40 IELTS READING TESTS

PASSAGE 3

Compiled By:
O'KTAMJON DILBAROV

▶ With Explained Answers

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READING PASSAGE 3

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

The Truth about the Environment

For many environmentalists, the world seems to be getting worse. They have developed a hit-list of our main fears: that natural resources are running out; that the population is ever growing, leaving less and less to eat; that species are becoming extinct in vast numbers, and that the planet's air and water are becoming ever more polluted.

But a quick look at the facts shows a different picture. First, energy and other natural resources have become more abundant, not less so, since the book 'The Limits to Growth' was published in 1972 by a group of scientists. Second, more food is now produced per head of the world's population than at any time in history. Fewer people are starving. Third, although species are indeed becoming extinct, only about 0.7% of them are expected to disappear in the next 50 years, not 25–50%, as has so often been predicted. And finally, most forms of environmental pollution either appear to have been exaggerated, or are transient – associated with the early phases of industrialisation and therefore best cured not by restricting economic growth, but by accelerating it. One form of pollution – the release of greenhouse gases that causes global warming – does appear to be a phenomenon that is going to extend well into our future, but its total impact is unlikely to pose a devastating problem. A bigger problem may well turn out to be an inappropriate response to it.

Yet opinion polls suggest that many people nurture the belief that environmental standards are declining and four factors seem to cause this disjunction between perception and reality.

One is the lopsidedness built into scientific research. Scientific funding goes mainly to areas with many problems. That may be wise policy, but it will also create an impression that many more potential problems exist than is the case.

Secondly, environmental groups need to be noticed by the mass media. They also need to keep the money rolling in. Understandably, perhaps, they sometimes overstate their arguments. In 1997, for example, the World Wide Fund for Nature issued a press release entitled: 'Two thirds of the world's forests lost forever'. The truth turns out to be nearer 20%.

Though these groups are run overwhelmingly by selfless folk, they nevertheless share many of the characteristics of other lobby groups. That would matter less if people applied the same degree of scepticism to environmental lobbying as they do to lobby groups in other fields. A trade organisation arguing for, say, weaker pollution controls is instantly seen as self-interested. Yet a green organisation opposing such a weakening is

seen as altruistic, even if an impartial view of the controls in question might suggest they are doing more harm than good.

A third source of confusion is the attitude of the media. People are clearly more curious about bad news than good. Newspapers and broadcasters are there to provide what the public wants. That, however, can lead to significant distortions of perception. An example was America's encounter with El Niño in 1997 and 1998. This climatic phenomenon was accused of wrecking tourism, causing allergies, melting the ski-slopes and causing 22 deaths. However, according to an article in the *Bulletin of the American Meteorological Society*, the damage it did was estimated at US$4 billion but the benefits amounted to some US$19 billion. These came from higher winter temperatures (which saved an estimated 850 lives, reduced heating costs and diminished spring floods caused by meltwaters).

The fourth factor is poor individual perception. People worry that the endless rise in the amount of stuff everyone throws away will cause the world to run out of places to dispose of waste. Yet, even if America's trash output continues to rise as it has done in the past, and even if the American population doubles by 2100, all the rubbish America produces through the entire 21st century will still take up only one-12,000th of the area of the entire United States.

So what of global warming? As we know, carbon dioxide emissions are causing the planet to warm. The best estimates are that the temperatures will rise by 2–3°C in this century, causing considerable problems, at a total cost of US$5,000 billion.

Despite the intuition that something drastic needs to be done about such a costly problem, economic analyses clearly show it will be far more expensive to cut carbon dioxide emissions radically than to pay the costs of adaptation to the increased temperatures. A model by one of the main authors of the United Nations Climate Change Panel shows how an expected temperature increase of 2.1 degrees in 2100 would only be diminished to an increase of 1.9 degrees. Or to put it another way, the temperature increase that the planet would have experienced in 2094 would be postponed to 2100.

So this does not prevent global warming, but merely buys the world six years. Yet the cost of reducing carbon dioxide emissions, for the United States alone, will be higher than the cost of solving the world's single, most pressing health problem: providing universal access to clean drinking water and sanitation. Such measures would avoid 2 million deaths every year, and prevent half a billion people from becoming seriously ill.

It is crucial that we look at the facts if we want to make the best possible decisions for the future. It may be costly to be overly optimistic – but more costly still to be too pessimistic.

Questions 27–32

Do the following statements agree with the claims of the writer in Reading Passage 3?

In boxes 27–32 on your answer sheet, 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*

27 Environmentalists take a pessimistic view of the world for a number of reasons.

28 Data on the Earth's natural resources has only been collected since 1972.

29 The number of starving people in the world has increased in recent years.

30 Extinct species are being replaced by new species.

31 Some pollution problems have been correctly linked to industrialisation.

32 It would be best to attempt to slow down economic growth.

Questions 33–37

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

Write your answers in boxes 33–37 on your answer sheet.

33 What aspect of scientific research does the writer express concern about in paragraph 4?

    A   the need to produce results
    B   the lack of financial support
    C   the selection of areas to research
    D   the desire to solve every research problem

34 The writer quotes from the Worldwide Fund for Nature to illustrate how

    A   influential the mass media can be.
    B   effective environmental groups can be.
    C   the mass media can help groups raise funds.
    D   environmental groups can exaggerate their claims.

35 What is the writer's main point about lobby groups in paragraph 6?

    A   Some are more active than others.
    B   Some are better organised than others.
    C   Some receive more criticism than others.
    D   Some support more important issues than others.

36 The writer suggests that newspapers print items that are intended to

    A   educate readers.
    B   meet their readers' expectations.
    C   encourage feedback from readers.
    D   mislead readers.

37 What does the writer say about America's waste problem?

    A   It will increase in line with population growth.
    B   It is not as important as we have been led to believe.
    C   It has been reduced through public awareness of the issues.
    D   It is only significant in certain areas of the country.

Questions 38–40

Complete the summary with the list of words A–I below.

Write the correct letter A–I in boxes 38–40 on your answer sheet.

GLOBAL WARMING

The writer admits that global warming is a **38** .... challenge, but says that it will not have a catastrophic impact on our future, if we deal with it in the **39** .... way. If we try to reduce the levels of greenhouse gases, he believes that it would only have a minimal impact on rising temperatures. He feels it would be better to spend money on the more **40** .... health problem of providing the world's population with clean drinking water.

A unrealistic	**B** agreed	**C** expensive	**D** right
E long-term	**F** usual	**G** surprising	**H** personal
I urgent			

READING PASSAGE 3

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

The Birth of Scientific English

World science is dominated today by a small number of languages, including Japanese, German and French, but it is English which is probably the most popular global language of science. This is not just because of the importance of English-speaking countries such as the USA in scientific research; the scientists of many non-English-speaking countries find that they need to write their research papers in English to reach a wide international audience. Given the prominence of scientific English today, it may seem surprising that no one really knew *how* to write science in English before the 17th century. Before that, Latin was regarded as the *lingua franca*[1] for European intellectuals.

The European Renaissance (c. 14th–16th century) is sometimes called the 'revival of learning', a time of renewed interest in the 'lost knowledge' of classical times. At the same time, however, scholars also began to test and extend this knowledge. The emergent nation states of Europe developed competitive interests in world exploration and the development of trade. Such expansion, which was to take the English language west to America and east to India, was supported by scientific developments such as the discovery of magnetism (and hence the invention of the compass), improvements in cartography and – perhaps the most important scientific revolution of them all – the new theories of astronomy and the movement of the *Earth* in relation to the planets and stars, developed by Copernicus (1473–1543).

England was one of the first countries where scientists adopted and publicised Copernican ideas with enthusiasm. Some of these scholars, including two with interests in language – John Wallis and John Wilkins – helped found the Royal Society in 1660 in order to promote empirical scientific research.

Across Europe similar academies and societies arose, creating new national traditions of science. In the initial stages of the scientific revolution, most publications in the national languages were popular works, encyclopaedias, educational textbooks and translations. Original science was not done in English until the second half of the 17th century. For example, Newton published his mathematical treatise, known as the *Principia*, in Latin, but published his later work on the properties of light – *Opticks* – in English.

There were several reasons why original science continued to be written in Latin. The first was simply a matter of audience. Latin was suitable for an *international* audience of scholars, whereas English reached a socially wider, but more local, audience. Hence, popular science was written in English.

[1] *lingua franca*: a language which is used for communication between groups of people who speak different languages

A second reason for writing in Latin may, perversely, have been a concern for secrecy. Open publication had dangers in putting into the public domain preliminary ideas which had not yet been fully exploited by their 'author'. This growing concern about intellectual property rights was a feature of the period – it reflected both the humanist notion of the individual, rational scientist who invents and discovers through private intellectual labour, and the growing connection between original science and commercial exploitation. There was something of a social distinction between 'scholars and gentlemen' who understood Latin, and men of trade who lacked a classical education. And in the mid-17th century it was common practice for mathematicians to keep their discoveries and proofs secret, by writing them in cipher, in obscure languages, or in private messages deposited in a sealed box with the Royal Society. Some scientists might have felt more comfortable with Latin precisely because its audience, though international, was socially restricted. Doctors clung the most keenly to Latin as an 'insider language'.

A third reason why the writing of original science in English was delayed may have been to do with the linguistic inadequacy of English in the early modern period. English was not well equipped to deal with scientific argument. First, it lacked the necessary technical vocabulary. Second, it lacked the grammatical resources required to represent the world in an objective and impersonal way, and to discuss the relations, such as cause and effect, that might hold between complex and hypothetical entities.

Fortunately, several members of the Royal Society possessed an interest in language and became engaged in various linguistic projects. Although a proposal in 1664 to establish a committee for improving the English language came to little, the society's members did a great deal to foster the publication of science in English and to encourage the development of a suitable writing style. Many members of the Royal Society also published monographs in English. One of the first was by Robert Hooke, the society's first curator of experiments, who described his experiments with microscopes in *Micrographia* (1665). This work is largely narrative in style, based on a transcript of oral demonstrations and lectures.

In 1665 a new scientific journal, *Philosophical Transactions*, was inaugurated. Perhaps the first international English-language scientific journal, it encouraged a new genre of scientific writing, that of short, focused accounts of particular experiments.

The 17th century was thus a formative period in the establishment of scientific English. In the following century much of this momentum was lost as German established itself as the leading European language of science. It is estimated that by the end of the 18th century 401 German scientific journals had been established as opposed to 96 in France and 50 in England. However, in the 19th century scientific English again enjoyed substantial lexical growth as the industrial revolution created the need for new technical vocabulary, and new, specialised, professional societies were instituted to promote and publish in the new disciplines.

Questions 28–34

Complete the summary.

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

Write your answers in boxes 28–34 on your answer sheet.

In Europe, modern science emerged at the same time as the nation state. At first, the scientific language of choice remained **28** .... It allowed scientists to communicate with other socially privileged thinkers while protecting their work from unwanted exploitation. Sometimes the desire to protect ideas seems to have been stronger than the desire to communicate them, particularly in the case of mathematicians and **29** ....
In Britain, moreover, scientists worried that English had neither the **30** .... nor the **31** .... to express their ideas. This situation only changed after 1660 when scientists associated with the **32** .... set about developing English. An early scientific journal fostered a new kind of writing based on short descriptions of specific experiments. Although English was then overtaken by **33** .... , it developed again in the 19th century as a direct result of the **34** ....

Questions 35–37

Do the following statements agree with the information given in Reading Passage 3?

In boxes 35–37 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*

35 There was strong competition between scientists in Renaissance Europe.

36 The most important scientific development of the Renaissance period was the discovery of magnetism.

37 In 17th-century Britain, leading thinkers combined their interest in science with an interest in how to express ideas.

Questions 38–40

Complete the table.

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

Write your answers in boxes 38–40 on your answer sheet.

Science written in the first half of the 17th century		
Language used	Latin	English
Type of science	Original	**38** ....
Examples	**39**	Encyclopaedias
Target audience	International scholars	**40** .... , but socially wider

TEST 3

READING PASSAGE 3

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

The Return of Artificial Intelligence

It is becoming acceptable again to talk of computers performing human tasks such as problem-solving and pattern-recognition

A After years in the wilderness, the term 'artificial intelligence' (AI) seems poised to make a comeback. AI was big in the 1980s but vanished in the 1990s. It re-entered public consciousness with the release of *AI*, a movie about a robot boy. This has ignited public debate about AI, but the term is also being used once more within the computer industry. Researchers, executives and marketing people are now using the expression without irony or inverted commas. And it is not always hype. The term is being applied, with some justification, to products that depend on technology that was originally developed by AI researchers. Admittedly, the rehabilitation of the term has a long way to go, and some firms still prefer to avoid using it. But the fact that others are starting to use it again suggests that AI has moved on from being seen as an over-ambitious and under-achieving field of research.

B The field was launched, and the term 'artificial intelligence' coined, at a conference in 1956 by a group of researchers that included Marvin Minsky, John McCarthy, Herbert Simon and Alan Newell, all of whom went on to become leading figures in the field. The expression provided an attractive but informative name for a research programme that encompassed such previously disparate fields as operations research, cybernetics, logic and computer science. The goal they shared was an attempt to capture or mimic human abilities using machines. That said, different groups of researchers attacked different problems, from speech recognition to chess playing, in different ways; AI unified the field in name only. But it was a term that captured the public imagination.

C Most researchers agree that AI peaked around 1985. A public reared on science-fiction movies and excited by the growing power of computers had high expectations. For years, AI researchers had implied that a breakthrough was just around the corner. Marvin Minsky said in 1967 that within a generation the problem of creating 'artificial intelligence' would be substantially solved. Prototypes of medical-diagnosis programs and speech recognition software appeared to be making progress. It proved to be a false dawn. Thinking computers and

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household robots failed to materialise, and a backlash ensued. 'There was undue optimism in the early 1980s,' says David Leake, a researcher at Indiana University. 'Then when people realised these were hard problems, there was retrenchment. By the late 1980s, the term AI was being avoided by many researchers, who opted instead to align themselves with specific sub-disciplines such as neural networks, agent technology, case-based reasoning, and so on.'

D Ironically, in some ways AI was a victim of its own success. Whenever an apparently mundane problem was solved, such as building a system that could land an aircraft unattended, the problem was deemed not to have been AI in the first place. 'If it works, it can't be AI,' as Dr Leake characterises it. The effect of repeatedly moving the goal-posts in this way was that AI came to refer to 'blue-sky' research that was still years away from commercialisation. Researchers joked that AI stood for 'almost implemented'. Meanwhile, the technologies that made it onto the market, such as speech recognition, language translation and decision-support software, were no longer regarded as AI. Yet all three once fell well within the umbrella of AI research.

E But the tide may now be turning, according to Dr Leake. HNC Software of San Diego, backed by a government agency, reckon that their new approach to artificial intelligence is the most powerful and promising approach ever discovered. HNC claim that their system, based on a cluster of 30 processors, could be used to spot camouflaged vehicles on a battlefield or extract a voice signal from a noisy background – tasks humans can do well, but computers cannot. 'Whether or not their technology lives up to the claims made for it, the fact that HNC are emphasising the use of AI is itself an interesting development,' says Dr Leake.

F Another factor that may boost the prospects for AI in the near future is that investors are now looking for firms using clever technology, rather than just a clever business model, to differentiate themselves. In particular, the problem of information overload, exacerbated by the growth of e-mail and the explosion in the number of web pages, means there are plenty of opportunities for new technologies to help filter and categorise information – classic AI problems. That may mean that more artificial intelligence companies will start to emerge to meet this challenge.

G The 1969 film, *2001:A Space Odyssey*, featured an intelligent computer called HAL 9000. As well as understanding and speaking English, HAL could play chess and even learned to lipread. HAL thus encapsulated the optimism of the 1960s that intelligent computers would be widespread by 2001. But 2001 has been and gone, and there is still no sign of a HAL-like computer. Individual systems can play chess or transcribe speech, but a general theory of machine intelligence still remains elusive. It may be, however, that the comparison with HAL no longer seems quite so important, and AI can now be judged by what it can do, rather than by how well it matches up to a 30-year-old science-fiction film. 'People are beginning to realise that there are impressive things that these systems can do,' says Dr Leake hopefully.

Questions 27–31

Reading Passage 3 has seven paragraphs, A–G.

Which paragraph contains the following information?

Write the correct letter A–G in boxes 27–31 on your answer sheet.

NB You may use any letter more than once.

27 how AI might have a military impact

28 the fact that AI brings together a range of separate research areas

29 the reason why AI has become a common topic of conversation again

30 how AI could help deal with difficulties related to the amount of information available electronically

31 where the expression AI was first used

Questions 32–37

Do the following statements agree with the information given in Reading Passage 3?

In boxes 32–37 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 about this*

32 The researchers who launched the field of AI had worked together on other projects in the past.

33 In 1985, AI was at its lowest point.

34 Research into agent technology was more costly than research into neural networks.

35 Applications of AI have already had a degree of success.

36 The problems waiting to be solved by AI have not changed since 1967.

37 The film *2001: A Space Odyssey* reflected contemporary ideas about the potential of AI computers.

Questions 38–40

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

Write your answers in boxes 38–40 on your answer sheet.

38 According to researchers, in the late 1980s there was a feeling that

    A   a general theory of AI would never be developed.
    B   original expectations of AI may not have been justified.
    C   a wide range of applications was close to fruition.
    D   more powerful computers were the key to further progress.

39 In Dr Leake's opinion, the reputation of AI suffered as a result of

    A   changing perceptions.
    B   premature implementation.
    C   poorly planned projects.
    D   commercial pressures.

40 The prospects for AI may benefit from

    A   existing AI applications.
    B   new business models.
    C   orders from internet-only companies.
    D   new investment priorities.

READING PASSAGE 3

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

• •
The effects of light on plant and animal species
• •

Light is important to organisms for two different reasons. Firstly it is used as a cue for the timing of daily and seasonal rhythms in both plants and animals, and secondly it is used to assist growth in plants.

Breeding in most organisms occurs during a part of the year only, and so a reliable cue is needed to trigger breeding behaviour. Day length is an excellent cue, because it provides a perfectly predictable pattern of change within the year. In the temperate zone in spring, temperatures fluctuate greatly from day to day, but day length increases steadily by a predictable amount. The seasonal impact of day length on physiological responses is called *photoperiodism*, and the amount of experimental evidence for this phenomenon is considerable. For example, some species of birds' breeding can be induced even in midwinter simply by increasing day length artificially (Wolfson 1964). Other examples of photoperiodism occur in plants. A *short-day plant* flowers when the day is less than a certain critical length. A *long-day plant* flowers after a certain critical day length is exceeded. In both cases the critical day length differs from species to species. Plants which flower after a period of vegetative growth, regardless of photoperiod, are known as *day-neutral plants*.

Breeding seasons in animals such as birds have evolved to occupy the part of the year in which offspring have the greatest chances of survival. Before the breeding season begins, food reserves must be built up to support the energy cost of reproduction, and to provide for young birds both when they are in the nest and after fledging. Thus many temperate-zone birds use the increasing day lengths in spring as a cue to begin the nesting cycle, because this is a point when adequate food resources will be assured.

The adaptive significance of photoperiodism in plants is also clear. Short-day plants that flower in spring in the temperate zone are adapted to maximising seedling growth during the growing season. Long-day plants are adapted for situations that require fertilization by insects, or a long period of seed ripening. Short-day plants that flower in the autumn in the temperate zone are able to build up food reserves over the growing season and over winter as seeds. Day-neutral plants have an evolutionary advantage when the connection between the favourable period for reproduction and day length is much less certain. For example, desert annuals germinate, flower and seed whenever suitable rainfall occurs, regardless of the day length.

The breeding season of some plants can be delayed to extraordinary lengths. Bamboos are perennial grasses that remain in a vegetative state for many years and then suddenly flower, fruit and die (Evans 1976). Every bamboo of the species *Chusquea abietifolia* on the island of Jamaica flowered, set seed and died during 1884. The next generation of bamboo flowered and died between 1916 and 1918, which suggests a vegetative cycle of about 31 years. The climatic trigger for this flowering cycle is not yet known, but the adaptive significance is clear. The simultaneous production of masses of bamboo seeds (in some cases lying 12 to 15 centimetres deep on the ground) is more than all the seed-eating animals can cope with at the time, so that some seeds escape being eaten and grow up to form the next generation (Evans 1976).

The second reason light is important to organisms is that it is essential for *photosynthesis*. This is the process by which plants use energy from the sun to convert carbon from soil or water into organic material for growth. The rate of photosynthesis in a plant can be measured by calculating the rate of its uptake of carbon. There is a wide range of photosynthetic responses of plants to variations in light intensity. Some plants reach maximal photosynthesis at one-quarter full sunlight, and others, like sugarcane, never reach a maximum, but continue to increase photosynthesis rate as light intensity rises.

Plants in general can be divided into two groups: *shade-tolerant* species and *shade-intolerant* species. This classification is commonly used in forestry and horticulture. Shade-tolerant plants have lower photosynthetic rates and hence have lower growth rates than those of shade-intolerant species. Plant species become adapted to living in a certain kind of habitat, and in the process evolve a series of characteristics that prevent them from occupying other habitats. Grime (1966) suggests that light may be one of the major components directing these adaptations. For example, eastern hemlock seedlings are shade-tolerant. They can survive in the forest understorey under very low light levels because they have a low photosynthetic rate.

Questions 27–33

Do the following statements agree with the information given in Reading Passage 3?

In boxes 27 33 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 There is plenty of scientific evidence to support photoperiodism.

28 Some types of bird can be encouraged to breed out of season.

29 Photoperiodism is restricted to certain geographic areas.

30 Desert annuals are examples of long-day plants.

31 Bamboos flower several times during their life cycle.

32 Scientists have yet to determine the cue for *Chusquea abietifolia*'s seasonal rhythm.

33 Eastern hemlock is a fast-growing plant.

Questions 34–40

Complete the sentences.

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

Write your answers in boxes 34–40 on your answer sheet.

34   Day length is a useful cue for breeding in areas where .... are unpredictable.

35   Plants which do not respond to light levels are referred to as ....

36   Birds in temperate climates associate longer days with nesting and the availability of ....

37   Plants that flower when days are long often depend on .... to help them reproduce.

38   Desert annuals respond to .... as a signal for reproduction.

39   There is no limit to the photosynthetic rate in plants such as ....

40   Tolerance to shade is one criterion for the .... of plants in forestry and horticulture.

READING PASSAGE 3

*You should spend about 20 minutes on **Questions 27–40**, which are based on Reading Passage 3 on the following pages.*

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.*

*Write the correct number, **i–ix**, in boxes 27–32 on your answer sheet.*

List of Headings

i	The reaction of the Inuit community to climate change
ii	Understanding of climate change remains limited
iii	Alternative sources of essential supplies
iv	Respect for Inuit opinion grows
v	A healthier choice of food
vi	A difficult landscape
vii	Negative effects on well-being
viii	Alarm caused by unprecedented events in the Arctic
ix	The benefits of an easier existence

Example	Answer
Paragraph A	**viii**

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27   Paragraph **B**

28   Paragraph **C**

29   Paragraph **D**

30   Paragraph **E**

31   Paragraph **F**

32   Paragraph **G**

Climate Change and the Inuit

The threat posed by climate change in the Arctic and the problems faced by Canada's Inuit people

A Unusual incidents are being reported across the Arctic. Inuit families going off on snowmobiles to prepare their summer hunting camps have found themselves cut off from home by a sea of mud, following early thaws. There are reports of igloos losing their insulating properties as the snow drips and refreezes, of lakes draining into the sea as permafrost melts, and sea ice breaking up earlier than usual, carrying seals beyond the reach of hunters. Climate change may still be a rather abstract idea to most of us, but in the Arctic it is already having dramatic effects – if summertime ice continues to shrink at its present rate, the Arctic Ocean could soon become virtually ice-free in summer. The knock-on effects are likely to include more warming, cloudier skies, increased precipitation and higher sea levels. Scientists are increasingly keen to find out what's going on because they consider the Arctic the 'canary in the mine' for global warming – a warning of what's in store for the rest of the world.

B For the Inuit the problem is urgent. They live in precarious balance with one of the toughest environments on earth. Climate change, whatever its causes, is a direct threat to their way of life. Nobody knows the Arctic as well as the locals, which is why they are not content simply to stand back and let outside experts tell them what's happening. In Canada, where the Inuit people are jealously guarding their hard-won autonomy in the country's newest territory, Nunavut, they believe their best hope of survival in this changing environment lies in combining their ancestral knowledge with the best of modern science. This is a challenge in itself.

C The Canadian Arctic is a vast, treeless polar desert that's covered with snow for most of the year. Venture into this terrain and you get some idea of the hardships facing anyone who calls this home. Farming is out of the question and nature offers meagre pickings. Humans first settled in the Arctic a mere 4,500 years ago, surviving by exploiting sea mammals and fish. The environment tested them to the limits: sometimes the colonists were successful, sometimes they failed and vanished. But around a thousand years ago, one group emerged that was uniquely well adapted to cope with the Arctic environment. These Thule people moved in from Alaska, bringing kayaks, sleds, dogs, pottery and iron tools. They are the ancestors of today's Inuit people.

D Life for the descendants of the Thule people is still harsh. Nunavut is 1.9 million square kilometres of rock and ice, and a handful of islands around the North Pole. It's currently home to 2,500 people, all but a handful of them indigenous Inuit. Over the past 40 years, most have abandoned their nomadic ways and settled in the territory's 28 isolated communities, but they still rely heavily on nature to provide food and clothing.

Provisions available in local shops have to be flown into Nunavut on one of the most costly air networks in the world, or brought by supply ship during the few ice-free weeks of summer. It would cost a family around £7,000 a year to replace meat they obtained themselves through hunting with imported meat. Economic opportunities are scarce, and for many people state benefits are their only income.

E While the Inuit may not actually starve if hunting and trapping are curtailed by climate change, there has certainly been an impact on people's health. Obesity, heart disease and diabetes are beginning to appear in a people for whom these have never before been problems. There has been a crisis of identity as the traditional skills of hunting, trapping and preparing skins have begun to disappear. In Nunavut's 'igloo and email' society, where adults who were born in igloos have children who may never have been out on the land, there's a high incidence of depression.

F With so much at stake, the Inuit are determined to play a key role in teasing out the mysteries of climate change in the Arctic. Having survived there for centuries, they believe their wealth of traditional knowledge is vital to the task. And Western scientists are starting to draw on this wisdom, increasingly referred to as 'Inuit Qaujimajatuqangit', or IQ. 'In the early days scientists ignored us when they came up here to study anything. They just figured these people don't know very much so we won't ask them,' says John Amagoalik, an Inuit leader and politician. 'But in recent years IQ has had much more credibility and weight.' In fact it is now a requirement for anyone hoping to get permission to do research that they consult the communities, who are helping to set the research agenda to reflect their most important concerns. They can turn down applications from scientists they believe will work against their interests, or research projects that will impinge too much on their daily lives and traditional activities.

G Some scientists doubt the value of traditional knowledge because the occupation of the Arctic doesn't go back far enough. Others, however, point out that the first weather stations in the far north date back just 50 years. There are still huge gaps in our environmental knowledge, and despite the scientific onslaught, many predictions are no more than best guesses. IQ could help to bridge the gap and resolve the tremendous uncertainty about how much of what we're seeing is natural capriciousness and how much is the consequence of human activity.

Questions 33–40

Complete the summary of paragraphs C and D below.

Choose NO MORE THAN TWO WORDS from paragraphs C and D for each answer.

Write your answers in boxes 33–40 on your answer sheet.

If you visit the Canadian Arctic, you immediately appreciate the problems faced by people for whom this is home. It would clearly be impossible for the people to engage in 33 .... as a means of supporting themselves. For thousands of years they have had to rely on catching 34 .... and 35 .... as a means of sustenance. The harsh surroundings saw many who tried to settle there pushed to their limits, although some were successful. The 36 .... people were an example of the latter and for them the environment did not prove unmanageable. For the present inhabitants, life continues to be a struggle. The territory of Nunavut consists of little more than ice, rock and a few 37 .... In recent years, many of them have been obliged to give up their 38 .... lifestyle, but they continue to depend mainly on 39 .... for their food and clothes. 40 .... produce is particularly expensive.

Test 2

READING PASSAGE 3

Numeration

One of the first great intellectual feats of a young child is learning how to talk, closely followed by learning how to count. From earliest childhood we are so bound up with our system of numeration that it is a feat of imagination to consider the problems faced by early humans who had not yet developed this facility. Careful consideration of our system of numeration leads to the conviction that, rather than being a facility that comes naturally to a person, it is one of *the* great and remarkable achievements of the human race.
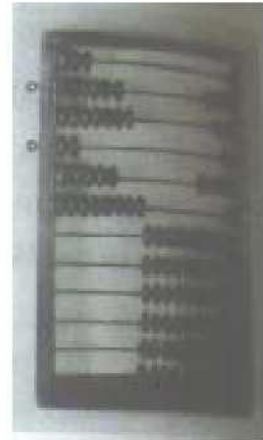
It is impossible to learn the sequence of events that led to our developing the concept of number. Even the earliest of tribes had a system of numeration that, if not advanced, was sufficient for the tasks that they had to perform. Our ancestors had little use for actual numbers; instead their considerations would have been more of the kind is this enough rather than How many when they were engaged in food gathering, for example. However when early humans first began to reflect on the nature of things around them, they discovered that they needed on idea of number simple to keep their thoughts in order. As they began to settle, grow plants and herd animals, the need for a sophisticated number system became paramount. It will never be known how and when this numeration ability developed, but it is certain that numeration was well developed by the time humans had formed even semi-permanent settlements.

Evidence of early stages of arithmetic and numeration can be readily found. The indigenous peoples of Tasmania were only able to count one, two, many; those of South Africa counted one, two, two and one, two twos and one, and so on. But in real situations the number and words are often accompanied by gestures to help resolve any confusion. For example, when using the one, two, many type of system, the word many would mean, Look at my hands and see how many fingers I am showing you. This basic approach is limited in the range of numbers that it can express, but this range will generally suffice when dealing with the simpler aspects of human existence.

The lack of ability of some cultures to deal with large numbers is not really surprising. European languages, When traced back to their earlier version, are very poor in number words and expressions. The ancient Gothic word for ten, tachund, is used to express the number 100 as tachund tachund. By the seventy century, the word teon had become interchangeable with the tachund or hund of the Anglo-Saxon language, and so 100 was denoted as hund teontig,or ten times ten. The average person in the seventh century in Europe was not as familiar with numbers as we are today. In fact, to qualify as a witness in a count of low a man had to be able to count to nine!

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Perhaps the most fundamental step in developing a sense of number is not the ability to count, but rather to see that a number is really an abstract idea instead of a simple attachment to a group of particular objects. It must have been within me grasp of the earliest humans to conceive that four birds are distinct from two birds; however, it is not an elementary step to associate the number 4, as connected with four birds, to the number 4, as connected with four rocks. Associating a number as one of the qualities of a specific object is a great hindrance to the development of a true number sense. When the number 4 can be registered in the mind as a specific word, independent of the object being referenced, the individual is ready to take the first step toward the development of a notational system for numbers and, from there, to arithmetic.

Traces of the very first stages in the development of numeration can be seen in several living languages today. The numeration system of the Tsimshian language in British Columbia contains seven distinct sets of words for numbers according to the class of the item being counted: for counting flat objects and animals, for round objects and time, for people, for long objects and trees, for canoes, for measures, and For counting when no particular object is being numerated. It seems that the last is a later development while the First six groups show the relics of an older system. This diversity of number names can also be found in some widely used languages such as Japanese.

Intermixed with the development of a number sense is the development of an ability to count. Counting is not directly related to the formation of a number concept because it is possible to count by matching the items being counted against a group of pebbles, grains of corn, or the counter's Fingers. These aids would have been indispensable to very early people who would hove Found the process impossible without some Form of mechanical aid. Such aids, while different, are still used even by the most educated in today's society due to their convenience. All counting ultimately involves reference to something other than the things being counted. At first it may have been grains or pebbles but now it is a memorised sequence of words that happen to be the names of the numbers.

Questions 27-31

Complete each sentence with the correct ending, A-G, below. Write the correct

letter, A-G. in boxes 27-31 on your answer sheet.

27 A developed system of numbering
28 An additional hand signal
29 In seventh-century Europe, the ability to count to a certain number
30 Thinking about numbers as concepts separate from physical objects
31 Expressing number differently according to class of item

A	was necessary in order to fulfil a civic role.
B	was necessary when people began farming
C	was necessary for the development of arithmetic
D	persists in all societies
E	was used when the range of number words was restricted
F	can be traced back to early European languages.
G	was a characteristic of early numeration systems

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Questions 32-40

Do the following statements agree with the information given in Reading Passage 3? *In*

boxes 32-40 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*

32   For the earliest tribes, the concept of sufficiency was more important than the concept of quantity.

33   Indigenous Tasmanians used only four terms to indicate numbers of objects.

34   Some peoples with simple number systems use body language to prevent misunderstanding of expressions of number.

35   All cultures have been able to express large numbers clearly.

36   The word 'thousand[1]' has Anglo-Saxon origins.

37   In general, people in seventh-century Europe had poor counting ability.

38   In the Tsimshian language, the number for long objects and canoes is expressed with the same word.

39   The Tsimshian language contains both older and newer systems of counting.

40   Early peoples found it easier to count by using their fingers rather than a group of pebbles.

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READING PASSAGE 3

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

The Search for the Anti-aging Pill

In government *laboratories* and elsewhere, scientists *are* seeking a drug able to prolong *life and youthful vigor*. Studies of *caloric* restriction *are* showing the way

As researchers on aging noted recently, no treatment on the market today has been proved to slow human aging - the build-up of molecular and cellular damage that increases vulnerability to infirmity as we grow older. But one intervention, consumption of a low-calorie* yet nutritionally balanced diet, works incredibly well in a broad range of animals, increasing longevity and prolonging good health. Those findings suggest that caloric restriction could delay aging and increase longevity in humans, too.

Unfortunately, for maximum benefit, people would probably have to reduce their caloric intake by roughly thirty per cent, equivalent to dropping from 2,500 calories a day to 1,750. Few mortals could stick to chat harsh a regimen, especially for years on end. But what if someone could create a pill that mimicked the physiological effects of eating less without actually forcing people to eat less? Could such a 'caloric-restriction mimetic', as we call it, enable people to stay healthy longer, postponing age-related disorders (such as diabetes, arteriosclerosis, heart disease and cancer) until very lace in life? Scientists first posed this question in the mid-1990s, after researchers came upon a chemical agent that in rodents seemed to reproduce many of caloric restriction's benefits. No compound that would safely achieve the same feat in people has been found yet, but the search has been informative and has fanned hope that caloric-restriction (CR) mimetics can indeed be developed eventually.

The benefits of caloric restriction

The hunt for CR mimetics grew out of a desire to better understand caloric restriction's many effects on the body. Scientists first recognized the value of the practice more than 60 years ago, when they found that rats fed a low-calorie diet lived longer on average than free-feeding rats and also had a reduced incidence of conditions that become increasingly common in old age. What is more, some of the treated animals survived longer than the oldest-living animals in the control group, which means that the maximum lifespan (the oldest attainable age), not merely the normal lifespan, increased. Various interventions, such as infection-fighting drugs, can increase a population's average survival time, but only approaches chat slow the body's rate of aging will increase the maximum lifespan.

The rat findings have been replicated many times and extended to creatures ranging from yeast to fruit flies, worms, fish, spiders, mice and hamsters. Until fairly recently, the studies were limited   short-lived creatures genetically distant from humans. But caloric-restriction projects underway   in two species more closely related to humans - rhesus and squirrel monkeys - have   scientists optimistic that CR mimetics could help people.

calorie: a measure of the energy value of food

The monkey projects demonstrate that, compared with control animals that eat normally. caloric-restricted monkeys have lower body temperatures and levels of the pancreatic hormone insulin, and they retain more youthful levels of certain hormones that tend to fall with age.

The caloric-restricted animals also look better on indicators of risk for age-related diseases. For example, they have lower blood pressure and triglyceride levels(signifying a decreased likelihood of heart disease),and they have more normal blood glucose levels(pointing to a reduced risk for diabetes, which is marked by unusually high blood glucose levels).Further, it has recently been shown that rhesus monkeys kept on caloric-restricted diets for an extended time(nearly 15 years) have less chronic disease. They and the other monkeys must be followed still longer, however, to know whether low-calorie intake can increase both average and maximum lifespans in monkeys. Unlike the multitude of elixirs being touted as the latest anti-aging cure, CR mimetics would alter fundamental processes that underlie aging. We aim to develop compounds that fool cells into activating maintenance and repair.

How a prototype caloric-restriction mimetic works

The best-studied candidate for a caloric-restriction mimetic, 2DG (2-deoxy-D-glucose), works by interfering with the way cells process glucose, it has proved toxic at some doses in animals and so cannot be used in humans. But it has demonstrated that chemicals can replicate the effects of caloric restriction; the trick is finding the right one.

Cells use the glucose from food to generate ATP (adenosine triphosphate), the molecule that powers many activities in the body. By limiting food intake, caloric restriction minimizes the amount of glucose entering cells and decreases ATP generation. When 2DG is administered to animals that eat normally, glucose reaches cells in abundance but the drug prevents most of it from being processed and thus reduces ATP synthesis. Researchers have proposed several explanations for why interruption of glucose processing and ATP production might retard aging. One possibility relates to the ATP-making machinery's emission of free radicals, which are thought to contribute to aging and t such age-related diseases as cancer by damaging cells. Reduced operation of the machinery should limit their production and thereby constrain the damage. Another hypothesis suggests that decreased processing of glucose could indicate to cells that food is scarce(even if it isn't) and induce them to shift into an anti-aging mode that emphasizes preservation of the organism over such 'luxuries' as growth and reproduction.

Questions 28-32

Do the following statements agree with the claims of the writer in Reading Passage 3? *In boxes 28-32 on your answer sheet, write*

YES	*if the statement t 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*

28   Studies show drugs available today can delay the process of growing old.

19   There is scientific evidence that eating fewer calories may extend human life.

30   Not many people are likely to find a caloric-restricted diet attractive.

31   Diet-related diseases are common in older people.

32   In experiments, rats who ale what they wanted led shorter lives than rats on a low-calorie diet.

Questions 33-37

Classify the following descriptions as relating to

A	*caloric-restricted monkeys*
B	*control monkeys*
C	*neither caloric-restricted monkeys nor control monkeys*

Write (he correct letter, A, B or C, in boxes 33-37 on your answer sheet.

33   Monkeys were less likely to become diabetic.

34   Monkeys experienced more chronic disease.

35   Monkeys have been shown to experience a longer than average life span.

36   Monkeys enjoyed a reduced chance of heart disease.

37   Monkeys produced greater quantities of insulin.

Questions 38-40

Complete the flowchart below.

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

Write your answers in boxes 38-40 on your answer sheet.

How a caloric-restriction mimetic works

CR mimetic

↓

less 38 .... is processed

↓

production of ATP is decreased

↙   ↘
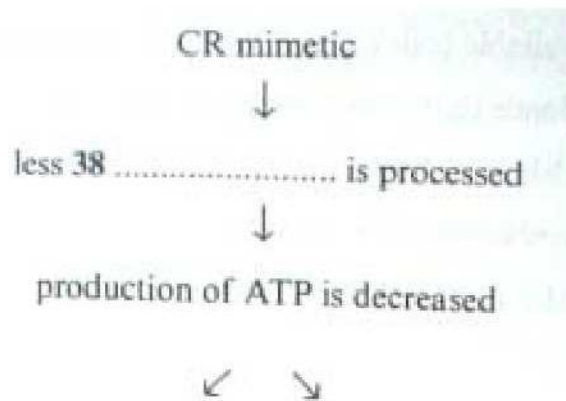
Theory 1:

cells less damaged by disease because fewer39........................ are emitted

Theory 2:

cells focus on 40........................ because food is in short supply

TEST 8

READING PASSAGE 3

You should spend about 20 minutes on Questions 27-40, which are based on Reading Passage 3 on the following pages.

Questions **27-30**

Reading Passage 3 has six sections, A-F

Choose the correct heading for sections A-D from the list of headings below.

Write the correct number, i-vii, in boxes **27-30** on your answer sheet.

> **List of Headings**
> i   The role of video violence
> ii   The failure of government policy
> Hi   Reasons for the increased rate of bullying
> iv   Research into how common bullying is in British schools
> v   The reaction from schools to enquiries about bullying
> vi   The effect of bullying on the children involved
> vii Developments that have led to a new approach by schools

27 Section A

28 Section B

29 Section C

30 Section D

Persistent bullying is one of the worst experiences a child can face. How can it be prevented? Peter Smith, Professor of Psychology at the University of Sheffield, directed the Sheffield Anti-Bullying Intervention Project, funded by the Department for Education. Here he reports on his findings

A   Bullying can take a variety of forms, from the verbal - being taunted or called hurtful names - to the physical - being kicked or shoved - as well as indirect   forms, such as being excluded from social groups. A survey I conducted with Irene Whitney found that in British primary schools up to a quarter of pupils reported experience of bullying, which in about one in ten cases was persistent. There was less bullying in secondary schools, with about one in twenty-five suffering persistent bullying, but these cases may be particularly recalcitrant.

B   Bullying is clearly unpleasant, and can make the child experiencing it feel unworthy and depressed. In extreme cases it can even lead to suicide, though this is thankfully rare. Victimised pupils are more likely to experience difficulties with interpersonal relationships as adults, while children who persistently bully are more likely to grow up to be physically violent, and convicted of anti-social offences.

C   Until recently, not much was known about the topic, and little help was available to teachers to deal with bullying. Perhaps as a consequence, schools would often deny the problem. 'There is no bullying at this school' has been a common refrain, almost certainty untrue. Fortunately more schools are now saying: There is not much bullying here, but when it occurs we have a clear policy for dealing with it.'

D   Three factors are involved in this change. First is an awareness of the severity of the problem. Second, a number of resources to help tackle bullying have become available in Britain. For example, the Scottish Council for Research in Education produced a package of materials, Action Against Bullying, circulated to all schools in England and Wales as well as in Scotland in summer 1992, with a second pack, Supporting Schools Against Bullying, produced the following year. In Ireland, Guidelines on Countering Bullying Behaviour in Post-Primary Schools was published in 1993. Third, there is evidence that these materials work, and that schools can achieve something. This comes from carefully conducted 'before and after1 evaluations of interventions in schools, monitored by a research team. In Norway, after an intervention campaign was introduced nationally, an evaluation of forty-two schools suggested that, over a two-year period, bullying was halved. The Sheffield investigation, which involved sixteen primary schools and seven secondary schools, found that most schools succeeded in reducing bullying.

E   Evidence suggests that a key step is to develop a policy on bullying, saying clearly what is meant by bullying, and giving explicit guidelines on what will be done if it occurs, what record will be kept, who will be informed, what sanctions will be employed. The policy should be developed through consultation, over a period of time-not just imposed from the head teacher's office! Pupils, parents and staff should feel they have been involved in the policy, which needs to be disseminated and implemented effectively.

Other actions can be taken to back up the policy. There are ways of dealing with the topic through the curriculum, using video, drama and literature. These are useful for raising awareness, and can best be tied in to early phases of development while the school is starting to discuss the issue of bullying. They are also useful in renewing the policy for new pupils, or revising it in the tight of experience. But curriculum work alone may only have short-term effects; it should be an addition to policy work, not a substitute.

There are also ways of working with individual pupils, or in small groups. Assertiveness training for pupils who are liable to be victims is worthwhile, and certain approaches to group bullying such as 'no blame', can be useful in changing the behaviour of bullying pupils without confronting them directly, although other sanctions may be needed for those who continue with persistent bullying.

Work in the playground is important, too. One helpful step is to train lunchtime supervisors to distinguish bullying from playful fighting, and help them break up conflicts. Another possibility is to improve the playground environment, so that pupils are less likely to be led into bullying from boredom or frustration.

F   With these developments, schools can expect that at least the most serious kinds of bullying can largely be prevented. The more effort put in and the wider the whole school involvement, the more substantial the results are likely to be. The reduction in bullying - and the consequent improvement in pupil happiness - is surely a worthwhile objective.

Questions 31-34

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

Write the correct letter in boxes 31-34 on your answer sheet,

31 A recent survey found that in British secondary schools

    A   there was more bullying than had previously been the case.
    B   there was less bullying than in primary schools.
    C   cases of persistent bullying were very common.
    D   indirect forms of bullying were particularly difficult to deal with.

32 Children who are bullied

    A   are twice as likely to commit suicide as the average person.
    B   find it more difficult to relate to adults.
    C   are less likely to be violent in later life.
    D   may have difficulty forming relationships in later life.

33 The writer thinks that the declaration 'There is no bullying at this school'

    A   is no longer true in many schools.
    B   was not in fact made by many schools.
    C   reflected the school's lack of concern.
    D   reflected a lack of knowledge and resources.

34 What were the findings of research carried out in Norway?

    A   Bullying declined by 50% after an anti-bullying campaign.
    B   Twenty-one schools reduced bullying as a result of an anti-bullying campaign
    C   Two years is the optimum length for an anti-bullying campaign.
    D   Bullying is a less serious problem in Norway than in the UK.

Complete the summary below

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

Write your answers in boxes 35-39 on your answer sheet.

What steps should schools take to reduce bullying?

The most important step is for the school authorities to produce a **35** .... which makes the school's attitude towards bullying quite clear. It should include detailed **36** .... as to how the school and its staff will react if bullying occurs.

In addition, action can be taken through the **37** .... This is particularly useful in the early part of the process, as a way of raising awareness and encouraging discussion On its own, however, it is insufficient to bring about a permanent solution.

Effective work can also be done with individual pupils and small groups. For example, potential **38** .... of bullying can be trained to be more self-confident. Or again, in dealing with group bullying, a 'no blame' approach, which avoids confronting the offender too directly, is often effective.

Playground supervision will be more effective if members of staff are trained to recognise the difference between bullying and mere **39** ....

Question 40

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

Write the correct letter in box 40 on your answer sheet.

Which of the following is the most suitable title for Reading Passage 3?

    A   Bullying: what parents can do

    B   Bullying: are the media to blame?

    C   Bullying: the link with academic failure

    D   Bullying: from crisis management to prevention

READING PASSAGE 3

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

EDUCATING PSYCHE

Educating Psyche by Bernie Neville is a book which looks at radical new approaches to learning, describing the effects of emotion, imagination and the unconscious on learning. One theory discussed in the book is that proposed by George Lozanov, which focuses on the power of suggestion.

Lozanov's instructional technique is based on the evidence that the connections made in the brain through unconscious processing (which he calls non-specific mental reactivity) are more durable than those made through conscious processing. Besides the laboratory evidence for this, we know from our experience that we often remember what we have perceived peripherally, long after we have forgotten what we set out to learn. If we think of a book we studied months or years ago, we will find it easier to recall peripheral details – the colour, the binding, the typeface, the table at the library where we sat while studying it – than the content on which we were concentrating. If we think of a lecture we listened to with great concentration, we will recall the lecturer's appearance and mannerisms, our place in the auditorium, the failure of the air-conditioning, much more easily than the ideas we went to learn. Even if these peripheral details are a bit elusive, they come back readily in hypnosis or when we relive the event imaginatively, as in psychodrama. The details of the content of the lecture, on the other hand, seem to have gone forever.

This phenomenon can be partly attributed to the common counterproductive approach to study (making extreme efforts to memorise, tensing muscles, inducing fatigue), but it also simply reflects the way the brain functions. Lozanov therefore made indirect instruction (suggestion) central to his teaching system. In suggestopedia, as he called his method, consciousness is shifted away from the curriculum to focus on something peripheral. The curriculum then becomes peripheral and is dealt with by the reserve capacity of the brain.

The suggestopedic approach to foreign language learning provides a good illustration. In its most recent variant (1980), it consists of the reading of vocabulary and text while the class is listening to music. The first session is in two parts. In the first part, the music is classical (Mozart, Beethoven, Brahms) and the teacher reads the text slowly and solemnly, with attention to the dynamics of the music. The students follow the text in their books. This is followed by several minutes of silence. In the second part, they listen to baroque music (Bach, Corelli, Handel) while the teacher reads the text in a normal speaking voice. During this time they have their books closed. During the whole of this session, their attention is passive; they listen to the music but make no attempt to learn the material.

Beforehand, the students have been carefully prepared for the language learning experience. Through meeting with the staff and satisfied students they develop the expectation that learning will be easy and pleasant and that they will successfully learn

several hundred words of the foreign language during the class. In a preliminary talk, the teacher introduces them to the material to be covered, but does not 'teach' it. Likewise, the students are instructed not to try to learn it during this introduction.

Some hours after the two-part session, there is a follow-up class at which the students are stimulated to recall the material presented. Once again the approach is indirect. The students do not focus their attention on trying to remember the vocabulary, but focus on using the language to communicate (e.g. through games or improvised dramatisations). Such methods are not unusual in language teaching. What is distinctive in the suggestopedic method is that they are devoted entirely to assisting recall. The 'learning' of the material is assumed to be automatic and effortless, accomplished while listening to music. The teacher's task is to assist the students to apply what they have learned paraconsciously, and in doing so to make it easily accessible to consciousness. Another difference from conventional teaching is the evidence that students can regularly learn 1000 new words of a foreign language during a suggestopedic session, as well as grammar and idiom.

Lozanov experimented with teaching by direct suggestion during sleep, hypnosis and trance states, but found such procedures unnecessary. Hypnosis, yoga, Silva mind-control, religious ceremonies and faith healing are all associated with successful suggestion, but none of their techniques seem to be essential to it. Such rituals may be seen as placebos. Lozanov acknowledges that the ritual surrounding suggestion in his own system is also a placebo, but maintains that without such a placebo people are unable or afraid to tap the reserve capacity of their brains. Like any placebo, it must be dispensed with authority to be effective. Just as a doctor calls on the full power of autocratic suggestion by insisting that the patient take precisely this white capsule precisely three times a day before meals, Lozanov is categoric in insisting that the suggestopedic session be conducted exactly in the manner designated, by trained and accredited suggestopedic teachers.

While suggestopedia has gained some notoriety through success in the teaching of modern languages, few teachers are able to emulate the spectacular results of Lozanov and his associates. We can, perhaps, attribute mediocre results to an inadequate placebo effect. The students have not developed the appropriate mind set. They are often not motivated to learn through this method. They do not have enough 'faith'. They do not see it as 'real teaching', especially as it does not seem to involve the 'work' they have learned to believe is essential to learning.

Questions 27–30

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

Write the correct letter in boxes 27–30 on your answer sheet.

27   The book *Educating Psyche* is mainly concerned with

    A   the power of suggestion in learning.
    B   a particular technique for learning based on emotions.
    C   the effects of emotion on the imagination and the unconscious.
    D   ways of learning which are not traditional.

28   Lozanov's theory claims that, when we try to remember things,

    A   unimportant details are the easiest to recall.
    B   concentrating hard produces the best results.
    C   the most significant facts are most easily recalled.
    D   peripheral vision is not important.

29   In this passage, the author uses the examples of a book and a lecture to illustrate that

    A   both of these are important for developing concentration.
    B   his theory about methods of learning is valid.
    C   reading is a better technique for learning than listening.
    D   we can remember things more easily under hypnosis.

30   Lozanov claims that teachers should train students to

    A   memorise details of the curriculum.
    B   develop their own sets of indirect instructions.
    C   think about something other than the curriculum content.
    D   avoid overloading the capacity of the brain.

Questions 31–36

Do the following statements agree with the information given in Reading Passage 3?

In boxes 31–36 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*

31 In the example of suggestopedic teaching in the fourth paragraph, the only variable that changes is the music.

32 Prior to the suggestopedia class, students are made aware that the language experience will be demanding.

33 In the follow-up class, the teaching activities are similar to those used in conventional classes.

34 As an indirect benefit, students notice improvements in their memory.

35 Teachers say they prefer suggestopedia to traditional approaches to language teaching.

36 Students in a suggestopedia class retain more new vocabulary than those in ordinary classes.

Questions 37–40

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

Write the correct letter, *A–K*, in boxes 37–40 on your answer sheet.

Suggestopedia uses a less direct method of suggestion than other techniques such as hypnosis. However, Lozanov admits that a certain amount of **37** .... is necessary in order to convince students, even if this is just a **38** .... Furthermore, if the method is to succeed, teachers must follow a set procedure. Although Lozanov's method has become quite **39** .... , the results of most other teachers using this method have been **40** ....

A	spectacular	**B**	teaching	**C**	lesson
D	authoritarian	**E**	unpopular	**F**	ritual
G	unspectacular	**H**	placebo	**I**	involved
J	appropriate	**K**	well known		

TEST 10

READING PASSAGE 3

You should spend about 20 minutes on **Questions 27–40**, which are based on Reading Passage 3 on the following pages.

Questions 27–30

Reading Passage 3 has six sections, **A–F**.

Choose the correct heading for sections **B, C, E** and **F** from the list of headings below.

Write the correct number, **i–xi**, in boxes 27–30 on your answer sheet.

List of Headings
i   MIRTP as a future model
ii   Identifying the main transport problems
iii   Preference for motorised vehicles
iv   Government authorities' instructions
v   Initial improvements in mobility and transport modes
vi   Request for improved transport in Makete
vii   Transport improvements in the northern part of the district
viii Improvements in the rail network
ix   Effects of initial MIRTP measures
x   Co-operation of district officials
xi   Role of wheelbarrows and donkeys

Example	Answer
Section A	**vi**

27   Section **B**

28   Section **C**

Example	Answer
Section D	**ix**

29   Section **E**

30   Section **F**

Makete Integrated Rural Transport Project

Section A

The disappointing results of many conventional road transport projects in Africa led some experts to rethink the strategy by which rural transport problems were to be tackled at the beginning of the 1980s. A request for help in improving the availability of transport within the remote Makete District of south-western Tanzania presented the opportunity to try a new approach.

The concept of 'integrated rural transport' was adopted in the task of examining the transport needs of the rural households in the district. The objective was to reduce the time and effort needed to obtain access to essential goods and services through an improved rural transport system. The underlying assumption was that the time saved would be used instead for activities that would improve the social and economic development of the communities. The Makete Integrated Rural Transport Project (MIRTP) started in 1985 with financial support from the Swiss Development Corporation and was co-ordinated with the help of the Tanzanian government.

Section B

When the project began, Makete District was virtually totally isolated during the rainy season. The regional road was in such bad shape that access to the main towns was impossible for about three months of the year. Road traffic was extremely rare within the district, and alternative means of transport were restricted to donkeys in the north of the district. People relied primarily on the paths, which were slippery and dangerous during the rains.

Before solutions could be proposed, the problems had to be understood. Little was known about the transport demands of the rural households, so Phase I, between December 1985 and December 1987, focused on research. The socio-economic survey of more than 400 households in the district indicated that a household in Makete spent, on average, seven hours a day on transporting themselves and their goods, a figure which seemed extreme but which has also been obtained in surveys in other rural areas in Africa. Interesting facts regarding transport were found: 95% was on foot; 80% was within the locality; and 70% was related to the collection of water and firewood and travelling to grinding mills.

Section C

Having determined the main transport needs, possible solutions were identified which might reduce the time and burden. During Phase II, from January to February 1991, a number of approaches were implemented in an effort to improve mobility and access to transport.

An improvement of the road network was considered necessary to ensure the import and export of goods to the district. These improvements were carried out using methods that were heavily dependent on labour. In addition to the improvement of roads, these methods provided training in the operation of a mechanical workshop and bus and truck services. However, the difference from the conventional approach was that this time consideration was given to local transport needs outside the road network.

Most goods were transported along the paths that provide short-cuts up and down the hillsides, but the paths were a real safety risk and made the journey on foot even more arduous. It made sense to improve the paths by building steps, handrails and footbridges.

It was uncommon to find means of transport that were more efficient than walking but less technologically advanced than motor vehicles. The use of bicycles was constrained by their high cost and the lack of available spare parts. Oxen were not used at all but donkeys were used by a few households in the northern part of the district. MIRTP focused on what would be most appropriate for the inhabitants of Makete in terms of what was available, how much they could afford and what they were willing to accept.

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After careful consideration, the project chose the promotion of donkeys – a donkey costs less than a bicycle – and the introduction of a locally manufacturable wheelbarrow.

Section D
At the end of Phase II, it was clear that the selected approaches to Makete's transport problems had had different degrees of success. Phase III, from March 1991 to March 1993, focused on the refinement and institutionalisation of these activities.

The road improvements and accompanying maintenance system had helped make the district centre accessible throughout the year. Essential goods from outside the district had become more readily available at the market, and prices did not fluctuate as much as they had done before.

Paths and secondary roads were improved only at the request of communities who were willing to participate in construction and maintenance. However, the improved paths impressed the inhabitants, and requests for assistance greatly increased soon after only a few improvements had been completed.

The efforts to improve the efficiency of the existing transport services were not very successful because most of the motorised vehicles in the district broke down and there were no resources to repair them. Even the introduction of low-cost means of transport was difficult because of the general poverty of the district. The locally manufactured wheelbarrows were still too expensive for all but a few of the households. Modifications to the original design by local carpenters cut production time and costs. Other local carpenters have been trained in the new design so that they can respond to requests. Nevertheless, a locally produced wooden wheelbarrow which costs around 5000 Tanzanian shillings (less than US$20) in Makete, and is about one quarter the cost of a metal wheelbarrow, is still too expensive for most people.

Donkeys, which were imported to the district, have become more common and contribute, in particular, to the transportation of crops and goods to market. Those who have bought donkeys are mainly from richer households but, with an increased supply through local breeding, donkeys should become more affordable. Meanwhile, local initiatives are promoting the renting out of the existing donkeys.

It should be noted, however, that a donkey, which at 20,000 Tanzanian shillings costs less than a bicycle, is still an investment equal to an average household's income over half a year. This clearly illustrates the need for supplementary measures if one wants to assist the rural poor.

Section E
It would have been easy to criticise the MIRTP for using in the early phases a 'top-down' approach, in which decisions were made by experts and officials before being handed down to communities, but it was necessary to start the process from the level of the governmental authorities of the district. It would have been difficult to respond to the requests of villagers and other rural inhabitants without the support and understanding of district authorities.

Section F
Today, nobody in the district argues about the importance of improved paths and inexpensive means of transport. But this is the result of dedicated work over a long period, particularly from the officers in charge of community development. They played an essential role in raising awareness and interest among the rural communities.

The concept of integrated rural transport is now well established in Tanzania, where a major program of rural transport is just about to start. The experiences from Makete will help in this initiative, and Makete District will act as a reference for future work.

Questions 31–35

Do the following statements agree with the claims of the writer in Reading Passage 3?

In boxes 31–35 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*

31 MIRTP was divided into five phases.

32 Prior to the start of MIRTP the Makete district was almost inaccessible during the rainy season.

33 Phase I of MIRTP consisted of a survey of household expenditure on transport.

34 The survey concluded that one-fifth or 20% of the household transport requirement as outside the local area.

35 MIRTP hoped to improve the movement of goods from Makete district to the country's capital.

Questions 36–39

Complete each sentence with the correct ending, A–J, below.

Write the correct letter, A–J, in boxes 36–39 on your answer sheet.

36 Construction of footbridges, steps and handrails

37 Frequent breakdown of buses and trucks in Makete

38 The improvement of secondary roads and paths

39 The isolation of Makete for part of the year

A	provided the people of Makete with experience in running bus and truck services.
B	was especially successful in the northern part of the district.
C	differed from earlier phases in that the community became less actively involved.
D	improved paths used for transport up and down hillsides.
E	was no longer a problem once the roads had been improved.
F	cost less than locally made wheelbarrows.
G	was done only at the request of local people who were willing to lend a hand.
H	was at first considered by MIRTP to be affordable for the people of the district.
I	hindered attempts to make the existing transport services more efficient.
J	was thought to be the most important objective of Phase III.

Question 40

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

Write the correct letter in box 40 on your answer sheet.

Which of the following phrases best describes the main aim of Reading Passage 3?

    A   to suggest that projects such as MIRTP are needed in other countries

    B   to describe how MIRTP was implemented and how successful it was

    C   to examine how MIRTP promoted the use of donkeys

    D   to warn that projects such as MIRTP are likely to have serious problems

TEST 11

READING PASSAGE 3

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

Forests are one of the main elements of our natural heritage. The decline of Europe's forests over the last decade and a half has led to an increasing awareness and understanding of the serious imbalances which threaten them. European countries are becoming increasingly concerned by major threats to European forests, threats which know no frontiers other than those of geography or climate: air pollution, soil deterioration, the increasing number of forest fires and sometimes even the mismanagement of our woodland and forest heritage. There has been a growing awareness of the need for countries to get together to co-ordinate their policies. In December 1990, Strasbourg hosted the first Ministerial Conference on the protection of Europe's forests. The conference brought together 31 countries from both Western and Eastern Europe. The topics discussed included the co-ordinated study of the destruction of forests, as well as how to combat forest fires and the extension of European research programs on the forest ecosystem. The preparatory work for the conference had been undertaken at two meetings of experts. Their initial task was to decide which of the many forest problems of concern to Europe involved the largest number of countries and might be the subject of joint action. Those confined to particular geographical areas, such as countries bordering the Mediterranean or the Nordic countries therefore had to be discarded. However, this does not mean that in future they will be ignored.

As a whole, European countries see forests as performing a triple function: biological, economic and recreational. The first is to act as a 'green lung' for our planet; by means of photosynthesis, forests produce oxygen through the transformation of solar energy, thus fulfilling what for humans is the essential role of an immense, non-polluting power plant. At the same time, forests provide raw materials for human activities through their constantly renewed production of wood. Finally, they offer those condemned to spend five days a week in an urban environment an unrivalled area of freedom to unwind and take part in a range of leisure activities, such as hunting, riding and hiking. The economic importance of forests has been understood since the dawn of man – wood was the first fuel. The other aspects have been recognised only for a few centuries but they are becoming more and more important. Hence, there is a real concern throughout Europe about the damage to the forest environment which threatens these three basic roles.

The myth of the 'natural' forest has survived, yet there are effectively no remaining 'primary' forests in Europe. All European forests are artificial, having been adapted and exploited by man for thousands of years. This means that a forest policy is vital, that it must transcend national frontiers and generations of people, and that it must allow for the inevitable changes that take place in the forests, in needs, and hence in policy. The Strasbourg conference was one of the first events on such a scale to reach this conclusion. A general declaration was made that 'a central place in any ecologically coherent forest policy must be given to continuity over time and to the possible effects of unforeseen events, to ensure that the full potential of these forests is maintained'.

That general declaration was accompanied by six detailed resolutions to assist national policy-making. The first proposes the extension and systematisation of surveillance sites to monitor forest decline. Forest decline is still poorly understood but leads to the loss of a high proportion of a tree's needles or leaves. The entire continent and the majority of species are now affected: between 30% and 50% of the tree population. The condition appears to result from the cumulative effect of a number of factors, with atmospheric pollutants the principal culprits. Compounds of nitrogen and sulphur dioxide should be particularly closely watched. However, their effects are probably accentuated by climatic factors, such as drought and hard winters, or soil imbalances such as soil acidification, which damages the roots. The second resolution concentrates on the need to preserve the genetic diversity of European forests. The aim is to reverse the decline in the number of tree species or at least to preserve the 'genetic material' of all of them. Although forest fires do not affect all of Europe to the same extent, the amount of damage caused the experts to propose as the third resolution that the Strasbourg conference consider the establishment of a European databank on the subject. All information used in the development of national preventative policies would become generally available. The subject of the fourth resolution discussed by the ministers was mountain forests. In Europe, it is undoubtedly the mountain ecosystem which has changed most rapidly and is most at risk. A thinly scattered permanent population and development of leisure activities, particularly skiing, have resulted in significant long-term changes to the local ecosystems. Proposed developments include a preferential research program on mountain forests. The fifth resolution relaunched the European research network on the physiology of trees, called Eurosilva. Eurosilva should support joint European research on tree diseases and their physiological and biochemical aspects. Each country concerned could increase the number of scholarships and other financial support for doctoral theses and research projects in this area. Finally, the conference established the framework for a European research network on forest ecosystems. This would also involve harmonising activities in individual countries as well as identifying a number of priority research topics relating to the protection of forests. The Strasbourg conference's main concern was to provide for the future. This was the initial motivation, one now shared by all 31 participants representing 31 European countries. Their final text commits them to on-going discussion between government representatives with responsibility for forests.

Questions 27–33

Do the following statements agree with the information given in Reading Passage 3?

In boxes 27–33 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 Forest problems of Mediterranean countries are to be discussed at the next meeting of experts.

28 Problems in Nordic countries were excluded because they are outside the European Economic Community.

29 Forests are a renewable source of raw material.

30 The biological functions of forests were recognised only in the twentieth century.

31 Natural forests still exist in parts of Europe.

32 Forest policy should be limited by national boundaries.

33 The Strasbourg conference decided that a forest policy must allow for the possibility of change.

Questions 34–39

Look at the following statements issued by the conference.

*Which six of the following statements, **A–J**, refer to the resolutions that were issued?*

Match the statements with the appropriate resolutions (Questions 34–39).

*Write the correct letter, **A–J**, in boxes 34–39 on your answer sheet.*

A	All kinds of species of trees should be preserved.
B	Fragile mountain forests should be given priority in research programs.
C	The surviving natural forests of Europe do not need priority treatment.
D	Research is to be better co-ordinated throughout Europe.
E	Information on forest fires should be collected and shared.
F	Loss of leaves from trees should be more extensively and carefully monitored.
G	Resources should be allocated to research into tree diseases.
H	Skiing should be encouraged in thinly populated areas.
I	Soil imbalances such as acidification should be treated with compounds of nitrogen and sulphur.
J	Information is to be systematically gathered on any decline in the condition of forests.

34   Resolution 1

35   Resolution 2

36   Resolution 3

37   Resolution 4

38   Resolution 5

39   Resolution 6

Question 40

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

Write the correct letter in box 40 on your answer sheet.

40   What is the best title for Reading Passage 3?

    A   The biological, economic and recreational role of forests

    B   Plans to protect the forests of Europe

    C   The priority of European research into ecosystems

    D   Proposals for a world-wide policy on forest management

READING PASSAGE 3

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

EFFECTS OF NOISE

In general, it is plausible to suppose that we should prefer peace and quiet to noise. And yet most of us have had the experience of having to adjust to sleeping in the mountains or the countryside because it was initially 'too quiet', an experience that suggests that humans are capable of adapting to a wide range of noise levels. Research supports this view. For example, Glass and Singer (1972) exposed people to short bursts of very loud noise and then measured their ability to work out problems and their physiological reactions to the noise. The noise was quite disruptive at first, but after about four minutes the subjects were doing just as well on their tasks as control subjects who were not exposed to noise. Their physiological arousal also declined quickly to the same levels as those of the control subjects.

But there are limits to adaptation and loud noise becomes more troublesome if the person is required to concentrate on more than one task. For example, high noise levels interfered with the performance of subjects who were required to monitor three dials at a time, a task not unlike that of an aeroplane pilot or an air-traffic controller (Broadbent, 1957). Similarly, noise did not affect a subject's ability to track a moving line with a steering wheel, but it did interfere with the subject's ability to repeat numbers while tracking (Finkelman and Glass, 1970).

Probably the most significant finding from research on noise is that its predictability is more important than how loud it is. We are much more able to 'tune out' chronic background noise, even if it is quite loud, than to work under circumstances with unexpected intrusions of noise. In the Glass and Singer study, in which subjects were exposed to bursts of noise as they worked on a task, some subjects heard loud bursts and others heard soft bursts. For some subjects, the bursts were spaced exactly one minute apart (predictable noise); others heard the same amount of noise overall, but the bursts

	Unpredictable Noise	Predictable Noise	Average
Loud noise	40.1	31.8	35.9
Soft noise	36.7	27.4	32.1
Average	38.4	29.6	

Table 1: *Proofreading Errors and Noise*

occurred at random intervals (unpredictable noise). Subjects reported finding the predictable and unpredictable noise equally annoying, and all subjects performed at about the same level during the noise portion of the experiment. But the different noise conditions had quite different after-effects when the subjects were required to proofread written material under conditions of no noise. As shown in Table 1 the unpredictable noise produced more errors in the later proofreading task than predictable noise; and soft, unpredictable noise actually produced slightly more errors on this task than the loud, predictable noise.

Apparently, unpredictable noise produces more fatigue than predictable noise, but it takes a while for this fatigue to take its toll on performance.

Predictability is not the only variable that reduces or eliminates the negative effects of noise. Another is control. If the individual knows that he or she can control the noise, this seems to eliminate both its negative effects at the time and its after-effects. This is true even if the individual never actually exercises his or her option to turn the noise off (Glass and Singer, 1972). Just the knowledge that one has control is sufficient.

The studies discussed so far exposed people to noise for only short periods and only transient effects were studied. But the major worry about noisy environments is that living day after day with chronic noise may produce serious, lasting effects. One study, suggesting that this worry is a realistic one, compared elementary school pupils who attended schools near Los Angeles's busiest airport with students who attended schools in quiet neighbourhoods (Cohen et al., 1980). It was found that children from the noisy schools had higher blood pressure and were more easily distracted than those who attended the quiet schools. Moreover, there was no evidence of adaptability to the noise. In fact, the longer the children had attended the noisy schools, the more distractible they became. The effects also seem to be long lasting. A follow-up study showed that children who were moved to less noisy classrooms still showed greater distractibility one year later than students who had always been in the quiet schools (Cohen et al, 1981). It should be noted that the two groups of children had been carefully matched by the investigators so that they were comparable in age, ethnicity, race, and social class.

Questions 27–29

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

Write the correct letter in boxes 27–29 on your answer sheet.

27   The writer suggests that people may have difficulty sleeping in the mountains because

   A   humans do not prefer peace and quiet to noise.
   B   they may be exposed to short bursts of very strange sounds.
   C   humans prefer to hear a certain amount of noise while they sleep.
   D   they may have adapted to a higher noise level in the city.

28   In noise experiments, Glass and Singer found that

   A   problem-solving is much easier under quiet conditions.
   B   physiological arousal prevents the ability to work.
   C   bursts of noise do not seriously disrupt problem-solving in the long term.
   D   the physiological arousal of control subjects declined quickly.

29   Researchers discovered that high noise levels are not likely to interfere with the

   A   successful performance of a single task.
   B   tasks of pilots or air traffic controllers.
   C   ability to repeat numbers while tracking moving lines.
   D   ability to monitor three dials at once.

Questions 30–34

Complete the summary using the list of words and phrases, A–J, below.

Write the correct letter, A–J, in boxes 30–34 on your answer sheet.

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

Glass and Singer (1972) showed that situations in which there is intense noise have less effect on performance than circumstances in which 30 .... noise occurs. Subjects were divided into groups to perform a task. Some heard loud bursts of noise, others soft. For some subjects, the noise was predictable, while for others its occurrence was random. All groups were exposed to 31 .... noise. The predictable noise group 32 .... the unpredictable noise group on this task.

In the second part of the experiment, the four groups were given a proofreading task to complete under conditions of no noise. They were required to check written material for errors. The group which had been exposed to unpredictable noise 33 .... the group which had been exposed to predictable noise. The group which had been exposed to loud predictable noise performed better than those who had heard soft, unpredictable bursts. The results suggest that 34 .... noise produces fatigue but that this manifests itself later.

A	no control over
B	unexpected
C	intense
D	the same amount of
E	performed better than
F	performed at about the same level as
G	no
H	showed more irritation than
I	made more mistakes than
J	different types of

Questions 35–40

Look at the following statements (Questions 35–40) and the list of researchers below.

Match each statement with the correct researcher(s), A–E.

Write the correct letter, A–E, in boxes 35–40 on your answer sheet.

NB You may use any letter more than once.

35 Subjects exposed to noise find it difficult at first to concentrate on problem-solving tasks.

36 Long-term exposure to noise can produce changes in behaviour which can still be observed a year later.

37 The problems associated with exposure to noise do not arise if the subject knows they can make it stop.

38 Exposure to high-pitched noise results in more errors than exposure to low-pitched noise.

39 Subjects find it difficult to perform three tasks at the same time when exposed to noise.

40 Noise affects a subject's capacity to repeat numbers while carrying out another task.

	List of Researchers
A	Glass and Singer
B	Broadbent
C	Finkelman and Glass
D	Cohen et al.
E	None of the above

READING PASSAGE 3

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

TELEPATHY

Can human beings communicate by thought alone? For more than a century the issue of telepathy has divided the scientific community, and even today it still sparks bitter controversy among top academics

Since the 1970s, parapsychologists at leading universities and research institutes around the world have risked the derision of sceptical colleagues by putting the various claims for telepathy to the test in dozens of rigorous scientific studies. The results and their implications are dividing even the researchers who uncovered them.

Some researchers say the results constitute compelling evidence that telepathy is genuine. Other parapsychologists believe the field is on the brink of collapse, having tried to produce definitive scientific proof and failed. Sceptics and advocates alike do concur on one issue, however: that the most impressive evidence so far has come from the so-called 'ganzfeld' experiments, a German term that means 'whole field'. Reports of telepathic experiences had by people during meditation led parapsychologists to suspect that telepathy might involve 'signals' passing between people that were so faint that they were usually swamped by normal brain activity. In this case, such signals might be more easily detected by those experiencing meditation-like tranquillity in a relaxing 'whole field' of light, sound and warmth.

The ganzfeld experiment tries to recreate these conditions with participants sitting in soft reclining chairs in a sealed room, listening to relaxing sounds while their eyes are covered with special filters letting in only soft pink light. In early ganzfeld experiments, the telepathy test involved identification of a picture chosen from a random selection of four taken from a large image bank. The idea was that a person acting as a 'sender' would attempt to beam the image over to the 'receiver' relaxing in the sealed room. Once the session was over, this person was asked to identify which of the four images had been used. Random guessing would give a hit-rate of 25 per cent; if telepathy is real, however, the hit-rate would be higher. In 1982, the results from the first ganzfeld studies were analysed by one of its pioneers, the American parapsychologist Charles Honorton. They pointed to typical hit-rates of better than 30 per cent – a small effect, but one which statistical tests suggested could not be put down to chance.

The implication was that the ganzfeld method had revealed real evidence for telepathy. But there was a crucial flaw in this argument – one routinely overlooked in more conventional areas of science. Just because chance had been ruled out as an explanation did not prove telepathy must exist; there were many other ways of getting positive

results. These ranged from 'sensory leakage' – where clues about the pictures accidentally reach the receiver – to outright fraud. In response, the researchers issued a review of all the ganzfeld studies done up to 1985 to show that 80 per cent had found statistically significant evidence. However, they also agreed that there were still too many problems in the experiments which could lead to positive results, and they drew up a list demanding new standards for future research.

After this, many researchers switched to autoganzfeld tests – an automated variant of the technique which used computers to perform many of the key tasks such as the random selection of images. By minimising human involvement, the idea was to minimise the risk of flawed results. In 1987, results from hundreds of autoganzfeld tests were studied by Honorton in a 'meta-analysis', a statistical technique for finding the overall results from a set of studies. Though less compelling than before, the outcome was still impressive.

Yet some parapsychologists remain disturbed by the lack of consistency between individual ganzfeld studies. Defenders of telepathy point out that demanding impressive evidence from every study ignores one basic statistical fact: it takes large samples to detect small effects. If, as current results suggest, telepathy produces hit-rates only marginally above the 25 per cent expected by chance, it's unlikely to be detected by a typical ganzfeld study involving around 40 people: the group is just not big enough. Only when many studies are combined in a meta-analysis will the faint signal of telepathy really become apparent. And that is what researchers do seem to be finding.

What they are certainly not finding, however, is any change in attitude of mainstream scientists: most still totally reject the very idea of telepathy. The problem stems at least in part from the lack of any plausible mechanism for telepathy.

Various theories have been put forward, many focusing on esoteric ideas from theoretical physics. They include 'quantum entanglement', in which events affecting one group of atoms instantly affect another group, no matter how far apart they may be. While physicists have demonstrated entanglement with specially prepared atoms, no-one knows if it also exists between atoms making up human minds. Answering such questions would transform parapsychology. This has prompted some researchers to argue that the future lies not in collecting more evidence for telepathy, but in probing possible mechanisms. Some work has begun already, with researchers trying to identify people who are particularly successful in autoganzfeld trials. Early results show that creative and artistic people do much better than average: in one study at the University of Edinburgh, musicians achieved a hit-rate of 56 per cent. Perhaps more tests like these will eventually give the researchers the evidence they are seeking and strengthen the case for the existence of telepathy.

Questions 27–30

Complete each sentence with the correct ending, *A–G*, below.

Write the correct letter, *A–G*, in boxes 27–30 on your answer sheet.

27 Researchers with differing attitudes towards telepathy agree on

28 Reports of experiences during meditation indicated

29 Attitudes to parapsychology would alter drastically with

30 Recent autoganzfeld trials suggest that success rates will improve with

A	the discovery of a mechanism for telepathy.
B	the need to create a suitable environment for telepathy.
C	their claims of a high success rate.
D	a solution to the problem posed by random guessing.
E	the significance of the ganzfeld experiments.
F	a more careful selection of subjects.
G	a need to keep altering conditions.

Questions 31–40

Complete the table below.

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

Write your answers in boxes 31–40 on your answer sheet.

Telepathy Experiments			
Name/Date	**Description**	**Result**	**Flaw**
Ganzfeld studies 1982	Involved a person acting as a **31** ...., who picked out one **32** .... from a random selection of four, and a **33** .... , who then tried to identify it.	Hit-rates were higher than with random guessing.	Positive results could be produced by factors such as **34** .... or **35** ....
Autoganzfeld studies 1987	**36** .... were used for key tasks to limit the amount of **37** .... in carrying out the tests.	The results were then subjected to a **38**	The **39** .... between different test results was put down to the fact that sample groups were not **40** .... (as with most ganzfeld studies).

TEST 14

READING PASSAGE 3

*You should spend about 20 minutes on **Questions 27–40**, which are based on Reading Passage 3 on the following pages.*

Questions 27–32

Reading Passage 3 has six paragraphs, **A–F**.

Choose the correct heading for each paragraph from the list of headings below.

*Write the correct number, **i–viii**, in boxes 27–32 on your answer sheet.*

List of Headings
i The difficulties of talking about smells
ii The role of smell in personal relationships
iii Future studies into smell
iv The relationship between the brain and the nose
v The interpretation of smells as a factor in defining groups
vi Why our sense of smell is not appreciated
vii Smell is our superior sense
viii The relationship between smell and feelings

27 Paragraph **A**

28 Paragraph **B**

29 Paragraph **C**

30 Paragraph **D**

31 Paragraph **E**

32 Paragraph **F**

The meaning and power of smell

The sense of smell, or olfaction, is powerful. Odours affect us on a physical, psychological and social level. For the most part, however, we breathe in the aromas which surround us without being consciously aware of their importance to us. It is only when the faculty of smell is impaired for some reason that we begin to realise the essential role the sense of smell plays in our sense of well-being

A   A survey conducted by Anthony Synott at Montreal's Concordia University asked participants to comment on how important smell was to them in their lives. It became apparent that smell can evoke strong emotional responses. A scent associated with a good experience can bring a rush of joy, while a foul odour or one associated with a bad memory may make us grimace with disgust. Respondents to the survey noted that many of their olfactory likes and dislikes were based on emotional associations. Such associations can be powerful enough so that odours that we would generally label unpleasant become agreeable, and those that we would generally consider fragrant become disagreeable for particular individuals. The perception of smell, therefore, consists not only of the sensation of the odours themselves, but of the experiences and emotions associated with them.

B   Odours are also essential cues in social bonding. One respondent to the survey believed that there is no true emotional bonding without touching and smelling a loved one. In fact, infants recognise the odours of their mothers soon after birth and adults can often identify their children or spouses by scent. In one well-known test, women and men were able to distinguish by smell alone clothing worn by their marriage partners from similar clothing worn by other people. Most of the subjects would probably never have given much thought to odour as a cue for identifying family members before being involved in the test, but as the experiment revealed, even when not consciously considered, smells register.

C   In spite of its importance to our emotional and sensory lives, smell is probably the most undervalued sense in many cultures. The reason often given for the low regard in which smell is held is that, in comparison with its importance among animals, the human sense of smell is feeble and undeveloped. While it is true that the olfactory powers of humans are nothing like as fine as those possessed by certain animals, they are still remarkably acute. Our noses are able to recognise thousands of smells, and to perceive odours which are present only in extremely small quantities.

D   Smell, however, is a highly elusive phenomenon. Odours, unlike colours, for instance, cannot be named in many languages because the specific vocabulary simply doesn't exist. 'It smells like . . . ,' we have to say when describing an odour, struggling to express our olfactory experience. Nor can odours be recorded: there is no effective way to either capture or store them over time. In the realm of olfaction, we must make do with descriptions and recollections. This has implications for olfactory research.

E   Most of the research on smell undertaken to date has been of a physical scientific nature. Significant advances have been made in the understanding of the biological and chemical nature of olfaction, but many fundamental questions have yet to be answered. Researchers have still to decide whether smell is one sense or two – one responding to odours proper and the other registering odourless chemicals in the air. Other unanswered questions are whether the nose is the only part of the body affected by odours, and how smells can be measured objectively given the non-physical components. Questions like these mean that interest in the psychology of smell is inevitably set to play an increasingly important role for researchers.

F   However, smell is not simply a biological and psychological phenomenon. Smell is cultural, hence it is a social and historical phenomenon. Odours are invested with cultural values: smells that are considered to be offensive in some cultures may be perfectly acceptable in others. Therefore, our sense of smell is a means of, and model for, interacting with the world. Different smells can provide us with intimate and emotionally charged experiences and the value that we attach to these experiences is interiorised by the members of society in a deeply personal way. Importantly, our commonly held feelings about smells can help distinguish us from other cultures. The study of the cultural history of smell is, therefore, in a very real sense, an investigation into the essence of human culture.

Questions 33–36

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

Write the correct letter in boxes 33–36 on your answer sheet.

33   According to the introduction, we become aware of the importance of smell when

    A   we discover a new smell.
    B   we experience a powerful smell.
    C   our ability to smell is damaged.
    D   we are surrounded by odours.

34   The experiment described in paragraph B

    A   shows how we make use of smell without realising it.
    B   demonstrates that family members have a similar smell.
    C   proves that a sense of smell is learnt.
    D   compares the sense of smell in males and females.

35 What is the writer doing in paragraph C?

    A supporting other research

    B making a proposal

    C rejecting a common belief

    D describing limitations

36 What does the writer suggest about the study of smell in the atmosphere in paragraph E?

    A The measurement of smell is becoming more accurate.

    B Researchers believe smell is a purely physical reaction.

    C Most smells are inoffensive.

    D Smell is yet to be defined.

Questions 37–40

Complete the sentences below.

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

Write your answers in boxes 37–40 on your answer sheet.

37 Tests have shown that odours can help people recognise the .... belonging to their husbands and wives.

38 Certain linguistic groups may have difficulty describing smell because they lack the appropriate ....

39 The sense of smell may involve response to .... which do not smell, in addition to obvious odours.

40 Odours regarded as unpleasant in certain .... are not regarded as unpleasant in others.

TEST 15

READING PASSAGE 3

You should spend about 20 minutes on **Questions 27–40**, which are based on Reading Passage 3 on the following pages.

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.

Write the correct number, *i–x*, in boxes 27–32 on your answer sheet.

List of Headings

i	The biological clock
ii	Why dying is beneficial
iii	The ageing process of men and women
iv	Prolonging your life
v	Limitations of life span
vi	Modes of development of different species
vii	A stable life span despite improvements
viii	Energy consumption
ix	Fundamental differences in ageing of objects and organisms
x	Repair of genetic material

Example	*Answer*
Paragraph **A**	**v**

---

27 Paragraph **B**

28 Paragraph **C**

29 Paragraph **D**

30 Paragraph **E**

31 Paragraph **F**

32 Paragraph **G**

HOW DOES THE BIOLOGICAL CLOCK TICK?

A Our life span is restricted. Everyone accepts this as 'biologically' obvious. 'Nothing lives for ever!' However, in this statement we think of artificially produced, technical objects, products which are subjected to natural wear and tear during use. This leads to the result that at some time or other the object stops working and is unusable ('death' in the biological sense). But are the wear and tear and loss of function of technical objects and the death of living organisms really similar or comparable?

B Our 'dead' products are 'static', closed systems. It is always the basic material which constitutes the object and which, in the natural course of things, is worn down and becomes 'older'. Ageing in this case must occur according to the laws of physical chemistry and of thermodynamics. Although the same law holds for a living organism, the result of this law is not inexorable in the same way. At least as long as a biological system has the ability to renew itself it could actually become older without ageing; an organism is an open, dynamic system through which new material continuously flows. Destruction of old material and formation of new material are thus in permanent dynamic equilibrium. The material of which the organism is formed changes continuously. Thus our bodies continuously exchange old substance for new, just like a spring which more or less maintains its form and movement, but in which the water molecules are always different.

C Thus ageing and death should not be seen as inevitable, particularly as the organism possesses many mechanisms for repair. It is not, in principle, necessary for a biological system to age and die. Nevertheless, a restricted life span, ageing, and then death are basic characteristics of life. The reason for this is easy to recognise: in nature, the existent organisms either adapt or are regularly replaced by new types. Because of changes in the genetic material (mutations) these have new characteristics and in the course of their individual lives they are tested for optimal or better adaptation to the environmental conditions. Immortality would disturb this system – it needs room for new and better life. This is the basic problem of evolution.

D Every organism has a life span which is highly characteristic. There are striking differences in life span between different species, but within one species the parameter is relatively constant. For example, the average duration of human life has hardly changed in thousands of years. Although more and more people attain an advanced age as a result of developments in medical care and better nutrition, the characteristic upper limit for most remains 80 years. A further argument against the simple wear and tear theory is the observation that the time within which organisms age lies between a few days (even a few hours for unicellular organisms) and several thousand years, as with mammoth trees.

E If a life span is a genetically determined biological characteristic, it is logically necessary to propose the existence of an internal clock, which in some way measures and controls the ageing process and which finally determines death as the last step in a fixed programme. Like the life span, the metabolic rate has for different organisms a fixed mathematical relationship to the body mass. In comparison to the life span this relationship is 'inverted': the larger the organism the lower its metabolic rate. Again this relationship is valid not only for birds, but also, similarly on average within the systematic unit, for all other organisms (plants, animals, unicellular organisms).

F Animals which behave 'frugally' with energy become particularly old, for example, crocodiles and tortoises. Parrots and birds of prey are often held chained up. Thus they are not able to 'experience life' and so they attain a high life span in captivity. Animals which save energy by hibernation or lethargy (e.g. bats or hedgehogs) live much longer than those which are always active. The metabolic rate of mice can be reduced by a very low consumption of food (hunger diet). They then may live twice as long as their well fed comrades. Women become distinctly (about 10 per cent) older than men. If you examine the metabolic rates of the two sexes you establish that the higher male metabolic rate roughly accounts for the lower male life span. That means that they live life 'energetically' – more intensively, but not for as long.

G It follows from the above that sparing use of energy reserves should tend to extend life. Extreme high performance sports may lead to optimal cardiovascular performance, but they quite certainly do not prolong life. Relaxation lowers metabolic rate, as does adequate sleep and in general an equable and balanced personality. Each of us can develop his or her own 'energy saving programme' with a little self-observation, critical self-control and, above all, logical consistency. Experience will show that to live in this way not only increases the life span but is also very healthy. This final aspect should not be forgotten.

Questions 33–36

Complete the notes below.

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

Write your answers in boxes 33–36 on your answer sheet.

- Objects age in accordance with principles of **33** .... and of **34** ....

- Through mutations, organisms can **35** .... better to the environment

- **36** .... would pose a serious problem for the theory of evolution

Questions 37–40

Do the following statements agree with the views of the writer in Reading Passage 3?

In boxes 37–40 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*

37   The wear and tear theory applies to both artificial objects and biological systems.

38   In principle, it is possible for a biological system to become older without ageing.

39   Within seven years, about 90 per cent of a human body is replaced as new.

40   Conserving energy may help to extend a human's life.

READING PASSAGE 3

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

Collecting Ant Specimens

Collecting ants can be as simple as picking up stray ones and placing them in a glass jar, or as complicated as completing an exhaustive survey of all species present in an area and estimating their relative abundances. The exact method used will depend on the final purpose of the collections. For taxonomy, or classification, long series, from a single nest, which contain all castes (workers, including majors and minors, and, if present, queens and males) are desirable, to allow the determination of variation within species. For ecological studies, the most important factor is collecting identifiable samples of as many of the different species present as possible. Unfortunately, these methods are not always compatible. The taxonomist sometimes overlooks whole species in favour of those groups currently under study, while the ecologist often collects only a limited number of specimens of each species, thus reducing their value for taxonomic investigations.

To collect as wide a range of species as possible, several methods must be used. These include hand collecting, using baits to attract the ants, ground litter sampling, and the use of pitfall traps. Hand collecting consists of searching for ants everywhere they are likely to occur. This includes on the ground, under rocks, logs or other objects on the ground, in rotten wood on the ground or on trees, in vegetation, on tree trunks and under bark. When possible, collections should be made from nests or foraging columns and at least 20 to 25 individuals collected. This will ensure that all individuals are of the same species, and so increase their value for detailed studies. Since some species are largely nocturnal, collecting should not be confined to daytime. Specimens are collected using an aspirator (often called a pooter), forceps, a fine, moistened paint brush, or fingers, if the ants are known not to sting. Individual insects are placed in plastic or glass tubes (1.5-3.0 ml capacity for small ants, 5-8 ml for larger ants) containing 75% to 95% ethanol. Plastic tubes with secure tops are better than glass because they are lighter, and do not break as easily if mishandled.

Baits can be used to attract and concentrate foragers. This often increases the number of individuals collected and attracts species that are otherwise elusive. Sugars and meats or oils will attract different species and a range should be utilised. These baits can be placed either on the ground or on the trunks of trees or large shrubs. When placed on the ground, baits should be situated on small paper cards or other flat, light-coloured surfaces, or in test-tubes or vials. This makes it easier to spot ants and to capture them before they can escape into the surrounding leaf litter.

Many ants are small and forage primarily in the layer of leaves and other debris on the ground. Collecting these species by hand can be difficult. One of the most successful ways to collect them is to gather the leaf litter in which they are foraging and extract the ants from it. This is most commonly done by placing leaf litter on a screen over a large funnel, often under some heat. As the leaf litter dries from above, ants (and other animals) move downward and eventually fall out the bottom and are collected in alcohol placed below the funnel. This method works especially well in rain forests and marshy areas. A method of improving the catch when using a funnel is to sift the leaf litter through a coarse screen before placing it above the funnel. This will concentrate the litter and remove larger leaves and twigs. It will also allow more litter to be sampled when using a limited number of funnels.

The pitfall trap is another commonly used tool for collecting ants. A pitfall trap can be any small container placed in the ground with the top level with the surrounding surface and filled with a preservative. Ants are collected when they fall into the trap while foraging. The diameter of the traps can vary from about 18 mm to 10 cm and the number used can vary from a few to several hundred. The size of the traps used is influenced largely by personal preference (although larger sizes are generally better), while the number will be determined by the study being undertaken. The preservative used is usually ethylene glycol or propylene glycol, as alcohol will evaporate quickly and the traps will dry out. One advantage of pitfall traps is that they can be used to collect over a period of time with minimal maintenance and intervention. One disadvantage is that some species are not collected as they either avoid the traps or do not commonly encounter them while foraging.

Questions 27–30

Do the following statements agree with the information given in Reading Passage 3?

In boxes 27–30 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   Taxonomic research involves comparing members of one group of ants.

28   New species of ant are frequently identified by taxonomists.

29   Range is the key criterion for ecological collections.

30   A single collection of ants can generally be used for both taxonomic and ecological purposes.

Questions 31–36

Classify the following statements as referring to

> **A**   hand collecting
> **B**   using bait
> **C**   sampling ground litter
> **D**   using a pitfall trap

*Write the correct letter, **A, B, C** or **D**, in boxes 31–36 on your answer sheet.*

31   It is preferable to take specimens from groups of ants.

32   It is particularly effective for wet habitats.

33   It is a good method for species which are hard to find.

34   Little time and effort is required.

35   Separate containers are used for individual specimens.

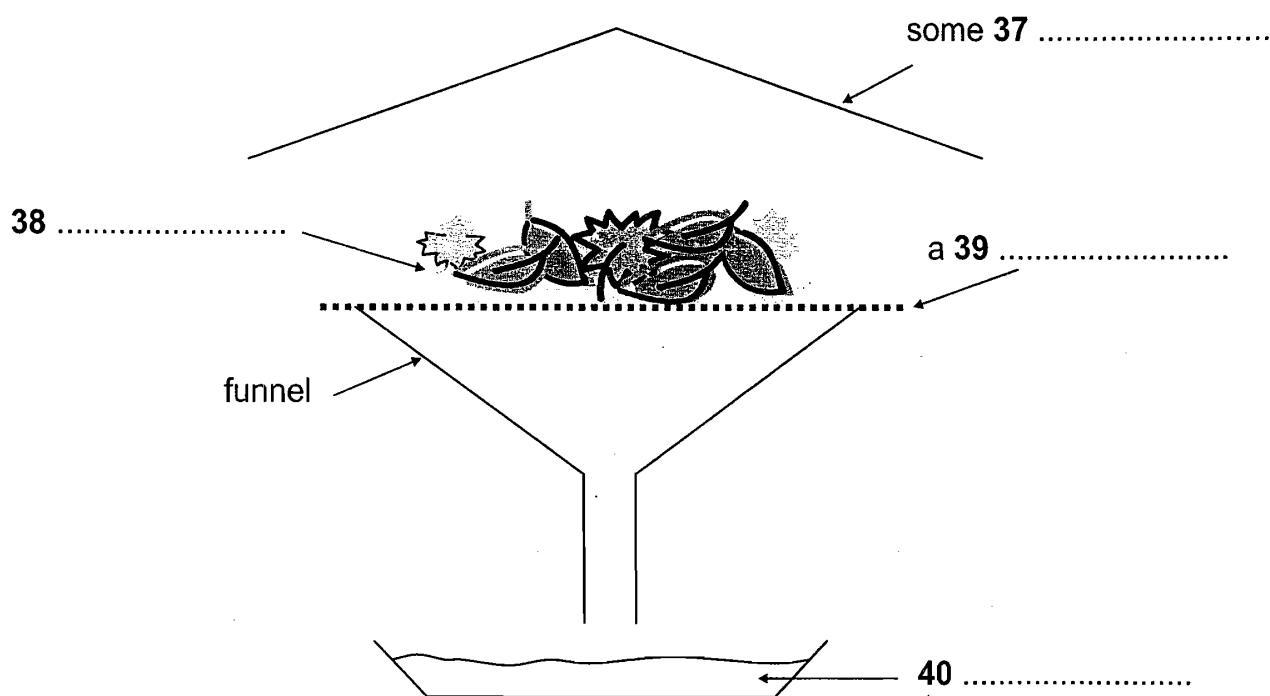**36**   Non-alcoholic preservative should be used.

Questions 37–40

Label the diagram below.

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

Write your answers in boxes 37–40 on your answer sheet.

One method of collecting ants

some **37** ....

38 ....

a **39** ....

funnel

40 ....

READING PASSAGE 3

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

The history of the tortoise

If you go back far enough, everything lived in the sea. At various points in evolutionary history, enterprising individuals within many different animal groups moved out onto the land, sometimes even to the most parched deserts, taking their own private seawater with them in blood and cellular fluids. In addition to the reptiles, birds, mammals and insects which we see all around us, other groups that have succeeded out of water include scorpions, snails, crustaceans such as woodlice and land crabs, millipedes and centipedes, spiders and various worms. And we mustn't forget the plants, without whose prior invasion of the land none of the other migrations could have happened.

Moving from water to land involved a major redesign of every aspect of life, including breathing and reproduction. Nevertheless, a good number of thoroughgoing land animals later turned around, abandoned their hard-earned terrestrial re-tooling, and returned to the water again. Seals have only gone part way back. They show us what the intermediates might have been like, on the way to extreme cases such as whales and dugongs. Whales (including the small whales we call dolphins) and dugongs, with their close cousins the manatees, ceased to be land creatures altogether and reverted to the full marine habits of their remote ancestors. They don't even come ashore to breed. They do, however, still breathe air, having never developed anything equivalent to the gills of their earlier marine incarnation. Turtles went back to the sea a very long time ago and, like all vertebrate returnees to the water, they breathe air. However, they are, in one respect, less fully given back to the water than whales or dugongs, for turtles still lay their eggs on beaches.

There is evidence that all modern turtles are descended from a terrestrial ancestor which lived before most of the dinosaurs. There are two key fossils called *Proganochelys quenstedti* and *Palaeochersis talampayensis* dating from early dinosaur times, which appear to be close to the ancestry of all modern turtles and tortoises. You might wonder how we can tell whether fossil animals lived on land or in water, especially if only fragments are found. Sometimes it's obvious. Ichthyosaurs were reptilian contemporaries of the dinosaurs, with fins and streamlined bodies. The fossils look like dolphins and they surely lived like dolphins, in the water. With turtles it is a little less obvious. One way to tell is by measuring the bones of their forelimbs.

Walter Joyce and Jacques Gauthier, at Yale University, obtained three measurements in these particular bones

of 71 species of living turtles and tortoises. They used a kind of triangular graph paper to plot the three measurements against one another. All the land tortoise species formed a tight cluster of points in the upper part of the triangle; all the water turtles cluster in the lower part of the triangular graph. There was no overlap, except when they added some species that spend time both in water and on land. Sure enough, these amphibious species show up on the triangular graph approximately half way between the 'wet cluster' of sea turtles and the 'dry cluster' of land tortoises. The next step was to determine where the fossils fell. The bones of *P. quenstedti* and *P. talampayensis* leave us in no doubt. Their points on the graph are right in the thick of the dry cluster. Both these fossils were dry-land tortoises. They come from the era before our turtles returned to the water.

You might think, therefore, that modern land tortoises have probably stayed on land ever since those early terrestrial times, as most mammals did after a few of them went back to the sea. But apparently not. If you draw out the family tree of all modern turtles and tortoises, nearly all the branches are aquatic. Today's land tortoises constitute a single branch, deeply nested among branches consisting of aquatic turtles. This suggests that modern land tortoises have not stayed on land continuously since the time of *P. quenstedti* and *P. talampayensis*. Rather, their ancestors were among those who went back to the water, and they then re-emerged back onto the land in (relatively) more recent times.

Tortoises therefore represent a remarkable double return. In common with all mammals, reptiles and birds, their remote ancestors were marine fish and before that various more or less worm-like creatures stretching back, still in the sea, to the primeval bacteria. Later ancestors lived on land and stayed there for a very large number of generations. Later ancestors still evolved back into the water and became sea turtles. And finally they returned yet again to the land as tortoises, some of which now live in the driest of deserts.

Questions 27–30

Answer the questions below.

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

Write your answers in boxes 27–30 on your answer sheet.

27 What had to transfer from sea to land before any animals could migrate?

28 Which **TWO** processes are mentioned as those in which animals had to make big changes as they moved onto land?

29 Which physical feature, possessed by their ancestors, do whales lack?

30 Which animals might ichthyosaurs have resembled?

Questions 31–33

Do the following statements agree with the information given in Reading Passage 3?

In boxes 31–33 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*

31 Turtles were among the first group of animals to migrate back to the sea.

32 It is always difficult to determine where an animal lived when its fossilised remains are incomplete.

33 The habitat of ichthyosaurs can be determined by the appearance of their fossilised remains.

Questions 34–39

Complete the flow-chart below.

*Choose **NO MORE THAN TWO WORDS AND/OR A NUMBER** from the passage for each answer.*

Write your answers in boxes 34–39 on your answer sheet.

Method of determining where the ancestors of turtles and tortoises come from

Step 1
71 species of living turtles and tortoises were examined and a total of **34** .... were taken from the bones of their forelimbs.

⬇

Step 2
The data was recorded on a **35** .... (necessary for comparing the information).
Outcome: Land tortoises were represented by a dense **36** .... of points towards the top.
Sea turtles were grouped together in the bottom part.

⬇

Step 3
The same data was collected from some living **37** .... species and added to the other results.
Outcome: The points for these species turned out to be positioned about **38** .... up the triangle between the land tortoises and the sea turtles.

⬇

Step 4
Bones of *P. quenstedti* and *P. talampayensis* were examined in a similar way and the results added.
Outcome: The position of the points indicated that both these ancient creatures were **39** ....

Question 40

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

Write the correct letter in box 40 on your answer sheet.

According to the writer, the most significant thing about tortoises is that

    A   they are able to adapt to life in extremely dry environments.
    B   their original life form was a kind of primeval bacteria.
    C   they have so much in common with sea turtles.
    D   they have made the transition from sea to land more than once.

READING PASSAGE 3

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

A neuroscientist reveals how to think differently

In the last decade a revolution has occurred in the way that scientists think about the brain. We now know that the decisions humans make can be traced to the firing patterns of neurons in specific parts of the brain. These discoveries have led to the field known as *neuroeconomics,* which studies the brain's secrets to success in an economic environment that demands innovation and being able to do things differently from competitors. A brain that can do this is an iconoclastic one. Briefly, an *iconoclast* is a person who does something that others say can't be done.

This definition implies that iconoclasts are different from other people, but more precisely, it is their brains that are different in three distinct ways: perception, fear response, and social intelligence. Each of these three functions utilizes a different circuit in the brain. Naysayers might suggest that the brain is irrelevant, that thinking in an original, even revolutionary, way is more a matter of personality than brain function. But the field of neuroeconomics was born out of the realization that the physical workings of the brain place limitations on the way we make decisions. By understanding these constraints, we begin to understand why some people march to a different drumbeat.

The first thing to realize is that the brain suffers from limited resources. It has a fixed energy budget, about the same as a 40 watt light bulb, so it has evolved to work as efficiently as possible. This is where most people are impeded from being an iconoclast. For example, when confronted with information streaming from the eyes, the brain will interpret this information in the quickest way possible. Thus it will draw on both past experience and any other source of information, such as what other people say, to make sense of what it is seeing. This happens all the time. The brain takes shortcuts that work so well we are hardly ever aware of them. We think our perceptions of the world are real, but they are only biological and electrical rumblings. Perception is not simply a product of what your eyes or ears transmit to your brain. More than the physical reality of photons or sound waves, perception is a product of the brain.

Perception is central to iconoclasm. Iconoclasts see things differently to other people. Their brains do not fall into efficiency pitfalls as much as the average person's brain. Iconoclasts, either because they were born that way or through learning, have found ways to work around the perceptual shortcuts that plague most people. Perception is not something that is hardwired

TEST 18

into the brain. It is a learned process, which is both a curse and an opportunity for change. The brain faces the fundamental problem of interpreting physical stimuli from the senses. Everything the brain sees, hears, or touches has multiple interpretations. The one that is ultimately chosen is simply the brain's best theory. In technical terms, these conjectures have their basis in the statistical likelihood of one interpretation over another and are heavily influenced by past experience and, importantly for potential iconoclasts, what other people say.

The best way to see things differently to other people is to bombard the brain with things it has never encountered before. Novelty releases the perceptual process from the chains of past experience and forces the brain to make new judgments. Successful iconoclasts have an extraordinary willingness to be exposed to what is fresh and different. Observation of iconoclasts shows that they embrace novelty while most people avoid things that are different.

The problem with novelty, however, is that it tends to trigger the brain's fear system. Fear is a major impediment to thinking like an iconoclast and stops the average person in his tracks. There are many types of fear, but the two that inhibit iconoclastic thinking and people generally find difficult to deal with are *fear of uncertainty* and *fear of public ridicule.* These may seem like trivial phobias. But fear of public speaking, which everyone must do from time to time, afflicts one-third of the population. This makes it too common to be considered a mental disorder. It is simply a common variant of human nature, one which iconoclasts do not let inhibit their reactions.

Finally, to be successful iconoclasts, individuals must sell their ideas to other people. This is where *social intelligence* comes in. Social intelligence is the ability to understand and manage people in a business setting. In the last decade there has been an explosion of knowledge about the social brain and how the brain works when groups coordinate decision making. Neuroscience has revealed which brain circuits are responsible for functions like understanding what other people think, empathy, fairness, and social identity. These brain regions play key roles in whether people convince others of their ideas. Perception is important in social cognition too. The perception of someone's enthusiasm, or reputation, can make or break a deal. Understanding how perception becomes intertwined with social decision making shows why successful iconoclasts are so rare.

Iconoclasts create new opportunities in every area from artistic expression to technology to business. They supply creativity and innovation not easily accomplished by committees. Rules aren't important to them. Iconoclasts face alienation and failure, but can also be a major asset to any organization. It is crucial for success in any field to understand how the iconoclastic mind works.

Questions 27–31

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

Write the correct letter in boxes 27–31 on your answer sheet.

27   Neuroeconomics is a field of study which seeks to

    A   cause a change in how scientists understand brain chemistry.
    B   understand how good decisions are made in the brain.
    C   understand how the brain is linked to achievement in competitive fields.
    D   trace the specific firing patterns of neurons in different areas of the brain.

28   According to the writer, iconoclasts are distinctive because

    A   they create unusual brain circuits.
    B   their brains function differently.
    C   their personalities are distinctive.
    D   they make decisions easily.

29   According to the writer, the brain works efficiently because

    A   it uses the eyes quickly.
    B   it interprets data logically.
    C   it generates its own energy.
    D   it relies on previous events.

30   The writer says that perception is

    A   a combination of photons and sound waves.
    B   a reliable product of what your senses transmit.
    C   a result of brain processes.
    D   a process we are usually conscious of.

31   According to the writer, an iconoclastic thinker

    A   centralises perceptual thinking in one part of the brain.
    B   avoids cognitive traps.
    C   has a brain that is hardwired for learning.
    D   has more opportunities than the average person.

Questions 32–37

Do the following statements agree with the claims of the writer in Reading Passage 3?

In boxes 32–37 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　Exposure to different events forces the brain to think differently.

33　Iconoclasts are unusually receptive to new experiences.

34　Most people are too shy to try different things.

35　If you think in an iconoclastic way, you can easily overcome fear.

36　When concern about embarrassment matters less, other fears become irrelevant.

37　Fear of public speaking is a psychological illness.

Questions 38–40

*Complete each sentence with the correct ending, **A–E**, below.*

*Write the correct letter, **A–E**, in boxes 38–40 on your answer sheet.*

38　Thinking like a successful iconoclast is demanding because it

39　The concept of the social brain is useful to iconoclasts because it

40　Iconoclasts are generally an asset because their way of thinking

A	requires both perceptual and social intelligence skills.
B	focuses on how groups decide on an action.
C	works in many fields, both artistic and scientific.
D	leaves one open to criticism and rejection.
E	involves understanding how organisations manage people.

TEST 19

READING PASSAGE 3

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

Information theory – the big idea

Information theory lies at the heart of everything – from DVD players and the genetic code of DNA to the physics of the universe at its most fundamental. It has been central to the development of the science of communication, which enables data to be sent electronically and has therefore had a major impact on our lives

A In April 2002 an event took place which demonstrated one of the many applications of information theory. The space probe, Voyager I, launched in 1977, had sent back spectacular images of Jupiter and Saturn and then soared out of the Solar System on a one-way mission to the stars. After 25 years of exposure to the freezing temperatures of deep space, the probe was beginning to show its age. Sensors and circuits were on the brink of failing and NASA experts realised that they had to do something or lose contact with their probe forever. The solution was to get a message to Voyager I to instruct it to use spares to change the failing parts. With the probe 12 billion kilometres from Earth, this was not an easy task. By means of a radio dish belonging to NASA's Deep Space Network, the message was sent out into the depths of space. Even travelling at the speed of light, it took over 11 hours to reach its target, far beyond the orbit of Pluto. Yet, incredibly, the little probe managed to hear the faint call from its home planet, and successfully made the switchover.

B It was the longest-distance repair job in history, and a triumph for the NASA engineers. But it also highlighted the astonishing power of the techniques developed by American communications engineer Claude Shannon, who had died just a year earlier. Born in 1916 in Petoskey, Michigan, Shannon showed an early talent for maths and for building gadgets, and made breakthroughs in the foundations of computer technology when still a student. While at Bell Laboratories, Shannon developed information theory, but shunned the resulting acclaim. In the 1940s, he single-handedly created an entire science of communication which has since inveigled its way into a host of applications, from DVDs to satellite communications to bar codes – any area, in short, where data has to be conveyed rapidly yet accurately.

C   This all seems light years away from the down-to-earth uses Shannon originally had for his work, which began when he was a 22-year-old graduate engineering student at the prestigious Massachusetts Institute of Technology in 1939. He set out with an apparently simple aim: to pin down the precise meaning of the concept of 'information'. The most basic form of information, Shannon argued, is whether something is true or false – which can be captured in the binary unit, or 'bit', of the form 1 or 0. Having identified this fundamental unit, Shannon set about defining otherwise vague ideas about information and how to transmit it from place to place. In the process he discovered something surprising: it is always possible to guarantee information will get through random interference – 'noise' – intact.

D   Noise usually means unwanted sounds which interfere with genuine information. Information theory generalises this idea via theorems that capture the effects of noise with mathematical precision. In particular, Shannon showed that noise sets a limit on the rate at which information can pass along communication channels while remaining error-free. This rate depends on the relative strengths of the signal and noise travelling down the communication channel, and on its capacity (its 'bandwidth'). The resulting limit, given in units of bits per second, is the absolute maximum rate of error-free communication given signal strength and noise level. The trick, Shannon showed, is to find ways of packaging up – 'coding' – information to cope with the ravages of noise, while staying within the information-carrying capacity – 'bandwidth' – of the communication system being used.

E   Over the years scientists have devised many such coding methods, and they have proved crucial in many technological feats. The Voyager spacecraft transmitted data using codes which added one extra bit for every single bit of information; the result was an error rate of just one bit in 10,000 – and stunningly clear pictures of the planets. Other codes have become part of everyday life – such as the Universal Product Code, or bar code, which uses a simple error-detecting system that ensures supermarket check-out lasers can read the price even on, say, a crumpled bag of crisps. As recently as 1993, engineers made a major breakthrough by discovering so-called turbo codes – which come very close to Shannon's ultimate limit for the maximum rate that data can be transmitted reliably, and now play a key role in the mobile videophone revolution.

F   Shannon also laid the foundations of more efficient ways of storing information, by stripping out superfluous ('redundant') bits from data which contributed little real information. As mobile phone text messages like 'I CN C U' show, it is often possible to leave out a lot of data without losing much meaning. As with error correction, however, there's a limit beyond which messages become too ambiguous. Shannon showed how to calculate this limit, opening the way to the design of compression methods that cram maximum information into the minimum space.

Questions 27–32

Reading Passage 3 has six paragraphs, **A–F**.

Which paragraph contains the following information?

*Write the correct letter, **A–F**, in boxes 27–32 on your answer sheet.*

27 an explanation of the factors affecting the transmission of information

28 an example of how unnecessary information can be omitted

29 a reference to Shannon's attitude to fame

30 details of a machine capable of interpreting incomplete information

31 a detailed account of an incident involving information theory

32 a reference to what Shannon initially intended to achieve in his research

Complete the notes below.

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

Write your answers in boxes 33–37 on your answer sheet.

The Voyager 1 Space Probe

- The probe transmitted pictures of both **33** .... and .... , then left the **34** ....

- The freezing temperatures were found to have a negative effect on parts of the space probe.

- Scientists feared that both the **35** .... and .... were about to stop working.

- The only hope was to tell the probe to replace them with **36** .... – but distance made communication with the probe difficult.

- A **37** .... was used to transmit the message at the speed of light.

- The message was picked up by the probe and the switchover took place.

Questions 38–40

Do the following statements agree with the information given in Reading Passage 3?

In boxes 38–40 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*

38 The concept of describing something as true or false was the starting point for Shannon in his attempts to send messages over distances.

39 The amount of information that can be sent in a given time period is determined with reference to the signal strength and noise level.

40 Products have now been developed which can convey more information than Shannon had anticipated as possible.

READING PASSAGE 3

*You should spend about 20 minutes on **Questions 27–40**, which are based on Reading Passage 3 on the following pages.*

Questions 27–30

Reading Passage 3 has six paragraphs, **A–F**.

*Choose the correct heading for paragraphs **B–E** from the list of headings below.*

*Write the correct number, **i–vii**, in boxes 27–30 on your answer sheet.*

List of Headings
i   Commercial pressures on people in charge
ii   Mixed views on current changes to museums
iii   Interpreting the facts to meet visitor expectations
iv   The international dimension
v   Collections of factual evidence
vi   Fewer differences between public attractions
vii   Current reviews and suggestions

Example	*Answer*
Paragraph **A**	**v**

27   Paragraph **B**

28   Paragraph **C**

29   Paragraph **D**

30   Paragraph **E**

The Development of Museums

A The conviction that historical relics provide infallible testimony about the past is rooted in the nineteenth and early twentieth centuries, when science was regarded as objective and value free. As one writer observes: 'Although it is now evident that artefacts are as easily altered as chronicles, public faith in their veracity endures: a tangible relic seems *ipso facto* real.' Such conviction was, until recently, reflected in museum displays. Museums used to look – and some still do – much like storage rooms of objects packed together in showcases: good for scholars who wanted to study the subtle differences in design, but not for the ordinary visitor, to whom it all looked alike. Similarly, the information accompanying the objects often made little sense to the lay visitor. The content and format of explanations dated back to a time when the museum was the exclusive domain of the scientific researcher.

B Recently, however, attitudes towards history and the way it should be presented have altered. The key word in heritage display is now 'experience', the more exciting the better and, if possible, involving all the senses. Good examples of this approach in the UK are the Jorvik Centre in York; the National Museum of Photography, Film and Television in Bradford; and the Imperial War Museum in London. In the US the trend emerged much earlier: Williamsburg has been a prototype for many heritage developments in other parts of the world. No one can predict where the process will end. On so-called heritage sites the re-enactment of historical events is increasingly popular, and computers will soon provide virtual reality experiences, which will present visitors with a vivid image of the period of their choice, in which they themselves can act as if part of the historical environment. Such developments have been criticised as an intolerable vulgarisation, but the success of many historical theme parks and similar locations suggests that the majority of the public does not share this opinion.

C In a related development, the sharp distinction between museum and heritage sites on the one hand, and theme parks on the other, is gradually evaporating. They already borrow ideas and concepts from one another. For example, museums have adopted story lines for exhibitions, sites have accepted 'theming' as a relevant tool, and theme parks are moving towards more authenticity and research-based presentations. In zoos, animals are no longer kept in cages, but in great spaces, either in the open air or in enormous greenhouses, such as the jungle and desert environments in Burgers' Zoo in Holland. This particular trend is regarded as one of the major developments in the presentation of natural history in the twentieth century.

D Theme parks are undergoing other changes, too, as they try to present more serious social and cultural issues, and move away from fantasy. This development is a response to market forces and, although museums and heritage sites have a special, rather distinct, role to fulfil, they are also operating in a very competitive environment, where visitors make choices on how and where to spend their free time. Heritage and museum experts do not have to invent stories and recreate historical environments to attract their visitors: their assets are already in place. However, exhibits must be both based on artefacts and facts as we know them, and attractively presented. Those who are professionally engaged in the art of interpreting history are thus in a difficult position, as they must steer a narrow course between the demands of 'evidence' and 'attractiveness', especially given the increasing need in the heritage industry for income-generating activities.

E It could be claimed that in order to make everything in heritage more 'real', historical accuracy must be increasingly altered. For example, *Pithecanthropus erectus* is depicted in an Indonesian museum with Malay facial features, because this corresponds to public perceptions. Similarly, in the Museum of Natural History in Washington, Neanderthal man is shown making a dominant gesture to his wife. Such presentations tell us more about contemporary perceptions of the world than about our ancestors. There is one compensation, however, for the professionals who make these interpretations: if they did not provide the interpretation, visitors would do it for themselves, based on their own ideas, misconceptions and prejudices. And no matter how exciting the result, it would contain a lot more bias than the presentations provided by experts.

F Human bias is inevitable, but another source of bias in the representation of history has to do with the transitory nature of the materials themselves. The simple fact is that not everything from history survives the historical process. Castles, palaces and cathedrals have a longer lifespan than the dwellings of ordinary people. The same applies to the furnishings and other contents of the premises. In a town like Leyden in Holland, which in the seventeenth century was occupied by approximately the same number of inhabitants as today, people lived within the walled town, an area more than five times smaller than modern Leyden. In most of the houses several families lived together in circumstances beyond our imagination. Yet in museums, fine period rooms give only an image of the lifestyle of the upper class of that era. No wonder that people who stroll around exhibitions are filled with nostalgia; the evidence in museums indicates that life was so much better in the past. This notion is induced by the bias in its representation in museums and heritage centres.

Questions 31–36

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

Write the correct letter in boxes 31–36 on your answer sheet.

31 Compared with today's museums, those of the past

    A   did not present history in a detailed way.
    B   were not primarily intended for the public.
    C   were more clearly organised.
    D   preserved items with greater care.

32 According to the writer, current trends in the heritage industry

    A   emphasise personal involvement.
    B   have their origins in York and London.
    C   rely on computer images.
    D   reflect minority tastes.

33 The writer says that museums, heritage sites and theme parks

    A   often work in close partnership.
    B   try to preserve separate identities.
    C   have similar exhibits.
    D   are less easy to distinguish than before.

34 The writer says that in preparing exhibits for museums, experts

    A   should pursue a single objective.
    B   have to do a certain amount of language translation.
    C   should be free from commercial constraints.
    D   have to balance conflicting priorities.

35 In paragraph E, the writer suggests that some museum exhibits

    A   fail to match visitor expectations.
    B   are based on the false assumptions of professionals.
    C   reveal more about present beliefs than about the past.
    D   allow visitors to make more use of their imagination.

36 The passage ends by noting that our view of history is biased because

    A   we fail to use our imagination.
    B   only very durable objects remain from the past.
    C   we tend to ignore things that displease us.
    D   museum exhibits focus too much on the local area.

Questions 37–40

Do the following statements agree with the information given in Reading Passage 3?

In boxes 37–40 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*

37   Consumers prefer theme parks which avoid serious issues.

38   More people visit museums than theme parks.

39   The boundaries of Leyden have changed little since the seventeenth century.

40   Museums can give a false impression of how life used to be.

READING PASSAGE 3

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

The psychology of innovation

Why are so few companies truly innovative?

Innovation is key to business survival, and companies put substantial resources into inspiring employees to develop new ideas. There are, nevertheless, people working in luxurious, state-of-the-art centres designed to stimulate innovation who find that their environment doesn't make them feel at all creative. And there are those who don't have a budget, or much space, but who innovate successfully.

For Robert B. Cialdini, Professor of Psychology at Arizona State University, one reason that companies don't succeed as often as they should is that innovation starts with recruitment. Research shows that the fit between an employee's values and a company's values makes a difference to what contribution they make and whether, two years after they join, they're still at the company. Studies at Harvard Business School show that, although some individuals may be more creative than others, almost every individual can be creative in the right circumstances.

One of the most famous photographs in the story of rock'n'roll emphasises Cialdini's views. The 1956 picture of singers Elvis Presley, Carl Perkins, Johnny Cash and Jerry Lee Lewis jamming at a piano in Sun Studios in Memphis tells a hidden story. Sun's 'million-dollar quartet' could have been a quintet. Missing from the picture is Roy Orbison, a greater natural singer than Lewis, Perkins or Cash. Sam Phillips, who owned Sun, wanted to revolutionise popular music with songs that fused black and white music, and country and blues. Presley, Cash, Perkins and Lewis instinctively understood Phillips's ambition and believed in it. Orbison wasn't inspired by the goal, and only ever achieved one hit with the Sun label.

The value fit matters, says Cialdini, because innovation is, in part, a process of change, and under that pressure we, as a species, behave differently, 'When things change, we are hard-wired to play it safe.' Managers should therefore adopt an approach that appears counter-intuitive – they should explain what stands to be lost if the company fails to seize a particular opportunity. Studies show that we invariably take more gambles when threatened with a loss than when offered a reward.

Managing innovation is a delicate art. It's easy for a company to be pulled in conflicting directions as the marketing, product development, and finance departments each get different feedback from different sets of people. And without a system which ensures collaborative exchanges within the company, it's also easy for small 'pockets of innovation' to disappear. Innovation is a contact sport. You can't brief people just by saying, 'We're going in this direction and I'm going to take you with me.'

Cialdini believes that this 'follow-the-leader syndrome' is dangerous, not least because it encourages bosses to go it alone. 'It's been scientifically proven that three people will be better than one at solving problems, even if that one person is the smartest person in the field.' To prove his point, Cialdini cites an interview with molecular biologist James Watson. Watson, together with Francis Crick, discovered the structure of DNA, the genetic information carrier of all living organisms. 'When asked how they had cracked the code ahead of an array of highly accomplished rival investigators, he said something that stunned me. He said he and Crick had succeeded because they were aware that they weren't the most intelligent of the scientists pursuing the answer. The smartest scientist was called Rosalind Franklin who, Watson said, "was so intelligent she rarely sought advice".'

Teamwork taps into one of the basic drivers of human behaviour. 'The principle of social proof is so pervasive that we don't even recognise it,' says Cialdini. 'If your project is being resisted, for example, by a group of veteran employees, ask another old-timer to speak up for it.' Cialdini is not alone in advocating this strategy. Research shows that peer power, used horizontally not vertically, is much more powerful than any boss's speech.

Writing, visualising and prototyping can stimulate the flow of new ideas. Cialdini cites scores of research papers and historical events that prove that even something as simple as writing deepens every individual's engagement in the project. It is, he says, the reason why all those competitions on breakfast cereal packets encouraged us to write in saying, in no more than 10 words: 'I like Kellogg's Corn Flakes because… .' The very act of writing makes us more likely to believe it.

Authority doesn't have to inhibit innovation but it often does. The wrong kind of leadership will lead to what Cialdini calls 'captainitis, the regrettable tendency of team members to opt out of team responsibilities that are properly theirs'. He calls it captainitis because, he says, 'crew members of multipilot aircraft exhibit a sometimes deadly passivity when the flight captain makes a clearly wrong-headed decision'. This behaviour is not, he says, unique to air travel, but can happen in any workplace where the leader is overbearing.

At the other end of the scale is the 1980s Memphis design collective, a group of young designers for whom 'the only rule was that there were no rules'. This environment encouraged a free interchange of ideas, which led to more creativity with form, function, colour and materials that revolutionised attitudes to furniture design.

Many theorists believe the ideal boss should lead from behind, taking pride in collective accomplishment and giving credit where it is due. Cialdini says: 'Leaders should encourage everyone to contribute and simultaneously assure all concerned that every recommendation is important to making the right decision and will be given full attention.' The frustrating thing about innovation is that there are many approaches, but no magic formula. However, a manager who wants to create a truly innovative culture can make their job a lot easier by recognising these psychological realities.

Questions 27–30

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

Write the correct letter in boxes 27–30 on your answer sheet.

27   The example of the 'million-dollar quartet' underlines the writer's point about

    A   recognising talent.
    B   working as a team.
    C   having a shared objective.
    D   being an effective leader.

28   James Watson suggests that he and Francis Crick won the race to discover the DNA code because they

    A   were conscious of their own limitations.
    B   brought complementary skills to their partnership.
    C   were determined to outperform their brighter rivals.
    D   encouraged each other to realise their joint ambition.

29   The writer mentions competitions on breakfast cereal packets as an example of how to

    A   inspire creative thinking.
    B   generate concise writing.
    C   promote loyalty to a group.
    D   strengthen commitment to an idea.

30   In the last paragraph, the writer suggests that it is important for employees to

    A   be aware of their company's goals.
    B   feel that their contributions are valued.
    C   have respect for their co-workers' achievements.
    D   understand why certain management decisions are made.

Questions 31–35

*Complete each sentence with the correct ending, **A–G**, below.*

*Write the correct letter, **A–G**, in boxes 31–35 on your answer sheet.*

31 Employees whose values match those of their employers are more likely to

32 At times of change, people tend to

33 If people are aware of what they might lose, they will often

34 People working under a dominant boss are liable to

35 Employees working in organisations with few rules are more likely to

A	take chances.
B	share their ideas.
C	become competitive.
D	get promotion.
E	avoid risk.
F	ignore their duties.
G	remain in their jobs.

Questions 36–40

Do the following statements agree with the claims of the writer in Reading Passage 3?

In boxes 36–40 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 physical surroundings in which a person works play a key role in determining their creativity.

37   Most people have the potential to be creative.

38   Teams work best when their members are of equally matched intelligence.

39   It is easier for smaller companies to be innovative.

40   A manager's approval of an idea is more persuasive than that of a colleague.

READING PASSAGE 3

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

Museums of fine art and their public

The fact that people go to the Louvre museum in Paris to see the original painting *Mona Lisa* when they can see a reproduction anywhere leads us to question some assumptions about the role of museums of fine art in today's world

One of the most famous works of art in the world is Leonardo da Vinci's *Mona Lisa*. Nearly everyone who goes to see the original will already be familiar with it from reproductions, but they accept that fine art is more rewardingly viewed in its original form.

However, if *Mona Lisa* was a famous novel, few people would bother to go to a museum to read the writer's actual manuscript rather than a printed reproduction. This might be explained by the fact that the novel has evolved precisely because of technological developments that made it possible to print out huge numbers of texts, whereas oil paintings have always been produced as unique objects. In addition, it could be argued that the practice of interpreting or 'reading' each medium follows different conventions. With novels, the reader attends mainly to the meaning of words rather than the way they are printed on the page, whereas the 'reader' of a painting must attend just as closely to the material form of marks and shapes in the picture as to any ideas they may signify.

Yet it has always been possible to make very accurate facsimiles of pretty well any fine art work. The seven surviving versions of *Mona Lisa* bear witness to the fact that in the 16th century, artists seemed perfectly content to assign the reproduction of their creations to their workshop apprentices as regular 'bread and butter' work. And today the task of reproducing pictures is incomparably more simple and reliable, with reprographic techniques that allow the production of high-quality prints made exactly to the original scale, with faithful colour values, and even with duplication of the surface relief of the painting.

But despite an implicit recognition that the spread of good reproductions can be culturally valuable, museums continue to promote the special status of original work.

Unfortunately, this seems to place severe limitations on the kind of experience offered to visitors.

One limitation is related to the way the museum presents its exhibits. As repositories of unique historical objects, art museums are often called 'treasure houses'. We are reminded of this even before we view a collection by the presence of security guards, attendants, ropes and display cases to keep us away from the exhibits. In many cases, the architectural style of the building further reinforces that notion. In addition, a major collection like that of London's

National Gallery is housed in numerous rooms, each with dozens of works, any one of which is likely to be worth more than all the average visitor possesses. In a society that judges the personal status of the individual so much by their material worth, it is therefore difficult not to be impressed by one's own relative 'worthlessness' in such an environment.

Furthermore, consideration of the 'value' of the original work in its treasure house setting impresses upon the viewer that, since these works were originally produced, they have been assigned a huge monetary value by some person or institution more powerful than themselves. Evidently, nothing the viewer thinks about the work is going to alter that value, and so today's viewer is deterred from trying to extend that spontaneous, immediate, self-reliant kind of reading which would originally have met the work.

The visitor may then be struck by the strangeness of seeing such diverse paintings, drawings and sculptures brought together in an environment for which they were not originally created. This 'displacement effect' is further heightened by the sheer volume of exhibits. In the case of a major collection, there are probably more works on display than we could realistically view in weeks or even months.

This is particularly distressing because time seems to be a vital factor in the appreciation of all art forms. A fundamental difference between paintings and other art forms is that there is no prescribed time over which a painting is viewed. By contrast, the audience encounters an opera or a play over a specific time, which is the duration of the performance. Similarly, novels and poems are read in a prescribed temporal sequence, whereas a picture has no clear place at which to start viewing, or at which to finish. Thus art works themselves encourage us to view them superficially, without appreciating the richness of detail and labour that is involved.

Consequently, the dominant critical approach becomes that of the art historian, a specialised academic approach devoted to 'discovering the meaning' of art within the cultural context of its time. This is in perfect harmony with the museum's function, since the approach is dedicated to seeking out and conserving 'authentic', 'original' readings of the exhibits. Again, this seems to put paid to that spontaneous, participatory criticism which can be found in abundance in criticism of classic works of literature, but is absent from most art history.

The displays of art museums serve as a warning of what critical practices can emerge when spontaneous criticism is suppressed. The museum public, like any other audience, experience art more rewardingly when given the confidence to express their views. If appropriate works of fine art could be rendered permanently accessible to the public by means of high-fidelity reproductions, as literature and music already are, the public may feel somewhat less in awe of them. Unfortunately, that may be too much to ask from those who seek to maintain and control the art establishment.

Questions 27–31

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

*Write the correct letter, **A–L**, in boxes 27–31 on your answer sheet.*

The value attached to original works of art

People go to art museums because they accept the value of seeing an original work of art. But they do not go to museums to read original manuscripts of novels, perhaps because the availability of novels has depended on **27** .... for so long, and also because with novels, the **28** .... are the most important thing.

However, in historical times artists such as Leonardo were happy to instruct **29** .... to produce copies of their work and these days new methods of reproduction allow excellent replication of surface relief features as well as colour and **30** ....

It is regrettable that museums still promote the superiority of original works of art, since this may not be in the interests of the **31** ....

A	institution	**B**	mass production	**C**	mechanical processes
D	public	**E**	paints	**F**	artist
G	size	**H**	underlying ideas	**I**	basic technology
J	readers	**K**	picture frames	**L**	assistants

Questions 32–35

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

Write the correct letter in boxes 32–35 on your answer sheet.

32   The writer mentions London's National Gallery to illustrate

    A   the undesirable cost to a nation of maintaining a huge collection of art.

    B   the conflict that may arise in society between financial and artistic values.

    C   the negative effect a museum can have on visitors' opinions of themselves.

    D   the need to put individual well-being above large-scale artistic schemes.

33   The writer says that today, viewers may be unwilling to criticise a work because

    A   they lack the knowledge needed to support an opinion.

    B   they fear it may have financial implications.

    C   they have no real concept of the work's value.

    D   they feel their personal reaction is of no significance.

34   According to the writer, the 'displacement effect' on the visitor is caused by

    A   the variety of works on display and the way they are arranged.

    B   the impossibility of viewing particular works of art over a long period.

    C   the similar nature of the paintings and the lack of great works.

    D   the inappropriate nature of the individual works selected for exhibition.

35   The writer says that unlike other forms of art, a painting does not

    A   involve direct contact with an audience.

    B   require a specific location for a performance.

    C   need the involvement of other professionals.

    D   have a specific beginning or end.

Questions 36–40

Do the following statements agree with the views of the writer in Reading Passage 3?

In boxes 36–40 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 Art history should focus on discovering the meaning of art using a range of media.

37 The approach of art historians conflicts with that of art museums.

38 People should be encouraged to give their opinions openly on works of art.

39 Reproductions of fine art should only be sold to the public if they are of high quality.

40 In the future, those with power are likely to encourage more people to enjoy art.

TEST 23

READING PASSAGE 3

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

Beyond the blue horizon

Ancient voyagers who settled the far-flung islands of the Pacific Ocean

An important archaeological discovery on the island of Éfaté in the Pacific archipelago of Vanuatu has revealed traces of an ancient seafaring people, the distant ancestors of today's Polynesians. The site came to light only by chance. An agricultural worker, digging in the grounds of a derelict 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 remains of an ancient people archaeologists call the Lapita.

They were daring blue-water adventurers who used basic canoes to rove across the ocean. But they were not just explorers. They were also pioneers who carried with them everything they would need to build new lives – their livestock, taro seedlings and stone tools. Within the span of several 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.

The Lapita left precious few clues about themselves, but Éfaté expands the volume of data available to researchers dramatically. The remains of 62 individuals have been uncovered so far, and archaeologists were also thrilled to find six complete Lapita pots. Other items included a Lapita burial urn with modeled birds arranged on the rim as though peering down at the human remains sealed inside. 'It's an important discovery,' says Matthew Spriggs, professor of archaeology at the Australian National University and head of

the international team digging up the site, 'for it conclusively identifies the remains as Lapita.'

DNA teased from these human remains may 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.'

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, for they turn into myths 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. 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 nearby islands. The real adventure didn't begin, however, until their Lapita descendants sailed out of sight of land, with empty horizons on every side. This must have been as difficult for them as landing on the moon is for us today. Certainly it distinguished them from their ancestors, but what gave them the courage to launch out on such risky voyages?

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 assess the area, secure in the knowledge that if they didn't find anything, they could turn about and catch a swift ride back on the trade winds. This is what would have made the whole thing work.' Once out there, skilled seafarers would have detected abundant leads to follow to land: seabirds, coconuts and twigs carried out to sea by the tides, and the afternoon pile-up of clouds on the horizon which often indicates an island in the distance.

For returning explorers, successful or not, the geography of their own archipelagoes would have provided a safety net. Without this to go by, overshooting their home ports, getting lost and sailing off into eternity would have been all too easy. Vanuatu, for example, stretches more than 500 miles in a northwest-southeast trend, its scores of intervisible islands forming a backstop for mariners riding the trade winds home.

All this presupposes one essential detail, says Atholl Anderson, professor of prehistory at the Australian National University: the Lapita had mastered the advanced art of sailing against the wind. 'And there's no proof they could do any such thing,' Anderson says. 'There has been this assumption they did, 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.'

Rather than give all the credit to human skill, Anderson invokes the winds of chance. El Niño, the same climate disruption that affects the Pacific today, may have helped scatter the Lapita, Anderson suggests. He points out that climate data obtained from slow-growing corals around the Pacific indicate a series of unusually frequent El Niños around the time of the Lapita expansion. By reversing the regular east-to-west flow of the trade winds for weeks at a time, these 'super El Niños' might have taken the Lapita on long unplanned voyages.

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.

Questions 27–31

*Complete the summary using the list of words and phrases, **A–J**, below.*

*Write the correct letter, **A–J**, in boxes 27–31 on your answer sheet.*

The Éfaté burial site

A 3,000-year-old burial ground of a seafaring people called the Lapita has been found on an abandoned **27** .... on the Pacific island of Éfaté. The cemetery, which is a significant **28** .... , was uncovered accidentally by an agricultural worker.

The Lapita explored and colonised many Pacific islands over several centuries. They took many things with them on their voyages including **29** .... and tools.

The burial ground increases the amount of information about the Lapita available to scientists. A team of researchers, led by Matthew Spriggs from the Australian National University, are helping with the excavation of the site. Spriggs believes the **30** .... which was found at the site is very important since it confirms that the **31** .... found inside are Lapita.

A	proof
B	plantation
C	harbour
D	bones
E	data
F	archaeological discovery
G	burial urn
H	source
I	animals
J	maps

Questions 32–35

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

Write the correct letter in boxes 32–35 on your answer sheet.

32   According to the writer, there are difficulties explaining how the Lapita accomplished their journeys because

  A   the canoes that have been discovered offer relatively few clues.
  B   archaeologists have shown limited interest in this area of research.
  C   little information relating to this period can be relied upon for accuracy.
  D   technological advances have altered the way such achievements are viewed.

33   According to the sixth paragraph, what was extraordinary about the Lapita?

  A   They sailed beyond the point where land was visible.
  B   Their cultural heritage discouraged the expression of fear.
  C   They were able to build canoes that withstood ocean voyages.
  D   Their navigational skills were passed on from one generation to the next.

34   What does 'This' refer to in the seventh paragraph?

  A   the Lapita's seafaring talent
  B   the Lapita's ability to detect signs of land
  C   the Lapita's extensive knowledge of the region
  D   the Lapita's belief they would be able to return home

35   According to the eighth paragraph, how was the geography of the region significant?

  A   It played an important role in Lapita culture.
  B   It meant there were relatively few storms at sea.
  C   It provided a navigational aid for the Lapita.
  D   It made a large number of islands habitable.

Questions 36–40

Do the following statements agree with the views of the writer in Reading Passage 3?

In boxes 36–40 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   It is now clear that the Lapita could sail into a prevailing wind.

37   Extreme climate conditions may have played a role in Lapita migration.

38   The Lapita learnt to predict the duration of El Niños.

39   It remains unclear why the Lapita halted their expansion across the Pacific.

40   It is likely that the majority of Lapita settled on Fiji.

READING PASSAGE 3

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

When evolution runs backwards

Evolution isn't supposed to run backwards – yet an increasing number of examples show that it does and that it can sometimes represent the future of a species

The description of any animal as an 'evolutionary throwback' is controversial. For the better part of a century, most biologists have been reluctant to use those words, mindful of a principle of evolution that says 'evolution cannot run backwards'. But as more and more examples come to light and modern genetics enters the scene, that principle is having to be rewritten. Not only are evolutionary throwbacks possible, they sometimes play an important role in the forward march of evolution.

The technical term for an evolutionary throwback is an 'atavism', from the Latin *atavus*, meaning forefather. The word has ugly connotations thanks largely to Cesare Lombroso, a 19th-century Italian medic who argued that criminals were born not made and could be identified by certain physical features that were throwbacks to a primitive, sub-human state.

While Lombroso was measuring criminals, a Belgian palaeontologist called Louis Dollo was studying fossil records and coming to the opposite conclusion. In 1890 he proposed that evolution was irreversible: that 'an organism is unable to return, even partially, to a previous stage already realised in the ranks of its ancestors'. Early 20th-century biologists came to a similar conclusion, though they qualified it in terms of probability, stating that there is no reason why evolution cannot run backwards – it is just very unlikely. And so the idea of irreversibility in evolution stuck and came to be known as 'Dollo's law'.

If Dollo's law is right, atavisms should occur only very rarely, if at all. Yet almost since the idea took root, exceptions have been cropping up. In 1919, for example, a humpback whale with a pair of leg-like appendages over a metre long, complete with a full set of limb bones, was caught off Vancouver Island in Canada. Explorer Roy Chapman Andrews argued at the time that the whale must be a throwback to a land-living ancestor. 'I can see no other explanation,' he wrote in 1921.

Since then, so many other examples have been discovered that it no longer makes sense to say that evolution is as good as irreversible. And this poses a puzzle: how can characteristics that disappeared millions of years ago suddenly reappear? In 1994, Rudolf Raff and colleagues at Indiana University in the USA decided to use genetics to put a number on the probability of evolution going into reverse. They reasoned that while some evolutionary changes involve the loss of genes and are therefore irreversible, others may be the result of genes being switched off. If these

silent genes are somehow switched back on, they argued, long-lost traits could reappear.

Raff's team went on to calculate the likelihood of it happening. Silent genes accumulate random mutations, they reasoned, eventually rendering them useless. So how long can a gene survive in a species if it is no longer used? The team calculated that there is a good chance of silent genes surviving for up to 6 million years in at least a few individuals in a population, and that some might survive as long as 10 million years. In other words, throwbacks are possible, but only to the relatively recent evolutionary past.

As a possible example, the team pointed to the mole salamanders of Mexico and California. Like most amphibians these begin life in a juvenile 'tadpole' state, then metamorphose into the adult form – except for one species, the axolotl, which famously lives its entire life as a juvenile. The simplest explanation for this is that the axolotl lineage alone lost the ability to metamorphose, while others retained it. From a detailed analysis of the salamanders' family tree, however, it is clear that the other lineages evolved from an ancestor that itself had lost the ability to metamorphose. In other words, metamorphosis in mole salamanders is an atavism. The salamander example fits with Raff's 10-million-year time frame.

More recently, however, examples have been reported that break the time limit, suggesting that silent genes may not be the whole story. In a paper published last year, biologist Gunter Wagner of Yale University reported some work on the evolutionary history of a group of South American lizards called Bachia. Many of these have minuscule limbs; some look more like snakes than lizards and a few have completely lost the toes on their hind limbs. Other species, however, sport up to four toes on their hind legs. The simplest explanation is that the toed lineages never lost their toes, but Wagner begs to differ. According to his analysis of the Bachia family tree, the toed species re-evolved toes from toeless ancestors and, what is more, digit loss and gain has occurred on more than one occasion over tens of millions of years.

So what's going on? One possibility is that these traits are lost and then simply reappear, in much the same way that similar structures can independently arise in unrelated species, such as the dorsal fins of sharks and killer whales. Another more intriguing possibility is that the genetic information needed to make toes somehow survived for tens or perhaps hundreds of millions of years in the lizards and was reactivated. These atavistic traits provided an advantage and spread through the population, effectively reversing evolution.

But if silent genes degrade within 6 to 10 million years, how can long-lost traits be reactivated over longer timescales? The answer may lie in the womb. Early embryos of many species develop ancestral features. Snake embryos, for example, sprout hind limb buds. Later in development these features disappear thanks to developmental programs that say 'lose the leg'. If for any reason this does not happen, the ancestral feature may not disappear, leading to an atavism.

Questions 27–31

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

Write the correct letter in boxes 27–31 on your answer sheet.

27   When discussing the theory developed by Louis Dollo, the writer says that

   A   it was immediately referred to as Dollo's law.
   B   it supported the possibility of evolutionary throwbacks.
   C   it was modified by biologists in the early twentieth century.
   D   it was based on many years of research.

28   The humpback whale caught off Vancouver Island is mentioned because of

   A   the exceptional size of its body.
   B   the way it exemplifies Dollo's law.
   C   the amount of local controversy it caused.
   D   the reason given for its unusual features.

29   What is said about 'silent genes'?

   A   Their numbers vary according to species.
   B   Raff disagreed with the use of the term.
   C   They could lead to the re-emergence of certain characteristics.
   D   They can have an unlimited life span.

30   The writer mentions the mole salamander because

   A   it exemplifies what happens in the development of most amphibians.
   B   it suggests that Raff's theory is correct.
   C   it has lost and regained more than one ability.
   D   its ancestors have become the subject of extensive research.

31   Which of the following does Wagner claim?

   A   Members of the Bachia lizard family have lost and regained certain features several times.
   B   Evidence shows that the evolution of the Bachia lizard is due to the environment.
   C   His research into South American lizards supports Raff's assertions.
   D   His findings will apply to other species of South American lizards.

Questions 32–36

*Complete each sentence with the correct ending, **A–G**, below.*

*Write the correct letter, **A–G**, in boxes 32–36 on your answer sheet.*

32 For a long time biologists rejected

33 Opposing views on evolutionary throwbacks are represented by

34 Examples of evolutionary throwbacks have led to

35 The shark and killer whale are mentioned to exemplify

36 One explanation for the findings of Wagner's research is

A	the question of how certain long-lost traits could reappear.
B	the occurrence of a particular feature in different species.
C	parallels drawn between behaviour and appearance.
D	the continued existence of certain genetic information.
E	the doubts felt about evolutionary throwbacks.
F	the possibility of evolution being reversible.
G	Dollo's findings and the convictions held by Lombroso.

Questions 37–40

Do the following statements agree with the claims of the writer in Reading Passage 3?

In boxes 37–40 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 Wagner was the first person to do research on South American lizards.

38 Wagner believes that Bachia lizards with toes had toeless ancestors.

39 The temporary occurrence of long-lost traits in embryos is rare.

40 Evolutionary throwbacks might be caused by developmental problems in the womb.

READING PASSAGE 3

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

Reducing the Effects of Climate Change

Mark Rowe reports on the increasingly ambitious geo-engineering projects being explored by scientists

A Such is our dependence on fossil fuels, and such is the volume of carbon dioxide already released into the atmosphere, that many experts agree that significant global warming is now inevitable. They believe that the best we can do is keep it at a reasonable level, and at present the only serious option for doing this is cutting back on our carbon emissions. But while 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 it. Consequently, an increasing number of scientists are beginning to explore the alternative of geo-engineering – a term which generally refers to the intentional large-scale manipulation of the environment. According to its proponents, geo-engineering is the equivalent of a backup generator: if Plan A – reducing our dependency on fossil fuels – fails, we require a Plan B, employing grand schemes to slow down or reverse the process of global warming.

B Geo-engineering 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 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. The most eye-catching idea of all is suggested by Professor Roger Angel of the University of Arizona. His scheme would employ up to 16 trillion minute spacecraft, each weighing about one gram, to form a transparent, sunlight-refracting sunshade in an orbit 1.5 million km above the Earth. This could, argues Angel, reduce the amount of light reaching the Earth by two per cent.

C The majority of geo-engineering projects so far carried out – which include planting forests in deserts and depositing iron in the ocean to stimulate the growth of algae – have focused on achieving a general cooling of the Earth. But some look specifically at reversing the melting at the poles, particularly the Arctic. The reasoning is that if you replenish the ice sheets and frozen waters of the high latitudes, more light will be reflected back into space, so reducing the warming of the oceans and atmosphere.

D The concept of releasing aerosol sprays into the stratosphere above the Arctic has been proposed by several scientists. This would involve using sulphur or hydrogen sulphide aerosols so that sulphur dioxide would form clouds, which would, in turn, lead to a global dimming. The idea is modelled on historic 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. Scientists have also scrutinised whether it's possible to preserve the ice sheets of Greenland with reinforced high-tension cables, preventing icebergs from moving into the sea. Meanwhile in the Russian Arctic, geo-engineering plans include the planting of millions of birch trees. Whereas the region's native evergreen pines shade the snow and absorb radiation, birches would shed their

leaves in winter, thus enabling radiation to be reflected by the snow. Re-routing Russian rivers to increase cold water flow to ice-forming areas could also be used to slow down warming, say some climate scientists.

E   But will such schemes ever be implemented? Generally speaking, those who are most cautious about geo-engineering are the scientists involved in the research. Angel says that his plan is 'no substitute for developing renewable energy: the only permanent solution'. And Dr Phil Rasch of the US-based Pacific Northwest National Laboratory is equally guarded about the role of geo-engineering: 'I think all of us agree that if we were to end geo-engineering on a given day, then the planet would return to its pre-engineered condition very rapidly, and probably within ten to twenty years. That's certainly something to worry about.'

F   The US National Center for Atmospheric Research has already suggested that the proposal to inject sulphur into the atmosphere might affect rainfall patterns across the tropics and the Southern Ocean. 'Geo-engineering plans to inject stratospheric aerosols or to seed clouds would act to cool the planet, and act to increase the extent of sea ice,' says Rasch. 'But all the models suggest some impact on the distribution of precipitation.'

G   'A further risk with geo-engineering projects is that you can "overshoot",' says Dr Dan Lunt, from the University of Bristol's School of Geophysical Sciences, who has studied the likely impacts of the sunshade and aerosol schemes on the climate. '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 will be cooler than before industrialisation.' To avoid such a scenario, Lunt says Angel's project would have to operate at half strength; all of which reinforces his view that the best option is to avoid the need for geo-engineering altogether.

H   The main reason why geo-engineering is supported by many in the scientific community is that most researchers have little faith in the ability of politicians to agree – and then bring in – the necessary carbon cuts. Even leading conservation organisations see the value of investigating the potential of geo-engineering. According to Dr Martin Sommerkorn, climate change advisor for the World Wildlife Fund's International Arctic Programme, 'Human-induced climate change has brought humanity to a position where we shouldn't exclude thinking thoroughly about this topic and its possibilities.'

Questions 27–29

Reading Passage 3 has eight paragraphs **A–H**.

Which paragraph contains the following information?

*Write the correct letter, **A–H**, in boxes 27–29 on your answer sheet.*

27   mention of a geo-engineering project based on an earlier natural phenomenon

28   an example of a successful use of geo-engineering

29   a common definition of geo-engineering

Questions 30–36

Complete the table below.

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

Write your answers in boxes 30–36 on your answer sheet.

GEO-ENGINEERING PROJECTS

Procedure	Aim
put a large number of tiny spacecraft into orbit far above Earth	to create a **30** .... that would reduce the amount of light reaching Earth
place **31** .... in the sea	to encourage **32** .... to form
release aerosol sprays into the stratosphere	to create **33** .... that would reduce the amount of light reaching Earth
fix strong **34** .... to Greenland ice sheets	to prevent icebergs moving into the sea
plant trees in Russian Arctic that would lose their leaves in winter	to allow the **35** .... to reflect radiation
change the direction of **36**	to bring more cold water into ice-forming areas

Questions 37–40

Look at the following statements (Questions 37–40) and the list of scientists below.

*Match each statement with the correct scientist, **A–D**.*

*Write the correct letter, **A–D**, in boxes 37–40 on your answer sheet.*

37   The effects of geo-engineering may not be long-lasting.

38   Geo-engineering is a topic worth exploring.

39   It may be necessary to limit the effectiveness of geo-engineering projects.

40   Research into non-fossil-based fuels cannot be replaced by geo-engineering.

	List of Scientists
A	Roger Angel
B	Phil Rasch
C	Dan Lunt
D	Martin Sommerkorn

READING PASSAGE 3

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

Neuroaesthetics

An emerging discipline called neuroaesthetics is seeking to bring scientific objectivity to the study of art, and has already given us a better understanding of many masterpieces. The blurred imagery of Impressionist paintings seems to stimulate the brain's amygdala, for instance. Since the amygdala plays a crucial role in our feelings, that finding might explain why many people find these pieces so moving.

Could the same approach also shed light on abstract twentieth-century pieces, from Mondrian's geometrical blocks of colour, to Pollock's seemingly haphazard arrangements of splashed paint on canvas? Sceptics believe that people claim to like such works simply because they are famous. We certainly do have an inclination to follow the crowd. When asked to make simple perceptual decisions such as matching a shape to its rotated image, for example, people often choose a definitively wrong answer if they see others doing the same. It is easy to imagine that this mentality would have even more impact on a fuzzy concept like art appreciation, where there is no right or wrong answer.

Angelina Hawley-Dolan, of Boston College, Massachusetts, responded to this debate by asking volunteers to view pairs of paintings – either the creations of famous abstract artists or the doodles of infants, chimps and elephants. They then had to judge which they preferred. A third of the paintings were given no captions, while many were labelled incorrectly – volunteers might think they were viewing a chimp's messy brushstrokes when they were actually seeing an acclaimed masterpiece. In each set of trials, volunteers generally preferred the work of renowned artists, even when they believed it was by an animal or a child. It seems that the viewer can sense the artist's vision in paintings, even if they can't explain why.

Robert Pepperell, an artist based at Cardiff University, creates ambiguous works that are neither entirely abstract nor clearly representational. In one study, Pepperell and his collaborators asked volunteers to decide how 'powerful' they considered an artwork to be, and whether they saw anything familiar in the piece. The longer they took to answer these questions, the more highly they rated the piece under scrutiny, and the greater their neural activity. It would seem that the brain sees these images as puzzles, and the harder it is to decipher the meaning, the more rewarding is the moment of recognition.

And what about artists such as Mondrian, whose paintings consist exclusively of horizontal and vertical lines encasing blocks of colour? Mondrian's works are deceptively simple, but eye-tracking studies confirm that they are meticulously composed, and that simply rotating a piece radically changes the way we view it. With the originals, volunteers' eyes tended to stay longer on certain places in the image, but with the altered versions they would flit across a piece more rapidly. As a result, the volunteers considered the altered versions less pleasurable when they later rated the work.

In a similar study, Oshin Vartanian of Toronto University asked volunteers to compare original paintings with ones which he had altered by moving objects around within the frame. He found that almost everyone preferred the original, whether it was a Van Gogh still life or an abstract by Miró. Vartanian also found that changing the composition of the paintings reduced activation in those brain areas linked with meaning and interpretation.

In another experiment, Alex Forsythe of the University of Liverpool analysed the visual intricacy of different pieces of art, and her results suggest that many artists use a key level of detail to please the brain. Too little and the work is boring, but too much results in a kind of 'perceptual overload', according to Forsythe. What's more, appealing pieces both abstract and representational, show signs of 'fractals' – repeated motifs recurring in different scales. Fractals are common throughout nature, for example in the shapes of mountain peaks or the branches of trees. It is possible that our visual system, which evolved in the great outdoors, finds it easier to process such patterns.

It is also intriguing that the brain appears to process movement when we see a handwritten letter, as if we are replaying the writer's moment of creation. This has led some to wonder whether Pollock's works feel so dynamic because the brain reconstructs the energetic actions the artist used as he painted. This may be down to our brain's 'mirror neurons', which are known to mimic others' actions. The hypothesis will need to be thoroughly tested, however. It might even be the case that we could use neuroaesthetic studies to understand the longevity of some pieces of artwork. While the fashions of the time might shape what is currently popular, works that are best adapted to our visual system may be the most likely to linger once the trends of previous generations have been forgotten.

It's still early days for the field of neuroaesthetics – and these studies are probably only a taste of what is to come. It would, however, be foolish to reduce art appreciation to a set of scientific laws. We shouldn't underestimate the importance of the style of a particular artist, their place in history and the artistic environment of their time. Abstract art offers both a challenge and the freedom to play with different interpretations. In some ways, it's not so different to science, where we are constantly looking for systems and decoding meaning so that we can view and appreciate the world in a new way.

Questions 27–30

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

Write the correct letter in boxes 27–30 on your answer sheet.

27 In the second paragraph, the writer refers to a shape-matching test in order to illustrate

    A   the subjective nature of art appreciation.
    B   the reliance of modern art on abstract forms.
    C   our tendency to be influenced by the opinions of others.
    D   a common problem encountered when processing visual data.

28 Angelina Hawley-Dolan's findings indicate that people

    A   mostly favour works of art which they know well.
    B   hold fixed ideas about what makes a good work of art.
    C   are often misled by their initial expectations of a work of art.
    D   have the ability to perceive the intention behind works of art.

29 Results of studies involving Robert Pepperell's pieces suggest that people

    A   can appreciate a painting without fully understanding it.
    B   find it satisfying to work out what a painting represents.
    C   vary widely in the time they spend looking at paintings.
    D   generally prefer representational art to abstract art.

30 What do the experiments described in the fifth paragraph suggest about the paintings of Mondrian?

    A   They are more carefully put together than they appear.
    B   They can be interpreted in a number of different ways.
    C   They challenge our assumptions about shape and colour.
    D   They are easier to appreciate than many other abstract works.

Questions 31–33

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

*Write the correct letters, **A–H**, in boxes 31–33 on your answer sheet.*

Art and the Brain

The discipline of neuroaesthetics aims to bring scientific objectivity to the study of art. Neurological studies of the brain, for example, demonstrate the impact which Impressionist paintings have on our **31** .... Alex Forsythe of the University of Liverpool believes many artists give their works the precise degree of **32** .... which most appeals to the viewer's brain. She also observes that pleasing works of art often contain certain repeated **33** .... which occur frequently in the natural world.

A	interpretation	**B**	complexity	**C**	emotions
D	movements	**E**	skill	**F**	layout
G	concern	**H**	images		

Questions 34–39

Do the following statements agree with the views of the writer in Reading Passage 3?

In boxes 34–39 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 there is no information on this*

34   Forsythe's findings contradicted previous beliefs on the function of 'fractals' in art.

35   Certain ideas regarding the link between 'mirror neurons' and art appreciation require further verification.

36   People's taste in paintings depends entirely on the current artistic trends of the period.

37   Scientists should seek to define the precise rules which govern people's reactions to works of art.

38   Art appreciation should always involve taking into consideration the cultural context in which an artist worked.

39   It is easier to find meaning in the field of science than in that of art.

Question 40

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

Write the correct letter in box 40 on your answer sheet.

40   What would be the most appropriate subtitle for the article?

     A   Some scientific insights into how the brain responds to abstract art
     B   Recent studies focusing on the neural activity of abstract artists
     C   A comparison of the neurological bases of abstract and representational art
     D   How brain research has altered public opinion about abstract art

READING PASSAGE 3

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

Preface to 'How the other half thinks: Adventures in mathematical reasoning'

A Occasionally, in some difficult musical compositions, there are beautiful, but easy parts – parts so simple a beginner could play them. So it is with mathematics as well. There are some discoveries in advanced mathematics that do not depend on specialized knowledge, not even on algebra, geometry, or trigonometry. Instead they may involve, at most, a little arithmetic, such as 'the sum of two odd numbers is even', and common sense. Each of the eight chapters in this book illustrates this phenomenon. Anyone can understand every step in the reasoning.

The thinking in each chapter uses at most only elementary arithmetic, and sometimes not even that. Thus all readers will have the chance to participate in a mathematical experience, to appreciate the beauty of mathematics, and to become familiar with its logical, yet intuitive, style of thinking.

B One of my purposes in writing this book is to give readers who haven't had the opportunity to see and enjoy real mathematics the chance to appreciate the mathematical way of thinking. I want to reveal not only some of the fascinating discoveries, but, more importantly, the reasoning behind them.

In that respect, this book differs from most books on mathematics written for the general public. Some present the lives of colorful mathematicians. Others describe important applications of mathematics. Yet others go into mathematical procedures, but assume that the reader is adept in using algebra.

C I hope this book will help bridge that notorious gap that separates the two cultures: the humanities and the sciences, or should I say the right brain (intuitive) and the left brain (analytical, numerical). As the chapters will illustrate, mathematics is not restricted to the analytical and numerical; intuition plays a significant role. The alleged gap can be narrowed or completely overcome by anyone, in part because each of us is far from using the full capacity of either side of the brain. To illustrate our human potential, I cite a structural engineer who is an artist, an electrical engineer who is an opera singer, an opera singer who published mathematical research, and a mathematician who publishes short stories.

D Other scientists have written books to explain their fields to non-scientists, but have necessarily had to omit the mathematics, although it provides the foundation of their theories. The reader must remain a tantalized spectator rather than an involved participant, since the appropriate language for describing the details in much of science is mathematics, whether the subject is expanding universe, subatomic particles, or chromosomes. Though the broad outline of a scientific theory can be

sketched intuitively, when a part of the physical universe is finally understood, its description often looks like a page in a mathematics text.

E   Still, the non-mathematical reader can go far in understanding mathematical reasoning. This book presents the details that illustrate the mathematical style of thinking, which involves sustained, step-by-step analysis, experiments, and insights. You will turn these pages much more slowly than when reading a novel or a newspaper. It may help to have a pencil and paper ready to check claims and carry out experiments.

F   As I wrote, I kept in mind two types of readers: those who enjoyed mathematics until they were turned off by an unpleasant episode, usually around fifth grade, and mathematics aficionados, who will find much that is new throughout the book.

This book also serves readers who simply want to sharpen their analytical skills. Many careers, such as law and medicine, require extended, precise analysis. Each chapter offers practice in following a sustained and closely argued line of thought. That mathematics can develop this skill is shown by these two testimonials:

G   A physician wrote, 'The discipline of analytical thought processes [in mathematics] prepared me extremely well for medical school. In medicine one is faced with a problem which must be thoroughly analyzed before a solution can be found. The process is similar to doing mathematics.'

A lawyer made the same point, 'Although I had no background in law – not even one political science course – I did well at one of the best law schools. I attribute much of my success there to having learned, through the study of mathematics, and, in particular, theorems, how to analyze complicated principles. Lawyers who have studied mathematics can master the legal principles in a way that most others cannot.'

I hope you will share my delight in watching as simple, even naïve, questions lead to remarkable solutions and purely theoretical discoveries find unanticipated applications.

Questions 27–34

Reading Passage 3 has seven sections, **A–G**.

Which section contains the following information?

*Write the correct letter, **A–G**, in boxes 27–34 on your answer sheet.*

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

27   a reference to books that assume a lack of mathematical knowledge

28   the way in which this is not a typical book about mathematics

29   personal examples of being helped by mathematics

30   examples of people who each had abilities that seemed incompatible

31   mention of different focuses of books about mathematics

32   a contrast between reading this book and reading other kinds of publication

33   a claim that the whole of the book is accessible to everybody

34   a reference to different categories of intended readers of this book

Questions 35–40

Complete the sentences below.

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

Write your answers in boxes 35–40 on your answer sheet.

35 Some areas of both music and mathematics are suitable for someone who is a ....

36 It is sometimes possible to understand advanced mathematics using no more than a limited knowledge of ....

37 The writer intends to show that mathematics requires .... thinking, as well as analytical skills.

38 Some books written by .... have had to leave out the mathematics that is central to their theories.

39 The writer advises non-mathematical readers to perform .... while reading the book.

40 A lawyer found that studying .... helped even more than other areas of mathematics in the study of law.

TEST 28

READING PASSAGE 3

*You should spend about 20 minutes on **Questions 27–40**, which are based on Reading Passage 3 on the following pages.*

Questions 27–32

Reading Passage 3 has six paragraphs, **A–F**.

*Choose the correct heading for paragraphs **A–F** from the list of headings below.*

*Write the correct number, **i–vii**, in boxes 27–32 on your answer sheet.*

List of Headings

Differences between languages highlight their impressiveness

ii   The way in which a few sounds are organised to convey a huge range of meaning

iii   Why the sounds used in different languages are not identical

iv   Apparently incompatible characteristics of language

v   Even silence can be meaningful

vi   Why language is the most important invention of all

vii   The universal ability to use language

---

27   Paragraph **A**

28   Paragraph **B**

29   Paragraph **C**

30   Paragraph **D**

31   Paragraph **E**

32   Paragraph **F**

'This Marvellous Invention'

A   Of all mankind's manifold creations, language must take pride of place. Other inventions – the wheel, agriculture, sliced bread – may have transformed our material existence, but the advent of language is what made us human. Compared to language, all other inventions pale in significance, since everything we have ever achieved depends on language and originates from it. Without language, we could never have embarked on our ascent to unparalleled power over all other animals, and even over nature itself.

B   But language is foremost not just because it came first. In its own right it is a tool of extraordinary sophistication, yet based on an idea of ingenious simplicity: 'this marvellous invention of composing out of twenty-five or thirty sounds that infinite variety of expressions which, whilst having in themselves no likeness to what is in our mind, allow us to disclose to others its whole secret, and to make known to those who cannot penetrate it all that we imagine, and all the various stirrings of our soul'. This was how, in 1660, the renowned French grammarians of the Port-Royal abbey near Versailles distilled the essence of language, and no one since has celebrated more eloquently the magnitude of its achievement. Even so, there is just one flaw in all these hymns of praise, for the homage to language's unique accomplishment conceals a simple yet critical incongruity. Language is mankind's greatest invention – except, of course, that it was never invented. This apparent paradox is at the core of our fascination with language, and it holds many of its secrets.

C   Language often seems so skillfully drafted that one can hardly imagine it as anything other than the perfected handiwork of a master craftsman. How else could this instrument make so much out of barely three dozen measly morsels of sound? In themselves, these configurations of mouth – *p,f,b,v,t,d,k,g,sh,a,e* and so on – amount to nothing more than a few haphazard spits and splutters, random noises with no meaning, no ability to express, no power to explain. But run them through the cogs and wheels of the language machine, let it arrange them in some very special orders, and there is nothing that these meaningless streams of air cannot do: from sighing the interminable boredom of existence to unravelling the fundamental order of the universe.

D   The most extraordinary thing about language, however, is that one doesn't have to be a genius to set its wheels in motion. The language machine allows just about everybody – from pre-modern foragers in the subtropical savannah, to post-modern philosophers in the suburban sprawl – to tie these meaningless sounds together into an infinite variety of subtle senses, and all apparently without the slightest exertion. Yet it is precisely this deceptive ease which makes language a victim of its own success, since in everyday life its triumphs are usually taken for granted. The wheels of language run so smoothly that one rarely bothers to stop and think about all the resourcefulness and expertise that must have gone into making it tick. Language conceals art.

E   Often, it is only the estrangement of foreign tongues, with their many exotic and outlandish features, that brings home the wonder of language's design. One of the showiest stunts that some languages can pull off is an ability to build up words of breath-breaking length, and thus express in one word what English takes a whole sentence to say. The Turkish word *şehirlileştiremediklerimizdensiniz*, to take one example, means nothing less than 'you are one of those whom we can't turn into a town-dweller'. (In case you were wondering, this monstrosity really is one word, not merely many different words squashed together – most of its components cannot even stand up on their own.)

F   And if that sounds like some one-off freak, then consider Sumerian, the language spoken on the banks of the Euphrates some 5,000 years ago by the people who invented writing and thus enabled the documentation of history. A Sumerian word like *munintuma'a* ('when he had made it suitable for her') might seem rather trim compared to the Turkish colossus above. What is so impressive about it, however, is not its lengthiness but rather the reverse – the thrifty compactness of its construction. The word is made up of different slots, each corresponding to a particular portion of meaning. This sleek design allows single sounds to convey useful information, and in fact even the absence of a sound has been enlisted to express something specific. If you were to ask which bit in the Sumerian word corresponds to the pronoun 'it' in the English translation 'when he had made it suitable for her', then the answer would have to be nothing. Mind you, a very particular kind of nothing: the nothing that stands in the empty slot in the middle. The technology is so fine-tuned then that even a non-sound, when carefully placed in a particular position, has been invested with a specific function. Who could possibly have come up with such a nifty contraption?

Questions 33–36

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

*Write the correct letter, **A–G**, in boxes 33–36 on your answer sheet.*

The importance of language

The wheel is one invention that has had a major impact on **33** .... aspects of life, but no impact has been as **34** .... as that of language. Language is very **35** .... , yet composed of just a small number of sounds.

Language appears to be **36** .... to use. However, its sophistication is often overlooked.

A	difficult	**B**	complex	**C**	original
D	admired		material	**F**	easy
G	fundamental				

Quesfions 37 - 40

Do the following statements agree with the views of the writer in Reading Passage 3?

In boxes 37–40 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*

37   Human beings might have achieved their present position without language.

38   The Port-Royal grammarians did justice to the nature of language.

39   A complex idea can be explained more clearly in a sentence than in a single word.

40   The Sumerians were responsible for starting the recording of events.

READING PASSAGE 3

*You should spend about 20 minutes on **Questions 27–40**, which are based on Reading Passage 3 on pages 24 and 25.*

Questions 27–32

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–viii**, in boxes 27–32 on your answer sheet.*

List of Headings
i   Courses that require a high level of commitment
ii   A course title with two meanings
iii   The equal importance of two key issues
iv   Applying a theory in an unexpected context
v   The financial benefits of studying
vi   A surprising course title
vii   Different names for different outcomes
viii   The possibility of attracting the wrong kind of student

27   Section **A**

28   Section **B**

29   Section **C**

30   Section **D**

31   Section **E**

32   Section **F**

What's the purpose of gaining knowledge?

A 'I would found an institution where any person can find instruction in any subject.' That was the founder's motto for Cornell University, and it seems an apt characterization of the different university, also in the USA, where I currently teach philosophy. A student can prepare for a career in resort management, engineering, interior design, accounting, music, law enforcement, you name it. But what would the founders of these two institutions have thought of a course called 'Arson for Profit'? I kid you not: we have it on the books. Any undergraduates who have met the academic requirements can sign up for the course in our program in 'fire science'.

B Naturally, the course is intended for prospective arson investigators, who can learn all the tricks of the trade for detecting whether a fire was deliberately set, discovering who did it, and establishing a chain of evidence for effective prosecution in a court of law. But wouldn't this also be the perfect course for prospective arsonists to sign up for? My point is not to criticize academic programs in fire science: they are highly welcome as part of the increasing professionalization of this and many other occupations. However, it's not unknown for a firefighter to torch a building. This example suggests how dishonest and illegal behavior, with the help of higher education, can creep into every aspect of public and business life.

C I realized this anew when I was invited to speak before a class in marketing, which is another of our degree programs. The regular instructor is a colleague who appreciates the kind of ethical perspective I can bring as a philosopher. There are endless ways I could have approached this assignment, but I took my cue from the title of the course: 'Principles of Marketing'. It made me think to ask the students, 'Is marketing principled?' After all, a subject matter can have principles in the sense of being codified, having rules, as with football or chess, without being principled in the sense of being ethical. Many of the students immediately assumed that the answer to my question about marketing principles was obvious: *no.* Just look at the ways in which everything under the sun has been marketed; obviously it need not be done in a *principled* (=ethical) fashion.

D Is that obvious? I made the suggestion, which may sound downright crazy in light of the evidence, that perhaps marketing is *by definition* principled. My inspiration for this judgement is the philosopher Immanuel Kant, who argued that any body of knowledge consists of an end (or purpose) and a means.

E   Let us apply both the terms 'means' and 'end' to marketing. The students have signed up for a course in order to learn how to market effectively. But to what *end*? There seem to be two main attitudes toward that question. One is that the answer is obvious: the purpose of marketing is to sell things and to make money. The other attitude is that the *purpose* of marketing is irrelevant: Each person comes to the program and course with his or her own plans, and these need not even concern the acquisition of marketing expertise as such. My proposal, which I believe would also be Kant's, is that *neither* of these attitudes captures the significance of the end to the means for marketing. A field of knowledge or a professional endeavor is defined by both the means *and* the end; hence *both* deserve scrutiny. Students need to study both how to achieve X, and also what X is.

F   It is at this point that 'Arson for Profit' becomes supremely relevant. That course is presumably all about *means*: how to detect and prosecute criminal activity. It is therefore assumed that the *end* is good in an ethical sense. When I ask fire science students to articulate the end, or purpose, of their field, they eventually generalize to something like, 'The safety and welfare of society,' which seems right. As we have seen, someone could use the very same knowledge of *means* to achieve a much less noble end, such as personal profit via destructive, dangerous, reckless activity. But *we would not call that firefighting*. We have a separate word for it: *arson*. Similarly, if you employed the 'principles of marketing' in an unprincipled way, *you would not be doing marketing*. We have another term for it: *fraud*. Kant gives the example of a doctor and a poisoner, who use the identical knowledge to achieve their divergent ends. We would say that one is practicing medicine, the other, murder.

Questions 33–36

Complete the summary below.

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

Write your answers in boxes 33–36 on your answer sheet.

The 'Arson for Profit' course

This is a university course intended for students who are undergraduates and who are studying **33** …………… . The expectation is that they will become **34** ………… specialising in arson. The course will help them to detect cases of arson and find **35** ………… of criminal intent, leading to successful **36** ………… in the courts.

Questions 37–40

Do the following statements agree with the views of the writer in Reading Passage 3?

In boxes 37–40 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

37   It is difficult to attract students onto courses that do not focus on a career.

38   The 'Arson for Profit' course would be useful for people intending to set fire to buildings.

39   Fire science courses are too academic to help people to be good at the job of firefighting.

40   The writer's fire science students provided a detailed definition of the purpose of their studies.

Test 6

READING PASSAGE 3

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

The Benefits of Being Bilingual

A According to the latest figures, the majority of the world's population is now bilingual or multilingual, having grown up speaking two or more languages. In the past, such children were considered to be at a disadvantage compared with their monolingual peers. Over the past few decades, however, technological advances have allowed researchers to look more deeply at how bilingualism interacts with and changes the cognitive and neurological systems, thereby identifying several clear benefits of being bilingual.

B Research shows that when a bilingual person uses one language, the other is active at the same time. When we hear a word, we don't hear the entire word all at once: the sounds arrive in sequential order. Long before the word is finished, the brain's language system begins to guess what that word might be. If you hear 'can', you will likely activate words like 'candy' and 'candle' as well, at least during the earlier stages of word recognition. For bilingual people, this activation is not limited to a single language; auditory input activates corresponding words regardless of the language to which they belong. Some of the most compelling evidence for this phenomenon, called 'language co-activation', comes from studying eye movements. A Russian-English bilingual asked to 'pick up a marker' from a set of objects would look more at a stamp than someone who doesn't know Russian, because the Russian word for 'stamp', *marka*, sounds like the English word he or she heard, 'marker'. In cases like this, language co-activation occurs because what the listener hears could map onto words in either language.

C Having to deal with this persistent linguistic competition can result in difficulties, however. For instance, knowing more than one language can cause speakers to name pictures more slowly, and can increase 'tip-of-the-tongue states', when you can almost, but not quite, bring a word to mind. As a result, the constant juggling of two languages creates a need to control how much a person accesses a language at any given time. For this reason, bilingual people often perform better on tasks that require conflict management. In the classic Stroop Task, people see a word and are asked to name the colour of the word's font. When the colour and the word match (i.e., the word 'red' printed in red), people correctly name the colour more quickly than when the colour and the word don't match (i.e., the word 'red' printed in blue). This occurs because the word itself ('red') and its font colour (blue) conflict. Bilingual people often excel at tasks such as this, which tap into the ability to ignore competing perceptual information and focus on the relevant aspects of the input. Bilinguals are also better at switching between two tasks; for example, when bilinguals have to switch from categorizing objects by colour (red or green)

to categorizing them by shape (circle or triangle), they do so more quickly than monolingual people, reflecting better cognitive control when having to make rapid changes of strategy.

D   It also seems that the neurological roots of the bilingual advantage extend to brain areas more traditionally associated with sensory processing. When monolingual and bilingual adolescents listen to simple speech sounds without any intervening background noise, they show highly similar brain stem responses. When researchers play the same sound to both groups in the presence of background noise, however, the bilingual listeners' neural response is considerably larger, reflecting better encoding of the sound's fundamental frequency, a feature of sound closely related to pitch perception.

E   Such improvements in cognitive and sensory processing may help a bilingual person to process information in the environment, and help explain why bilingual adults acquire a third language better than monolingual adults master a second language. This advantage may be rooted in the skill of focussing on information about the new language while reducing interference from the languages they already know.

F   Research also indicates that bilingual experience may help to keep the cognitive mechanisms sharp by recruiting alternate brain networks to compensate for those that become damaged during aging. Older bilinguals enjoy improved memory relative to monolingual people, which can lead to real-world health benefits. In a study of over 200 patients with Alzheimer's disease, a degenerative brain disease, bilingual patients reported showing initial symptoms of the disease an average of five years later than monolingual patients. In a follow-up study, researchers compared the brains of bilingual and monolingual patients matched on the severity of Alzheimer's symptoms. Surprisingly, the bilinguals' brains had more physical signs of disease than their monolingual counterparts, even though their outward behaviour and abilities were the same. If the brain is an engine, bilingualism may help it to go farther on the same amount of fuel.

G   Furthermore, the benefits associated with bilingual experience seem to start very early. In one study, researchers taught seven-month-old babies growing up in monolingual or bilingual homes that when they heard a tinkling sound, a puppet appeared on one side of a screen. Halfway through the study, the puppet began appearing on the opposite side of the screen. In order to get a reward, the infants had to adjust the rule they'd learned; only the bilingual babies were able to successfully learn the new rule. This suggests that for very young children, as well as for older people, navigating a multilingual environment imparts advantages that transfer far beyond language.

Test 6

Questions 27–31

Complete the table below.

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

Write your answers in boxes 27–31 on your answer sheet.

Test	Findings
Observing the **27** .... of Russian-English bilingual people when asked to select certain objects	Bilingual people engage both languages simultaneously: a mechanism known as **28** ....
A test called the **29** .... , focusing on naming colours	Bilingual people are more able to handle tasks involving a skill called **30** ....
A test involving switching between tasks	When changing strategies, bilingual people have superior **31** ....

Questions 32–36

Do the following statements agree with the claims of the writer in Reading Passage 3?

In boxes 32–36 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   Attitudes towards bilingualism have changed in recent years.

33   Bilingual people are better than monolingual people at guessing correctly what words are before they are finished.

34   Bilingual people consistently name images faster than monolingual people.

35   Bilingual people's brains process single sounds more efficiently than monolingual people in all situations.

36   Fewer bilingual people than monolingual people suffer from brain disease in old age.

Questions 37–40

Reading Passage 3 has seven paragraphs, **A–G**.

Which paragraph contains the following information?

*Write the correct letter, **A–G**, in boxes 37–40 on your answer sheet.*

37 an example of how bilingual and monolingual people's brains respond differently to a certain type of non-verbal auditory input

38 a demonstration of how a bilingual upbringing has benefits even before we learn to speak

39 a description of the process by which people identify words that they hear

40 reference to some negative consequences of being bilingual

TEST 31

READING PASSAGE 3

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

Music and the emotions

Neuroscientist Jonah Lehrer considers the emotional power of music

Why does music make us feel? On the one hand, music is a purely abstract art form, devoid of language or explicit ideas. And yet, even though music says little, it still manages to touch us deeply. When listening to our favourite songs, our body betrays all the symptoms of emotional arousal. The pupils in our eyes dilate, our pulse and blood pressure rise, the electrical conductance of our skin is lowered, and the cerebellum, a brain region associated with bodily movement, becomes strangely active. Blood is even re-directed to the muscles in our legs. In other words, sound stirs us at our biological roots.

A recent paper in *Nature Neuroscience* by a research team in Montreal, Canada, marks an important step in revealing the precise underpinnings of 'the potent pleasurable stimulus' that is music. Although the study involves plenty of fancy technology, including functional magnetic resonance imaging (fMRI) and ligand-based positron emission tomography (PET) scanning, the experiment itself was rather straightforward. After screening 217 individuals who responded to advertisements requesting people who experience 'chills' to instrumental music, the scientists narrowed down the subject pool to ten. They then asked the subjects to bring in their playlist of favourite songs – virtually every genre was represented, from techno to tango – and played them the music while their brain activity was monitored. Because the scientists were combining methodologies (PET and fMRI), they were able to obtain an impressively exact and detailed portrait of music in the brain. The first thing they discovered is that music triggers the production of dopamine – a chemical with a key role in setting people's moods – by the neurons (nerve cells) in both the dorsal and ventral regions of the brain. As these two regions have long been linked with the experience of pleasure, this finding isn't particularly surprising.

What is rather more significant is the finding that the dopamine neurons in the caudate – a region of the brain involved in learning stimulus-response associations, and in anticipating food and other 'reward' stimuli – were at their most active around 15 seconds before the participants' favourite moments in the music. The researchers call this the 'anticipatory phase' and argue that the purpose of this activity is to help us predict the arrival of our favourite part. The question, of course, is what all these dopamine neurons are up to. Why are they so active in the period *preceding* the acoustic climax? After all, we typically associate surges of dopamine with pleasure, with the processing of *actual* rewards. And yet, this cluster of cells is most active when the 'chills' have yet to arrive, when the melodic pattern is still unresolved.

One way to answer the question is to look at the music and not the neurons. While music can often seem (at least to the outsider) like a labyrinth of intricate patterns, it turns out that the most important part of every song or symphony is when the patterns break down, when the sound becomes unpredictable. If the music is too obvious, it is annoyingly boring, like an alarm clock. Numerous studies, after all, have demonstrated that dopamine neurons quickly adapt to predictable rewards. If we know what's going to happen next, then we don't get excited. This is why composers often introduce a key note in the beginning of a song, spend most of the rest of the piece in the studious avoidance of the pattern, and then finally repeat it only at the end. The longer we are denied the pattern we expect, the greater the emotional release when the pattern returns, safe and sound.

To demonstrate this psychological principle, the musicologist Leonard Meyer, in his classic book *Emotion and Meaning in Music* (1956), analysed the 5th movement of Beethoven's String Quartet in C-sharp minor, Op. 131. Meyer wanted to show how music is defined by its flirtation with – but not submission to – our expectations of order. Meyer dissected 50 measures (bars) of the masterpiece, showing how Beethoven begins with the clear statement of a rhythmic and harmonic pattern and then, in an ingenious tonal dance, carefully holds off repeating it. What Beethoven does instead is suggest variations of the pattern. He wants to preserve an element of uncertainty in his music, making our brains beg for the one chord he refuses to give us. Beethoven saves that chord for the end.

According to Meyer, it is the suspenseful tension of music, arising out of our unfulfilled expectations, that is the source of the music's feeling. While earlier theories of music focused on the way a sound can refer to the real world of images and experiences – its 'connotative' meaning – Meyer argued that the emotions we find in music come from the unfolding events of the music itself. This 'embodied meaning' arises from the patterns the symphony invokes and then ignores. It is this uncertainty that triggers the surge of dopamine in the caudate, as we struggle to figure out what will happen next. We can predict some of the notes, but we can't predict them all, and that is what keeps us listening, waiting expectantly for our reward, for the pattern to be completed.

Questions 27–31

Complete the summary below.

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

Write your answers in boxes 27–31 on your answer sheet.

The Montreal Study

Participants, who were recruited for the study through advertisements, had their brain activity monitored while listening to their favourite music. It was noted that the music stimulated the brain's neurons to release a substance called **27** .... in two of the parts of the brain which are associated with feeling **28** ....

Researchers also observed that the neurons in the area of the brain called the **29** .... were particularly active just before the participants' favourite moments in the music – the period known as the **30** .... Activity in this part of the brain is associated with the expectation of 'reward' stimuli such as **31** ....

Questions 32–36

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

Write the correct letter in boxes 32–36 on your answer sheet.

32 What point does the writer emphasise in the first paragraph?

- **A** how dramatically our reactions to music can vary
- **B** how intense our physical responses to music can be
- **C** how little we know about the way that music affects us
- **D** how much music can tell us about how our brains operate

33 What view of the Montreal study does the writer express in the second paragraph?

- **A** Its aims were innovative.
- **B** The approach was too simplistic.
- **C** It produced some remarkably precise data.
- **D** The technology used was unnecessarily complex.

34 What does the writer find interesting about the results of the Montreal study?

- **A** the timing of participants' neural responses to the music
- **B** the impact of the music on participants' emotional state
- **C** the section of participants' brains which was activated by the music
- **D** the type of music which had the strongest effect on participants' brains

35 Why does the writer refer to Meyer's work on music and emotion?

- **A** to propose an original theory about the subject
- **B** to offer support for the findings of the Montreal study
- **C** to recommend the need for further research into the subject
- **D** to present a view which opposes that of the Montreal researchers

36 According to Leonard Meyer, what causes the listener's emotional response to music?

- **A** the way that the music evokes poignant memories in the listener
- **B** the association of certain musical chords with certain feelings
- **C** the listener's sympathy with the composer's intentions
- **D** the internal structure of the musical composition

Test 7

Questions 37–40

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

*Write the correct letter, **A–F**, in boxes 37–40 on your answer sheet.*

37   The Montreal researchers discovered that

38   Many studies have demonstrated that

39   Meyer's analysis of Beethoven's music shows that

40   Earlier theories of music suggested that

A	our response to music depends on our initial emotional state.
B	neuron activity decreases if outcomes become predictable.
C	emotive music can bring to mind actual pictures and events.
D	experiences in our past can influence our emotional reaction to music.
E	emotive music delays giving listeners what they expect to hear.
F	neuron activity increases prior to key points in a musical piece.

TEST 32

READING PASSAGE 3

*You should spend about 20 minutes on **Questions 27–40**, which are based on Reading Passage 3 on pages 89 and 90.*

Questions 27–33

Reading Passage 3 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 27–33 on your answer sheet.*

List of Headings

i	Disputes over financial arrangements regarding senior managers
ii	The impact on companies of being subjected to close examination
iii	The possible need for fundamental change in every area of business
iv	Many external bodies being held responsible for problems
v	The falling number of board members with broad enough experience
vi	A risk that not all directors take part in solving major problems
vii	Boards not looking far enough ahead
viii	A proposal to change the way the board operates

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27 Paragraph **A**

28 Paragraph **B**

29 Paragraph **C**

30 Paragraph **D**

31 Paragraph **E**

32 Paragraph **F**

33 Paragraph **G**

UK companies need more effective boards of directors

A After a number of serious failures of governance (that is, how they are managed at the highest level), companies in Britain, as well as elsewhere, should consider radical changes to their directors' roles. It is clear that the role of a board director today is not an easy one. Following the 2008 financial meltdown, which resulted in a deeper and more prolonged period of economic downturn than anyone expected, the search for explanations in the many post-mortems of the crisis has meant blame has been spread far and wide. Governments, regulators, central banks and auditors have all been in the frame. The role of bank directors and management and their widely publicised failures have been extensively picked over and examined in reports, inquiries and commentaries.

B The knock-on effect of this scrutiny has been to make the governance of companies in general an issue of intense public debate and has significantly increased the pressures on, and the responsibilities of, directors. At the simplest and most practical level, the time involved in fulfilling the demands of a board directorship has increased significantly, calling into question the effectiveness of the classic model of corporate governance by part-time, independent non-executive directors. Where once a board schedule may have consisted of between eight and ten meetings a year, in many companies the number of events requiring board input and decisions has dramatically risen. Furthermore, the amount of reading and preparation required for each meeting is increasing. Agendas can become overloaded and this can mean the time for constructive debate must necessarily be restricted in favour of getting through the business.

C Often, board business is devolved to committees in order to cope with the workload, which may be more efficient but can mean that the board as a whole is less involved in fully addressing some of the most important issues. It is not uncommon for the audit committee meeting to last longer than the main board meeting itself. Process may take the place of discussion and be at the expense of real collaboration, so that boxes are ticked rather than issues tackled.

D A radical solution, which may work for some very large companies whose businesses are extensive and complex, is the professional board, whose members would work up to three or four days a week, supported by their own dedicated staff and advisers. There are obvious risks to this and it would be important to establish clear guidelines for such a board to ensure that it did not step on the toes of management by becoming too engaged in the day-to-day running of the company. Problems of recruitment, remuneration and independence could also arise and this structure would not be appropriate for all companies. However, more professional and better-informed boards would have been particularly appropriate for banks where the executives had access to information that part-time non-executive directors lacked, leaving the latter unable to comprehend or anticipate the 2008 crash.

E   One of the main criticisms of boards and their directors is that they do not focus sufficiently on longer-term matters of strategy, sustainability and governance, but instead concentrate too much on short-term financial metrics. Regulatory requirements and the structure of the market encourage this behaviour. The tyranny of quarterly reporting can distort board decision-making, as directors have to 'make the numbers' every four months to meet the insatiable appetite of the market for more data. This serves to encourage the trading methodology of a certain kind of investor who moves in and out of a stock without engaging in constructive dialogue with the company about strategy or performance, and is simply seeking a short-term financial gain. This effect has been made worse by the changing profile of investors due to the globalisation of capital and the increasing use of automated trading systems. Corporate culture adapts and management teams are largely incentivised to meet financial goals.

F   Compensation for chief executives has become a combat zone where pitched battles between investors, management and board members are fought, often behind closed doors but increasingly frequently in the full glare of press attention. Many would argue that this is in the interest of transparency and good governance as shareholders use their muscle in the area of pay to pressure boards to remove underperforming chief executives. Their powers to vote down executive remuneration policies increased when binding votes came into force. The chair of the remuneration committee can be an exposed and lonely role, as Alison Carnwath, chair of Barclays Bank's remuneration committee, found when she had to resign, having been roundly criticised for trying to defend the enormous bonus to be paid to the chief executive; the irony being that she was widely understood to have spoken out against it in the privacy of the committee.

G   The financial crisis stimulated a debate about the role and purpose of the company and a heightened awareness of corporate ethics. Trust in the corporation has been eroded and academics such as Michael Sandel, in his thoughtful and bestselling book *What Money Can't Buy*, are questioning the morality of capitalism and the market economy. Boards of companies in all sectors will need to widen their perspective to encompass these issues and this may involve a realignment of corporate goals. We live in challenging times.

Questions 34–37

Do the following statements agree with the claims of the writer in Reading Passage 3?

In boxes 34–37 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*

34   Close scrutiny of the behaviour of boards has increased since the economic downturn.

35   Banks have been mismanaged to a greater extent than other businesses.

36   Board meetings normally continue for as long as necessary to debate matters in full.

37   Using a committee structure would ensure that board members are fully informed about significant issues.

Questions 38–40

Complete the sentences below.

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

Write your answers in boxes 38–40 on your answer sheet.

38   Before 2008, non-executive directors were at a disadvantage because of their lack of ....

39   Boards tend to place too much emphasis on .... considerations that are only of short-term relevance.

40   On certain matters, such as pay, the board may have to accept the views of ....

TEST 33

READING PASSAGE 3

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

Artificial artists

Can computers really create works of art?

The Painting Fool is one of a growing number of computer programs which, so their makers claim, possess creative talents. Classical music by an artificial composer has had audiences enraptured, and even tricked them into believing a human was behind the score. Artworks painted by a robot have sold for thousands of dollars and been hung in prestigious galleries. And software has been built which creates art that could not have been imagined by the programmer.

Human beings are the only species to perform sophisticated creative acts regularly. If we can break this process down into computer code, where does that leave human creativity? 'This is a question at the very core of humanity,' says Geraint Wiggins, a computational creativity researcher at Goldsmiths, University of London. 'It scares a lot of people. They are worried that it is taking something special away from what it means to be human.'

To some extent, we are all familiar with computerised art. The question is: where does the work of the artist stop and the creativity of the computer begin? Consider one of the oldest machine artists, Aaron, a robot that has had paintings exhibited in London's Tate Modern and the San Francisco Museum of Modern Art. Aaron can pick up a paintbrush and paint on canvas on its own. Impressive perhaps, but it is still little more than a tool to realise the programmer's own creative ideas.

Simon Colton, the designer of the Painting Fool, is keen to make sure his creation doesn't attract the same criticism. Unlike earlier 'artists' such as Aaron, the Painting Fool only needs minimal direction and can come up with its own concepts by going online for material. The software runs its own web searches and trawls through social media sites. It is now beginning to display a kind of imagination too, creating pictures from scratch. One of its original works is a series of fuzzy landscapes, depicting trees and sky. While some might say they have a mechanical look, Colton argues that such reactions arise from people's double standards towards software-produced and human-produced art. After all, he says, consider that the Painting Fool painted the landscapes without referring to a photo. 'If a child painted a new scene from its head, you'd say it has a certain level of imagination,' he points out. 'The same should be true of a machine.' Software bugs can also lead to unexpected results. Some of the Painting Fool's paintings of a chair came out in black and white, thanks to a technical glitch. This gives the work an eerie, ghostlike quality. Human artists like the renowned Ellsworth Kelly are lauded for limiting their colour palette – so why should computers be any different?

Researchers like Colton don't believe it is right to measure machine creativity directly to that of humans who 'have had millennia to develop our skills'. Others, though, are fascinated by the prospect that a computer might create something as original and subtle as our best artists. So far, only one has come close. Composer David Cope invented a program called Experiments in Musical Intelligence, or EMI. Not only did EMI create compositions in Cope's style, but also that of the most revered classical composers, including Bach, Chopin and Mozart. Audiences were moved to tears, and EMI even fooled classical music experts into thinking they were hearing genuine Bach. Not everyone was impressed however. Some, such as Wiggins, have blasted Cope's work as pseudoscience, and condemned him for his deliberately vague explanation of how the software worked. Meanwhile, Douglas Hofstadter of Indiana University said EMI created replicas which still rely completely on the original artist's creative impulses. When audiences found out the truth they were often outraged with Cope, and one music lover even tried to punch him. Amid such controversy, Cope destroyed EMI's vital databases.

But why did so many people love the music, yet recoil when they discovered how it was composed? A study by computer scientist David Moffat of Glasgow Caledonian University provides a clue. He asked both expert musicians and non-experts to assess six compositions. The participants weren't told beforehand whether the tunes were composed by humans or computers, but were asked to guess, and then rate how much they liked each one. People who thought the composer was a computer tended to dislike the piece more than those who believed it was human. This was true even among the experts, who might have been expected to be more objective in their analyses.

Where does this prejudice come from? Paul Bloom of Yale University has a suggestion: he reckons part of the pleasure we get from art stems from the creative process behind the work. This can give it an 'irresistible essence', says Bloom. Meanwhile, experiments by Justin Kruger of New York University have shown that people's enjoyment of an artwork increases if they think more time and effort was needed to create it. Similarly, Colton thinks that when people experience art, they wonder what the artist might have been thinking or what the artist is trying to tell them. It seems obvious, therefore, that with computers producing art, this speculation is cut short – there's nothing to explore. But as technology becomes increasingly complex, finding those greater depths in computer art could become possible. This is precisely why Colton asks the Painting Fool to tap into online social networks for its inspiration: hopefully this way it will choose themes that will already be meaningful to us.

Questions 27–31

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

Write the correct letter in boxes 27–31 on your answer sheet.

27 What is the writer suggesting about computer-produced works in the first paragraph?

    A   People's acceptance of them can vary considerably.
    B   A great deal of progress has already been attained in this field.
    C   They have had more success in some artistic genres than in others.
    D   The advances are not as significant as the public believes them to be.

28 According to Geraint Wiggins, why are many people worried by computer art?

    A   It is aesthetically inferior to human art.
    B   It may ultimately supersede human art.
    C   It undermines a fundamental human quality.
    D   It will lead to a deterioration in human ability.

29 What is a key difference between Aaron and the Painting Fool?

    A   its programmer's background
    B   public response to its work
    C   the source of its subject matter
    D   the technical standard of its output

30 What point does Simon Colton make in the fourth paragraph?

    A   Software-produced art is often dismissed as childish and simplistic.
    B   The same concepts of creativity should not be applied to all forms of art.
    C   It is unreasonable to expect a machine to be as imaginative as a human being.
    D   People tend to judge computer art and human art according to different criteria.

31 The writer refers to the paintings of a chair as an example of computer art which

    A   achieves a particularly striking effect.
    B   exhibits a certain level of genuine artistic skill.
    C   closely resembles that of a well-known artist.
    D   highlights the technical limitations of the software.

Questions 32–37

Complete each sentence with the correct ending, **A–G** below.

Write the correct letter, **A–G**, in boxes 32–37 on your answer sheet.

32   Simon Colton says it is important to consider the long-term view when

33   David Cope's EMI software surprised people by

34   Geraint Wiggins criticised Cope for not

35   Douglas Hofstadter claimed that EMI was

36   Audiences who had listened to EMI's music became angry after

37   The participants in David Moffat's study had to assess music without

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List of Ideas

A   generating work that was virtually indistinguishable from that of humans.

B   knowing whether it was the work of humans or software.

C   producing work entirely dependent on the imagination of its creator.

D   comparing the artistic achievements of humans and computers.

E   revealing the technical details of his program.

F   persuading the public to appreciate computer art.

G   discovering that it was the product of a computer program.

Questions 38–40

Do the following statements agree with the claims of the writer in Reading Passage 3?

In boxes 38–40 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*

38   Moffat's research may help explain people's reactions to EMI.

39   The non-experts in Moffat's study all responded in a predictable way.

40   Justin Kruger's findings cast doubt on Paul Bloom's theory about people's prejudice towards computer art.

READING PASSAGE 3

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

MAKING THE MOST OF TRENDS

Experts from Harvard Business School give advice to managers

Most managers can identify the major trends of the day. But in the course of conducting research in a number of industries and working directly with companies, we have discovered that managers often fail to recognize the less obvious but profound ways these trends are influencing consumers' aspirations, attitudes, and behaviors. This is especially true of trends that managers view as peripheral to their core markets.

Many ignore trends in their innovation strategies or adopt a wait-and-see approach and let competitors take the lead. At a minimum, such responses mean missed profit opportunities. At the extreme, they can jeopardize a company by ceding to rivals the opportunity to transform the industry. The purpose of this article is twofold: to spur managers to think more expansively about how trends could engender new value propositions in their core markets, and to provide some high-level advice on how to make market research and product development personnel more adept at analyzing and exploiting trends.

One strategy, known as 'infuse and augment', is to design a product or service that retains most of the attributes and functions of existing products in the category but adds others that address the needs and desires unleashed by a major trend. A case in point is the Poppy range of handbags, which the firm Coach created in response to the economic downturn of 2008. The Coach brand had been a symbol of opulence and luxury for nearly 70 years, and the most obvious reaction to the downturn would have been to lower prices. However, that would have risked cheapening the brand's image. Instead, they initiated a consumer-research project which revealed that customers were eager to lift themselves and the country out of tough times. Using these insights, Coach launched the lower-priced Poppy handbags, which were in vibrant colors, and looked more youthful and playful than conventional Coach products. Creating the sub-brand allowed Coach to avert an across-the-board price cut. In contrast to the many companies that responded to the recession by cutting prices, Coach saw the new consumer mindset as an opportunity for innovation and renewal.

A further example of this strategy was supermarket Tesco's response to consumers' growing concerns about the environment. With that in mind, Tesco, one of the world's top five retailers, introduced its Greener Living program, which demonstrates the company's commitment to protecting the environment by involving consumers in ways that produce tangible results. For example, Tesco customers can accumulate points for such activities as reusing bags, recycling cans and printer cartridges, and buying home-insulation materials. Like points earned on regular purchases, these green points can be redeemed for cash. Tesco has not abandoned its traditional retail offerings but augmented its business with these innovations, thereby infusing its value proposition with a green streak.

A more radical strategy is 'combine and transcend'. This entails combining aspects of the product's existing value proposition with attributes addressing changes arising from a trend, to create a novel experience – one that may land the company in an entirely new market space. At first glance, spending resources to incorporate elements of a seemingly irrelevant trend into one's core offerings sounds like it's hardly worthwhile. But consider Nike's move to integrate the digital revolution into its reputation for high-performance athletic footwear. In 2006, they teamed up with technology company Apple to launch Nike+, a digital sports kit comprising a sensor that attaches to the running shoe and a wireless receiver that connects to the user's iPod. By combining Nike's original value proposition for amateur athletes with one for digital consumers, the Nike+ sports kit and web interface moved the company from a focus on athletic apparel to a new plane of engagement with its customers.

A third approach, known as 'counteract and reaffirm', involves developing products or services that stress the values traditionally associated with the category in ways that allow consumers to oppose – or at least temporarily escape from – the aspects of trends they view as undesirable. A product that accomplished this is the ME2, a video game created by Canada's iToys. By reaffirming the toy category's association with physical play, the ME2 counteracted some of the widely perceived negative impacts of digital gaming devices. Like other handheld games, the device featured a host of exciting interactive games, a full-color LCD screen, and advanced 3D graphics. What set it apart was that it incorporated the traditional physical component of children's play: it contained a pedometer, which tracked and awarded points for physical activity (walking, running, biking, skateboarding, climbing stairs). The child could use the points to enhance various virtual skills needed for the video game. The ME2, introduced in mid-2008, catered to kids' huge desire to play video games while countering the negatives, such as associations with lack of exercise and obesity.

Once you have gained perspective on how trend-related changes in consumer opinions and behaviors impact on your category, you can determine which of our three innovation strategies to pursue. When your category's basic value proposition continues to be meaningful for consumers influenced by the trend, the infuse-and-augment strategy will allow you to reinvigorate the category. If analysis reveals an increasing disparity between your category and consumers' new focus, your innovations need to transcend the category to integrate the two worlds. Finally, if aspects of the category clash with undesired outcomes of a trend, such as associations with unhealthy lifestyles, there is an opportunity to counteract those changes by reaffirming the core values of your category.

Trends – technological, economic, environmental, social, or political – that affect how people perceive the world around them and shape what they expect from products and services present firms with unique opportunities for growth.

Questions 27–31

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

Write the correct letter in boxes 27–31 on your answer sheet.

27 In the first paragraph, the writer says that most managers

    A   fail to spot the key consumer trends of the moment.
    B   make the mistake of focusing only on the principal consumer trends.
    C   misinterpret market research data relating to current consumer trends.
    D   are unaware of the significant impact that trends have on consumers' lives.

28 According to the third paragraph, Coach was anxious to

    A   follow what some of its competitors were doing.
    B   maintain its prices throughout its range.
    C   safeguard its reputation as a manufacturer of luxury goods.
    D   modify the entire look of its brand to suit the economic climate.

29 What point is made about Tesco's Greener Living programme?

    A   It did not require Tesco to modify its core business activities.
    B   It succeeded in attracting a more eco-conscious clientele.
    C   Its main aim was to raise consumers' awareness of environmental issues.
    D   It was not the first time that Tesco had implemented such an initiative.

30 What does the writer suggest about Nike's strategy?

    A   It was an extremely risky strategy at the time.
    B   It was a strategy that only a major company could afford to follow.
    C   It was the type of strategy that would not have been possible in the past.
    D   It was the kind of strategy which might appear to have few obvious benefits.

31 What was original about the ME2?

    A   It contained technology that had been developed for the sports industry.
    B   It appealed to young people who were keen to improve their physical fitness.
    C   It took advantage of a current trend for video games with colourful 3D graphics.
    D   It was a handheld game that addressed people's concerns about unhealthy lifestyles.

Questions 32–37

Look at the following statements (Questions 32–37) and the list of companies below.

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

*Write the correct letter, **A**, **B**, **C** or **D**, in boxes 32–37 on your answer sheet.*

NB You may use any letter more than once.

32   It turned the notion that its products could have harmful effects to its own advantage.

33   It extended its offering by collaborating with another manufacturer.

34   It implemented an incentive scheme to demonstrate its corporate social responsibility.

35   It discovered that customers had a positive attitude towards dealing with difficult circumstances.

36   It responded to a growing lifestyle trend in an unrelated product sector.

37   It successfully avoided having to charge its customers less for its core products.

List of companies
A   Coach
B   Tesco
C   Nike
D   iToys

Questions 38–40

*Complete each sentence with the correct ending, **A**, **B**, **C** or **D** below.*

*Write the correct letter, **A**, **B**, **C** or **D**, in boxes 38–40 on your answer sheet.*

38 If there are any trend-related changes impacting on your category, you should

39 If a current trend highlights a negative aspect of your category, you should

40 If the consumers' new focus has an increasing lack of connection with your offering you should

A	employ a combination of strategies to maintain your consumer base.
B	identify the most appropriate innovation strategy to use.
C	emphasise your brand's traditional values with the counteract-and-affirm strategy.
D	use the combine-and-transcend strategy to integrate the two worlds.

TEST 35

READING PASSAGE 3

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

Whatever happened to the Harappan Civilisation?

New research sheds light on the disappearance of an ancient society

A   The Harappan Civilisation of ancient Pakistan and India flourished 5,000 years ago, but a thousand years later their cities were abandoned. The Harappan Civilisation was a sophisticated Bronze Age society who built 'megacities' and traded internationally in luxury craft products, and yet seemed to have left almost no depictions of themselves. But their lack of self-imagery – at a time when the Egyptians were carving and painting representations of themselves all over their temples – is only part of the mystery.

B   'There is plenty of archaeological evidence to tell us about the rise of the Harappan Civilisation, but relatively little about its fall,' explains archaeologist Dr Cameron Petrie of the University of Cambridge. 'As populations increased, cities were built that had great baths, craft workshops, palaces and halls laid out in distinct sectors. Houses were arranged in blocks, with wide main streets and narrow alleyways, and many had their own wells and drainage systems. It was very much a "thriving" civilisation.' Then around 2100 BC, a transformation began. Streets went uncleaned, buildings started to be abandoned, and ritual structures fell out of use. After their final demise, a millennium passed before really large-scale cities appeared once more in South Asia.

C   Some have claimed that major glacier-fed rivers changed their course, dramatically affecting the water supply and agriculture; or that the cities could not cope with an increasing population, they exhausted their resource base, the trading economy broke down or they succumbed to invasion and conflict; and yet others that climate change caused an environmental change that affected food and water provision. 'It is unlikely that there was a single cause for the decline of the civilisation. But the fact is, until now, we have had little solid evidence from the area for most of the key elements,' said Petrie. 'A lot of the archaeological debate has really only been well-argued speculation.'

D   A research team led by Petrie, together with Dr Ravindanath Singh of Banaras Hindu University in India, found early in their investigations that many of the archaeological sites were not where they were supposed to be, completely altering understanding of the way that this region was inhabited in the past. When they carried out a survey of how the larger area was settled in relation to sources of water, they found inaccuracies in the published geographic locations of ancient settlements ranging from several hundred metres to many kilometres. They realised

that any attempts to use the existing data were likely to be fundamentally flawed. Over the course of several seasons of fieldwork they carried out new surveys, finding an astonishing 198 settlement sites that were previously unknown.

E   Now, research published by Dr Yama Dixit and Professor David Hodell, both from Cambridge's Department of Earth Sciences, has provided the first definitive evidence for climate change affecting the plains of north-western India, where hundreds of Harappan sites are known to have been situated. The researchers gathered shells of *Melanoides tuberculata* snails from the sediments of an ancient lake and used geochemical analysis as a means of tracing the climate history of the region. 'As today, the major source of water into the lake is likely to have been the summer monsoon,' says Dixit. 'But we have observed that there was an abrupt change about 4,100 years ago, when the amount of evaporation from the lake exceeded the rainfall – indicative of a drought.' Hodell adds: 'We estimate that the weakening of the Indian summer monsoon climate lasted about 200 years before recovering to the previous conditions, which we still see today.'

F   It has long been thought that other great Bronze Age civilisations also declined at a similar time, with a global-scale climate event being seen as the cause. While it is possible that these local-scale processes were linked, the real archaeological interest lies in understanding the impact of these larger-scale events on different environments and different populations. 'Considering the vast area of the Harappan Civilisation with its variable weather systems,' explains Singh, 'it is essential that we obtain more climate data from areas close to the two great cities at Mohenjodaro and Harappa and also from the Indian Punjab.'

G   Petrie and Singh's team is now examining archaeological records and trying to understand details of how people led their lives in the region five millennia ago. They are analysing grains cultivated at the time, and trying to work out whether they were grown under extreme conditions of water stress, and whether they were adjusting the combinations of crops they were growing for different weather systems. They are also looking at whether the types of pottery used, and other aspects of their material culture, were distinctive to specific regions or were more similar across larger areas. This gives us insight into the types of interactive networks that the population was involved in, and whether those changed.

H   Petrie believes that archaeologists are in a unique position to investigate how past societies responded to environmental and climatic change. 'By investigating responses to environmental pressures and threats, we can learn from the past to engage with the public, and the relevant governmental and administrative bodies, to be more proactive in issues such as the management and administration of water supply, the balance of urban and rural development, and the importance of preserving cultural heritage in the future.'

Questions 27–31

Reading Passage 3 has eight paragraphs, **A–H**.

Which paragraph contains the following information?

*Write the correct letter, **A–H**, in boxes 27–31 on your answer sheet.*

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

27   proposed explanations for the decline of the Harappan Civilisation

28   reference to a present-day application of some archaeological research findings

29   a difference between the Harappan Civilisation and another culture of the same period

30   a description of some features of Harappan urban design

31   reference to the discovery of errors made by previous archaeologists

Questions 32–36

Complete the summary below.

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

Write your answers in boxes 32–36 on your answer sheet.

Looking at evidence of climate change

Yama Dixit and David Hodell have found the first definitive evidence of climate change affecting the plains of north-western India thousands of years ago. By collecting the 32 .... of snails and analysing them, they discovered evidence of a change in water levels in a 33 .... in the region. This occurred when there was less 34 .... than evaporation, and suggests that there was an extended period of drought.

Petrie and Singh's team are using archaeological records to look at 35 .... from five millennia ago, in order to know whether people had adapted their agricultural practices to changing climatic conditions. They are also examining objects including 36 .... , so as to find out about links between inhabitants of different parts of the region and whether these changed over time.

Test 3

Questions 37–40

Look at the following statements (Questions 37–40) and the list of researchers below.

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

*Write the correct letter, **A, B, C** or **D**, in boxes 37–40 on your answer sheet.*

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

37 Finding further information about changes to environmental conditions in the region is vital.

38 Examining previous patterns of behaviour may have long-term benefits.

39 Rough calculations indicate the approximate length of a period of water shortage.

40 Information about the decline of the Harappan Civilisation has been lacking.

List of Researchers
A   Cameron Petrie
B   Ravindanath Singh
C   Yama Dixit
D   David Hodell

READING PASSAGE 3

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

Book Review

*The Happiness Industry: How the Government and Big Business
Sold Us Well-Being*

By William Davies

'Happiness is the ultimate goal because it is self-evidently good. If we are asked why happiness matters we can give no further external reason. It just obviously does matter.' This pronouncement by Richard Layard, an economist and advocate of 'positive psychology', summarises the beliefs of many people today. For Layard and others like him, it is obvious that the purpose of government is to promote a state of collective well-being. The only question is how to achieve it, and here positive psychology – a supposed science that not only identifies what makes people happy but also allows their happiness to be measured – can show the way. Equipped with this science, they say, governments can secure happiness in society in a way they never could in the past.

It is an astonishingly crude and simple-minded way of thinking, and for that very reason increasingly popular. Those who think in this way are oblivious to the vast philosophical literature in which the meaning and value of happiness have been explored and questioned, and write as if nothing of any importance had been thought on the subject until it came to their attention. It was the philosopher Jeremy Bentham (1748–1832) who was more than anyone else responsible for the development of this way of thinking. For Bentham it was obvious that the human good consists of pleasure and the absence of pain. The Greek philosopher Aristotle may have identified happiness with self-realisation in the 4th century BC, and thinkers throughout the ages may have struggled to reconcile the pursuit of happiness with other human values, but for Bentham all this was mere metaphysics or fiction. Without knowing anything much of him or the school of moral theory he established – since they are by education and intellectual conviction illiterate in the history of ideas – our advocates of positive psychology follow in his tracks in rejecting as outmoded and irrelevant pretty much the entirety of ethical reflection on human happiness to date.

But as William Davies notes in his recent book *The Happiness Industry*, the view that happiness is the only self-evident good is actually a way of limiting moral inquiry. One of the virtues of this rich, lucid and arresting book is that it places the current cult of happiness in a well-defined historical framework. Rightly, Davies begins his story with Bentham, noting that he was far more than a philosopher. Davies writes, 'Bentham's activities were those which we might now associate with a public sector management consultant'. In the 1790s, he wrote to the Home Office suggesting that the departments of government be linked together through a set of 'conversation tubes', and to the Bank of England with a design for a printing device that could produce

unforgeable banknotes. He drew up plans for a 'frigidarium' to keep provisions such as meat, fish, fruit and vegetables fresh. His celebrated design for a prison to be known as a 'Panopticon', in which prisoners would be kept in solitary confinement while being visible at all times to the guards, was very nearly adopted. (Surprisingly, Davies does not discuss the fact that Bentham meant his Panopticon not just as a model prison but also as an instrument of control that could be applied to schools and factories.)

Bentham was also a pioneer of the 'science of happiness'. If happiness is to be regarded as a science, it has to be measured, and Bentham suggested two ways in which this might be done. Viewing happiness as a complex of pleasurable sensations, he suggested that it might be quantified by measuring the human pulse rate. Alternatively, money could be used as the standard for quantification: if two different goods have the same price, it can be claimed that they produce the same quantity of pleasure in the consumer. Bentham was more attracted by the latter measure. By associating money so closely to inner experience, Davies writes, Bentham 'set the stage for the entangling of psychological research and capitalism that would shape the business practices of the twentieth century'.

The Happiness Industry describes how the project of a science of happiness has become integral to capitalism. We learn much that is interesting about how economic problems are being redefined and treated as psychological maladies. In addition, Davies shows how the belief that inner states of pleasure and displeasure can be objectively measured has informed management studies and advertising. The tendency of thinkers such as J B Watson, the founder of behaviourism*, was that human beings could be shaped, or manipulated, by policymakers and managers. Watson had no factual basis for his view of human action. When he became president of the American Psychological Association in 1915, he 'had never even studied a single human being': his research had been confined to experiments on white rats. Yet Watson's reductive model is now widely applied, with 'behaviour change' becoming the goal of governments: in Britain, a 'Behaviour Insights Team' has been established by the government to study how people can be encouraged, at minimum cost to the public purse, to live in what are considered to be socially desirable ways.

Modern industrial societies appear to need the possibility of ever-increasing happiness to motivate them in their labours. But whatever its intellectual pedigree, the idea that governments should be responsible for promoting happiness is always a threat to human freedom.

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* 'behaviourism': a branch of psychology which is concerned with observable behaviour

Questions 27–29

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

Write the correct letter in boxes 27–29 on your answer sheet.

27   What is the reviewer's attitude to advocates of positive psychology?

    A   They are wrong to reject the ideas of Bentham.
    B   They are over-influenced by their study of Bentham's theories.
    C   They have a fresh new approach to ideas on human happiness.
    D   They are ignorant about the ideas they should be considering.

28   The reviewer refers to the Greek philosopher Aristotle in order to suggest that happiness

    A   may not be just pleasure and the absence of pain.
    B   should not be the main goal of humans.
    C   is not something that should be fought for.
    D   is not just an abstract concept.

29   According to Davies, Bentham's suggestion for linking the price of goods to happiness was significant because

    A   it was the first successful way of assessing happiness.
    B   it established a connection between work and psychology.
    C   it was the first successful example of psychological research.
    D   it involved consideration of the rights of consumers.

Questions 30–34

Complete the summary using the list of words **A–G** below.

Write the correct letter, **A–G**, in boxes 30–34 on your answer sheet.

Jeremy Bentham

Jeremy Bentham was active in other areas besides philosophy. In the 1790s he suggested a type of technology to improve **30** .... for different Government departments. He developed a new way of printing banknotes to increase **31** .... and also designed a method for the **32** .... of food. He also drew up plans for a prison which allowed the **33** .... of prisoners at all times, and believed the same design could be used for other institutions as well. When researching happiness, he investigated possibilities for its **34** .... , and suggested some methods of doing this.

A	measurement	**B**	security	**C**	implementation
D	profits	**E**	observation	**F**	communication
G	preservation				

Questions 35–40

Do the following statements agree with the claims of the writer in Reading Passage 3?

In boxes 35–40 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 One strength of *The Happiness Industry* is its discussion of the relationship between psychology and economics.

36 It is more difficult to measure some emotions than others.

37 Watson's ideas on behaviourism were supported by research on humans he carried out before 1915.

38 Watson's ideas have been most influential on governments outside America.

39 The need for happiness is linked to industrialisation.

40 A main aim of government should be to increase the happiness of the population.

READING PASSAGE 3

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

Motivational factors and the hospitality industry

A critical ingredient in the success of hotels is developing and maintaining superior performance from their employees. How is that accomplished? What Human Resource Management (HRM) practices should organizations invest in to acquire and retain great employees?

Some hotels aim to provide superior working conditions for their employees. The idea originated from workplaces – usually in the non-service sector – that emphasized fun and enjoyment as part of work–life balance. By contrast, the service sector, and more specifically hotels, has traditionally not extended these practices to address basic employee needs, such as good working conditions.

Pfeffer (1994) emphasizes that in order to succeed in a global business environment, organizations must make investment in Human Resource Management (HRM) to allow them to acquire employees who possess better skills and capabilities than their competitors. This investment will be to their competitive advantage. Despite this recognition of the importance of employee development, the hospitality industry has historically been dominated by underdeveloped HR practices (Lucas, 2002).

Lucas also points out that 'the substance of HRM practices does not appear to be designed to foster constructive relations with employees or to represent a managerial approach that enables developing and drawing out the full potential of people, even though employees may be broadly satisfied with many aspects of their work' (Lucas, 2002). In addition, or maybe as a result, high employee turnover has been a recurring problem throughout the hospitality industry. Among the many cited reasons are low compensation, inadequate benefits, poor working conditions and compromised employee morale and attitudes (Maroudas et al., 2008).

Ng and Sorensen (2008) demonstrated that when managers provide recognition to employees, motivate employees to work together, and remove obstacles preventing effective performance, employees feel more obligated to stay with the company. This was succinctly summarized by Michel et al. (2013): '[P]roviding support to employees gives them the confidence to perform their jobs better and the motivation to stay with the organization.' Hospitality organizations can therefore enhance employee motivation and retention through the development and improvement of their working conditions. These conditions are inherently linked to the working environment.

While it seems likely that employees' reactions to their job characteristics could be affected by a predisposition to view their work environment negatively, no evidence exists to support this hypothesis (Spector et al., 2000). However, given the opportunity, many people will find

something to complain about in relation to their workplace (Poulston, 2009). There is a strong link between the perceptions of employees and particular factors of their work environment that are separate from the work itself, including company policies, salary and vacations.

Such conditions are particularly troubling for the luxury hotel market, where high-quality service, requiring a sophisticated approach to HRM, is recognized as a critical source of competitive advantage (Maroudas et al., 2008). In a real sense, the services of hotel employees represent their industry (Schneider and Bowen, 1993). This representation has commonly been limited to guest experiences. This suggests that there has been a dichotomy between the guest environment provided in luxury hotels and the working conditions of their employees.

It is therefore essential for hotel management to develop HRM practices that enable them to inspire and retain competent employees. This requires an understanding of what motivates employees at different levels of management and different stages of their careers (Enz and Siguaw, 2000). This implies that it is beneficial for hotel managers to understand what practices are most favorable to increase employee satisfaction and retention.

Herzberg (1966) proposes that people have two major types of needs, the first being extrinsic motivation factors relating to the context in which work is performed, rather than the work itself. These include working conditions and job security. When these factors are unfavorable, job dissatisfaction may result. Significantly, though, just fulfilling these needs does not result in satisfaction, but only in the reduction of dissatisfaction (Maroudas et al., 2008).

Employees also have intrinsic motivation needs or motivators, which include such factors as achievement and recognition. Unlike extrinsic factors, motivator factors may ideally result in job satisfaction (Maroudas et al., 2008). Herzberg's (1966) theory discusses the need for a 'balance' of these two types of needs.

The impact of fun as a motivating factor at work has also been explored. For example, Tews, Michel and Stafford (2013) conducted a study focusing on staff from a chain of themed restaurants in the United States. It was found that fun activities had a favorable impact on performance and manager support for fun had a favorable impact in reducing turnover. Their findings support the view that fun may indeed have a beneficial effect, but the framing of that fun must be carefully aligned with both organizational goals and employee characteristics. 'Managers must learn how to achieve the delicate balance of allowing employees the freedom to enjoy themselves at work while simultaneously maintaining high levels of performance' (Tews et al., 2013).

Deery (2008) has recommended several actions that can be adopted at the organizational level to retain good staff as well as assist in balancing work and family life. Those particularly appropriate to the hospitality industry include allowing adequate breaks during the working day, staff functions that involve families, and providing health and well-being opportunities.

Questions 27–31

Look at the following statements (Questions 27–31) and the list of researchers below.

Match each statement with the correct researcher, A–F.

Write the correct letter, A–F, in boxes 27–31 on your answer sheet.

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

27 Hotel managers need to know what would encourage good staff to remain.

28 The actions of managers may make staff feel they shouldn't move to a different employer.

29 Little is done in the hospitality industry to help workers improve their skills.

30 Staff are less likely to change jobs if cooperation is encouraged.

31 Dissatisfaction with pay is not the only reason why hospitality workers change jobs.

List of Researchers

A	Pfeffer
B	Lucas
C	Maroudas et al.
D	Ng and Sorensen
E	Enz and Siguaw
F	Deery

Questions 32–35

Do the following statements agree with the claims of the writer in Reading Passage 3?

In boxes 32–35 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   One reason for high staff turnover in the hospitality industry is poor morale.

33   Research has shown that staff have a tendency to dislike their workplace.

34   An improvement in working conditions and job security makes staff satisfied with their jobs.

35   Staff should be allowed to choose when they take breaks during the working day.

Questions 36–40

Complete the summary below.

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

Write your answers in boxes 36–40 on your answer sheet.

Fun at work

Tews, Michel and Stafford carried out research on staff in an American chain of **36** .... They discovered that activities designed for staff to have fun improved their **37** .... , and that management involvement led to lower staff **38** .... They also found that the activities needed to fit with both the company's **39** .... and the **40** .... of the staff. A balance was required between a degree of freedom and maintaining work standards.

READING PASSAGE 3

*You should spend about 20 minutes on **Questions 27–40**, which are based on Reading Passage 3 on pages 47 and 48.*

Questions 27–34

Reading Passage 3 has eight sections, **A–H**.

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

*Write the correct number, **i–ix**, in boxes 27–34 on your answer sheet.*

List of Headings

	Complaints about the impact of a certain approach
ii	Fundamental beliefs that are in fact incorrect
iii	Early recommendations concerning business activities
iv	Organisations that put a new approach into practice
v	Companies that have suffered from changing their approach
vi	What people are increasingly expected to do
vii	How to achieve outcomes that are currently impossible
viii	Neither approach guarantees continuous improvement
ix	Evidence that a certain approach can have more disadvantages than advantages

27   Section **A**

28   Section **B**

29   Section **C**

30   Section **D**

31   Section **E**

32   Section **F**

33   Section **G**

34   Section **H**

Why companies should welcome disorder

A   Organisation is big business. Whether it is of our lives – all those inboxes and calendars – or how companies are structured, a multi-billion dollar industry helps to meet this need.

We have more strategies for time management, project management and self-organisation than at any other time in human history. We are told that we ought to organise our company, our home life, our week, our day and even our sleep, all as a means to becoming more productive. Every week, countless seminars and workshops take place around the world to tell a paying public that they ought to structure their lives in order to achieve this.

This rhetoric has also crept into the thinking of business leaders and entrepreneurs, much to the delight of self-proclaimed perfectionists with the need to get everything right. The number of business schools and graduates has massively increased over the past 50 years, essentially teaching people how to organise well.

B   Ironically, however, the number of businesses that fail has also steadily increased. Work-related stress has increased. A large proportion of workers from all demographics claim to be dissatisfied with the way their work is structured and the way they are managed.

This begs the question: what has gone wrong? Why is it that on paper the drive for organisation seems a sure shot for increasing productivity, but in reality falls well short of what is expected?

C   This has been a problem for a while now. Frederick Taylor was one of the forefathers of scientific management. Writing in the first half of the 20th century, he designed a number of principles to improve the efficiency of the work process, which have since become widespread in modern companies. So the approach has been around for a while.

D   New research suggests that this obsession with efficiency is misguided. The problem is not necessarily the management theories or strategies we use to organise our work; it's the basic assumptions we hold in approaching how we work. Here it's the assumption that order is a necessary condition for productivity. This assumption has also fostered the idea that disorder must be detrimental to organisational productivity. The result is that businesses and people spend time and money organising themselves for the sake of organising, rather than actually looking at the end goal and usefulness of such an effort.

E   What's more, recent studies show that order actually has diminishing returns. Order does increase productivity to a certain extent, but eventually the usefulness of the process of organisation, and the benefit it yields, reduce until the point where any further increase in order reduces productivity. Some argue that in a business, if the cost of formally structuring something outweighs the benefit of doing it, then that thing ought not to be formally structured. Instead, the resources involved can be better used elsewhere.

F   In fact, research shows that, when innovating, the best approach is to create an environment devoid of structure and hierarchy and enable everyone involved to engage as one organic group. These environments can lead to new solutions that, under conventionally structured environments (filled with bottlenecks in terms of information flow, power structures, rules, and routines) would never be reached.

G   In recent times companies have slowly started to embrace this disorganisation. Many of them embrace it in terms of perception (embracing the idea of disorder, as opposed to fearing it) and in terms of process (putting mechanisms in place to reduce structure).

For example, Oticon, a large Danish manufacturer of hearing aids, used what it called a 'spaghetti' structure in order to reduce the organisation's rigid hierarchies. This involved scrapping formal job titles and giving staff huge amounts of ownership over their own time and projects. This approach proved to be highly successful initially, with clear improvements in worker productivity in all facets of the business.

In similar fashion, the former chairman of General Electric embraced disorganisation, putting forward the idea of the 'boundaryless' organisation. Again, it involves breaking down the barriers between different parts of a company and encouraging virtual collaboration and flexible working. Google and a number of other tech companies have embraced (at least in part) these kinds of flexible structures, facilitated by technology and strong company values which glue people together.

H   A word of warning to others thinking of jumping on this bandwagon: the evidence so far suggests disorder, much like order, also seems to have diminishing utility, and can also have detrimental effects on performance if overused. Like order, disorder should be embraced only so far as it is useful. But we should not fear it – nor venerate one over the other. This research also shows that we should continually question whether or not our existing assumptions work.

Questions 35–37

Complete the sentences below.

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

Write your answers in boxes 35–37 on your answer sheet.

35   Numerous training sessions are aimed at people who feel they are not
.... enough.

36   Being organised appeals to people who regard themselves as ....

37   Many people feel .... with aspects of their work.

Questions 38–40

Do the following statements agree with the information given in Reading Passage 3?

In boxes 38–40 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*

38   Both businesses and people aim at order without really considering its value.

39   Innovation is most successful if the people involved have distinct roles.

40   Google was inspired to adopt flexibility by the success of General Electric.

READING PASSAGE 3

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

The power of play

Virtually every child, the world over, plays. The drive to play is so intense that children will do so in any circumstances, for instance when they have no real toys, or when parents do not actively encourage the behavior. In the eyes of a young child, running, pretending, and building are fun. Researchers and educators know that these playful activities benefit the development of the whole child across social, cognitive, physical, and emotional domains. Indeed, play is such an instrumental component to healthy child development that the United Nations High Commission on Human Rights (1989) recognized play as a fundamental right of every child.

Yet, while experts continue to expound a powerful argument for the importance of play in children's lives, the actual time children spend playing continues to decrease. Today, children play eight hours less each week than their counterparts did two decades ago (Elkind 2008). Under pressure of rising academic standards, play is being replaced by test preparation in kindergartens and grade schools, and parents who aim to give their preschoolers a leg up are led to believe that flashcards and educational 'toys' are the path to success. Our society has created a false dichotomy between play and learning.

Through play, children learn to regulate their behavior, lay the foundations for later learning in science and mathematics, figure out the complex negotiations of social relationships, build a repertoire of creative problem-solving skills, and so much more. There is also an important role for adults in guiding children through playful learning opportunities.

Full consensus on a formal definition of play continues to elude the researchers and theorists who study it. Definitions range from discrete descriptions of various types of play such as physical, construction, language, or symbolic play (Miller & Almon 2009), to lists of broad criteria, based on observations and attitudes, that are meant to capture the essence of all play behaviors (e.g. Rubin et al. 1983).

A majority of the contemporary definitions of play focus on several key criteria. The founder of the National Institute for Play, Stuart Brown, has described play as 'anything that spontaneously is done for its own sake'. More specifically, he says it 'appears purposeless, produces pleasure and joy, [and] leads one to the next stage of mastery' (as quoted in Tippett 2008). Similarly, Miller and Almon (2009) say that play includes 'activities that are freely chosen and directed by children and arise from intrinsic motivation'. Often, play is defined along a continuum as more or less playful using the following set of behavioral and dispositional criteria (e.g. Rubin et al. 1983):

Play is pleasurable: Children must enjoy the activity or it is not play. It is intrinsically motivated: Children engage in play simply for the satisfaction the behavior itself brings. It has no extrinsically motivated function or goal. Play is process oriented: When children

play, the means are more important than the ends. It is freely chosen, spontaneous and voluntary. If a child is pressured, they will likely not think of the activity as play. Play is actively engaged: Players must be physically and/or mentally involved in the activity. Play is non-literal. It involves make-believe.

According to this view, children's playful behaviors can range in degree from 0% to 100% playful. Rubin and colleagues did not assign greater weight to any one dimension in determining playfulness; however, other researchers have suggested that process orientation and a lack of obvious functional purpose may be the most important aspects of play (e.g. Pellegrini 2009).

From the perspective of a continuum, play can thus blend with other motives and attitudes that are less playful, such as work. Unlike play, work is typically not viewed as enjoyable and it is extrinsically motivated (i.e. it is goal oriented). Researcher Joan Goodman (1994) suggested that hybrid forms of work and play are not a detriment to learning; rather, they can provide optimal contexts for learning. For example, a child may be engaged in a difficult, goal-directed activity set up by their teacher, but they may still be actively engaged and intrinsically motivated. At this mid-point between play and work, the child's motivation, coupled with guidance from an adult, can create robust opportunities for playful learning.

Critically, recent research supports the idea that adults can facilitate children's learning while maintaining a playful approach in interactions known as 'guided play' (Fisher et al. 2011). The adult's role in play varies as a function of their educational goals and the child's developmental level (Hirsch-Pasek et al. 2009).

Guided play takes two forms. At a very basic level, adults can enrich the child's environment by providing objects or experiences that promote aspects of a curriculum. In the more direct form of guided play, parents or other adults can support children's play by joining in the fun as a co-player, raising thoughtful questions, commenting on children's discoveries, or encouraging further exploration or new facets to the child's activity. Although playful learning can be somewhat structured, it must also be child-centered (Nicolopolou et al. 2006). Play should stem from the child's own desire.

Both free and guided play are essential elements in a child-centered approach to playful learning. Intrinsically motivated free play provides the child with true autonomy, while guided play is an avenue through which parents and educators can provide more targeted learning experiences. In either case, play should be actively engaged, it should be predominantly child-directed, and it must be fun.

Questions 27–31

Look at the following statements (Questions 27–31) and the list of researchers below.

Match each statement with the correct researcher, **A–G**.

Write the correct letter, **A–G**, *in boxes 27–31 on your answer sheet.*

27 Play can be divided into a number of separate categories.

28 Adults' intended goals affect how they play with children.

29 Combining work with play may be the best way for children to learn.

30 Certain elements of play are more significant than others.

31 Activities can be classified on a scale of playfulness.

List of Researchers

A Elkind

B Miller & Almon

C Rubin et al.

D Stuart Brown

E Pellegrini

F Joan Goodman

G Hirsch-Pasek et al.

Questions 32–36

Do the following statements agree with the claims of the writer in Reading Passage 3?

In boxes 32–36 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 Children need toys in order to play.

33 It is a mistake to treat play and learning as separate types of activities.

34 Play helps children to develop their artistic talents.

35 Researchers have agreed on a definition of play.

36 Work and play differ in terms of whether or not they have a target.

Questions 37–40

Complete the summary below.

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

Write your answers in boxes 37–40 on your answer sheet.

Guided play

In the simplest form of guided play, an adult contributes to the environment in which the child is playing. Alternatively, an adult can play with a child and develop the play, for instance by **37** .... the child to investigate different aspects of their game. Adults can help children to learn through play, and may make the activity rather structured, but it should still be based on the child's **38** .... to play.

Play without the intervention of adults gives children real **39** .... ; with adults, play can be **40** .... at particular goals. However, all forms of play should be an opportunity for children to have fun**.**

READING PASSAGE 3

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

Chelsea Rochman, an ecologist at the University of California, Davis, has been trying to answer a dismal question: Is everything terrible, or are things just very, very bad?

Rochman is a member of the National Center for Ecological Analysis and Synthesis's marine-debris working group, a collection of scientists who study, among other things, the growing problem of marine debris, also known as ocean trash. Plenty of studies have sounded alarm bells about the state of marine debris; in a recent paper published in the journal *Ecology*, Rochman and her colleagues set out to determine how many of those perceived risks are real.

Often, Rochman says, scientists will end a paper by speculating about the broader impacts of what they've found. For example, a study could show that certain seabirds eat plastic bags, and go on to warn that whole bird populations are at risk of dying out. 'But the truth was that nobody had yet tested those perceived threats,' Rochman says. 'There wasn't a lot of information.'

Rochman and her colleagues examined more than a hundred papers on the impacts of marine debris that were published through 2013. Within each paper, they asked what threats scientists had studied – 366 perceived threats in all – and what they'd actually found.

In 83 percent of cases, the perceived dangers of ocean trash were proven true. In the remaining cases, the working group found the studies had weaknesses in design and content which affected the validity of their conclusions – they lacked a control group, for example, or used faulty statistics.

Strikingly, Rochman says, only one well-designed study failed to find the effect it was looking for, an investigation of mussels ingesting microscopic plastic bits. The plastic moved from the mussels' stomachs to their bloodstreams, scientists found, and stayed there for weeks – but didn't seem to stress out the shellfish.

While mussels may be fine eating trash, though, the analysis also gave a clearer picture of the many ways that ocean debris *is* bothersome.

Within the studies they looked at, most of the proven threats came from plastic debris, rather than other materials like metal or wood. Most of the dangers also involved large pieces of debris – animals getting entangled in trash, for example, or eating it and severely injuring themselves.

But a lot of ocean debris is 'microplastic', or pieces smaller than five millimeters. These may be ingredients used in cosmetics and toiletries, fibers shed by synthetic clothing in the wash, or eroded remnants of larger debris. Compared to the number of studies investigating large-scale debris, Rochman's group found little research on the effects of these tiny bits. 'There are a lot of open questions still for microplastic,' Rochman says, though she notes that more papers on the subject have been published since 2013, the cutoff point for the group's analysis.

There are also, she adds, a lot of open questions about the ways that ocean debris can lead to sea-creature death. Many studies have looked at how plastic affects an individual animal, or that animal's tissues or cells, rather than whole populations. And in the lab, scientists often use higher concentrations of plastic than what's really in the ocean. None of that tells us how many birds or fish or sea turtles could die from plastic pollution – or how deaths in one species could affect that animal's predators, or the rest of the ecosystem.

'We need to be asking more ecologically relevant questions,' Rochman says. Usually, scientists don't know exactly how disasters such as a tanker accidentally spilling its whole cargo of oil and polluting huge areas of the ocean will affect the environment until after they've happened. 'We don't ask the right questions early enough,' she says. But if ecologists can understand how the slow-moving effect of ocean trash is damaging ecosystems, they might be able to prevent things from getting worse.

Asking the right questions can help policy makers, and the public, figure out where to focus their attention. The problems that look or sound most dramatic may not be the best places to start. For example, the name of the 'Great Pacific Garbage Patch' – a collection of marine debris in the northern Pacific Ocean – might conjure up a vast, floating trash island. In reality though, much of the debris is tiny or below the surface; a person could sail through the area without seeing any trash at all. A Dutch group called 'The Ocean Cleanup' is currently working on plans to put mechanical devices in the Pacific Garbage Patch and similar areas to suck up plastic. But a recent paper used simulations to show that strategically positioning the cleanup devices closer to shore would more effectively reduce pollution over the long term.

'I think clearing up some of these misperceptions is really important,' Rochman says. Among scientists as well as in the media, she says, 'A lot of the images about strandings and entanglement and all of that cause the perception that plastic debris is killing everything in the ocean.' Interrogating the existing scientific literature can help ecologists figure out which problems really need addressing, and which ones they'd be better off – like the mussels – absorbing and ignoring.

Questions 27–33

Do the following statements agree with the information given in Reading Passage 3?

In boxes 27–33 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 Rochman and her colleagues were the first people to research the problem of marine debris.

28 The creatures most in danger from ocean trash are certain seabirds.

29 The studies Rochman has reviewed have already proved that populations of some birds will soon become extinct.

30 Rochman analysed papers on the different kinds of danger caused by ocean trash.

31 Most of the research analysed by Rochman and her colleagues was badly designed.

32 One study examined by Rochman was expecting to find that mussels were harmed by eating plastic.

33 Some mussels choose to eat plastic in preference to their natural diet.

Questions 34–39

Complete the notes below.

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

Write your answers in boxes 34–39 on your answer sheet.

Findings related to marine debris

Studies of marine debris found the biggest threats were

- plastic (not metal or wood)

- bits of debris that were **34** .... (harmful to animals)

There was little research into **35** .... e.g. from synthetic fibres.

Drawbacks of the studies examined

- most of them focused on individual animals, not entire **36** ....

- the **37** .... of plastic used in the lab did not always reflect those in the ocean

- there was insufficient information on

    numbers of animals which could be affected

    the impact of a reduction in numbers on the **38** .... of that species

    the impact on the ecosystem

Rochman says more information is needed on the possible impact of future **39** .... (e.g. involving oil).

Question 40

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

Write the correct letter in box 40 on your answer sheet.

40   What would be the best title for this passage?

    A   Assessing the threat of marine debris
    B   Marine debris: who is to blame?
    C   A new solution to the problem of marine debris
    D   Marine debris: the need for international action

ACADEMIC READING

Reading Passage 1, Questions 1–13

1–3 IN ANY ORDER
   D
   E
   G
4 clerks / copying clerks
5 library
6 stability
7 pension
8 TRUE
9 FALSE
10 NOT GIVEN
11 FALSE
12 FALSE
13 TRUE

Reading Passage 2, Questions 14–26

14 F
15 A
16 B
17 D
18 I
19 C

20 B
21 D
22 C
23 NOT GIVEN
24 TRUE
25 FALSE
26 FALSE

Reading Passage 3, Questions 27–40

27 YES
28 NOT GIVEN
29 NO
30 NOT GIVEN
31 YES
32 NO
33 C
34 D
35 C
36 B
37 B
38 E
39 D
40 I

If you score . . .

0–11	12–29	30–40
you are highly unlikely to get an acceptable score under examination conditions and we recommend that you spend a lot of time improving your English before you take IELTS.	you may get an acceptable score under examination conditions but we recommend that you think about having more practice or lessons before you take IELTS.	you are likely to get an acceptable score under examination conditions but remember that different institutions will find different scores acceptable.

TEST 2

ACADEMIC READING

Reading Passage 1, Questions 1–13

1 candlewax
2 synthetic
3 chemistry
4 Novalak
5 fillers
6 hexa
7 raw
8 pressure
9 B
10 C
11 TRUE
12 FALSE
13 FALSE

Reading Passage 2, Questions 14–27

14 FALSE
15 NOT GIVEN
16 TRUE
17 FALSE
18 TRUE
19 NOT GIVEN
20 TRUE

21 problem solving
22 temporal lobes
23 evaluating information
24 C
25 A
26 F
27 D

Reading Passage 3, Questions 28–40

28 Latin
29 doctors
30 & 31 *IN EITHER ORDER*
technical vocabulary
grammatical resources
32 Royal Society
33 German
34 industrial revolution
35 NOT GIVEN
36 FALSE
37 TRUE
38 popular
39 Principia / the Principia / Newton's Principia / mathematical treatise
40 local / more local / local audience

If you score . . .

0–12	13–29	30–40
you are highly unlikely to get an acceptable score under examination conditions and we recommend that you spend a lot of time improving your English before you take IELTS.	you may get an acceptable score under examination conditions but we recommend that you think about having more practice or lessons before you take IELTS.	you are likely to get an acceptable score under examination conditions but remember that different institutions will find different scores acceptable.

TEST 3

ACADEMIC READING

Reading Passage 1, Questions 1–13

1	D
2	B
3	C
4	E
5	B
6	D
7	A
8	B
9	D
10	C
11	TRUE
12	FALSE
13	NOT GIVEN

Reading Passage 2, Questions 14–26

14	iv
15	i
16	v
17	viii
18	YES
19	NOT GIVEN
20	NO
21	YES
22	NOT GIVEN
23	YES
24	F
25	A
26	B

Reading Passage 3, Questions 27–40

27	E
28	B
29	A
30	F
31	B
32	NOT GIVEN
33	FALSE
34	NOT GIVEN
35	TRUE
36	FALSE
37	TRUE
38	B
39	A
40	D

If you score . . .

0–11	12 28	29–40
you are highly unlikely to get an acceptable score under examination conditions and we recommend that you spend a lot of time improving your English before you take IELTS.	you may get an acceptable score under examination conditions but we recommend that you think about having more practice or lessons before you take IELTS.	you are likely to get an acceptable score under examination conditions but remember that different institutions will find different scores acceptable.

TEST 4

ACADEMIC READING

Reading Passage 1, Questions 1–13

1 iii
2 v
3 ii
4 YES
5 YES
6 NO
7 YES
8 NO
9 NOT GIVEN
10 cheese
11 tourism/tourist/tour
12 pottery
13 jewellery/jewelry

Reading Passage 2, Questions 14–26

14 G
15 A
16 H
17 C
18 F
19 I
20 C
21 K
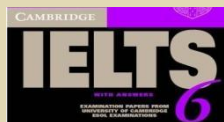22 E
23 L
24 TRUE
25 NOT GIVEN
26 FALSE

Reading Passage 3, Questions 27–40

27 TRUE
28 TRUE
29 NOT GIVEN
30 FALSE
31 FALSE
32 TRUE
33 FALSE
34 temperatures
35 day-neutral / day-neutral plants
36 food / food resources / adequate food / adequate food resources
37 insects / fertilization by insects
38 rainfall / suitable rainfall
39 sugarcane
40 classification

If you score . . .

0–12	13–28	29–40
you are highly unlikely to get an acceptable score under examination conditions and we recommend that you spend a lot of time improving your English before you take IELTS.	you may get an acceptable score under examination conditions but we recommend that you think about having more practice or lessons before you take IELTS.	you are likely to get an acceptable score under examination conditions but remember that different institutions will find different scores acceptable.

IELTS 6

Answers

BRITISH COUNCIL · **IELTS idp AUSTRALIA** · **UNIVERSITY of CAMBRIDGE ESOL Examinations**

TEST1

LESTENING

1 (a) keep-fit (studio)
2 swimming
3 yoga (classes)
4 (a) salad bar
5 500
6 1
7 10(am) 4.30(pm)
8 180
9 assessment
10 Kynchley

11-16 B G C A E D
17 (OOctober (the)) 19th
18 7
19 Monday Thursday
20 18

21 A
22 in advance
23 nursery
24 annual fee
25 tutor
26 27 laptops printers
28 report writting
29 marketing
30 Individual

31 feed
32 metal / leather
33 restricions
34 ships
35 England
36 built
37 property
38-40 C E F

READING

1-11 B C B F D A E A B A C
12 (a) competition model
13 (by) 20 percent

14-17 I F E D
18-22 T F NG T NG
23-26 G B C A

27-32 1 6 3 7 4 2
33 farming
34 35 fish sea mammals
36 Thule
37 islands
38 nomadic
39 nature
40 Imported

TEST2

LISTENING

1 8
2 （in/ on）Tamer
3 green button
4 library
5 educational department
6 castles
7 old clothes
8 bottle tops
9 Undersea Worlds
10 Silver paper

11 King Street
12 central
13 half hours / 30 minutes
14 refreshments
15 10.15
16 Advance
17 (seat) reservations

18-20 C D G
22 catalog(ue)s
23 computer center /centre
24 checklist
25 teaching experience
26 classroom
27 review
28 schools
29 ((the) year) 200
30 end of term

31 research
31-37 A B C A A C A
38 Great Train Robbery
39 Sound effects
40 poor sound quality

READING

1-5 2 7 4 1 3
6 FALSE
7 TRUE
8 NOT GIVEN
9 FALSE
10 TRUE

11-13 F D C
14-15 B I
16-20 F M J N K
21-25 G A G E H
26-30 C B E A C
31 G
32-35 T F T F
36-40 NG T F T NG

TEST3

LISTENING

1 Select
2 27.01.1973
3 15 Riverside
4 2 weeks\
5 616295
6 engineer
7 month
8 2,000
9 month
10 internet

11-15 C A C H F
16-17 B D
18 field
19 footbridge
20 viewpoint

21 entertainment industry
22 telephone interviews
23 30/thirty
24 male and female
25 jazz
26 classical
27 concerts
28 department stores
29 club
30 opera house

31-34 C A A B
35 people
36 water sand
37 Scotland
38 outside
39 local
40 tops

READING

1-5 A I J E G
6-9 Y NG NG N
10-13 B C D D

14-18 7 3 2 4 1
19-22 N NG N Y
23-24 NG Y
25-27 B C A

28-32 N Y Y N G
33-37 A B C A B
38 glucose
39 free radicals
40 preservation

TEST4

LISTENING

1 75
2 check / cheque
3 15
4 25
5 10 minute(s') / min(s')
6 conference pack
7 South
8 library
9 5
10 21A

11-14 D A C
14 tax
15 security
16 ground floor
17 lecture room 311
18 Safety at Work
19 Main Hall
20 team leaders

21 reference
22 textbooks
23 secondary
24 primary
25 back
26 overdue books/ ones
27 7 working days
28-30 C E F

31-34 B A B
35 1,450
36 disease
37 (wealthy) prince
38 diet
39 attack humans
40 leadership

READING

1-7 5 6 3 9 1 7 10
8-13 N Y N Y NG Y
14-18 B F C J F
19-24 NG N Y Y N NG
25-26 C E

27-30 4 6 5 7
31-34 B D D A
35 policy
36 (explicit) guidelines
37 (school) curriculum
38 victims
39 playful fighting
40 D

TEST 5   TEST 6   TEST 7   TEST 8

ACADEMIC READING

Reading Passage 1, Questions 1–13

1	B
2	A
3	A
4	E
5	D
6	phantom
7	echoes/obstacles
8	depth
9	submarines
10	natural selection
11	radio waves/echoes
12	mathematical theories
13	zoologist

Reading Passage 2, Questions 14–26

14	xi
15	vii
16	v
17	i
18	ix
19	ii
20	x
21	NO
22	YES
23	NOT GIVEN
24	NO
25	YES
26	NOT GIVEN

Reading Passage 3, Questions 27–40

27	D
28	A
29	B
30	C
31	FALSE
32	FALSE
33	TRUE
34	NOT GIVEN
35	NOT GIVEN
36	TRUE
37	F
38	H
39	K
40	G

If you score . . .

0–11	12–27	28–40
you are unlikely to get an acceptable score under examination conditions and we recommend that you spend a lot of time improving your English before you take IELTS.	you may get an acceptable score under examination conditions but we recommend that you think about having more practice or lessons before you take IELTS.	you are likely to get an acceptable score under examination conditions but remember that different institutions will find different scores acceptable.

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ACADEMIC READING

Reading Passage 1, Questions 1–13

1	YES
2	NO
3	NOT GIVEN
4	YES
5	B
6	A
7	B
8	C
9	A
10	C
11	D
12	C
13	C

Reading Passage 2, Questions 14–26

14	E
15	B
16	C
17	B
18	YES
19	NOT GIVEN
20	NO
21	YES
22	food bills/costs
23	(modern) intensive farming
24	organic farming
25	Greener Food Standard
26	*IN EITHER ORDER* farmers (and) consumers

Reading Passage 3, Questions 27–40

27	ii
28	v
29	x
30	i
31	NO
32	YES
33	NO
34	YES
35	NOT GIVEN
36	D
37	I
38	G
39	E
40	B

If you score . . .

0–13	14–29	30–40
you are unlikely to get an acceptable score under examination conditions and we recommend that you spend a lot of time improving your English before you take IELTS.	you may get an acceptable score under examination conditions but we recommend that you think about having more practice or lessons before you take IELTS.	you are likely to get an acceptable score under examination conditions but remember that different institutions will find different scores acceptable.

ACADEMIC READING

Reading Passage 1, Questions 1–13

1	FALSE
2	TRUE
3	NOT GIVEN
4	TRUE
5	FALSE
6	NOT GIVEN
7	C
8	M
9	F
10	D
11	N
12	O
13	E

Reading Passage 2, Questions 14–26

14	iv
15	vii
16	x
17	i
18	vi
19	ii
20	E
21	D
22	C
23	B
24	A
25	A
26	A

Reading Passage 3, Questions 27–40

27	NOT GIVEN
28	FALSE
29	TRUE
30	FALSE
31	FALSE
32	FALSE
33	TRUE
34	J
35	A
36	E
37	B
38	G
39	D
40	B

If you score . . .

0–13	14–30	31–40
you are unlikely to get an acceptable score under examination conditions and we recommend that you spend a lot of time improving your English before you take IELTS.	you may get an acceptable score under examination conditions but we recommend that you think about having more practice or lessons before you take IELTS.	you are likely to get an acceptable score under examination conditions but remember that different institutions will find different scores acceptable.

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ACADEMIC READING

Reading Passage 1, Questions 1–13

1	TRUE
2	FALSE
3	NOT GIVEN
4	TRUE
5	FALSE
6	NOT GIVEN
7	TRUE
8	(wooden) pulleys
9	stone
10	(accomplished) sailors
11	(modern) glider
12	flight
13	messages

Reading Passage 2, Questions 14–26

14	FALSE
15	NOT GIVEN
16	TRUE
17	NOT GIVEN
18	TRUE
19	TRUE
20	FALSE
21	G
22	E
23	B
24	A
25	K
26	F

Reading Passage 3, Questions 27–40

27	D
28	C
29	A
30	B
31	D
32	F
33	I
34	B
35	A
36	D
37	A
38	E
39	B
40	C

If you score . . .

0–11	12–27	28–40
you are unlikely to get an acceptable score under examination conditions and we recommend that you spend a lot of time improving your English before you take IELTS.	you may get an acceptable score under examination conditions but we recommend that you think about having more practice or lessons before you take IELTS.	you are likely to get an acceptable score under examination conditions but remember that different institutions will find different scores acceptable.

ACADEMIC READING

Reading Passage 1, Questions 1–13

1 D
2 B
3 F
4 E
5 B
6 F
7 D
8 A
9 (ship's) anchor/(an/the) anchor
10 (escape) wheel
11 tooth
12 (long) pendulum
13 second

Reading Passage 2, Questions 14–26

14 ii
15 iii
16 v
17 iv
18 viii
19 vii
20 FALSE
21 FALSE
22 NOT GIVEN
23 TRUE
24 TRUE
25 FALSE
26 TRUE

Reading Passage 3, Questions 27–40

27 E
28 B
29 A
30 F
31 sender
32 picture/image
33 receiver
34&35 *IN EITHER ORDER*
     sensory leakage (or)
     (outright) fraud
36 computers
37 ·human involvement
38 meta-analysis
39 lack of consistency
40 big/large enough

If you score . . .

0–12	13–29	30–40
you are unlikely to get an acceptable score under examination conditions and we recommend that you spend a lot of time improving your English before you take IELTS.	you may get an acceptable score under examination conditions but we recommend that you think about having more practice or lessons before you take IELTS.	you are likely to get an acceptable score under examination conditions but remember that different institutions will find different scores acceptable.

TEST 14

ACADEMIC READING

Reading Passage 1, Questions 1–13

1	spinning
2	(perfectly) unblemished
3	labour/labor-intensive
4	thickness
5	marked
6	(molten) glass
7	(molten) tin/metal
8	rollers
9	TRUE
10	NOT GIVEN
11	FALSE
12	TRUE
13	TRUE

Reading Passage 2, Questions 14–26

14	ii
15	vii
16	ix
17	iv
18&19	*IN EITHER ORDER*
	C
	B
20	A
21	H
22	G
23	C
24	C
25	A
26	B

Reading Passage 3, Questions 27–40

27	viii
28	ii
29	vi
30	i
31	iii
32	v
33	C
34	A
35	C
36	D
37	clothing
38	vocabulary
39	chemicals
40	cultures

If you score . . .

0–11	12–28	29–40
you are unlikely to get an acceptable score under examination conditions and we recommend that you spend a lot of time improving your English before you take IELTS.	you may get an acceptable score under examination conditions but we recommend that you think about having more practice or lessons before you take IELTS.	you are likely to get an acceptable score under examination conditions but remember that different institutions will find different scores acceptable.

ACADEMIC READING

Reading Passage 1, Questions 1–13

1 D
2 A
3 A
4 power companies
5 safely
6 size
7 B
8 C
9 G
10 D
11 NO
12 YES
13 NOT GIVEN

Reading Passage 2, Questions 14–26

14–18 IN ANY ORDER
    B
    C
    F
    H
    J
19 TRUE

20 TRUE
21 FALSE
22 TRUE
23 TRUE
24 NOT GIVEN
25 TRUE
26 NOT GIVEN

Reading Passage 3, Questions 27–40

27 ix
28 ii
29 vii
30 i
31 viii
32 iv
33&34 IN EITHER ORDER
    physical chemistry (and)
    thermodynamics
35 adapt
36 immortality
37 NO
38 YES
39 NOT GIVEN
40 YES

If you score . . .

0–11	12–28	29–40
you are unlikely to get an acceptable score under examination conditions and we recommend that you spend a lot of time improving your English before you take IELTS.	you may get an acceptable score under examination conditions but we recommend that you think about having more practice or lessons before you take IELTS.	you are likely to get an acceptable score under examination conditions but remember that different institutions will find different scores acceptable.

TEST 16

ACADEMIC READING

Reading Passage 1, Questions 1–13

1 vii
2 i
3 v
4 ii
5 viii
6 YES
7 NO
8 NOT GIVEN
9 NO
10 B
11 C
12 A
13 C

Reading Passage 2, Questions 14–26

14 B
15 A
16 D
17 D
18 NOT GIVEN
19 YES
20 NO
21 YES
22 D
23 H
24 C
25 E
26 B

Reading Passage 3, Questions 27–40

27 TRUE
28 NOT GIVEN
29 TRUE
30 FALSE
31 A
32 C
33 B
34 D
35 A
36 D
37 heat
38 leaf litter
39 screen
40 alcohol

If you score . . .

0–11	12–28	29–40
you are unlikely to get an acceptable score under examination conditions and we recommend that you spend a lot of time improving your English before you take IELTS.	you may get an acceptable score under examination conditions but we recommend that you think about having more practice or lessons before you take IELTS.	you are likely to get an acceptable score under examination conditions but remember that different institutions will find different scores acceptable.

ACADEMIC READING

Reading Passage 1, Questions 1–13

1   FALSE
2   NOT GIVEN
3   FALSE
4   TRUE
5   NOT GIVEN
6   TRUE
7   NOT GIVEN
8   (the / only) rich
9   commercial (possibilities)
10 mauve (was/is)
11 (Robert) Pullar
12 (in) France
13 malaria (is)

Reading Passage 2, Questions 14–26

14 iv
15 vii
16 i
17 ii
18 several billion years
19 radio (waves/signals)
20 1000 (stars)
21 YES
22 YES
23 NOT GIVEN
24 NO
25 NOT GIVEN
26 NO

Reading Passage 3, Questions 27–40

27 plants
28 *IN EITHER ORDER; BOTH REQUIRED FOR ONE MARK*
    breathing
    reproduction
29 gills
30 dolphins
31 NOT GIVEN
32 FALSE
33 TRUE
34 3 measurements
35 (triangular) graph
36 cluster
37 amphibious
38 half way
39 dry-land tortoises
40 D

If you score…

0–11	12–27	28–40
you are unlikely to get an acceptable score under examination conditions and we recommend that you spend a lot of time improving your English before you take IELTS.	you may get an acceptable score under examination conditions but we recommend that you think about having more practice or lessons before you take IELTS.	you are likely to get an acceptable score under examination conditions but remember that different institutions will find different scores acceptable.

ACADEMIC READING

Reading Passage 1, Questions 1–13

1	H
2	C
3	B
4	I
5	D
6	A
7	two decades
8	crowd (noise)
9	invisible (disabilities/disability)
10	Objective 3

11&12 *IN EITHER ORDER*

	A
	C
13	C

Reading Passage 2, Questions 14–26

14	F
15	D
16	G
17	E
18	D
19	A
20	B
21	C
22	FALSE
23	FALSE
24	TRUE
25	NOT GIVEN
26	TRUE

Reading Passage 3, Questions 27–40

27	C
28	B
29	D
30	C
31	B
32	YES
33	YES
34	NOT GIVEN
35	NO
36	NOT GIVEN
37	NO
38	A
39	B
40	C

If you score…

0–11	12–28	29–40
you are unlikely to get an acceptable score under examination conditions and we recommend that you spend a lot of time improving your English before you take IELTS.	you may get an acceptable score under examination conditions but we recommend that you think about having more practice or lessons before you take IELTS.	you are likely to get an acceptable score under examination conditions but remember that different institutions will find different scores acceptable.

ACADEMIC READING

Reading Passage 1, Questions 1–13

1 YES
2 NO
3 YES
4 NOT GIVEN
5 YES
6 YES
7 NO
8 YES
9 H
10 F
11 A
12 C
13 B

Reading Passage 2, Questions 14–26

14 C
15 E
16 A
17 C
18–22 *IN ANY ORDER*
  A
  D
  E
  F
  J
23 maintenance
24 slow (turning)
25 low pressure
26 cavitation

Reading Passage 3, Questions 27–40

27 D
28 F
29 B
30 E
31 A
32 C
33 *IN EITHER ORDER; BOTH REQUIRED FOR ONE MARK*
  Jupiter
  Saturn
34 Solar System
35 *IN EITHER ORDER; BOTH REQUIRED FOR ONE MARK*
  sensors
  circuits
36 spares
37 radio dish
38 TRUE
39 TRUE
40 FALSE

If you score…

0–12	13–29	30–40
you are unlikely to get an acceptable score under examination conditions and we recommend that you spend a lot of time improving your English before you take IELTS.	you may get an acceptable score under examination conditions but we recommend that you think about having more practice or lessons before you take IELTS.	you are likely to get an acceptable score under examination conditions but remember that different institutions will find different scores acceptable.

ACADEMIC READING

Reading Passage 1, Questions 1–13

1	FALSE
2	NOT GIVEN
3	TRUE
4	FALSE
5	TRUE
6	NOT GIVEN
7	thorium
8	pitchblende
9	radium
10	soldiers
11	illness
12	neutron
13	leukaemia/leukemia

Reading Passage 2, Questions 14–26

14	G
15	C
16	G
17	D
18	H
19	E
20	D
21	B
22	E
23	C
24	mirror
25	communication
26	ownership

Reading Passage 3, Questions 27–40

27	ii
28	vi
29	i
30	iii
31	B
32	A
33	D
34	D
35	C
36	B
37	FALSE
38	NOT GIVEN
39	FALSE
40	TRUE

If you score…

0–11	12–28	29–40
you are unlikely to get an acceptable score under examination conditions and we recommend that you spend a lot of time improving your English before you take IELTS.	you may get an acceptable score under examination conditions but we recommend that you think about having more practice or lessons before you take IELTS.	you are likely to get an acceptable score under examination conditions but remember that different institutions will find different scores acceptable.

TEST 21

ACADEMIC READING

Reading Passage 1, Questions 1–13

1 FALSE
2 TRUE
3 NOT GIVEN
4 NOT GIVEN
5 TRUE
6 pavilions
7 drought
8 tourists
9 earthquake
10 4/four sides
11 tank
12 verandas/verandahs
13 underwater

Reading Passage 2, Questions 14–26

14 viii
15 iii
16 xi
17 i
18 v
19 x
20 ii
21 iv
22 TRUE
23 FALSE
24 NOT GIVEN
25 NOT GIVEN
26 FALSE

Reading Passage 3, Questions 27–40

27 C
28 A
29 D
30 B
31 G
32 E
33 A
34 F
35 B
36 NO
37 YES
38 NOT GIVEN
39 NOT GIVEN
40 NO

If you score...

0–11	12–27	28–40
you are unlikely to get an acceptable score under examination conditions and we recommend that you spend a lot of time improving your English before you take IELTS.	you may get an acceptable score under examination conditions but we recommend that you think about having more practice or lessons before you take IELTS.	you are likely to get an acceptable score under examination conditions but remember that different institutions will find different scores acceptable.

TEST 22

ACADEMIC READING

Reading Passage 1, Questions 1–13

1	iv
2	viii
3	vii
4	i
5	vi
6	ix
7	ii
8	NOT GIVEN
9	TRUE
10	FALSE
11	FALSE
12	NOT GIVEN
13	TRUE

Reading Passage 2, Questions 14–26

14	A
15	D
16	F
17	D
18	B
19	D
20	E
21	A

22	C
23	**IN EITHER ORDER; BOTH REQUIRED FOR ONE MARK** books (and) activities
24	internal regulation / self-regulation
25	emotional awareness
26	spoon-feeding

Reading Passage 3, Questions 27–40

27	B
28	H
29	L
30	G
31	D
32	C
33	D
34	A
35	D
36	NOT GIVEN
37	NO
38	YES
39	NOT GIVEN
40	NO

If you score…

0–12	13–28	29–40
you are unlikely to get an acceptable score under examination conditions and we recommend that you spend a lot of time improving your English before you take IELTS.	you may get an acceptable score under examination conditions but we recommend that you think about having more practice or lessons before you take IELTS.	you are likely to get an acceptable score under examination conditions but remember that different institutions will find different scores acceptable.

TEST 23

ACADEMIC READING

Reading Passage 1, Questions 1–13

1	ii
2	i
3	v
4	vii
5	TRUE
6	NOT GIVEN
7	NOT GIVEN
8	TRUE
9	NOT GIVEN
10	FALSE
11	source of income / industry
12	employer
13	domestic tourism

Reading Passage 2, Questions 14–26

14	C
15	B
16	H
17	B
18	E
19	sun(light)
20	upper
21	dry
22	north
23	FALSE
24	TRUE
25	NOT GIVEN
26	B

Reading Passage 3, Questions 27–40

27	B
28	F
29	I
30	G
31	D
32	C
33	A
34	D
35	C
36	NO
37	YES
38	NOT GIVEN
39	YES
40	NOT GIVEN

If you score…

0–11	12–27	28–40
you are unlikely to get an acceptable score under examination conditions and we recommend that you spend a lot of time improving your English before you take IELTS.	you may get an acceptable score under examination conditions but we recommend that you think about having more practice or lessons before you take IELTS.	you are likely to get an acceptable score under examination conditions but remember that different institutions will find different scores acceptable.

TEST 24

ACADEMIC READING

Reading Passage 1, Questions 1–13

1	spread
2	10/ten times
3	below
4	fuel
5	seasons
6	homes/housing
7	TRUE
8	FALSE
9	TRUE
10	TRUE
11	NOT GIVEN
12	FALSE
13	FALSE

Reading Passage 2, Questions 14–26

14	transformation/change
15	young age
16	optimism
17	skills/techniques
18	negative emotions / feelings
19	E

20	C
21	G
22	A
23	E
24	C
25	G
26	H

Reading Passage 3, Questions 27–40

27	C
28	D
29	C
30	B
31	A
32	F
33	G
34	A
35	B
36	D
37	NOT GIVEN
38	YES
39	NO
40	YES

If you score…

0–11	12–28	29–40
you are unlikely to get an acceptable score under examination conditions and we recommend that you spend a lot of time improving your English before you take IELTS.	you may get an acceptable score under examination conditions but we recommend that you think about having more practice or lessons before you take IELTS.	you are likely to get an acceptable score under examination conditions but remember that different institutions will find different scores acceptable.

TEST 25

READING

Reading Passage 1, Questions 1–13

1 tomatoes
2 urban centres/centers
3 energy
4 fossil fuel
5 artificial
6 (stacked) trays
7 (urban) rooftops
8 NOT GIVEN
9 TRUE
10 FALSE
11 TRUE
12 FALSE
13 TRUE

Reading Passage 2, Questions 14–26

14 FALSE
15 NOT GIVEN
16 TRUE
17 NOT GIVEN
18 FALSE
19 TRUE

20 gates
21 clamp
22 axle
23 cogs
24 aqueduct
25 wall
26 locks

Reading Passage 3, Questions 27–40

27 D
28 B
29 A
30 sunshade
31 iron
32 algae
33 clouds
34 cables
35 snow
36 rivers
37 B
38 D
39 C
40 A

If you score …

0–11	12–24	25–40
you are unlikely to get an acceptable score under examination conditions and we recommend that you spend a lot of time improving your English before you take IELTS.	you may get an acceptable score under examination conditions but we recommend that you think about having more practice or lessons before you take IELTS.	you are likely to get an acceptable score under examination conditions but remember that different institutions will find different scores acceptable.

TEST 26

READING

Reading Passage 1, Questions 1–13

1   TRUE
2   NOT GIVEN
3   TRUE
4   FALSE
5   C
6   B
7   G
8   A
9   (lifting) frame
10 hydraulic jacks
11 stabbing guides
12 (lifting) cradle
13 air bags

Reading Passage 2, Questions 14–26

14 ii
15 ix
16 viii
17 i
18 iv
19 vii
20 vi
21 farming
22 canoes
23 birds
24 wood
25&26 *IN EITHER ORDER*
    B
    C

Reading Passage 3, Questions 27–40

27 C
28 D
29 B
30 A
31 C
32 B
33 H
34 NOT GIVEN
35 YES
36 NO
37 NO
38 YES
39 NOT GIVEN
40 A

If you score …

0–11	12–24	25–40
you are unlikely to get an acceptable score under examination conditions and we recommend that you spend a lot of time improving your English before you take IELTS.	you may get an acceptable score under examination conditions but we recommend that you think about having more practice or lessons before you take IELTS.	you are likely to get an acceptable score under examination conditions but remember that different institutions will find different scores acceptable.

TEST 27

READING

Reading Passage 1, Questions 1–13

1 tea
2 reel
3 women
4 royalty
5 currency
6 paper
7 wool
8 monks
9 nylon
10 FALSE
11 TRUE
12 FALSE
13 NOT GIVEN

Reading Passage 2, Questions 14–26

14 FALSE
15 TRUE
16 NOT GIVEN
17 TRUE
18 FALSE
19 G

20 C
21 A
22 E
23 speed
24 plains
25 bottlenecks
26 corridor/passageway

Reading Passage 3, Questions 27–40

27
28
29 G
30 C
31 B
32 E
33 A
34 F
35 beginner
36 arithmetic
37 intuitive
38 scientists
39 experiments
40 theorems

If you score …

0–12	13–25	26–40
you are unlikely to get an acceptable score under examination conditions and we recommend that you spend a lot of time improving your English before you take IELTS.	you may get an acceptable score under examination conditions but we recommend that you think about having more practice or lessons before you take IELTS.	you are likely to get an acceptable score under examination conditions but remember that different institutions will find different scores acceptable.

TEST 28

READING

Reading Passage 1, Questions 1–13

1 FALSE
2 NOT GIVEN
3 NOT GIVEN
4 TRUE
5 A
6 C
7 B
8 A
9 A
10 D
11 B
12 E
13 F

Reading Passage 2, Questions 14–26

14 B
15 A
16 B
17 D
18 C
19 D
20 TRUE
21 TRUE
22 NOT GIVEN
23 TRUE
24 FALSE
25 C
26 A

Reading Passage 3, Questions 27–40

27 vi
28 iv
29 ii
30 vii
31 i
32 v
33 E
34 G
35 B
36 F
37 NO
38 YES
39 NOT GIVEN
40 YES

If you score …

0–12	13–25	26–40
you are unlikely to get an acceptable score under examination conditions and we recommend that you spend a lot of time improving your English before you take IELTS.	you may get an acceptable score under examination conditions but we recommend that you think about having more practice or lessons before you take IELTS.	you are likely to get an acceptable score under examination conditions but remember that different institutions will find different scores acceptable.

READING

Reading Passage 1, Questions 1–13

1 NOT GIVEN
2 FALSE
3 FALSE
4 TRUE
5 TRUE
6 taste
7 cheaper
8 convenient
9 image
10 sustainable
11 recycled
12 biodiversity
13 desertification

Reading Passage 2, Questions 14–26

14 antiques
15 triumph
16 information
17 contact/meetings
18 hunt/desire
19 aimless/empty
20 educational
21 Trainspotting
22 NOT GIVEN
23 FALSE
24 NOT GIVEN
25 TRUE
26 TRUE

Reading Passage 3, Questions 27–40

27 vi
28 viii
29 ii
30 iv
31 iii
32 vii
33 fire science
34 investigators
35 evidence
36 prosecution
37 NOT GIVEN
38 YES
39 NO
40 NO

If you score ...

0–15	16–25	26–40
you are unlikely to get an acceptable score under examination conditions and we recommend that you spend a lot of time improving your English before you take IELTS.	you may get an acceptable score under examination conditions but we recommend that you think about having more practice or lessons before you take IELTS.	you are likely to get an acceptable score under examination conditions but remember that different institutions will find different scores acceptable.

READING

Reading Passage 1,
Questions 1–13

1	A
2	B
3	H
4	D
5	B
6	C
7	G
8	B
9	A

10&11   *IN EITHER ORDER*
D
E

12&13   *IN EITHER ORDER*
C
D

Reading Passage 2,
Questions 14–26

14	iv
15	vi
16	viii
17	v
18	i
19	vii

20	iii
21	TRUE
22	FALSE
23	FALSE
24	NOT GIVEN
25	rubber
26	farmer

Reading Passage 3,
Questions 27–40

27	eye movements
28	language co-activation
29	Stroop Task
30	conflict management
31	cognitive control
32	YES
33	NOT GIVEN
34	NO
35	NO
36	NOT GIVEN
37	D
38	G
39	B
40	C

If you score ...

0–15	16–25	26–40
you are unlikely to get an acceptable score under examination conditions and we recommend that you spend a lot of time improving your English before you take IELTS.	you may get an acceptable score under examination conditions but we recommend that you think about having more practice or lessons before you take IELTS.	you are likely to get an acceptable score under examination conditions but remember that different institutions will find different scores acceptable.

TEST 31

READING

Reading Passage 1, Questions 1–13

1. v
2. iii
3. viii
4. i
5. iv
6. vi
7. ii
8. pirates
9. food
10. oil
11. settlers
12. species
13. eggs

Reading Passage 2, Questions 14–26

14. D
15. C
16. F
17. G
18. D
19. B
20. vaccinations
21. antibiotics
22. mosquito(e)s
23. factories
24. forests
25. Polio
26. mountain

Reading Passage 3, Questions 27–40

27. dopamine
28. pleasure
29. caudate
30. anticipatory phase
31. food
32. B
33. C
34. A
35. B
36. D
37. F
38. B
39. E
40. C

If you score ...

0–14	15–24	25–40
you are unlikely to get an acceptable score under examination conditions and we recommend that you spend a lot of time improving your English before you take IELTS.	you may get an acceptable score under examination conditions but we recommend that you think about having more practice or lessons before you take IELTS.	you are likely to get an acceptable score under examination conditions but remember that different institutions will find different scores acceptable.

TEST 32

READING

Reading Passage 1, Questions 1–13

1 obsidian
2 spears
3 beads
4 impurities
5 Romans
6 lead
7 clouding
8 taxes
9 TRUE
10 FALSE
11 NOT GIVEN
12 TRUE
13 FALSE

Reading Passage 2, Questions 14–26

14 D
15 A
16 C
17 A
18 C
19 E
20 D
21 F
22 A
23 NO
24 NOT GIVEN
25 YES
26 YES

Reading Passage 3, Questions 27–40

27 iv
28 ii
29 vi
30 viii
31 vii
32 i
33 iii
34 YES
35 NOT GIVEN
36 NO
37 NO
38 information
39 financial
40 shareholders/investors

If you score ...

0–14	15–24	25–40
you are unlikely to get an acceptable score under examination conditions and we recommend that you spend a lot of time improving your English before you take IELTS.	you may get an acceptable score under examination conditions but we recommend that you think about having more practice or lessons before you take IELTS.	you are likely to get an acceptable score under examination conditions but remember that different institutions will find different scores acceptable.

TEST 33

TEST 1

READING

Reading Passage 1, Questions 1–13

1   update
2   environment
3   captain
4   films
5   season
6   accommodation
7   blog
8   FALSE
9   NOT GIVEN
10 FALSE
11 TRUE
12 NOT GIVEN
13 TRUE

Reading Passage 2, Questions 14–26

14 iv
15 vi
16 i
17 v
18 viii
19 iii

20 E
21 B
22 D
23 A
24 focus
25 pleasure
26 curiosity

Reading Passage 3, Questions 27–40

27 B
28 C
29 C
30 D
31 A
32 D
33 A
34 E
35 C
36 G
37 B
38 YES
39 NOT GIVEN
40 NO

If you score ...

0–16	17–25	26–40
you are unlikely to get an acceptable score under examination conditions and we recommend that you spend a lot of time improving your English before you take IELTS.	you may get an acceptable score under examination conditions but we recommend that you think about having more practice or lessons before you take IELTS.	you are likely to get an acceptable score under examination conditions but remember that different institutions will find different scores acceptable.

TEST 34

TEST 2

READING

Reading Passage 1, Questions 1–13

1 oils
2 friendship
3 funerals
4 wealth
5 indigestion
6 India
7 camels
8 Alexandria
9 Venice
10 TRUE
11 FALSE
12 NOT GIVEN
13 FALSE

Reading Passage 2, Questions 14–26

14 B
15 F
16 B
17 E
18 A
19 B
20 C
21 animals
22 childbirth
23 placebo
24 game
25 strangers
26 names

Reading Passage 3, Questions 27–40

27 D
28 C
29 A
30 D
31 D
32 D
33 C
34 B
35 A
36 C
37 A
38 B
39 C
40 D

If you score ...

0–15	16–23	24–40
you are unlikely to get an acceptable score under examination conditions and we recommend that you spend a lot of time improving your English before you take IELTS.	you may get an acceptable score under examination conditions but we recommend that you think about having more practice or lessons before you take IELTS.	you are likely to get an acceptable score under examination conditions but remember that different institutions will find different scores acceptable.

TEST 35

TEST 3

READING

Reading Passage 1, Questions 1–13

1 furniture
2 sugar
3 ropes
4 charcoal
5 bowls
6 hormones
7 cosmetics
8 dynamite
9 FALSE
10 FALSE
11 NOT GIVEN
12 TRUE
13 NOT GIVEN

Reading Passage 2, Questions 14–26

14 B
15 C
16 A
17 B
18 recording devices
19 fathers / dads
20 bridge hypothesis
21 repertoire
22 (audio-recording) vests
23 vocabulary
24 F
25 A
26 E

Reading Passage 3, Questions 27–40

27 C
28 H
29 A
30 B
31 D
32 shells
33 lake
34 rainfall
35 grains
36 pottery
37 B
38 A
39 D
40 A

If you score ...

0–16	17–24	25–40
you are unlikely to get an acceptable score under examination conditions and we recommend that you spend a lot of time improving your English before you take IELTS.	you may get an acceptable score under examination conditions but we recommend that you think about having more practice or lessons before you take IELTS.	you are likely to get an acceptable score under examination conditions but remember that different institutions will find different scores acceptable.

TEST 36

TEST 4

READING

Reading Passage 1, Questions 1–13

1 FALSE
2 FALSE
3 TRUE
4 TRUE
5 FALSE
6 TRUE
7 NOT GIVEN
8 TRUE
9 wool
10 navigator
11 gale
12 training
13 fire

Reading Passage 2, Questions 14–26

14 minerals
15 carbon
16 water
17 agriculture
18 C
19 E
20 A
21 D
22 E
23 C
24 F
25 G
26 F

Reading Passage 3, Questions 27–40

27 D
28 A
29 B
30 F
31 B
32 G
33 E
34 A
35 YES
36 NOT GIVEN
37 NO
38 NOT GIVEN
39 YES
40 NO

If you score ...

0–16	17–25	26–40
you are unlikely to get an acceptable score under examination conditions and we recommend that you spend a lot of time improving your English before you take IELTS.	you may get an acceptable score under examination conditions but we recommend that you think about having more practice or lessons before you take IELTS.	you are likely to get an acceptable score under examination conditions but remember that different institutions will find different scores acceptable.

TEST 1

READING

Reading Passage 1, Questions 1–13

1 creativity
2 rules
3 cities
4&5 IN EITHER ORDER
   traffic
   crime
6 competition
7 evidence
8 life
9 TRUE
10 TRUE
11 NOT GIVEN
12 FALSE
13 TRUE

Reading Passage 2, Questions 14–26

14 E
15 C
16 F
17 C
18 A
19&20 IN EITHER ORDER
   B
   D

21&22 IN EITHER ORDER
   D
   E
23 activists
24 consumerism
25 leaflets
26 police

Reading Passage 3, Questions 27–40

27 E
28 D
29 B
30 D
31 C
32 YES
33 NO
34 NO
35 NOT GIVEN
36 restaurants
37 performance
38 turnover
39 goals
40 characteristics

If you score …

0–17	18–26	27–40
you are unlikely to get an acceptable score under examination conditions and we recommend that you spend a lot of time improving your English before you take IELTS.	you may get an acceptable score under examination conditions but we recommend that you think about having more practice or lessons before you take IELTS.	you are likely to get an acceptable score under examination conditions but remember that different institutions will find different scores acceptable.

TEST 2

READING

Reading Passage 1, Questions 1–13

1 FALSE
2 TRUE
3 NOT GIVEN
4 FALSE
5 NOT GIVEN
6 TRUE
7 FALSE
8 TRUE
9 merchant
10 equipment
11 gifts
12 canoe
13 mountains

Reading Passage 2, Questions 14–26

14 F
15 C
16 E
17 D
18 B
19 design(s)

20 pathogens
21 tuberculosis
22 wards
23 communal
24 public
25 miasmas
26 cholera

Reading Passage 3, Questions 27–40

27 vi
28 i
29 iii
30 ii
31 ix
32 vii
33 iv
34 viii
35 productive
36 perfectionists
37 dissatisfied
38 TRUE
39 FALSE
40 NOT GIVEN

If you score …

0–18	19–27	28–40
you are unlikely to get an acceptable score under examination conditions and we recommend that you spend a lot of time improving your English before you take IELTS.	you may get an acceptable score under examination conditions but we recommend that you think about having more practice or lessons before you take IELTS.	you are likely to get an acceptable score under examination conditions but remember that different institutions will find different scores acceptable.

READING

Reading Passage 1, Questions 1–13

1   B
2   A
3   D
4   NOT GIVEN
5   NO
6   YES
7   B
8   C
9   B
10 A
11 A
12 C
13 A

Reading Passage 2, Questions 14–26

14 C
15 H
16 A
17 F
18 I
19 B
20 E

21&22 *IN EITHER ORDER*
     B
     C
23 ecology
24 prey
25 habitats
26 antibiotics

Reading Passage 3, Questions 27–40

27 B
28 G
29 F
30 E
31 C
32 NO
33 YES
34 NOT GIVEN
35 NO
36 YES
37 encouraging
38 desire
39 autonomy
40 targeted

If you score …

0–17	18–26	27–40
you are unlikely to get an acceptable score under examination conditions and we recommend that you spend a lot of time improving your English before you take IELTS.	you may get an acceptable score under examination conditions but we recommend that you think about having more practice or lessons before you take IELTS.	you are likely to get an acceptable score under examination conditions but remember that different institutions will find different scores acceptable.

TEST 4

READING

Reading Passage 1,
Questions 1–13

1   four / 4
2   young
3   food
4   light
5   aggressively
6   location
7   neurons
8   chemicals
9   FALSE
10 TRUE
11 FALSE
12 NOT GIVEN
13 TRUE

Reading Passage 2,
Questions 14–26

14 B
15 E
16 C
17 A
18 TRUE
19 TRUE
20 NOT GIVEN
21 FALSE
22 NOT GIVEN
23&24 *IN EITHER ORDER*
    B
    D
25&26 *IN EITHER ORDER*
    B
    E

Reading Passage 3,
Questions 27–40

27 FALSE
28 NOT GIVEN
29 FALSE
30 TRUE
31 FALSE
32 TRUE
33 NOT GIVEN
34 large
35 microplastic
36 populations
37 concentrations
38 predators
39 disasters
40 A

If you score …

0–17	18–26	27–40
you are unlikely to get an acceptable score under examination conditions and we recommend that you spend a lot of time improving your English before you take IELTS.	you may get an acceptable score under examination conditions but we recommend that you think about having more practice or lessons before you take IELTS.	you are likely to get an acceptable score under examination conditions but remember that different institutions will find different scores acceptable.