists look at martian meteorites, they tend to look for the kinds of vital signs that betray earthly organisms when we have absolutely no reason for thinking that life elsewhere should be earthlike, or that our definition of life cannot be based more broadly
31	**planet**	So, when probes land on Mars, or scientists look at martian meteorites, they tend to look for the kinds of vital signs that betray earthly organisms when we have absolutely no reason for thinking that life elsewhere should be earthlike, or that our definition of life cannot be based more broadly

#	Answer	Explanation
32	**narrow**	So, when probes land on Mars, or scientists look at martian meteorites, they tend to look for the kinds of vital signs that betray earthly organisms when we have absolutely no reason for thinking that life elsewhere should be earthlike, or that our definition of life cannot be based more broadly
33	**composition**	It is a fairly simple matter to come up with a definition of life that is based on what it does, rather than what it is made of
34	**defining**	It is a fairly simple matter to come up with a definition of life that is based on what it does, rather than what it is made of. It is much more difficult, however, to make such a definition stick, preventing the term from becoming so inclusive as to be meaningless
35	**C**	But as Cohen and Stewart show in their novel, it is possible to imagine entities that follow all three rules and which appear to be alive, but which bear absolutely no resemblance to terrestrial organisms
36	**A**	Aliens, he argues, are a manifestation of a fundamental human urge to populate the universe with 'others', whether gods, ghosts, little green men, or cartoon characters
37	**B**	In his latest novel, Look to Windward, Iain M Banks describes organisms the size of continents, supporting entire civilizations as their intestinal parasites
38	**C**	Their argument with astrobiology is not that aliens might not exist, but that we cannot help be constrained in our search
39	**A**	Astrobiology is arguably the trendiest buzzword in science after genomics
40	**D**	Could this mean that astrobiology, the aims of which are universal, is really no more than a parochial exercise? We might never know – perhaps even when we are visited by aliens from the other side of the galaxy who try, frantically, to gain our attention, by waving under our noses whatever it is they wave under such circumstances

Test 109

PASSAGE 1

You should spend about 20 minutes on Questions 1–14, which are based on Reading Passage 1.

Unmasking skin

A If you took off your skin and laid it flat, it would cover an area of about twenty-one square feet, making it by far the body's largest organ. Draped in place over our bodies, skin forms the barrier between what's inside us and what's outside. It protects us from a multitude of external forces. It serves as an avenue to our most intimate physical and psychological selves.

B This impervious yet permeable barrier, less than a millimetre thick in places, is composed of three layers. The outermost layer is the bloodless epidermis. The dermis includes collagen, elastin, and nerve endings. The innermost layer, subcutaneous fat, contains tissue that acts as an energy source, cushion and insulator for the body.

C From these familiar characteristics of skin emerge the profound mysteries of touch, arguably our most essential source of sensory stimulation. We can live without seeing or hearing – in fact, without any of our other senses. But babies born without effective nerve connections between skin and brain can fail to thrive and may even die.

D Laboratory experiments decades ago, now considered unethical and inhumane, kept baby monkeys from being touched by their mothers. It made no difference that the babies could see, hear and smell their mothers; without touching, the babies became apathetic, and failed to progress.

E For humans, insufficient touching in early years can have lifelong results. 'In touching cultures, adult aggression is low, whereas in cultures where touch is limited, adult aggression is high,' writes Tiffany Field, director of the Touch Research Institutes at the University of Miami School of Medicine. Studies of a variety of cultures show a correspondence between high rates of physical affection in childhood and low rates of adult physical violence.

F While the effects of touching are easy to understand, the mechanics of it are less so. 'Your skin has millions of nerve cells of various shapes at different depths,' explains Stanley Bolanowski, a neuroscientist and associate director of the Institute for Sensory Research at Syracuse University. 'When the nerve cells are stimulated, physical energy is transformed into energy used by the nervous system and passed from the skin to the spinal cord and brain. It's called transduction, and no one knows exactly how it takes place.' Suffice it to say that the process involves the intricate, split-second operation of a complex system of signals between neurons in the skin and brain.

G This is starting to sound very confusing until Bolanowski says: 'In simple terms people perceive three basic things via skin: pressure, temperature, and pain.' And then I'm sure he's

wrong. 'When I get wet, my skin feels wet,' I protest. 'Close your eyes and lean back,' says Bolanowski.

H Something cold and wet is on my forehead – so wet, in fact, that I wait for water to start dripping down my cheeks. 'Open your eyes.' Bolanowski says, showing me that the sensation comes from a chilled, but dry, metal cylinder. The combination of pressure and cold, he explains, is what makes my skin perceive wetness. He gives me a surgical glove to put on and has me put a finger in a glass of cold water. My finger feels wet, even though I have visual proof that it's not touching water. My skin, which seemed so reliable, has been deceiving me my entire life. When I shower or wash my hands, I now realize, my skin feels pressure and temperature. It's my brain that says I feel wet.

I Perceptions of pressure, temperature and pain manifest themselves in many different ways. Gentle stimulation of pressure receptors can result in ticklishness; gentle stimulation of pain receptors, in itching. Both sensations arise from a neurological transmission, not from something that physically exists. Skin, I'm realizing, is under constant assault, both from within the body and from forces outside. Repairs occur with varying success.

J Take the spot where I nicked myself with a knife while slicing fruit. I have a crusty scab surrounded by pink tissue about a quarter inch long on my right palm. Under the scab, epidermal cells are migrating into the wound to close it up. When the process is complete, the scab will fall off to reveal new epidermis. It's only been a few days, but my little self-repair is almost complete. Likewise, we recover quickly from slight burns. If you ever happen to touch a hot burner, just put your finger in cold water. The chances are you will have no blister, little pain and no scar. Severe burns, though, are a different matter.

PART 1 — QUESTIONS

Questions 1-4

The passage has 10 paragraphs A–J.

Which paragraph contains the following information?

Write the correct letter A–J

	A	B	C	D	E	F	G	H	I	J
1 the features of human skin, on and below the surface	○	○	○	○	○	○	○	○	○	○
2 an experiment in which the writer can see what is happening	○	○	○	○	○	○	○	○	○	○
3 advice on how you can avoid damage to the skin	○	○	○	○	○	○	○	○	○	○
4 cruel research methods used in the past	○	○	○	○	○	○	○	○	○	○

Questions 5-6

Choose the correct letter, A, B, C or D.

5 How does a lack of affectionate touching affect children?

- A ○ It makes them apathetic.
- B ○ They are more likely to become violent adults.
- C ○ They will be less aggressive when they grow up.
- D ○ We do not really know.

6 After the 'wetness' experiments, the writer says that

- A ○ his skin is not normal.
- B ○ his skin was wet when it felt wet.

C ◯ he knew why it felt wet when it was dry.

D ◯ the experiments taught him nothing new.

Questions 7-11

Complete each sentence with the correct ending A–I from the box below.

Write the correct letter A–I

• Touch is unique among the five senses **7** _____

• A substance may feel wet **8** _____

• Something may tickle **9** _____

• The skin may itch **10** _____

• A small cut heals up quickly **11** _____

A. **because it is both cold and painful.**

B. **because the outer layer of the skin can mend itself.**

C. **because it can be extremely thin.**

D. **because there is light pressure on the skin.**

E. **because we do not need the others to survive.**

F. **because there is a good blood supply to the skin.**

G. **because of a small amount of pain.**

H. **because there is a low temperature and pressure.**

I. **because it is hurting a lot.**

J. **because all humans are capable of experiencing it.**

Questions 12-14

Do the following statements agree with the information given in Reading Passage 1?

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

12 Even scientists have difficulty understanding how our sense of touch works.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

13 The skin is more sensitive to pressure than to temperature or pain.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

14 The human skin is always good at repairing itself.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

PASSAGE 2

You should spend about 20 minutes on Questions 15–27, which are based on Reading Passage 2.

How Lock Picking Works

Section A

Lock picking is an essential skill for locksmiths because it lets them get past a lock without destroying it. When you lock yourself out of your house or lose your key, a locksmith can let you back in very easily.

Lock-picking skills are not particularly common among burglars, mainly because there are so many other, simpler ways of breaking into a house (throwing a brick through a back window, for example). For the most part, only intruders who need to cover their tracks, such as spies and detectives, will bother to pick a lock.

Simply understanding the principles of lock picking may change your whole attitude toward locks and keys. Lock picking clearly demonstrates that normal locks are not infallible devices. They provide a level of security that can be breached with minimal effort. With the right tools, a determined intruder can break into almost anything.

Section B

Locksmiths define lock-picking as the manipulation of a lock's components to open a lock without a key. To understand lock-picking, then, you first have to know how locks and keys work.

Think about the normal deadbolt lock you might find on a front door. In this sort of lock, a movable bolt or latch is embedded in the door so it can be extended out to the side. This bolt is lined up with a notch in the frame. When you turn the lock, the bolt extends into the notch in the frame, so the door can't move. When you retract the bolt, the door moves freely. The lock's only job is to make it simple for someone with a key to move the bolt but difficult for someone without a key to move it.

Section C

The most widely-used lock design is the cylinder lock. In this kind, the key turns a cylinder in the middle of the lock, which turns the attached mechanism. When the cylinder is turned one way, the mechanism pulls in on the bolt and the door can open. When the cylinder turns the other way, the mechanism releases the bolt so the door cannot open.

One of the most common cylinder locks is the pin design. Its main components are the housing (the outer part of the lock which does not move), the central cylinder, and several vertical shafts that run down from the housing into the cylinder. Inside these shafts are pairs of metal pins of varying length, held in position by small springs.

Without the key, the pins are partly in the housing and partly in the cylinder, so that the mechanism cannot turn and the lock, therefore, cannot open. When you put the correct key into the cylinder, the notches in the key push each pair of pins up just enough so that the top pin is completely in the housing and the bottom pin is entirely in the cylinder. It now turns freely, and you can open the lock.

Section D

To pick a pin lock, you simply move each pin pair into the correct position, one by one. There are two main tools used in the picking process.

Picks: long, thin pieces of metal that curve up at the end (like a dentist's pick).

A tension wrench: the simplest sort of tension wrench is a thin screwdriver.

The first step in picking a lock is to insert the tension wrench into the keyhole and turn it in the same direction that you would turn the key. This turns the cylinder so that it is slightly offset from the housing around it, creating a slight ledge in the pin shafts.

While applying pressure on the cylinder, you slide the pick into the keyhole and begin lifting the pins. The object is to lift each pin pair up to the level at which the top pin moves completely into the housing, as if pushed by the correct key. When you do this while applying pressure with the tension wrench, you feel or hear a slight click when the pin falls into position. This is the sound of the upper pin falling into place on the ledge in the shaft. The ledge keeps the upper pin wedged in the housing, so it won't fall back down into the cylinder. In this way, you move each pin pair into the correct position until all the upper pins are pushed completely into the housing and all the lower pins rest inside the cylinder. At this point, the cylinder rotates freely and you can open the lock.

Section E

You'll find pin locks everywhere, from houses to padlocks. They are so popular because they are relatively inexpensive but offer moderate security.

Another common type of cylinder lock is the wafer lock. These work the same basic way as pin locks, but they have flat, thin pieces of metal called wafers rather than pins. You pick the wafers exactly the same way you pick pins – in fact, it is a little bit easier to pick wafer locks because the keyhole is wider. Despite giving relatively low security, these locks are found in most cars.

Tubular locks provide superior protection to pin and wafer locks, but they are also more expensive. Instead of one row of pins, tubular locks have pins positioned all the way around the circumference of the cylinder. This makes them much harder to pick. Conventional lock-picking techniques don't usually work on this type of lock, which is why they are often found on vending machines.

PART 2 — QUESTIONS

Questions 15-19

Reading passage 2 has five sections A–E.

Choose the most suitable headings for sections A–E from the list of headings below.

Write the correct number i–x

i. How to make the locks in your home more secure

ii. How to open a lock without a key

iii. Choosing the right tools to open locks

iv. The cylinder and the bolt

v. How to open a lock with a different key

vi. Lock varieties

vii. How a basic deadbolt system works

viii. The people who open locks without a key

ix. How a cylinder lock works

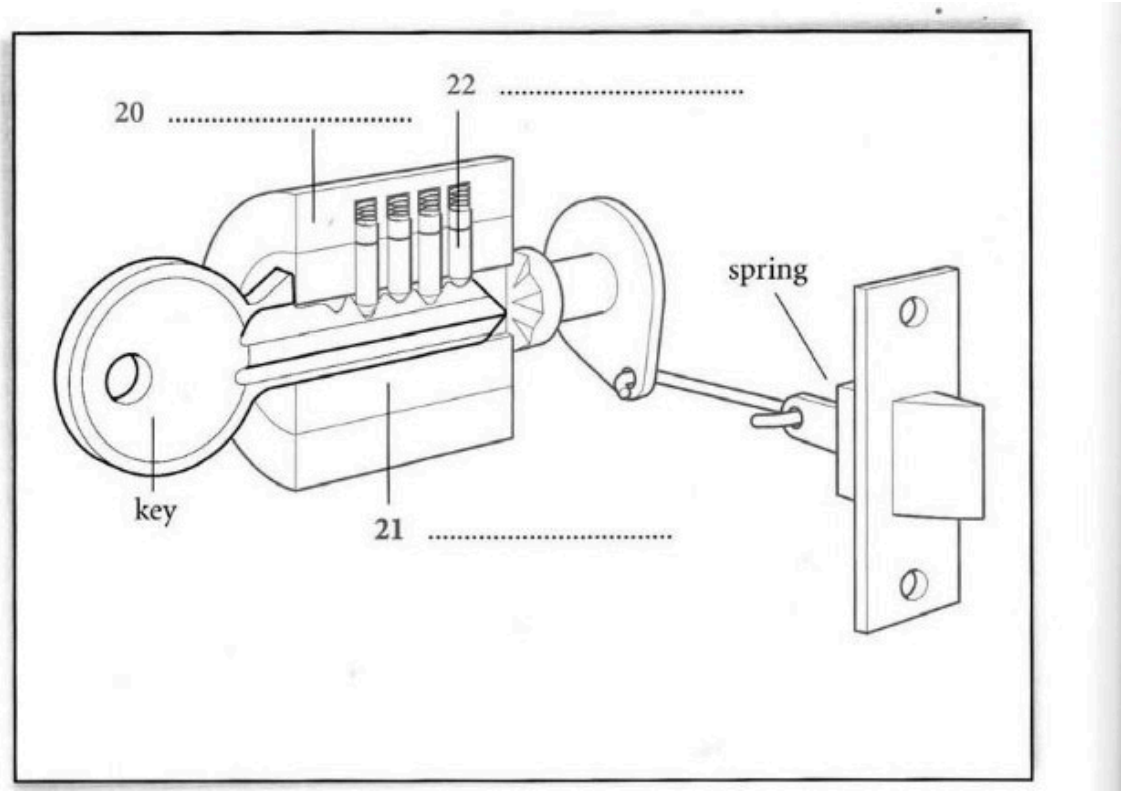
x. How to pick different kinds of lock

	i	ii	iii	iv	v	vi	vii	viii	ix	x
15 Section A	○	○	○	○	○	○	○	○	○	○
16 Section B	○	○	○	○	○	○	○	○	○	○
17 Section C	○	○	○	○	○	○	○	○	○	○
18 Section D	○	○	○	○	○	○	○	○	○	○
19 Section E	○	○	○	○	○	○	○	○	○	○

Questions 20-22

Complete the diagram below.

Choose ONLY ONE WORD from the passage for each answer.



20 _____

21 _____

22 _____

Questions 23-25

Complete the notes below.

Choose NO MORE THAN THREE WORDS from the passage for each answer.

Picking a lock

Turn cylinder slightly using **23** _____

Hold cylinder still and insert **24** _____

Push top pin into shaft.

Hold top pin above cylinder, on **25** _____

Lift and hold all other pins in same way.

Turn cylinder and open lock.

Questions 26-27

Complete the table below.

Choose NO MORE THAN THREE WORDS from the passage for each answer.

Type of lock	How secure?	Where used?
Pin	**26** _____	houses, padlocks, etc
27 _____	relatively low security	most cars
Tubular	superior protection	vending machines

PASSAGE 3

You should spend about 20 minutes on Questions 28–40, which are based on Reading Passage 3.

Stars without the stripes

Managing cultural diversity is a core component of most masters programmes these days. The growth of Japanese corporations in the sixties and seventies reminded us that there were other models of business than those taught by Harvard professors and US-based management consultants. And the cultural limits to the American model have more recently been underlined by developments in Russia and central Europe over the past decade.

Yet in Britain, we are still more ready to accept the American model of management than most other European countries. As a result, UK managers often fail to understand how business practices are fundamentally different on the Continent. One outcome is that many mergers and acquisitions, strategic alliances and joint ventures between British and European companies do not achieve their objectives and end in tears.

Alternatively, managers may avoid a merger or joint venture which makes sense from a hard-nosed strategic point of view because they fear that different working practices will prevent their goals from being achieved.

Essentially, Anglo-Saxon companies are structured on the principles of project management. In the eighties, companies were downsized, with tiers of management eliminated. In the nineties, management fashion embraced the ideas of business process re-engineering, so organizations were broken down into customer-focused trading units. Sometimes these were established as subsidiary companies, at other times as profit-and-loss or cost centres.

Over the past ten years, these principles have been applied as vigorously to the UK public sector as to private-sector corporations. Hospitals, schools, universities, social services departments, as well as large areas of national government, now operate on project management principles – all with built-in operational targets, key success factors, and performance-related reward systems.

The underlying objectives for this widespread process of organizational restructuring have been to increase the transparency of operations, encourage personal accountability, become more efficient at delivering service to customer, and directly relate rewards to performance.

The result is a management culture which is entrepreneurially oriented and focused almost entirely on the short term, and highly segmented organizational structures – since employee incentives and rewards are geared to the activities of their own particular unit.

This business model has also required development of new personal skills. We are now encouraged to lead, rather than to manage by setting goals and incentive systems for staff. We have to be cooperative team members rather than work on our own. We have to accept that, in flattened and decentralized organizations, there are very limited career prospects. We are to be

motivated by target-related rewards rather than a longer-term commitment to our employing organization.

This is in sharp contrast to the model of management that applies elsewhere in Europe. The principles of business process re-engineering have never been fully accepted in France, Germany and the other major economies; while in some Eastern European economies, the attempt to apply them in the nineties brought the economy virtually to its knees, and created huge opportunities for corrupt middle managers and organized crime.

Instead, continental European companies have stuck to the bureaucratic model which delivered economic growth for them throughout the twentieth century. European corporations continue to be structured hierarchically, with clearly defined job descriptions and explicit channels of reporting. Decision making, although incorporating consultative processes, remains essentially top-down.

Which of these two models is preferable? Certainly, the downside of the Anglo-American model is now becoming evident, not least in the long-hours working culture that the application of the decentralized project management model inevitably generates.

Whether in a hospital, a software start-up or a factory, the breakdown of work processes into project-driven targets leads to over-optimistic goals and underestimates of the resources needed. The result is that the success of projects often demands excessively long working hours if the targets are to be achieved.

Further, the success criteria, as calibrated in performance targets, are inevitably arbitrary, and the source of ongoing dispute. Witness the objections of teachers and medics to the performance measures applied to them by successive governments. This is not surprising. In a factory producing cars the output of individuals is directly measurable, but what criteria can be used to measure output and performance in knowledge-based activities such as R&D labs, government offices, and even the marketing departments of large corporations?

The demands and stresses of operating according to the Anglo-American model seem to be leading to increasing rates of personnel burn-out. It is not surprising that managers queue for early retirement. In a recent survey, just a fifth said they would work to 65. This could be why labour market participation rates have declined so dramatically for British 50-year-olds in the past twenty years.

By contrast, the European management model allows for family-friendly employment policies and working hours directives to be implemented. It encourages staff to have a long-term psychological commitment to their employing organizations. Of course, companies operating on target-focused project management principles may be committed to family-friendly employment policies in theory. But, if the business plan has to be finished by the end of the month, the advertising campaign completed by the end of next week, and patients pushed through the system to achieve measurable targets, are we really going to let down our 'team' by clocking out at 5 p.m. and taking our full entitlement of annual leave?

Perhaps this is why we admire the French for their quality of life.

PART 3 — QUESTIONS

Questions 28-31

Do the following statements agree with the writer's views in Reading Passage 3?

YES if the statement agrees with the views of the writer

NO if the statement does not agree with the views of the writer

NOT GIVEN if there is no information about this in the passage

28 Attempts by British and mainland European firms to work together often fail.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

29 Project management principles discourage consideration of long-term issues.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

30 There are good opportunities for promotion within segmented companies.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

31 The European model gives more freedom of action to junior managers.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

Questions 32-37

Complete the summary below.

Choose the answers from the box and write the corresponding words. There are more choices than spaces, so you will not need to use all of them.

argument | temperature | reach

manufacturing | increasing | able

office | pressure | negative

predict | declining | agreement

discussion | no | willing

unwilling

Adopting the US model in Britain has had negative effects. These include the **32** _____ hours spent at work, as small sections of large organizations struggle to **33** _____ unrealistic short-term objectives. Nor is there **34** _____ on how to calculate the productivity of professional, technical, and clerical staff, who cannot be assessed in the same way as **35** _____ employees. In addition, managers within this culture are finding the **36** _____ of work too great, with 80% reported to be **37** _____ to carry on working until the normal retirement age.

Questions 38-39

Complete the notes below.

Choose NO MORE THAN THREE WORDS from Reading Passage 3 for each answer.

Working conditions in mainland Europe are in practice more likely to be **38** _____

UK managers working to tight deadlines probably give up some of their **39** _____

Questions 40-40

Choose the correct letter A, B, C or D.

40 Which of the following statements best describes the writer's main purpose in Reading Passage 3?

A ○ to argue that Britain should have adopted the Japanese model of management many years ago

B ○ to criticize Britain's adoption of the US model, as compared to the European model.

C ○ to propose a completely new model that would be neither American nor European

D ○ to point out the negative effects of the existing model on the management of hospitals in Britain

Answer Key

#	Answer	Explanation
1	B	This impervious yet permeable barrier, less than a millimetre thick in places, is composed of three layers. The outermost layer is the bloodless epidermis. The dermis includes collagen, elastin, and nerve endings. The innermost layer, subcutaneous fat, contains tissue that acts as an energy source, cushion and insulator for the body
2	H	He gives me a surgical glove to put on and has me put a finger in a glass of cold water. My finger feels wet, even though I have visual proof that it's not touching water
3	J	If you ever happen to touch a hot burner, just put your finger in cold water. The chances are you will have no blister, little pain and no scar
4	D	Laboratory experiments decades ago, now considered unethical and inhumane, kept baby monkeys from being touched by their mothers
5	B	'In touching cultures, adult aggression is low, whereas in cultures where touch is limited, adult aggression is high,' writes Tiffany Field, director of the Touch Research Institutes at the University of Miami School of Medicine. Studies of a variety of cultures show a correspondence between high rates of physical affection in childhood and low rates of adult physical violence
6	C	The combination of pressure and cold, he explains, is what makes my skin perceive wetness
7	E	We can live without seeing or hearing – in fact, without any of our other senses. But babies born without effective nerve connections between skin and brain can fail to thrive and may even die
8	H	The combination of pressure and cold, he explains, is what makes my skin perceive wetness
9	D	Gentle stimulation of pressure receptors can result in ticklishness; gentle stimulation of pain receptors, in itching
10	G	Gentle stimulation of pressure receptors can result in ticklishness; gentle stimulation of pain receptors, in itching
11	B	Under the scab, epidermal cells are migrating into the wound to close it up. When the process is complete, the scab will fall off to

#	Answer	Explanation
		reveal new epidermis. It’s only been a few days, but my little self-repair is almost complete
12	**TRUE**	It’s called transduction, and no one knows exactly how it takes place
13	**NOT GIVEN**	‘In simple terms people perceive three basic things via skin: pressure, temperature, and pain.’
14	**FALSE**	Repairs occur with varying success
15	**viii**	Lock-picking skills are not particularly common among burglars, mainly because there are so many other, simpler ways of breaking into a house (throwing a brick through a back window, for example). For the most part, only intruders who need to cover their tracks, such as spies and detectives, will bother to pick a lock
16	**vii**	Think about the normal deadbolt lock you might find on a front door. In this sort of lock, a movable bolt or latch is embedded in the door so it can be extended out to the side. This bolt is lined up with a notch in the frame. When you turn the lock, the bolt extends into the notch in the frame, so the door can’t move. When you retract the bolt, the door moves freely
17	**ix**	The most widely-used lock design is the cylinder lock. In this kind, the key turns a cylinder in the middle of the lock, which turns the attached mechanism. When the cylinder is turned one way, the mechanism pulls in on the bolt and the door can open. When the cylinder turns the other way, the mechanism releases the bolt so the door cannot open
18	**ii**	To pick a pin lock, you simply move each pin pair into the correct position, one by one. There are two main tools used in the picking process
19	**vi**	You’ll find pin locks everywhere, from houses to padlocks Another common type of cylinder lock is the wafer lock Tubular locks provide superior protection to pin and wafer locks, but they are also more expensive
20	**housing**	Its main components are the housing (the outer part of the lock which does not move), the central cylinder, and several vertical shafts that run down from the housing into the cylinder
21	**cylinder**	Its main components are the housing (the outer part of the lock which does not move), the central cylinder, and several vertical shafts that run down from the housing into the cylinder
22	**pins**	Inside these shafts are pairs of metal pins of varying length, held in position by small springs

#	Answer	Explanation
23	**(a/the) (tension) wrench**	The first step in picking a lock is to insert the tension wrench into the keyhole and turn it in the same direction that you would turn the key. This turns the cylinder so that it is slightly offset from the housing around it, creating a slight ledge in the pin shafts
24	**(a/the) pick**	While applying pressure on the cylinder, you slide the pick into the keyhole and begin lifting the pins
25	**(the) ledge / ledge in shaft**	This is the sound of the upper pin falling into place on the ledge in the shaft. The ledge keeps the upper pin wedged in the housing, so it won't fall back down into the cylinder
26	**moderate (security)**	You'll find pin locks everywhere, from houses to padlocks. They are so popular because they are relatively inexpensive but offer moderate security
27	**(the) wafer (lock)**	Another common type of cylinder lock is the wafer lock. These work the same basic way as pin locks, but they have flat, thin pieces of metal called wafers rather than pins. You pick the wafers exactly the same way you pick pins – in fact, it is a little bit easier to pick wafer locks because the keyhole is wider. Despite giving relatively low security, these locks are found in most cars
28	**YES**	One outcome is that many mergers and acquisitions, strategic alliances and joint ventures between British and European companies do not achieve their objectives and end in tears
29	**YES**	The result is a management culture which is entrepreneurially oriented and focused almost entirely on the short term, and highly segmented organizational structures – since employee incentives and rewards are geared to the activities of their own particular unit
30	**NO**	We have to accept that, in flattened and decentralized organizations, there are very limited career prospects
31	**NO**	European corporations continue to be structured hierarchically, with clearly defined job descriptions and explicit channels of reporting. Decision making, although incorporating consultative processes, remains essentially top-down
32	**increasing**	Certainly, the downside of the Anglo-American model is now becoming evident, not least in the long-hours working culture that the application of the decentralized project management model inevitably generates

#	Answer	Explanation
33	**reach**	Whether in a hospital, a software start-up or a factory, the breakdown of work processes into project-driven targets leads to over-optimistic goals and underestimates of the resources needed. The result is that the success of projects often demands excessively long working hours if the targets are to be achieved
34	**agreement**	Further, the success criteria, as calibrated in performance targets, are inevitably arbitrary, and the source of ongoing dispute
35	**manufacturing**	In a factory producing cars the output of individuals is directly measurable, but what criteria can be used to measure output and performance in knowledge-based activities such as R&D labs, government offices, and even the marketing departments of large corporations
36	**pressure**	The demands and stresses of operating according to the Anglo-American model seem to be leading to increasing rates of personnel burn-out
37	**unwilling**	In a recent survey, just a fifth said they would work to 65
38	**family-friendly**	By contrast, the European management model allows for family-friendly employment policies and working hours directives to be implemented
39	**(annual) leave**	But, if the business plan has to be finished by the end of the month, the advertising campaign completed by the end of next week, and patients pushed through the system to achieve measurable targets, are we really going to let down our ‘team’ by clocking out at 5 p.m. and taking our full entitlement of annual leave
40	**B**	Which of these two models is preferable? Certainly, the downside of the Anglo-American model is now becoming evident, not least in the long-hours working culture that the application of the decentralized project management model inevitably generates

Test 110

PASSAGE 1

You should spend about 20 minutes on Questions 1–13, which are based on Reading Passage 1.

The Power of Light

Light reveals the world to us. It sets our biological clocks. It triggers in our brains the sensations of colour. Light feeds us, supplying the energy for plants to grow. It inspires us with special effects like rainbows and sunsets. Light gives us life-changing tools, from incandescent bulbs to lasers and fibre optics.

There has been light from the beginning. There will be light, feebly, at the end. In all its forms, visible and invisible, it saturates the universe. Light is more than a little bit inscrutable. Modern physics has sliced the stuff of nature into ever smaller and more exotic constituents, but light won't reduce. Light is light – pure, but not simple. No one is quite sure how to describe it. A wave? A particle? Yes, the scientists say. Both.

It is a measure of light's importance in our daily lives that we hardly pay any attention to it. Light is almost like air. It's a given. A human would no more linger over the concept of light than a fish would ponder the notion of water. There are exceptions, certain moments of sudden appreciation when a particular manifestation of light, a transitory glory, appears: a rainbow, a sunset, a flash of lightning in a dark sky, the shimmering surface of the sea at twilight, the dappled light in a forest, the little red dot from a professor's laser pointer. The flicker of a candle, flooding a room with romance. The torch searching for the circuit breakers after a power cut.

Usually, though, we don't see light, we merely see with it. You can't appreciate the beauty of a rose if you ponder that the colour red is just the brain's interpretation of a specific wavelength of light with crests that are roughly 700 nanometres apart. A theatrical lighting director told me that she's doing her job best when no one notices the lights at all. Her goal is to create an atmosphere, a mood – not to show off the fancy new filters that create colours of startling intensity.

Light is now used for everything from laser eye surgery to telephone technology. It could even become the main power source for long-distance space travel. The spaceship would have an ultrathin sail to catch the 'wind' of light beamed from an Earth-based laser. In theory such a craft could accelerate to a sizeable fraction of the speed of light, without carrying fuel.

What we call light is really the same thing in a different set of wavelengths as the radiation that we call radio waves or gamma rays or x-rays. But visible light is unlike any other fundamental element of the universe: it directly, regularly and dramatically interacts with our senses. Light offers high-resolution information across great distances. You can't hear or smell the moons of Jupiter or the Crab Nebula. So much of vital importance is communicated by visible light that

almost everything from a fly to an octopus has a way to capture it – an eye, eyes, or something similar.

It's worth noting that our eyes are designed to detect the kind of light that is radiated in abundance by the particular star that gives life to our planet: the sun. Visible light is powerful stuff, moving at relatively short wavelengths, which makes it biologically convenient. To see long, stretched-out radio waves, we'd have to have huge eyes like satellite dishes. Not worth the trouble! Nor would it make sense for our eyes to detect infrared light (though some deep-sea shrimp near hot springs do see this way). We'd be constantly distracted, because in these wavelengths any heat-emitting object glows. That would include almost everything around us.

There is also darkness in the daytime: shadows. There are many kinds of shadows, more than I realized until I consulted astronomer and shadow expert David Lynch in Topanga Canyon, up the coast from Santa Monica, California. Lynch points out that a shadow is filled with light reflected from the sky, otherwise it would be completely black. Black is the way shadows on the moon looked to the Apollo astronauts, because the moon has no atmosphere and thus no sky to bounce light into the unlit crannies of the lunar surface.

Lynch is a man who, when he looks at a rainbow, spots details that elude most of us. He knows, for example, that all rainbows come in pairs, and he always looks for the second rainbow: a faint, parallel rainbow, with the colours in reverse order. The intervening region is darker. That area has a name, wouldn't you know: Alexander's dark band. As I took in the spectacular view across the canyon, Lynch explained something else: 'the reason those mountains over there look a little blue,' he said, indicating the range that obscures the Pacific, 'is because there's sky between here and those mountains. It's called daylight.'

What next for light? What new application will we see? What orthodoxy-busting cosmic information will starlight deliver to our telescopes? Will the rotating disco ball ever make a dance-floor comeback? Above all, you have to wonder: will we ever fully understand light?

There have been recent headlines about scientists finding ways to make light go faster than the speed of light. This is what science fiction writers and certain overly imaginative folks have dreamed of for decades. If you could make a spaceship that wasn't bound by Einstein's speed limit, they fantasized, you could zip around the universe far more easily.

Lijun Wang, a research scientist at Princeton, managed to create a pulse of light that went faster than the supposed speed limit. 'We created an artificial medium of cesium gas in which the speed of a pulse of light exceeds the speed of light in a vacuum,' he said, 'but this is not at odds with Einstein.' Even though light can be manipulated to go faster than light, matter can't. Information can't. There's no possibility of time travel.

I asked Wang why light goes 186,282 miles a second and not some other speed. 'That's just the way nature is,' he said. There are scientists who don't like 'why' questions like this. The speed of light is just what it is. That's their belief. Whether light would move at a different velocity in a different universe is something that is currently outside the scope of experimental science. It's even a bit 'out there' for the theorists.

What's certain is that light is going to remain extremely useful for industry, science, art, and our daily, mundane comings and goings. Light permeates our reality at every scale of existence. It's an amazing tool, a carrier of beauty, a giver of life. I can't help but say that it has a very bright future.

PART 1 — QUESTIONS

Questions 1-5

Reading passage 3 describes a number of cause and effect relationships. Match each Cause (1–5) in List A, with its Effect (A–H) in List B.

There are more Effects in List B than you will need, so you will not use all of them.

A. Nearly all living creatures can detect it.

B. There is a dark gap between rainbows.

C. Light from Earth could power a spacecraft.

D. Shadows are totally black.

E. We cannot return to the past.

F. We don't really notice or think about it.

G. Certain creatures can detect infra-red light.

H. We instantly become aware of it.

	A	B	C	D	E	F	G	H
1 Much of the time, visible light is all around us.	○	○	○	○	○	○	○	○
2 Light can sometimes appear in an interesting way.	○	○	○	○	○	○	○	○
3 Visible light carries a lot of essential information.	○	○	○	○	○	○	○	○
4 Without an atmosphere, light is not reflected onto solid surfaces.	○	○	○	○	○	○	○	○
5 Only light can exceed 186,282 miles per second.	○	○	○	○	○	○	○	○

Questions 6-10

Do the following statements agree with the views of the writer in Reading Passage 1?

YES if the statement agrees with the views of the writer

NO if the statement does not agree with the views of the writer

NOT GIVEN if there is no information about this in the passage

6 It is difficult to find a single word to say exactly what light is.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

7 Thinking about the physics of light can make an object seem even more beautiful.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

8 Light from the sun makes it possible for life to exist on other planets.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

9 It is more practical for humans to detect visible light rather than radio waves.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

10 David Lynch sometimes notices things that other people don't.

- **A** ○ YES
- **B** ○ NO
- **C** ○ NOT GIVEN

Questions 11-13

Answer the following questions using NO MORE THAN THREE WORDS for each answer.

11 What appearance can the land have when seen from a distance? _____

12 In what have some people imagined travelling? _____

13 In what substance did light go faster than previously thought possible? _____

PASSAGE 2

You should spend about 20 minutes on Questions 14–27, which are based on Reading Passage 2.

To MBA or not to MBA?

'You could be forgiven for thinking just about every man and his dog has an MBA these days,' says Anthony Hesketh, of Lancaster University management school. We know what he means. Such is the worldwide growth and awareness of the MBA that this icon of career advancement and high salaries has almost become synonymous with postgraduate education in the business sector.

In reality, many postgraduate alternatives to an MBA exist. The total number of MBA programmes worldwide is around 2,400, while other masters and advanced courses in the whole spectrum of business education add up to more than 10,000.

Two key distinctions exist in matching what aspiring students want with what the universities offer: first is generalization versus specialization, and second is pre-experience versus post-experience, and the two distinctions are interlinked. Carol Blackman, of the University of Westminster school of business, explains the first distinction. 'Specialist masters programmes are designed either for career preparation in a clearly defined type of job or profession, or are intended to develop or enhance professional competence in individuals who are already experienced. The aim is to increase the depth of their knowledge in the specialist area. The MBA, on the other hand, is a general management programme which provides practising managers with an opportunity for personal development with a broadly-based introduction to all management subject areas and the theory and practice of management.'

Specialist knowledge, however, is not everything when it comes to finding a job. Surveys by the UK's Association of Graduate Recruiters (AGR) repeatedly confirm that what employers seek, and continue to find scarce, are the personal skills that will make graduates valuable employees. In fact, when recruiting new graduates, most employers considered these skills more important than specialist knowledge. What employers seek most from new graduates are enthusiasm and self-motivation, interpersonal skills, team working and good oral communication. Of the nineteen skills considered important in AGR's 2002 survey, just three require specialist education – numeracy, computer literacy and foreign languages – and these are low on the list.

Nunzio Quacquarelli, chief executive of topcareers.net, takes this further: 'Clearly, salary differentials for those with a second degree, but no significant work experience, do not match those of a good MBA and a number of years in the workplace. According to the AGR research, about 14% of employers offered a better salary to those new graduates with a masters – or even a doctorate. In my view, the salary improvement of 10% to 15% largely reflects the recruit's age and earning expectancy rather than the increase in human capital perceived by the employer. Contrast this with our latest topmba.com MBA Recruiters Survey results which shows

that the average salary paid to an MBA with good work experience in the US and Europe is US$80,000 – around two and a half times the average starting salary for a young postgraduate.'

Anthony Hesketh poses the question whether holding a second degree may even be a disadvantage. 'I have seen many reports over the years suggesting that employers view postgraduates as eminently less employable than those with a first degree. Drive, motivation and career focus, not to mention ability, are what employers value and are prepared to pay for. A postgraduate immediately has an uphill task explaining an additional year, or three years, of study.'

This view may seem cynical, but, if you are about to graduate and are considering a further degree, you should take the realities into account and ask yourself some hard questions:

• Is the qualification I am considering going to impress employers?

• Is it going to give me the edge over less qualified candidates?

• Is my consideration of a second degree because I am not sure of my career direction?

• Will employers consider that I lack drive and ambition because I have deferred my attempts to find a worthwhile job?

Many postgraduate options exist that can help you to acquire the personal skills that employers in the world of business are seeking. Consider, for example, the offerings of Strathclyde and Durham universities.

According to Dr Nic Beech, of the University of Strathclyde graduate school of business: 'The MSc in business management (MBM), offered at USGSB is suitable for students with a good first degree – particularly a non-business first degree – but little or no business experience. Our MBM offers these graduates the opportunity to combine the specialization of their first degree with a general management qualification – something employers recognize produces a well-rounded individual.

Graduates tell us that the MBM allows them to access sectors previously out of reach. It is designed to develop the business knowledge, practical experience and personal skills which employers are seeking.'

At the University of Durham business school, Sheena Maberly is careers development officer; she too sees high value in qualifications such as the Durham MA in management (DMAM). She says: 'Whatever your first degree, from anthropology to zoology, a postgraduate business degree can help you gain a competitive edge in an over-crowded job market. If you're just starting out in your career, a business masters degree like the DMAM will enable you to develop skills directly relevant to employers' needs. So, extending your studies into management can make you better equipped to 'hit the ground running' – and that's what employers expect. Recruiters are highly selective and a vocational qualification is additional evidence of motivation.'

Before committing yourself to postgraduate study, weigh up the options. Perhaps the best route might be to take a job now and plan to do an MBA a few years down the line? Try to get

sponsorship from a company. Or go for a well researched and thoroughly thought through masters that will help you land a good job. Ultimately the choice is yours, but focus on the future, and on your target employer's expectations.

PART 2 — QUESTIONS

Questions 14-16

Do the following statements agree with the information given in Reading Passage 2?

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

14 British employers are more interested in what potential recruits can do than what they know.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

15 A recruit with a specialist masters usually earns as much as an experienced employee with a good MBA.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

16 The writer claims that undergraduates often plan to do a masters because they can't decide what career to follow.

- **A** ○ TRUE
- **B** ○ FALSE
- **C** ○ NOT GIVEN

Questions 17-21

The text quotes various individuals. Match the four people A–D with the four points made in Questions 17–21. You may use any of the people more than once.

Write the appropriate letter (A–D)

A. Anthony Hesketh

B. Carol Blackman

C. Nunzio Quacquarelli

D. Nic Beech

	A	B	C	D
17 Employees with postgraduate qualifications earn more because they are older and expect more.	○	○	○	○
18 It can be difficult to convince an employer that the extra time spent at university was necessary.	○	○	○	○
19 One type of course focuses on a particular aspect of business, whereas the other is more general in approach.	○	○	○	○
20 Graduates who have neither worked in nor studied business are suited to our programme.	○	○	○	○
21 There is evidence that companies may prefer to employ people without a masters degree.	○	○	○	○

Questions 22-27

Complete the summary below. Choose ONE WORD from Reading Passage 2 for each answer.

According to Sheena Maberly, a second degree can improve the **22** _____ prospects of graduates in any subject. Taking a management MA gives them the **23** _____ companies are looking for, and lets them get straight on with the job as soon as they start work. It also shows they have the **24** _____ that companies seek.

First, however, it is important to consider the **25** _____: whether to start right away on a carefully chosen postgraduate course, or to do so after a few years' work, preferably with financial assistance from the **26** _____. Whichever they decide, they should think about the **27** _____, and what the company wants.

PASSAGE 3

You should spend about 20 minutes on Questions 28–40, which are based on Reading Passage 3.

The Ring Cycle

A In the jungle of scientific debate, you cannot always see the wood for the trees. But in climate change, the wood itself sometimes holds the key. Imagine an annual register of a year's sunshine and rainfall and frost, kept up to date with perfect accuracy almost everywhere south of the tundra and north of the tropics, and available for inspection not just at any time in life but, quite often, for centuries after death. The register is, of course, the annual growth rings of trees. Match the rings from young trees with those from old forest giants and you have a centuries-long measure of the march of the seasons. Match the rings from old trees with old cathedral rafters and you have a still longer chronology – and a science called dendrochronology.

28

B Dendrochronologists, scientists who study the growth of rings in trees, have successfully constructed long tree-ring records by overlapping the patterns of wide and narrow rings in successively older timber specimens. There are now a dozen or so chronologies in the world that date back more than 5,000 years. These records, normally constructed in a restricted area, using a single species of tree, are year-by-year records of how the trees reacted to their growth conditions – an environmental history from the trees' point of view.

29

C Because tree-ring chronologies are constructed on a regional basis, there has, in the past, been a tendency for dendrochronologists to think local. However, the success of dendrochronology as an international research topic means that there are now quite a lot of chronologies available for study. As the chronologies are dated absolutely, it is possible to compare the records from different areas year by year. Recently, an analysis of 383 modern chronologies, drawn from a vast area across Europe, northern Eurasia and North America was published. The authors, Keith Briffa and colleagues, observed that the maximum late-wood density of the growth rings in each year was related to the temperature in the growing season. Their analysis spanned 600 years, back to AD 1400, and presented a summer temperature record reconstructed from the huge grid of precisely dated ring densities. What they noticed was that the years of really low density – the cool summers – were directly associated with large explosive eruptions, as known from historical sources and from dated layers of acid in the Greenland ice record. Greenland ice is kilometres thick and is made up of the compressed snowfall of tens of thousands of years, so the ice record can be read in almost the same way as tree-rings. I shall use this study as an example of what else tree-rings can tell us.

30

D The study provides a year-by-year estimate of temperatures, together with the dates of some major volcanoes. It is a nice clean story – volcanoes load the atmosphere with dust and aerosol and reflect back sunlight, cooling the earth's surface. This cooling leads to variations in the density of growth rings in northern conifers. Because there are a lot of other records, it is possible to test the findings from the conifer density record.

31

E We can, for example, look at what European oak was doing across the same 600-year period. Was oak responding in the same way as the conifers? The 'oak chronology' is the mean of eight regional oak chronologies across a strip of land from Ireland to Poland. It represents how, on average, hundreds of millions of oaks grew. What we see from this comparison is that the oaks clearly do respond to the volcanoes in some cases (in 1602, 1740 and 1816, for instance), but nothing like so clearly in others. Immediately it becomes apparent that the conifers tell only part of the story. There are many downturns in oak growth, and only a few are related to the conifer record. The oaks were quite capable of being more stressed in years where the conifers were not affected. The point of this, however, is not to argue about the quality of global cooling; the point is to show what dendrochronology can do.

32

F Take the case of 1816, called the 'year without a summer' because of the terrible unseasonable cold and the crop failures that ensued. It has long been known that the primary cause of the cooling was the massive eruption of Tambora, east of Java, in 1815. However, there was a lot more going on in the run-up to 1816. Bald cypress trees in Tennessee show a major growth anomaly, with rings up to 400 per cent wider than normal, in the years following a huge earthquake in 1811–12 in Eastern America. But there is a volcanic acid layer in several Greenland and Antarctic ice cores in 1809–10, as well as in 1815–16. So here we have a combination of a highly unusual quake in an area of the USA not normally affected by earthquakes, and at least two volcanic eruptions, including Tambora, which is widely regarded as the largest in the last 10,000 years. According to Briffa, the period 1810–20 was the coldest in the last millennium, so we begin to see a combination of three unusual elements in less than ten years – exceptional earthquake, exceptional volcanic eruption, and exceptional cold. Given that the defeat of Napoleon's invasion of Russia in 1812 was famously attributed to 'General Winter', one wonders whether a natural series of events actually helped to change the course of modern history.

33

G Obviously, the case of 1816 and the years just before and after it is relatively recent and well documented. However, dendrochronology allows us to investigate the effects of such events geographically, indeed globally. We can interrogate the trees in areas where there is no historical or instrumental record. Further back in time, dendrochronology is almost the only way

to reconstruct abrupt environmental events and perhaps throw new light on far darker moments in human history. Were there just political forces at work in the Dark Ages, or did violent natural events also take a hand, tipping the balance by darkening the skies and lowering the temperature? The trees were there too, and kept a record. The wood hewn from them and preserved through the centuries is slowly beginning to yield at least circumstantial evidence that could support some of the stories – think of the Arthurian wasteland, or the plagues of Egypt – so far told only in enigmatic artefacts, or in legends, epics, and religious chronicles.

PART 3 — QUESTIONS

Questions 28-33

Reading passage 3 has seven paragraphs A–G.

Choose the most suitable headings for paragraphs B–G from the list of headings below.

Write the correct number i–x

i. **Looking at a particular decade**

ii. **Studying trees frozen in ice**

iii. **Bringing different studies together**

iv. **Records of different species compared**

v. **What dendrochronology is**

vi. **A war that affected the climate**

vii. **Showing how trees record volcanic activity**

viii. **A unique record of other times and places**

ix. **Local records covering thousands of years**

x. **How tree rings are formed**

Questions 34-36

Write the appropriate letters A–F

34 **35** **36** Which THREE of the following, are features of dendrochronology?

- **A** ☐ It provides a complete record of the weather in any part of the world.
- **B** ☐ It involves the study of ring patterns in trees of different ages.
- **C** ☐ A piece of wood cut a long time ago can form part of the record.
- **D** ☐ Studies show that trees of the same type all have the same number of rings.
- **E** ☐ As a science it has existed for over 5,000 years.
- **F** ☐ The oldest records are mostly of one type of tree in one place.

Questions 37-40

Choose the correct letters A, B, C or D.

37 What was the result of extending the research to the European oak?

- **A** ○ It added information to that obtained from studying conifers.
- **B** ○ It contradicted all the findings from the study of conifers.
- **C** ○ It showed exactly the same results as those for conifers.
- **D** ○ It proved that the world has cooled considerably since 1400 AD.

38 Which of these happened as a result of the eruption at Tambora?

- **A** ○ Agricultural production fell significantly.
- **B** ○ There was an earthquake in North America.
- **C** ○ Part of the polar ice caps melted.
- **D** ○ The outcome of a war changed.

39 By studying tree rings, we may discover

- **A** ○ whole new areas of human history.
- **B** ○ proof of events said to have happened.
- **C** ○ how earlier civilizations treated the environment.
- **D** ○ the truth about the nature of religious belief.

40 A suitable title for this passage would be

- **A** ○ How volcanoes and earthquakes changed history
- **B** ○ The influence of trees on the world's climate
- **C** ○ The role of trees in human history
- **D** ○ How trees can tell us more about the past

Answer Key

#	Answer	Explanation
1	**F**	It is a measure of light's importance in our daily lives that we hardly pay any attention to it. Light is almost like air. It's a given. A human would no more linger over the concept of light than a fish would ponder the notion of water
2	**H**	There are exceptions, certain moments of sudden appreciation when a particular manifestation of light, a transitory glory, appears: a rainbow, a sunset, a flash of lightning in a dark sky, the shimmering surface of the sea at twilight, the dappled light in a forest, the little red dot from a professor's laser pointer
3	**A**	So much of vital importance is communicated by visible light that almost everything from a fly to an octopus has a way to capture it – an eye, eyes, or something similar
4	**D**	Lynch points out that a shadow is filled with light reflected from the sky, otherwise it would be completely black. Black is the way shadows on the moon looked to the Apollo astronauts, because the moon has no atmosphere and thus no sky to bounce light into the unlit crannies of the lunar surface
5	**E**	Even though light can be manipulated to go faster than light, matter can't. Information can't. There's no possibility of time travel
6	**YES**	Light is light – pure, but not simple. No one is quite sure how to describe it. A wave? A particle? Yes, the scientists say. Both
7	**NO**	You can't appreciate the beauty of a rose if you ponder that the colour red is just the brain's interpretation of a specific wavelength of light with crests that are roughly 700 nanometres apart
8	**NOT GIVEN**	It's worth noting that our eyes are designed to detect the kind of light that is radiated in abundance by the particular star that gives life to our planet: the sun
9	**YES**	Visible light is powerful stuff, moving at relatively short wavelengths, which makes it biologically convenient. To see long, stretched-out radio waves, we'd have to have huge eyes like satellite dishes. Not worth the trouble
10	**YES**	Lynch is a man who, when he looks at a rainbow, spots details that elude most of us

#	Answer	Explanation
11	**a little blue**	‘the reason those mountains over there look a little blue,’ he said, indicating the range that obscures the Pacific, ‘is because there’s sky between here and those mountains
12	**a spaceship**	If you could make a spaceship that wasn’t bound by Einstein’s speed limit, they fantasized, you could zip around the universe far more easily
13	**cesium gas**	‘We created an artificial medium of cesium gas in which the speed of a pulse of light exceeds the speed of light in a vacuum,’ he said, ‘but this is not at odds with Einstein.’
14	**TRUE**	In fact, when recruiting new graduates, most employers considered these skills more important than specialist knowledge
15	**FALSE**	Contrast this with our latest topmba.com MBA Recruiters Survey results which shows that the average salary paid to an MBA with good work experience in the US and Europe is US$80,000 – around two and a half times the average starting salary for a young postgraduate
16	**NOT GIVEN**	• Is my consideration of a second degree because I am not sure of my career direction
17	**C**	In my view, the salary improvement of 10% to 15% largely reflects the recruit’s age and earning expectancy rather than the increase in human capital perceived by the employer
18	**A**	A postgraduate immediately has an uphill task explaining an additional year, or three years, of study
19	**B**	Carol Blackman, of the University of Westminster school of business, explains the first distinction. ‘Specialist masters programmes are designed either for career preparation in a clearly defined type of job or profession, or are intended to develop or enhance professional competence in individuals who are already experienced. The aim is to increase the depth of their knowledge in the specialist area. The MBA, on the other hand, is a general management programme which provides practising managers with an opportunity for personal development with a broadly-based introduction to all management subject areas and the theory and practice of management.’
20	**D**	The MSc in business management (MBM), offered at USGSB is suitable for students with a good first degree – particularly a non-business first degree – but little or no business experience

#	Answer	Explanation
21	**A**	Anthony Hesketh poses the question whether holding a second degree may even be a disadvantage. ‘I have seen many reports over the years suggesting that employers view postgraduates as eminently less employable than those with a first degree
22	**job**	Whatever your first degree, from anthropology to zoology, a postgraduate business degree can help you gain a competitive edge in an over-crowded job market
23	**skills**	If you’re just starting out in your career, a business masters degree like the DMAM will enable you to develop skills directly relevant to employers’ needs
24	**motivation**	Recruiters are highly selective and a vocational qualification is additional evidence of motivation
25	**options**	Before committing yourself to postgraduate study, weigh up the options
26	**company**	Perhaps the best route might be to take a job now and plan to do an MBA a few years down the line? Try to get sponsorship from a company
27	**future**	Ultimately the choice is yours, but focus on the future, and on your target employer’s expectations
28	**ix**	There are now a dozen or so chronologies in the world that date back more than 5,000 years. These records, normally constructed in a restricted area, using a single species of tree, are year-by-year records of how the trees reacted to their growth conditions – an environmental history from the trees’ point of view
29	**iii**	As the chronologies are dated absolutely, it is possible to compare the records from different areas year by year. Recently, an analysis of 383 modern chronologies, drawn from a vast area across Europe, northern Eurasia and North America was published
30	**vii**	volcanoes load the atmosphere with dust and aerosol and reflect back sunlight, cooling the earth’s surface. This cooling leads to variations in the density of growth rings in northern conifers
31	**iv**	We can, for example, look at what European oak was doing across the same 600-year period. Was oak responding in the same way as the conifers? The ‘oak chronology’ is the mean of eight regional oak chronologies across a strip of land from Ireland to Poland. It represents how, on average, hundreds of millions of oaks grew. What we see from this comparison is that the oaks clearly do respond to the volcanoes in some cases (in 1602, 1740 and 1816, for instance), but nothing like so clearly in others

#	Answer	Explanation
32	**i**	According to Briffa, the period 1810–20 was the coldest in the last millennium, so we begin to see a combination of three unusual elements in less than ten years – exceptional earthquake, exceptional volcanic eruption, and exceptional cold
33	**viii**	We can interrogate the trees in areas where there is no historical or instrumental record. Further back in time, dendrochronology is almost the only way to reconstruct abrupt environmental events and perhaps throw new light on far darker moments in human history
34	**B / C / F**	Match the rings from young trees with those from old forest giants and you have a centuries-long measure of the march of the seasons. Match the rings from old trees with old cathedral rafters and you have a still longer chronology – and a science called dendrochronology There are now a dozen or so chronologies in the world that date back more than 5,000 years. These records, normally constructed in a restricted area, using a single species of tree, are year-by-year records of how the trees reacted to their growth conditions – an environmental history from the trees' point of view
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37	**A**	Immediately it becomes apparent that the conifers tell only part of the story. There are many downturns in oak growth, and only a few are related to the conifer record. The oaks were quite capable of being more stressed in years where the conifers were not affected

#	Answer	Explanation
38	**A**	Take the case of 1816, called the ‘year without a summer’ because of the terrible unseasonable cold and the crop failures that ensued. It has long been known that the primary cause of the cooling was the massive eruption of Tambora, east of Java, in 1815
39	**B**	The wood hewn from them and preserved through the centuries is slowly beginning to yield at least circumstantial evidence that could support some of the stories – think of the Arthurian wasteland, or the plagues of Egypt – so far told only in enigmatic artefacts, or in legends, epics, and religious chronicles
40	**D**	I shall use this study as an example of what else tree-rings can tell us