40 IELTS READING TESTS

PASSAGE 1

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With Explained Answers

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TEST 1

READING

READING PASSAGE 1

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

Johnson's Dictionary

For the century before Johnson's *Dictionary* was published in 1775, there had been concern about the state of the English language. There was no standard way of speaking or writing and no agreement as to the best way of bringing some order to the chaos of English spelling. Dr Johnson provided the solution.

There had, of course, been dictionaries in the past, the first of these being a little book of some 120 pages, compiled by a certain Robert Cawdray, published in 1604 under the title *A Table Alphabeticall* 'of hard usuall English wordes'. Like the various dictionaries that came after it during the seventeenth century, Cawdray's tended to concentrate on 'scholarly' words; one function of the dictionary was to enable its student to convey an impression of fine learning.

Beyond the practical need to make order out of chaos, the rise of dictionaries is associated with the rise of the English middle class, who were anxious to define and circumscribe the various worlds to conquer – lexical as well as social and commercial. It is highly appropriate that Dr Samuel Johnson, the very model of an eighteenth-century literary man, as famous in his own time as in ours, should have published his *Dictionary* at the very beginning of the heyday of the middle class.

Johnson was a poet and critic who raised common sense to the heights of genius. His approach to the problems that had worried writers throughout the late seventeenth and early eighteenth centuries was intensely practical. Up until his time, the task of producing a dictionary on such a large scale had seemed impossible without the establishment of an academy to make decisions about right and wrong usage. Johnson decided he did not need an academy to settle arguments about language; he would write a dictionary himself; and he would do it single-handed. Johnson signed the contract for the *Dictionary* with the bookseller Robert Dosley at a breakfast held at the Golden Anchor Inn near Holborn Bar on 18 June 1764. He was to be paid £1,575 in instalments, and from this he took money to rent 17 Gough Square, in which he set up his 'dictionary workshop'.

James Boswell, his biographer, described the garret where Johnson worked as 'fitted up like a counting house' with a long desk running down the middle at which the copying clerks would work standing up.

Johnson himself was stationed on a rickety chair at an 'old crazy deal table' surrounded by a chaos of borrowed books. He was also helped by six assistants, two of whom died whilst the *Dictionary* was still in preparation.

The work was immense; filling about eighty large notebooks (and without a library to hand), Johnson wrote the definitions of over 40,000 words, and illustrated their many meanings with some 114,000 quotations drawn from English writing on every subject, from the Elizabethans to his own time. He did not expect to achieve complete originality. Working to a deadline, he had to draw on the best of all previous dictionaries, and to make his work one of heroic synthesis. In fact, it was very much more. Unlike his predecessors, Johnson treated English very practically, as a living language, with many different shades of meaning. He adopted his definitions on the principle of English common law – according to precedent. After its publication, his *Dictionary* was not seriously rivalled for over a century.

After many vicissitudes the *Dictionary* was finally published on 15 April 1775. It was instantly recognised as a landmark throughout Europe. 'This very noble work,' wrote the leading Italian lexicographer, 'will be a perpetual monument of Fame to the Author, an Honour to his own Country in particular, and a general Benefit to the republic of Letters throughout Europe.' The fact that Johnson had taken on the Academies of Europe and matched them (everyone knew that forty French academics had taken forty years to produce the first French national dictionary) was cause for much English celebration.

Johnson had worked for nine years, 'with little assistance of the learned, and without any patronage of the great; not in the soft obscurities of retirement, or under the shelter of academic bowers, but amidst inconvenience and distraction, in sickness and in sorrow'. For all its faults and eccentricities his two-volume work is a masterpiece and a landmark, in his own words, 'setting the orthography, displaying the analogy, regulating the structures, and ascertaining the significations of English words'. It is the cornerstone of Standard English, an achievement which, in James Boswell's words, 'conferred stability on the language of his country'.

The *Dictionary*, together with his other writing, made Johnson famous and so well esteemed that his friends were able to prevail upon King George III to offer him a pension. From then on, he was to become the Johnson of folklore.

Questions 1–3

*Choose **THREE** letters **A–H**.*

Write your answers in boxes 1–3 on your answer sheet.

***NB** Your answers may be given in any order.*

Which **THREE** of the following statements are true of Johnson's *Dictionary*?

A It avoided all scholarly words.

B It was the only English dictionary in general use for 200 years.

C It was famous because of the large number of people involved.

D It focused mainly on language from contemporary texts.

E There was a time limit for its completion.

F It ignored work done by previous dictionary writers.

G It took into account subtleties of meaning.

H Its definitions were famous for their originality.

Questions 4–7

Complete the summary.

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

Write your answers in boxes 4–7 on your answer sheet.

In 1764 Dr Johnson accepted the contract to produce a dictionary. Having rented a garret, he took on a number of **4** ..... , who stood at a long central desk. Johnson did not have a **5** ..... available to him, but eventually produced definitions of in excess of 40,000 words written down in 80 large notebooks. On publication, the *Dictionary* was immediately hailed in many European countries as a landmark. According to his biographer, James Boswell, Johnson's principal achievement was to bring **6** ..... to the English language. As a reward for his hard work, he was granted a **7** ..... by the king.

Questions 8–13

Do the following statements agree with the information given in Reading Passage 1?

In boxes 8–13 on your answer sheet, write

TRUE	*if the statement agrees with the information*
FALSE	*if the statement contradicts the information*
NOT GIVEN	*if there is no information on this*

8 The growing importance of the middle classes led to an increased demand for dictionaries.

9 Johnson has become more well known since his death.

10 Johnson had been planning to write a dictionary for several years.

11 Johnson set up an academy to help with the writing of his *Dictionary*.

12 Johnson only received payment for his *Dictionary* on its completion.

13 Not all of the assistants survived to see the publication of the *Dictionary*.

TEST 2

READING

READING PASSAGE 1

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

BAKELITE

The birth of modern plastics

In 1907, Leo Hendrick Baekeland, a Belgian scientist working in New York, discovered and patented a revolutionary new synthetic material. His invention, which he named 'Bakelite', was of enormous technological importance, and effectively launched the modern plastics industry.

The term 'plastic' comes from the Greek *plassein*, meaning 'to mould'. Some plastics are derived *from* natural sources, some are semi-synthetic (the result of chemical action on a natural substance), and some are entirely synthetic, that is, chemically engineered from the constituents of coal or oil. Some are 'thermoplastic', which means that, like candlewax, they melt when heated and can then be reshaped. Others are 'thermosetting': like eggs, they cannot revert to their original viscous state, and their shape is thus fixed for ever. Bakelite had the distinction of being the first totally synthetic thermosetting plastic.

The history of today's plastics begins with the discovery of a series of semi-synthetic thermoplastic materials in the mid-nineteenth century. The impetus behind the development of these early plastics was generated by a number of factors – immense technological progress in the domain of chemistry, coupled with wider cultural changes, and the pragmatic need to find acceptable substitutes for dwindling supplies of 'luxury' materials such as tortoiseshell and ivory.

Baekeland's interest in plastics began in 1885 when, as a young chemistry student in Belgium, he embarked on research into phenolic resins, the group of sticky substances produced when phenol (carbolic acid) combines with an aldehyde (a volatile fluid similar to alcohol). He soon abandoned the subject, however, only returning to it some years later. By 1905 he was a wealthy New Yorker, having recently made his fortune with the invention of a new photographic paper. While Baekeland had been busily amassing dollars, some advances had been made in the development of plastics. The years 1899 and 1900 had seen the patenting of the first semi-synthetic thermosetting material that could be manufactured on an industrial scale. In purely scientific terms, Baekeland's major contribution to the field is not so much the actual discovery of the material to which he gave his name, but rather the method by which a reaction between phenol and formaldehyde could be controlled, thus

making possible its preparation on a commercial basis. On 13 July 1907, Baekeland took out his famous patent describing this preparation, the essential features of which are still in use today.

The original patent outlined a three-stage process, in which phenol and formaldehyde (from wood or coal) were initially combined under vacuum inside a large egg-shaped kettle. The result was a resin known as Novalak, which became soluble and malleable when heated. The resin was allowed to cool in shallow trays until it hardened, and then broken up and ground into powder. Other substances were then introduced: including fillers, such as woodflour, asbestos or cotton, which increase strength and moisture resistance, catalysts (substances to speed up the reaction between two chemicals without joining to either) and hexa, a compound of ammonia and formaldehyde which supplied the additional formaldehyde necessary to form a thermosetting resin. This resin was then left to cool and harden, and ground up a second time. The resulting granular powder was raw Bakelite, ready to be made into a vast range of manufactured objects. In the last stage, the heated Bakelite was poured into a hollow mould of the required shape and subjected to extreme heat and pressure, thereby 'setting' its form for life.

The design of Bakelite objects, everything from earrings to television sets, was governed to a large extent by the technical requirements of the moulding process. The object could not be designed so that it was locked into the mould and therefore difficult to extract. A common general rule was that objects should taper towards the deepest part of the mould, and if necessary the product was moulded in separate pieces. Moulds had to be carefully designed so that the molten Bakelite would flow evenly and completely into the mould. Sharp corners proved impractical and were thus avoided, giving rise to the smooth, 'streamlined' style popular in the 1930s. The thickness of the walls of the mould was also crucial: thick walls took longer to cool and harden, a factor which had to be considered by the designer in order to make the most efficient use of machines.

Baekeland's invention, although treated with disdain in its early years, went on to enjoy an unparalleled popularity which lasted throughout the first half of the twentieth century. It became the wonder product of the new world of industrial expansion – 'the material of a thousand uses'. Being both non-porous and heat-resistant, Bakelite kitchen goods were promoted as being germ-free and sterilisable. Electrical manufacturers seized on its insulating properties, and consumers everywhere relished its dazzling array of shades, delighted that they were now, at last, no longer restricted to the wood tones and drab browns of the pre-plastic era. It then fell from favour again during the 1950s, and was despised and destroyed in vast quantities. Recently, however, it has been experiencing something of a renaissance, with renewed demand for original Bakelite objects in the collectors' marketplace, and museums, societies and dedicated individuals once again appreciating the style and originality of this innovative material.

Questions 1–3

Complete the summary.

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

Write your answers in boxes 1–3 on your answer sheet.

Some plastics behave in a similar way to **1** ..... in that they melt under heat and can be moulded into new forms. Bakelite was unique because it was the first material to be both entirely **2** ..... in origin, and thermosetting.

There were several reasons for the research into plastics in the nineteenth century, among them the great advances that had been made in the field of **3** ..... and the search for alternatives to natural resources like ivory.

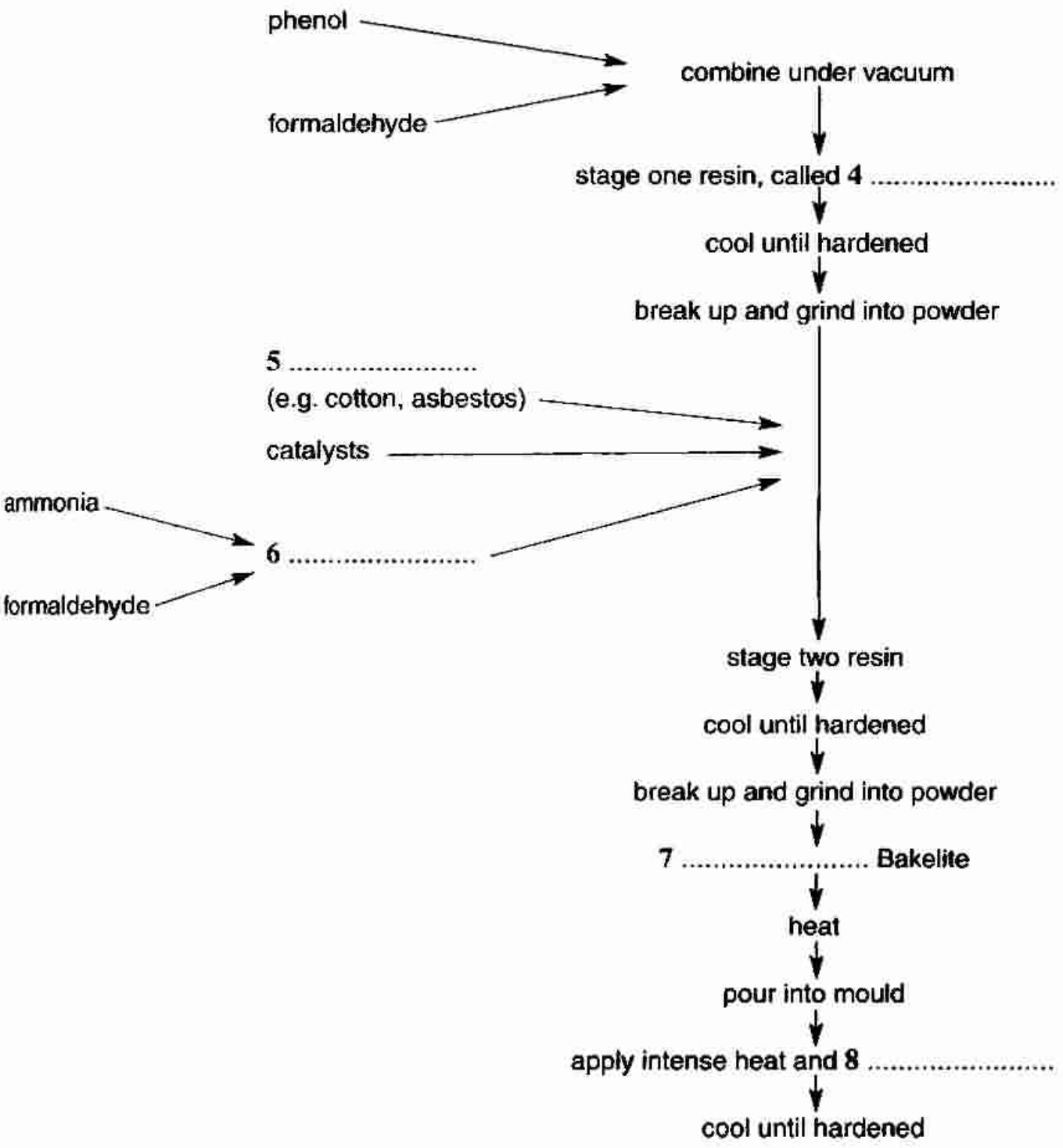
Questions 4–8

Complete the flow-chart.

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

Write your answers in boxes 4–8 on your answer sheet.

The Production of Bakelite



Questions 9 and 10

*Choose **TWO** letters **A–E**.*

Write your answers in boxes 9 and 10 on your answer sheet.

***NB** Your answers may be given in either order.*

Which **TWO** of the following factors influencing the design of Bakelite objects are mentioned in the text?

A the function which the object would serve

B the ease with which the resin could fill the mould

C the facility with which the object could be removed from the mould

D the limitations of the materials used to manufacture the mould

E the fashionable styles of the period

Questions 11–13

Do the following statements agree with the information given in Reading Passage 1?

In boxes 11–13 on your answer sheet, write

TRUE	*if the statement agrees with the information*
FALSE	*if the statement contradicts the information*
NOT GIVEN	*if there is no information on this*

11 Modern-day plastic preparation is based on the same principles as that patented in 1907.

12 Bakelite was immediately welcomed as a practical and versatile material.

13 Bakelite was only available in a limited range of colours.

TEST 3

READING

READING PASSAGE 1

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

Early Childhood Education

New Zealand's National Party spokesman on education, Dr Lockwood Smith, recently visited the US and Britain. Here he reports on the findings of his trip and what they could mean for New Zealand's education policy

A

'Education To Be More' was published last August. It was the report of the New Zealand Government's Early Childhood Care and Education Working Group. The report argued for enhanced equity of access and better funding for childcare and early childhood education institutions. Unquestionably, that's a real need; but since parents don't normally send children to pre-schools until the age of three, are we missing out on the most important years of all?

B

A 13-year study of early childhood development at Harvard University has shown that, by the age of three, most children have the potential to understand about 1000 words – most of the language they will use in ordinary conversation for the rest of their lives.

Furthermore, research has shown that while every child is born with a natural curiosity, it can be suppressed dramatically during the second and third years of life. Researchers claim that the human personality is formed during the first two years of life, and during the first three years children learn the basic skills they will use in all their later learning both at home and at school. Once over the age of three, children continue to expand on existing knowledge of the world.

C

It is generally acknowledged that young people from poorer socio-economic backgrounds tend to do less well in our education system. That's observed not just in New Zealand, but also in Australia, Britain and America. In an attempt to overcome that educational under-achievement, a nationwide programme called 'Headstart' was launched in the United States in 1965. A lot of money was poured into it. It took children into pre-school institutions at the age of three and was supposed to help the children of poorer families succeed in school.

Despite substantial funding, results have been disappointing. It is thought that there are two explanations for this. First, the programme began too late. Many children who entered it at the age of three were already behind their peers in language and measurable intelligence. Second, the parents were not involved. At the end of each day, 'Headstart' children returned to the same disadvantaged home environment.

D

As a result of the growing research evidence of the importance of the first three years of a child's life and the disappointing results from 'Headstart', a pilot programme was launched in Missouri in the US that focused on parents as the child's first teachers. The 'Missouri' programme was predicated on research showing that working with the family, rather than bypassing the parents, is the most effective way of helping children get off to the best possible start in life. The four-year pilot study included 380 families who were about to have their first child and who

represented a cross-section of socio-economic status, age and family configurations. They included single-parent and two-parent families, families in which both parents worked, and families with either the mother or father at home.

The programme involved trained parent-educators visiting the parents' home and working with the parent, or parents, and the child. Information on child development, and guidance on things to look for and expect as the child grows were provided, plus guidance in fostering the child's intellectual, language, social and motor-skill development. Periodic check-ups of the child's educational and sensory development (hearing and vision) were made to detect possible handicaps that interfere with growth and development. Medical problems were referred to professionals.

Parent-educators made personal visits to homes and monthly group meetings were held with other new parents to share experience and discuss topics of interest. Parent resource centres, located in school buildings, offered learning materials for families and facilitators for child care.

E

At the age of three, the children who had been involved in the 'Missouri' programme were evaluated alongside a cross-section of children selected from the same range of socio-economic backgrounds and family situations, and also a random sample of children that age. The results were phenomenal. By the age of three, the children in the programme were significantly more advanced in language development than their peers, had made greater strides in problem solving and other intellectual skills, and were further along in social development. In fact, the average child on the programme was performing at the level of the top 15 to 20 per cent of their peers in such things as auditory comprehension, verbal ability and language ability.

Most important of all, the traditional measures of 'risk', such as parents' age and education, or whether they were a single parent, bore little or no relationship to the measures of achievement and language development. Children in the programme performed equally well regardless of socio-economic disadvantages. Child abuse was virtually eliminated. The one factor that was found to affect the child's development was family stress leading to a poor quality of parent–child interaction. That interaction was not necessarily bad in poorer families.

F

These research findings are exciting. There is growing evidence in New Zealand that children from poorer socio-economic backgrounds are arriving at school less well developed and that our school system tends to perpetuate that disadvantage. The initiative outlined above could break that cycle of disadvantage. The concept of working with parents in their homes, or at their place of work, contrasts quite markedly with the report of the Early Childhood Care and Education Working Group. Their focus is on getting children and mothers access to childcare and institutionalised early childhood education. Education from the age of three to five is undoubtedly vital, but without a similar focus on parent education and on the vital importance of the first three years, some evidence indicates that it will not be enough to overcome educational inequity.

Questions 1–4

Reading Passage 1 has six sections, **A–F**.

Which paragraph contains the following information?

*Write the correct letter **A–F** in boxes 1–4 on your answer sheet.*

1 details of the range of family types involved in an education programme

2 reasons why a child's early years are so important

3 reasons why an education programme failed

4 a description of the positive outcomes of an education programme

Questions 5–10

Classify the following features as characterising

A *the 'Headstart' programme*
B *the 'Missouri' programme*
C *both the 'Headstart' and the 'Missouri' programmes*
D *neither the 'Headstart' nor the 'Missouri' programme*

*Write the correct letter **A**, **B**, **C** or **D** in boxes 5–10 on your answer sheet.*

5 was administered to a variety of poor and wealthy families

6 continued with follow-up assistance in elementary schools

7 did not succeed in its aim

8 supplied many forms of support and training to parents

9 received insufficient funding

10 was designed to improve pre-schoolers' educational development

Questions 11–13

Do the following statements agree with the information given in Reading Passage 1?

In boxes 11–13 on your answer sheet, write

TRUE	*if the statement agrees with the information*
FALSE	*if the statement contradicts the information*
NOT GIVEN	*if there is no information on this*

11 Most 'Missouri' programme three-year-olds scored highly in areas such as listening, speaking, reasoning and interacting with others.

12 'Missouri' programme children of young, uneducated, single parents scored less highly on the tests.

13 The richer families in the 'Missouri' programme had higher stress levels.

READING

READING PASSAGE 1

You should spend about 20 minutes on ***Questions 1–13****, which are based on Reading Passage 1 on the following pages.*

Questions 1–3

Reading Passage 1 has three sections, **A–C**.

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

Write the correct number ***i–vi*** *in boxes 1–3 on your answer sheet.*

List of Headings

i	The expansion of international tourism in recent years
ii	How local communities can balance their own needs with the demands of wilderness tourism
iii	Fragile regions and the reasons for the expansion of tourism there
iv	Traditional methods of food-supply in fragile regions
v	Some of the disruptive effects of wilderness tourism
vi	The economic benefits of mass tourism

1 Section **A**

2 Section **B**

3 Section **C**

The Impact of Wilderness Tourism

A

The market for tourism in remote areas is booming as never before. Countries all across the world are actively promoting their 'wilderness' regions – such as mountains, Arctic lands, deserts, small islands and wetlands – to high-spending tourists. The attraction of these areas is obvious: by definition, wilderness tourism requires little or no initial investment. But that does not mean that there is no cost. As the 1992 United Nations Conference on Environment and Development recognized, these regions are fragile (i.e. highly vulnerable to abnormal pressures) not just in terms of their ecology, but also in terms of the culture of their inhabitants. The three most significant types of fragile environment in these respects, and also in terms of the proportion of the Earth's surface they cover, are deserts, mountains and Arctic areas. An important characteristic is their marked seasonality, with harsh conditions prevailing for many months each year. Consequently, most human activities, including tourism, are limited to quite clearly defined parts of the year.

Tourists are drawn to these regions by their natural landscape beauty and the unique cultures of their indigenous people. And poor governments in these isolated areas have welcomed the new breed of 'adventure tourist', grateful for the hard currency they bring. For several years now, tourism has been the prime source of foreign exchange in Nepal and Bhutan. Tourism is also a key element in the economies of Arctic zones such as Lapland and Alaska and in desert areas such as Ayers Rock in Australia and Arizona's Monument Valley.

B

Once a location is established as a main tourist destination, the effects on the local community are profound. When hill-farmers, for example, can make more money in a few weeks working as porters for foreign trekkers than they can in a year working in their fields, it is not surprising that many of them give up their farm-work, which is thus left to other members of the family. In some hill-regions, this has led to a serious decline in farm output and a change in the local diet, because there is insufficient labour to maintain terraces and irrigation systems and tend to crops. The result has been that many people in these regions have turned to outside supplies of rice and other foods.

In Arctic and desert societies, year-round survival has traditionally depended on hunting animals and fish and collecting fruit over a relatively short season. However, as some inhabitants become involved in tourism, they no longer have time to collect wild food; this has led to increasing dependence on bought food and stores. Tourism is not always the culprit behind such changes. All kinds of wage labour, or government handouts, tend to undermine traditional survival

systems. Whatever the cause, the dilemma is always the same: what happens if these new, external sources of income dry up?

The physical impact of visitors is another serious problem associated with the growth in adventure tourism. Much attention has focused on erosion along major trails, but perhaps more important are the deforestation and impacts on water supplies arising from the need to provide tourists with cooked food and hot showers. In both mountains and deserts, slow-growing trees are often the main sources of fuel and water supplies may be limited or vulnerable to degradation through heavy use.

C

Stories about the problems of tourism have become legion in the last few years. Yet it does not have to be a problem. Although tourism inevitably affects the region in which it takes place, the costs to these fragile environments and their local cultures can be minimized. Indeed, it can even be a vehicle for reinvigorating local cultures, as has happened with the Sherpas of Nepal's Khumbu Valley and in some Alpine villages. And a growing number of adventure tourism operators are trying to ensure that their activities benefit the local population and environment over the long term.

In the Swiss Alps, communities have decided that their future depends on integrating tourism more effectively with the local economy. Local concern about the rising number of second home developments in the Swiss Pays d'Enhaut resulted in limits being imposed on their growth. There has also been a renaissance in communal cheese production in the area, providing the locals with a reliable source of income that does not depend on outside visitors.

Many of the Arctic tourist destinations have been exploited by outside companies, who employ transient workers and repatriate most of the profits to their home base. But some Arctic communities are now operating tour businesses themselves, thereby ensuring that the benefits accrue locally. For instance, a native corporation in Alaska, employing local people, is running an air tour from Anchorage to Kotzebue, where tourists eat Arctic food, walk on the tundra and watch local musicians and dancers.

Native people in the desert regions of the American Southwest have followed similar strategies, encouraging tourists to visit their pueblos and reservations to purchase high-quality handicrafts and artwork. The Acoma and San Ildefonso pueblos have established highly profitable pottery businesses, while the Navajo and Hopi groups have been similarly successful with jewellery.

Too many people living in fragile environments have lost control over their economies, their culture and their environment when tourism has penetrated their homelands. Merely restricting tourism cannot be the solution to the imbalance, because people's desire to see new places will not just disappear. Instead, communities in fragile environments must achieve greater control over tourism ventures in their regions, in order to balance their needs and aspirations with the demands of tourism. A growing number of communities are demonstrating that, with firm communal decision-making, this is possible. The critical question now is whether this can become the norm, rather than the exception.

Questions 4–9

Do the following statements reflect the opinion of the writer of Reading Passage 1?

In boxes 4–9 on your answer sheet, write

YES	*if the statement reflects the opinion of the writer*
NO	*if the statement contradicts the opinion of the writer*
NOT GIVEN	*if it is impossible to say what the writer thinks about this*

4 The low financial cost of setting up wilderness tourism makes it attractive to many countries.

5 Deserts, mountains and Arctic regions are examples of environments that are both ecologically and culturally fragile.

6 Wilderness tourism operates throughout the year in fragile areas.

7 The spread of tourism in certain hill-regions has resulted in a fall in the amount of food produced locally.

8 Traditional food-gathering in desert societies was distributed evenly over the year.

9 Government handouts do more damage than tourism does to traditional patterns of food-gathering.

Questions 10–13

Complete the table below.

Choose ***ONE WORD*** *from Reading Passage 1 for each answer.*

Write your answers in boxes 10–13 on your answer sheet.

The positive ways in which some local communities have responded to tourism	
People/Location	**Activity**
Swiss Pays d'Enhaut	Revived production of **10** .....
Arctic communities	Operate **11** ..... businesses
Acoma and San Ildefonso	Produce and sell **12** .....
Navajo and Hopi	Produce and sell **13** .....

READING

READING PASSAGE 1

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

AUSTRALIA'S SPORTING SUCCESS

A They play hard, they play often, and they play to win. Australian sports teams win more than their fair share of titles, demolishing rivals with seeming ease. How do they do it? A big part of the secret is an extensive and expensive network of sporting academies underpinned by science and medicine. At the Australian Institute of Sport (AIS), hundreds of youngsters and pros live and train under the eyes of coaches. Another body, the Australian Sports Commission (ASC), finances programmes of excellence in a total of 96 sports for thousands of sportsmen and women. Both provide intensive coaching, training facilities and nutritional advice.

B Inside the academies, science takes centre stage. The AIS employs more than 100 sports scientists and doctors, and collaborates with scores of others in universities and research centres. AIS scientists work across a number of sports, applying skills learned in one – such as building muscle strength in golfers – to others, such as swimming and squash. They are backed up by technicians who design instruments to collect data from athletes. They all focus on one aim: winning. 'We can't waste our time looking at ethereal scientific questions that don't help the coach work with an athlete and improve performance,' says Peter Fricker, chief of science at AIS.

C A lot of their work comes down to measurement – everything from the exact angle of a swimmer's dive to the second-by-second power output of a cyclist. This data is used to wring improvements out of athletes. The focus is on individuals, tweaking performances to squeeze an extra hundredth of a second here, an extra millimetre there. No gain is too slight to bother with. It's the tiny, gradual improvements that add up to world-beating results. To demonstrate how the system works, Bruce Mason at AIS shows off the prototype of a 3D analysis tool for studying swimmers. A wire-frame model of a champion swimmer slices through the water, her arms moving in slow motion. Looking side-on, Mason measures the distance between strokes. From above, he analyses how her spine swivels. When fully developed, this system will enable him to build a biomechanical profile for coaches to use to help budding swimmers. Mason's contribution to sport also includes the development of the SWAN (SWimming ANalysis) system now used in Australian national competitions. It collects images from digital cameras

running at 50 frames a second and breaks down each part of a swimmer's performance into factors that can be analysed individually – stroke length, stroke frequency, average duration of each stroke, velocity, start, lap and finish times, and so on. At the end of each race, SWAN spits out data on each swimmer.

D 'Take a look,' says Mason, pulling out a sheet of data. He points out the data on the swimmers in second and third place, which shows that the one who finished third actually swam faster. So why did he finish 35 hundredths of a second down? 'His turn times were 44 hundredths of a second behind the other guy,' says Mason. 'If he can improve on his turns, he can do much better.' This is the kind of accuracy that AIS scientists' research is bringing to a range of sports. With the Cooperative Research Centre for Micro Technology in Melbourne, they are developing unobtrusive sensors that will be embedded in an athlete's clothes or running shoes to monitor heart rate, sweating, heat production or any other factor that might have an impact on an athlete's ability to run. There's more to it than simply measuring performance. Fricker gives the example of athletes who may be down with coughs and colds 11 or 12 times a year. After years of experimentation, AIS and the University of Newcastle in New South Wales developed a test that measures how much of the immune-system protein immunoglobulin A is present in athletes' saliva. If IgA levels suddenly fall below a certain level, training is eased or dropped altogether. Soon, IgA levels start rising again, and the danger passes. Since the tests were introduced, AIS athletes in all sports have been remarkably successful at staying healthy.

E Using data is a complex business. Well before a championship, sports scientists and coaches start to prepare the athlete by developing a 'competition model', based on what they expect will be the winning times. 'You design the model to make *that* time,' says Mason. 'A start of *this* much, each free-swimming period has to be *this* fast, with a certain stroke frequency and stroke length, with turns done in *these* times.' All the training is then geared towards making the athlete hit those targets, both overall and for each segment of the race. Techniques like these have transformed Australia into arguably the world's most successful sporting nation.

F Of course, there's nothing to stop other countries copying – and many have tried. Some years ago, the AIS unveiled coolant-lined jackets for endurance athletes. At the Atlanta Olympic Games in 1996, these sliced as much as two per cent off cyclists' and rowers' times. Now everyone uses them. The same has happened to the 'altitude tent', developed by AIS to replicate the effect of altitude training at sea level. But Australia's success story is about more than easily copied technological fixes, and up to now no nation has replicated its all-encompassing system.

Questions 1–7

Reading Passage 1 has six paragraphs, **A–F**.

Which paragraph contains the following information?

*Write the correct letter, **A–F**, in boxes 1–7 on your answer sheet.*

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

1 a reference to the exchange of expertise between different sports

2 an explanation of how visual imaging is employed in investigations

3 a reason for narrowing the scope of research activity

4 how some AIS ideas have been reproduced

5 how obstacles to optimum achievement can be investigated

6 an overview of the funded support of athletes

7 how performance requirements are calculated before an event

Questions 8–11

Classify the following techniques according to whether the writer states they

A *are currently exclusively used by Australians*

B *will be used in the future by Australians*

C *are currently used by both Australians and their rivals*

*Write the correct letter, **A**, **B** or **C**, in boxes 8–11 on your answer sheet.*

8 cameras

9 sensors

10 protein tests

11 altitude tents

Questions 12 and 13

Answer the questions below.

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

Write your answers in boxes 12 and 13 on your answer sheet.

12 What is produced to help an athlete plan their performance in an event?

13 By how much did some cyclists' performance improve at the 1996 Olympic Games?

TEST 6

Test 2

R EADI NG

READING PASSAGE 1

*You should spend about 20 minutes on Questions **1-13**, which are based on Reading Passage 1*
on the following pages.

Questions 1-5

Reading Passage 1 has five marked paragraphs. A-E.

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

Write the correct number,i-viii, in boxes 1-5 on your answer sheet

List of headings

i	Avoiding an overcrowded centre
ii	Asuccessful exercise in people power
iii	The benefits of working together in cities
iv	Higher incomes need not mean more cars
v	Economic arguments fail to persuade
vi	The impact of telecommuications on population distribution
viii	Responding to arguments against public transport

1 Paragraph A

2 Paragraph B

3 Paragraph C

4 Paragraph D

5 Paragraph E

Advantages of public transport

A new study conducted for the World Bank by Murdoch University's Institute for Science and Technology Policy (ISTP) has demonstrated that public transport is more efficient than cars. The study compared the proportion of wealth poured into transport by thirty-seven cities around the world. This included both the public and private costs of building, maintaining and using a transport system.

The study found that the Western Australian city of Perth is a good example of a city with minimal public transport. As a result, 17% of its wealth went into transport costs, Some European and Asian cities, on the other hand, spent as little as 5%. Professor Peter Newman, !STP Director, pointed out that these more efficient cities were able to put the difference into attracting industry and jobs or creating *a* better place to live.

According to Professor Newman, the larger Australian city of Melbourne is a rather unusual city in this sort of comparison. He describes it as two cities: 'A European city surrounded by a car-dependent one'. Melbourne's large tram network has made car use in the inner city much lower, but the outer suburbs have the same car-based structure as most other Australian cities. The explosion in demand for accommodation in the inner suburbs of Melbourne suggests a recent change in many people's preferences as to where they live,

Newman says this is a new, broader way of considering public transport issues. In the past, the case for public transport has been made on the basis of environmental and social justice considerations rather than economics. Newman, however, believes the study demonstrates that 'the auto-dependent city model is inefficient and grossly inadequate in economic as well as environmental terms'.

Bicycle use was not included in the study but Newman noted that the two most 'bicycle friendly[1] cities considered - Amsterdam and Copenhagen - were very efficient, even though their public transport systems were 'reasonable but not special'.

Ii is common for supporters of road networks to reject the models of cities with good public transport by arguing that such systems would not work in their particular city. One objection is climate. Some people say their city could not make more use of public transport because it is either too hot or loo cold. Newman rejects this, pointing out that public transport has been successful in both Toronto and Singapore and, in fact, he has checked the use of cars against climate and found 'zero correlation',

When it comes to other physical features, road lobbies are on stronger ground. For example, Newman accepts it would be hard for a city as hilly as Auckland to develop a really good rail network. However, he points out that both Honk Kong and Zurich have managed to make a success of their rail systems, heavy and light respectively, though there are few cities in the world as hilly.

A in fact Newman believes the main reason for adopting one sort of transport over another is politics The more democratic the process, the more public transport ,s favored. He considers Portland Oregon, a perfect example of this. Some years ago federal money was granted to build a new road. However, local pressure groups forced a referendum over whether to spend the money on light rail instead. The rail proposal won and the railway worked spectacularly well. In the years that have followed, more and more rail systems have been put in, dramatically changing the nature of the city Newman notes that Portland has about the same population as Perth and had a similar population density at the time.

B In the UK, travel times to work had been stable for at least six centuries, with people avoiding situations that required them to spend more than half an hour travelling to work. Trains and cars initially allowed people to live at greater distances without taking longer to reach their destination. However, public infrastructure did not keep pace with urban sprawl, causing massive congestion problems which now make commuting times far higher.

C There is a widespread belief that increasing wealth encourages people to live farther out where cars are the only viable transport. The example of European cities refutes that. They are often wealthier than their American counterparts but have not generated the same level of car use. In Stockholm, car use has actually fallen in recent years as the city has become larger and wealthier. A new study makes this point even more starkly. Developing cities in Asia, such as Jakarta and Bangkok, make more use of the car than wealthy Asian cities such as Tokyo and Singapore. In cities that developed later, the World Bank and Asian Development Bank discouraged the building of public transport and people have been forced to rely on cars -creating the massive traffic jams that characterize those cities.

D Newman believes one of the best studies on how cities built for cars might be converted to rail use is *The Urban Village* report, which used Melbourne as an example. It found that pushino everyone into the city centre was not the best approach. Instead, the proposal advocated the creation of urban villages at hundreds of sites, mostly around railway stations.

E It was once assumed that improvements in telecommunications would lead to more dispersal in the population as people were no longer forced into cities. However, the ISTP team's research demonstrates that the population and job density of cities rose or remained constant in the 1980s after decades of decline. The explanation for this seems to be that it is valuable to place people working in related fields together. 'The new world will largely depend on human creativity, and creativity flourishes where people come together face-to-face.'

Questions 6-10

Do the following statements agree with the information given in Reading Passage 1?

In boxes 6-10 on your answer sheet, write

TRUE	*if the statement agrees with the information*
FALSE	*if the statement contradicts the information*
NOT GIVEN	*if there is no information on this*

6 The ISTP study examined public and private systems in every city of the world.

7 Efficient cities can improve the quality of life for their inhabitants.

8 An inner-city tram network is dangerous for car drivers.

9 In Melbourne, people prefer to live in the outer suburbs.

10 Cities with high levels of bicycle usage can be efficient even when public transport is only averagely good.

Questions 11-13

Look at the following cities (Questions 11-13) and the list of descriptions below.

Match each city with the correct description, A-F.

Write the correct letter, A-F. in boxes 11-13 on your answer sheet.

11 Perth

12 Auckland

13 Portland

List of Descriptions

A	successfully uses a light rail transport system in hilly environment
B	successful public transport system despite cold winters
C	profitably moved from road to light rail transport system
D	hilly and inappropriate for rail transport system
E	heavily dependent on cars despite widespread poverty
F	inefficient due to a limited public transport system

TEST 7

READING

READING PASSAGE 1

You should spend about 20 minutes on Questions ***1-13****. which are based on Reading Passage I below.*

A The Lumiere Brothers opened their Cinematographe, at 14 Boulevard des Capucines in Paris, lo 100 paying customers over 100 years ago, on December 8, 1895. Before the eyes of the stunned, thrilled audience, photographs came to life and moved across a flat screen.

B So ordinary and routine has this become to us that it takes a determined leap of the imagination to grasp the impact of those first moving images. But it is worth trying, for to understand the initial shock of those images is to understand the extraordinary power and magic of cinema, the unique, hypnotic quality that has made film the most dynamic, effective art form of the 20th century.

C One of the Lumiere Brothers' earliest films was a 30-second piece which showed a section of a railway platform flooded with sunshine. A train appears and heads straight for the camera. And that is all that happens. Yet the Russian director Andrei Tarkovsky, one of the greatest of all film artists, described the film as a 'work of genius'. 'As the train approached,' wrote Tarkovsky, panic started in the theatre: people jumped and ran away. That was the moment when cinema was born. The frightened audience could not accept that they were watching a mere picture. Pictures were still, only reality moved; this must, therefore, be reality. In their confusion, they feared that a real train was about to crush them.'

D Early cinema audiences often experienced the same confusion. In time, the idea of film became familiar, the magic was accepted -but it never stopped being magic. Film has never lost its unique power to embrace its audiences and transport them to a different world. For Tarkovsky, the key to that magic was the way in which cinema created a dynamic image of the real flow of events. A still picture could only imply the existence of time, while time in a novel passed at the whim of the reader. But in cinema, the real, objective flow of time was captured.

E One effect of this realism was to educate the world about itself. For cinema makes the world smaller. Long before people travelled to America or anywhere else, they knew what other places looked like; they know how other people worked and lived. Overwhelmingly, the lives recorded - at least in film fiction - have been American. From the earliest days of the industry, Hollywood has dominated the world film market. American imagery - the cars, the cities, the cowboys - become the primary imagery of film. Film carried American life and values around the globe.

F And, thanks to film, future generations will know the 20th century more intimately than any other period. We can only imagine what life was like in the 14th century or in classical Greece. But the life of the modem world has been recorded on film in massive, encyclopaedic detail. We shall be known better than any preceding generations.

G The 'star' was another natural consequence of cinema. The cinema star was effectively

born in 1910. Film personalities have such an immediate presence that inevitably, they become super-real. Because we watch them so closely ond because everybody in the world seems to know who they are, they appear more real to us than we do ourselves. The star as magnified human self is one of cinema's most strange and enduring legacies.

H Cinema has also given a new lease of life to the idea of the story. When the Lumiere Brothers and other pioneers began showing off this new invention, it was by no means obvious how it would be used. All that mattered at first was the wonder of movement. Indeed, some said that, once this novelty had worn off, cinema would fade away. It was no more than a passing gimmick, a fairground attraction.

I Cinema might, for example, have become primarily a documentary form. Or it might have developed like television - as a strange noisy transfer of music, information and narrative. But what happened was that it became, overwhelmingly, a medium for telling stories. Originally these were conceived as short stories - early producers doubted the ability of audiences to concentrate for more than the length of a reel. Then, in 1912, an Italian 2-hour film was hugely successful, and Hollywood settled upon the novel-length narrative that remains the dominant cinematic convention of today.

J And it has all happened so quickly. Almost unbelievably, it is a mere J 00 years since that train arrived ond fhe audience screamed and fled, convinced by the dangerous reality of what they saw, and, perhaps, suddenly aware that the world could never be the same again - that, maybe, it could be better, brighter, more astonishing, more real than reality,

Questions IS

Reading Passage 1 has ten paragraphs, A-J.

Which paragraph contains the following information?

Write the correct fetter, A-J. in boxes 1-5 on your answer sheet.

1 the location of [he first cinema

2 how cinema came to focus on stories

3 the speed with which cinema has changed

4 how cinema teaches us about other cultures

5 the attraction of actors in films

Questions 6-9

Do the following statements agree with the views of the writer in Reading Passage 1 ?

In boxes 6-9 on your answer sheet, write

YES	*if the statement agrees with the views of the writer if the*
NO	*statement contradicts the views of the writer if it is*
NOT GIVEN	*impossible to say what the writer thinks about this*

6 It is important to understand how the first audiences reacted to the cinema.

7. The Lumiere Brothers' film about the train was one of the greatest films ever made.

8 Cinema presents a biased view of other countries.

9 Storylines were important in very early cinema.

Questions 10-13

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

Write the correct letter in boxes 10-13 on your answer sheet.

10 The writer refers lo the film of the train in order lo demonstrate

A the simplicity of early films.
B the impact of early films.
C how short early films were.
D how imaginative early films were.

11 In Tarkovsky's opinion, the attraction of the cinema is that it

A aims lo impress its audience.
B tells stories better than books.
C illustrates the passing of lime.
D describes familiar events.

12 When cinema first began, people thought that

A it would always tell stories.
B it should be used in fairgrounds.
C Us audiences were unappreciative.
D its future was uncertain.

13 What is the best title for this passage?

A The rise of the cinema star
B Cinema and novels compared
C The domination of Hollywood
D The power of the big screen

TEST 8

READING

READING PASSAGE 1

You should spend about 20 minutes on Questions 1-13 which are based on Reading Passage 1 on the following pages.

Questions 1-7

Reading Passage 1 has seven paragraphs, A-G.

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

Write the correct number, i-x, in boxes 1-7 on your answer sheet.

List of Headings

i Nat all doctors are persuaded
ii Choosing the best offers
iii Who is responsible for the increase in promotions?
iv Fighting the drug companies
v An example of what doctors expect from drug companies
vi Gifts include financial incentives
vii Research shows that promotion works
viii The high costs of research
ix The positive side of drugs promotion
x Who really pays for doctors' free gifts?

1 Paragraph A
2 Paragraph B
3 Paragraph C
4 Paragraph D
5 Paragraph E
6 Paragraph F
7 Paragraph G

Doctoring sales

Pharmaceuticals is one of the most profitable industries in North America. But do the drugs industry's sales and marketing strategies go too far?

A A few months ago Kim Schaefer. sales representative of a major global pharmaceutical company, walked into a medical center in New York to bring information and free samples of her company's latest products. That day she was lucky - a doctor WAS available to see her. 'The last rep offered me a trip to Florida. What do you have?' the physician asked. He was only half joking.

B What was on offer that day was a pair of tickets for a New York musical. But on any given day what Schaefer can offer is typical for today's drugs rep - a car trunk full of promotional gifts and gadgets, a budget that could buy lunches and dinners for a smell county hundreds of free drug samples and the freedom to give a physician $200 to prescribe her new product to the next six patients who fit the drug's profile. And she also has a few $ 1,000 honoraria to offer in exchange for doctors' attendance at her company's next educational lecture.

C Selling Pharmaceuticals is a daily exercise in ethical judgment. Salespeople like Schaefer walk the line between the common practice of buying a prospect's time with a free meal, and bribing doctors to prescribe their drugs. They work in an industry highly criticized for its sales and marketing practices, but find themselves in the middle of the age-old chicken-or-egg question - businesses wont use strategies that don't work, so are doctors to blame for the escalating extravagance of pharmaceutical marketing? Or is it the industry's responsibility to decide the boundaries?

D The explosion in the sheer number of salespeople in the Reid - and the amount of funding used to promote their causes - forces close examination of the pressures, influences and relationships between drug reps and doctors. Salespeople provide much-needed information and education to physicians. In many cases the glossy brochures, article reprints and prescriptions they deliver are primary sources of drug education for healthcare givers. With the huge investment the industry has placed in face-to-face selling, salespeople have essentially become specialists in one drug or group of drugs - a tremendous advantage in getting the attention of busy doctors in need of quick information.

E But the sales push rarely stops in the office. The flashy brochures and pamphlets left by the sales reps are often followed up with meals at expensive restaurants, meetings in warm and sunny places, and an inundation of promotional gadgets. Rarely do patients watch a doctor write with a pen that isn't emblazoned with a drug's name, or see a

nurse use a tablet not bearing a pharmaceutical company' logo. Millions of dollars are spent by pharmaceutical companies on promotional products like coffee mugs, shirts, umbrellas, and golf balls. Money well spent? It's hard to tell. I've been the recipient of golf balls from one company and I use them, but it doesn't make me prescribe their medicine,' says one doctor.' I tend to think I'm not influenced by what they give me.'

F Free samples of new and expensive drugs might be the single most effective way of getting doctors and patients to become loyal to a product. Salespeople hand out hundreds of dollars' worth of samples each week-$7.2 billion worth of them in one year. Though few comprehensive studies have been conducted, one by the University of Washington investigated how drug sample availability affected what physicians prescribe. A total of 131 doctors self-reported their prescribing patterns-the conclusion was that the availability of samples led them to dispense and prescribe drugs that differed from their preferred drug choice.

G The bottom line is that pharmaceutical companies as a whole invest more in marketing than they do in research and development. And patients are the ones who pay-in the form of sky-rocketing prescription prices-for every pen that's handed out, every free theatre ticket, and every steak dinner eaten. In the end the fact remains that pharmaceutical companies have every right to make a profit and will continue to find new ways to increase sales. But as the medical world continues to grapple with what's acceptable and what's not, it is clear that companies must continue to be heavily scrutinized for their sales and marketing strategies.

Questions 8-13

Do the following statements agree with the views of the writer in Reading Passage 1?

In boxes 8-13 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

8 Sales representatives like Kim Schaefer work to a very limited budget.

9 Kim Schaefer's marketing technique may be open to criticism on moral grounds.

10 The information provided by drug companies is of little use to doctors.

11 Evidence of drug promotion is clearly visible in the healthcare environment.

12 The drug companies may give free drug samples to patients without doctors' prescriptions

13 It is legitimate for drug companies to make money.

TEST 9

READING

READING PASSAGE 1

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

Let's Go Bats

A Bats have a problem: how to find their way around in the dark. They hunt at night, and cannot use light to help them find prey and avoid obstacles. You might say that this is a problem of their own making, one that they could avoid simply by changing their habits and hunting by day. But the daytime economy is already heavily exploited by other creatures such as birds. Given that there is a living to be made at night, and given that alternative daytime trades are thoroughly occupied, natural selection has favoured bats that make a go of the night-hunting trade. It is probable that the nocturnal trades go way back in the ancestry of all mammals. In the time when the dinosaurs dominated the daytime economy, our mammalian ancestors probably only managed to survive at all because they found ways of scraping a living at night. Only after the mysterious mass extinction of the dinosaurs about 65 million years ago were our ancestors able to emerge into the daylight in any substantial numbers.

B Bats have an engineering problem: how to find their way and find their prey in the absence of light. Bats are not the only creatures to face this difficulty today. Obviously the night-flying insects that they prey on must find their way about somehow. Deep-sea fish and whales have little or no light by day or by night. Fish and dolphins that live in extremely muddy water cannot see because, although there is light, it is obstructed and scattered by the dirt in the water. Plenty of other modern animals make their living in conditions where seeing is difficult or impossible.

C Given the questions of how to manoeuvre in the dark, what solutions might an engineer consider? The first one that might occur to him is to manufacture light, to use a lantern or a searchlight. Fireflies and some fish (usually with the help of bacteria) have the power to manufacture their own light, but the process seems to consume a large amount of energy. Fireflies use their light for attracting mates. This doesn't require a prohibitive amount of energy: a male's tiny pinprick of light can be seen by a female from some distance on a dark night, since her eyes are exposed directly to the light source itself. However, using light to find one's own way around requires vastly more energy, since the eyes have to detect the tiny fraction of the light that bounces off each part of the scene. The light source must therefore be immensely

brighter if it is to be used as a headlight to illuminate the path, than if it is to be used as a signal to others. In any event, whether or not the reason is the energy expense, it seems to be the case that, with the possible exception of some weird deep-sea fish, no animal apart from man uses manufactured light to find its way about.

D What else might the engineer think of? Well, blind humans sometimes seem to have an uncanny sense of obstacles in their path. It has been given the name 'facial vision', because blind people have reported that it feels a bit like the sense of touch, on the face. One report tells of a totally blind boy who could ride his tricycle at good speed round the block near his home, using facial vision. Experiments showed that, in fact, facial vision is nothing to do with touch or the front of the face, although the sensation may be referred to the front of the face, like the referred pain in a phantom limb. The sensation of facial vision, it turns out, really goes in through the ears. Blind people, without even being aware of the fact, are actually using echoes of their own footsteps and of other sounds, to sense the presence of obstacles. Before this was discovered, engineers had already built instruments to exploit the principle, for example to measure the depth of the sea under a ship. After this technique had been invented, it was only a matter of time before weapons designers adapted it for the detection of submarines. Both sides in the Second World War relied heavily on these devices, under such codenames as Asdic (British) and Sonar (American), as well as Radar (American) or RDF (British), which uses radio echoes rather than sound echoes.

E The Sonar and Radar pioneers didn't know it then, but all the world now knows that bats, or rather natural selection working on bats, had perfected the system tens of millions of years earlier, and their radar' achieves feats of detection and navigation that would strike an engineer dumb with admiration. It is technically incorrect to talk about bat 'radar', since they do not use radio waves. It is sonar. But the underlying mathematical theories of radar and sonar are very similar, and much of our scientific understanding of the details of what bats are doing has come from applying radar theory to them. The American zoologist Donald Griffin, who was largely responsible for the discovery of sonar in bats, coined the term 'echolocation' to cover both sonar and radar, whether used by animals or by human instruments.

Questions 1–5

Reading Passage 1 has five paragraphs, **A–E.**

Which paragraph contains the following information?

*Write the correct letter, **A–E**, in boxes 1–5 on your answer sheet.*

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

1 examples of wildlife other than bats which do not rely on vision to navigate by
2 how early mammals avoided dying out
3 why bats hunt in the dark
4 how a particular discovery has helped our understanding of bats
5 early military uses of echolocation

Questions 6–9

Complete the summary below.

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

Write your answers in boxes 6–9 on your answer sheet.

Facial Vision

Blind people report that so-called 'facial vision' is comparable to the sensation of touch on the face. In fact, the sensation is more similar to the way in which pain from a **6** ..... arm or leg might be felt. The ability actually comes from perceiving **7** ..... through the ears. However, even before this was understood, the principle had been applied in the design of instruments which calculated the **8** ..... of the seabed. This was followed by a wartime application in devices for finding **9** ..... .

Questions 10–13

Complete the sentences below.

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

Write your answers in boxes 10–13 on your answer sheet.

10 Long before the invention of radar, ... had resulted in a sophisticated radar-like system in bats.

11 Radar is an inaccurate term when referring to bats because ..... are not used in their navigation system.

12 Radar and sonar are based on similar ..... .

13 The word 'echolocation' was first used by someone working as a ..... .

TEST 10

READING

READING PASSAGE 1

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

Why pagodas don,t fall down

In a land swept by typhoons and shaken by earthquakes, how have Japan's tallest and seemingly flimsiest old buildings – 500 or so wooden pagodas – remained standing for centuries? Records show that only two have collapsed during the past 1400 years. Those that have disappeared were destroyed by fire as a result of lightning or civil war. The disastrous Hanshin earthquake in 1995 killed 6,400 people, toppled elevated highways, flattened office blocks and devastated the port area of Kobe. Yet it left the magnificent five-storey pagoda at the Toji temple in nearby Kyoto unscathed, though it levelled a number of buildings in the neighbourhood.

Japanese scholars have been mystified for ages about why these tall, slender buildings are so stable. It was only thirty years ago that the building industry felt confident enough to erect office blocks of steel and reinforced concrete that had more than a dozen floors. With its special shock absorbers to dampen the effect of sudden sideways movements from an earthquake, the thirty-six-storey Kasumigaseki building in central Tokyo – Japan's first skyscraper – was considered a masterpiece of modern engineering when it was built in 1968.

Yet in 826, with only pegs and wedges to keep his wooden structure upright, the master builder Kobodaishi had no hesitation in sending his majestic Toji pagoda soaring fifty-five metres into the sky – nearly half as high as the Kasumigaseki skyscraper built some eleven centuries later. Clearly, Japanese carpenters of the day knew a few tricks about allowing a building to sway and settle itself rather than fight nature's forces. But what sort of tricks?

The multi-storey pagoda came to Japan from China in the sixth century. As in China, they were first introduced with Buddhism and were attached to important temples. The Chinese built their pagodas in brick or stone, with inner staircases, and used them in later centuries mainly as watchtowers. When the pagoda reached Japan, however, its architecture was freely adapted to local conditions – they were built less high, typically five rather than nine storeys, made mainly of wood and the staircase was dispensed with because the Japanese pagoda did not have any practical use but became more of an art object. Because of the typhoons that batter Japan in the summer, Japanese builders learned to extend the eaves of buildings further beyond the walls. This prevents rainwater gushing down the walls. Pagodas in China and Korea have nothing like the overhang that is found on pagodas in Japan.

The roof of a Japanese temple building can be made to overhang the sides of the structure by fifty per cent or more of the building's overall width. For the same reason, the builders of Japanese pagodas seem to have further increased their weight by choosing to cover these extended eaves not with the porcelain tiles of many Chinese pagodas but with much heavier earthenware tiles.

But this does not totally explain the great resilience of Japanese pagodas. Is the answer that, like a tall pine tree, the Japanese pagoda – with its massive trunk-like central pillar known as *shinbashira* – simply flexes and sways during a typhoon or earthquake? For centuries, many thought so. But the answer is not so simple because the startling thing is that the *shinbashira* actually carries no load at all. In fact, in some pagoda designs, it does not even rest on the ground, but is suspended from the top of the pagoda – hanging loosely down through the middle of the building. The weight of the building is supported entirely by twelve outer and four inner columns.

And what is the role of the *shinbashira*, the central pillar? The best way to understand the *shinbashira's* role is to watch a video made by Shuzo Ishida, a structural engineer at Kyoto Institute of Technology. Mr Ishida, known to his students as 'Professor Pagoda' because of his passion to understand the pagoda, has built a series of models and tested them on a 'shake-table' in his laboratory. In short, the *shinbashira* was acting like an enormous stationary pendulum. The ancient craftsmen, apparently without the assistance of very advanced mathematics, seemed to grasp the principles that were, more than a thousand years later, applied in the construction of Japan's first skyscraper. What those early craftsmen had found by trial and error was that under pressure a pagoda's loose stack of floors could be made to slither to and fro independent of one another. Viewed from the side, the pagoda seemed to be doing a snake dance – with each consecutive floor moving in the opposite direction to its neighbours above and below. The *shinbashira*, running up through a hole in the centre of the building, constrained individual storeys from moving too far because, after moving a certain distance, they banged into it, transmitting energy away along the column.

Another strange feature of the Japanese pagoda is that, because the building tapers, with each successive floor plan being smaller than the one below, none of the vertical pillars that carry the weight of the building is connected to its corresponding pillar above. In other words, a five-storey pagoda contains not even one pillar that travels right up through the building to carry the structural loads from the top to the bottom. More surprising is the fact that the individual storeys of a Japanese pagoda, unlike their counterparts elsewhere, are not actually connected to each other. They are simply stacked one on top of another like a pile of hats. Interestingly, such a design would not be permitted under current Japanese building regulations.

And the extra-wide eaves? Think of them as a tightrope walker's balancing pole. The bigger the mass at each end of the pole, the easier it is for the tightrope walker to maintain his or her balance. The same holds true for a pagoda. 'With the eaves extending out on all sides like balancing poles,' says Mr Ishida, 'the building responds to even the most powerful jolt of an earthquake with a graceful swaying, never an abrupt shaking.' Here again, Japanese master builders of a thousand years ago anticipated concepts of modern structural engineering.

Questions 1–4

Do the following statements agree with the claims of the writer in Reading Passage 1?

In boxes 1–4 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*

1 Only two Japanese pagodas have collapsed in 1400 years.

2 The Hanshin earthquake of 1995 destroyed the pagoda at the Toji temple.

3 The other buildings near the Toji pagoda had been built in the last 30 years.

4 The builders of pagodas knew how to absorb some of the power produced by severe weather conditions.

Questions 5–10

Classify the following as typical of

A both Chinese and Japanese pagodas
B only Chinese pagodas
C only Japanese pagodas

*Write the correct letter, **A**, **B** or **C**, in boxes 5–10 on your answer sheet.*

5 easy interior access to top

6 tiles on eaves

7 use as observation post

8 size of eaves up to half the width of the building

9 original religious purpose

10 floors fitting loosely over each other

Questions 11–13

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

Write the correct letter in boxes 11–13 on your answer sheet.

11 In a Japanese pagoda, the *shinbashira*

- **A** bears the full weight of the building.
- **B** bends under pressure like a tree.
- **C** connects the floors with the foundations.
- **D** stops the floors moving too far.

12 Shuzo Ishida performs experiments in order to

- **A** improve skyscraper design.
- **B** be able to build new pagodas.
- **C** learn about the dynamics of pagodas.
- **D** understand ancient mathematics.

13 The storeys of a Japanese pagoda are

- **A** linked only by wood.
- **B** fastened only to the central pillar.
- **C** fitted loosely on top of each other.
- **D** joined by special weights.

READING

READING PASSAGE 1

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

Ant Intelligence

When we think of intelligent members of the animal kingdom, the creatures that spring immediately to mind are apes and monkeys. But in fact the social lives of some members of the insect kingdom are sufficiently complex to suggest more than a hint of intelligence. Among these, the world of the ant has come in for considerable scrutiny lately, and the idea that ants demonstrate sparks of cognition has certainly not been rejected by those involved in these investigations.

Ants store food, repel attackers and use chemical signals to contact one another in case of attack. Such chemical communication can be compared to the human use of visual and auditory channels (as in religious chants, advertising images and jingles, political slogans and martial music) to arouse and propagate moods and attitudes. The biologist Lewis Thomas wrote, 'Ants are so much like human beings as to be an embarrassment. They farm fungi, raise aphids* as livestock, launch armies to war, use chemical sprays to alarm and confuse enemies, capture slaves, engage in child labour, exchange information ceaselessly. They do everything but watch television.'

However, in ants there is no cultural transmission – everything must be encoded in the genes – whereas in humans the opposite is true. Only basic instincts are carried in the genes of a newborn baby, other skills being learned from others in the community as the child grows up. It may seem that this cultural continuity gives us a huge advantage over ants. They have never mastered fire nor progressed. Their fungus farming and aphid herding crafts are sophisticated when compared to the agricultural skills of humans five thousand years ago but have been totally overtaken by modern human agribusiness.

Or have they? The farming methods of ants are at least sustainable. They do not ruin environments or use enormous amounts of energy. Moreover, recent evidence suggests that the crop farming of ants may be more sophisticated and adaptable than was thought.

Ants were farmers fifty million years before humans were. Ants can't digest the cellulose in leaves – but some fungi can. The ants therefore cultivate these fungi in their nests, bringing them leaves to feed on, and then

* aphids: small insects of a different species from ants

use them as a source of food. Farmer ants secrete antibiotics to control other fungi that might act as 'weeds', and spread waste to fertilise the crop.

It was once thought that the fungus that ants cultivate was a single type that they had propagated, essentially unchanged from the distant past. Not so. Ulrich Mueller of Maryland and his colleagues genetically screened 862 different types of fungi taken from ants' nests. These turned out to be highly diverse: it seems that ants are continually domesticating new species. Even more impressively, DNA analysis of the fungi suggests that the ants improve or modify the fungi by regularly swapping and sharing strains with neighbouring ant colonies.

Whereas prehistoric man had no exposure to urban lifestyles – the forcing house of intelligence – the evidence suggests that ants have lived in urban settings for close on a hundred million years, developing and maintaining underground cities of specialised chambers and tunnels.

When we survey Mexico City, Tokyo, Los Angeles, we are amazed at what has been accomplished by humans. Yet Hoelldobler and Wilson's magnificent work for ant lovers, *The Ants*, describes a supercolony of the ant *Formica yessensis* on the Ishikari Coast of Hokkaido. This 'megalopolis' was reported to be composed of 360 million workers and a million queens living in 4,500 interconnected nests across a territory of 2.7 square kilometres.

Such enduring and intricately meshed levels of technical achievement outstrip by far anything achieved by our distant ancestors. We hail as masterpieces the cave paintings in southern France and elsewhere, dating back some 20,000 years. Ant societies existed in something like their present form more than seventy million years ago. Beside this, prehistoric man looks technologically primitive. Is this then some kind of intelligence, albeit of a different kind?

Research conducted at Oxford, Sussex and Zürich Universities has shown that when desert ants return from a foraging trip, they navigate by integrating bearings and distances, which they continuously update in their heads. They combine the evidence of visual landmarks with a mental library of local directions, all within a framework which is consulted and updated. So ants can learn too.

And in a twelve-year programme of work, Ryabko and Reznikova have found evidence that ants can transmit very complex messages. Scouts who had located food in a maze returned to mobilise their foraging teams. They engaged in contact sessions, at the end of which the scout was removed in order to observe what her team might do. Often the foragers proceeded to the exact spot in the maze where the food had been. Elaborate precautions were taken to prevent the foraging team using odour clues. Discussion now centres on whether the route through the maze is communicated as a 'left-right' sequence of turns or as a 'compass bearing and distance' message.

During the course of this exhaustive study, Reznikova has grown so attached to her laboratory ants that she feels she knows them as individuals – even without the paint spots used to mark them. It's no surprise that Edward Wilson, in his essay, 'In the company of ants', advises readers who ask what to do with the ants in their kitchen to: 'Watch where you step. Be careful of little lives.'

Questions 1–6

Do the following statements agree with the information given in Reading Passage 1?

In boxes 1–6 on your answer sheet, write

TRUE	*if the statement agrees with the information*
FALSE	*if the statement contradicts the information*
NOT GIVEN	*if there is no information on this*

1 Ants use the same channels of communication as humans do.

2 City life is one factor that encourages the development of intelligence.

3 Ants can build large cities more quickly than humans do.

4 Some ants can find their way by making calculations based on distance and position.

5 In one experiment, foraging teams were able to use their sense of smell to find food.

6 The essay, 'In the company of ants', explores ant communication.

Questions 7–13

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

*Write the correct letter, **A–O**, in boxes 7–13 on your answer sheet.*

Ants as farmers

Ants have sophisticated methods of farming, including herding livestock and growing crops, which are in many ways similar to those used in human agriculture. The ants cultivate a large number of different species of edible fungi which convert **7** ..... into a form which they can digest. They use their own natural **8** ..... as weed-killers and also use unwanted materials as **9** ..... . Genetic analysis shows they constantly upgrade these fungi by developing new species and by **10** ..... species with neighbouring ant colonies. In fact, the farming methods of ants could be said to be more advanced than human agribusiness, since they use **11** ..... methods, they do not affect the **12** ..... and do not waste **13** ..... .

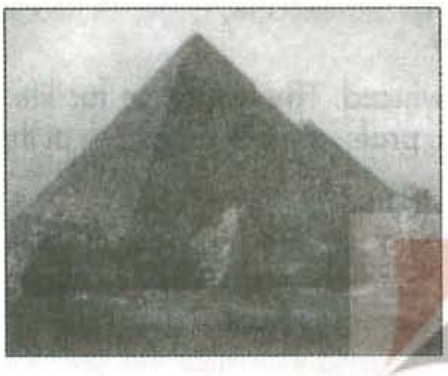
A	aphids	**B**	agricultural	**C**	cellulose	**D**	exchanging
E	energy	**F**	fertilizers	**G**	food	**H**	fungi
I	growing	**J**	interbreeding	**K**	natural	**L**	other species
M	secretions	**N**	sustainable	**O**	environment		

READING

READING PASSAGE 1

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

Pulling strings to build pyramids



No one knows exactly how the pyramids were built. Marcus Chown reckons the answer could be 'hanging in the air'.

The pyramids of Egypt were built more than three thousand years ago, and no one knows how. The conventional picture is that tens of thousands of slaves dragged stones on sledges. But there is no evidence to back this up. Now a Californian software consultant called Maureen Clemmons has suggested that kites might have been involved. While perusing a book on the monuments of Egypt, she noticed a hieroglyph that showed a row of men standing in odd postures. They were holding what looked like ropes that led, via some kind of mechanical system, to a giant bird in the sky. She wondered if perhaps the bird was actually a giant kite, and the men were using it to lift a heavy object.

Intrigued, Clemmons contacted Morteza Gharib, aeronautics professor at the California Institute of Technology. He was fascinated by the idea. 'Coming from Iran, I have a keen interest in Middle Eastern science,' he says. He too was puzzled by the picture that had sparked Clemmons's interest. The object in the sky apparently had wings far too short and wide for a bird. 'The possibility certainly existed that it was a kite,' he says. And since he needed a summer project for his student Emilio Graff, investigating the possibility of using kites as heavy lifters seemed like a good idea.

Gharib and Graff set themselves the task of raising a 4.5-metre stone column from horizontal to vertical, using no source of energy except the wind. Their initial calculations and scale-model wind-tunnel experiments convinced them they wouldn't need a strong wind to lift the 33.5-tonne column. Even a modest force, if sustained over a long time, would do. The key was to use a pulley system that would magnify the applied force. So they rigged up a tent-shaped scaffold directly above the tip of the horizontal column, with pulleys suspended from the scaffold's apex. The idea was that as one end of the column rose, the base would roll across the ground on a trolley.

Earlier this year, the team put Clemmons's unlikely theory to the test, using a 40-square-metre rectangular nylon sail. The kite lifted the column clean off the ground. 'We were absolutely stunned,' Gharib says. 'The instant the sail opened into the wind, a huge force was generated and the column was raised to the vertical in a mere 40 seconds.'

The wind was blowing at a gentle 16 to 20 kilometres an hour, little more than half what they thought would be needed. What they had failed to reckon with was what happened when the kite was opened. 'There was a huge initial force – five times larger than the steady state force,' Gharib says. This jerk meant that kites could lift huge weights, Gharib realised. Even a 300-tonne column could have been lifted to the vertical with 40 or so men and four or five sails. So Clemmons was right: the pyramid builders could have used kites to lift massive stones into place. 'Whether they actually did is another matter,' Gharib says. There are no pictures showing the construction of the pyramids, so there is no way to tell what really happened. 'The evidence for using kites to move large stones is no better or worse than the evidence for the brute force method,' Gharib says.

Indeed, the experiments have left many specialists unconvinced. 'The evidence for kite-lifting is non-existent,' says Willeke Wendrich, an associate professor of Egyptology at the University of California, Los Angeles.

Others feel there is more of a case for the theory. Harnessing the wind would not have been a problem for accomplished sailors like the Egyptians. And they are known to have used wooden pulleys, which could have been made strong enough to bear the weight of massive blocks of stone. In addition, there is some physical evidence that the ancient Egyptians were interested in flight. A wooden artefact found on the step pyramid at Saqqara looks uncannily like a modern glider. Although it dates from several hundred years after the building of the pyramids, its sophistication suggests that the Egyptians might have been developing ideas of flight for a long time. And other ancient civilisations certainly knew about kites; as early as 1250 BC, the Chinese were using them to deliver messages and dump flaming debris on their foes.

The experiments might even have practical uses nowadays. There are plenty of places around the globe where people have no access to heavy machinery, but do know how to deal with wind, sailing and basic mechanical principles. Gharib has already been contacted by a civil engineer in Nicaragua, who wants to put up buildings with adobe roofs supported by concrete arches on a site that heavy equipment can't reach. His idea is to build the arches horizontally, then lift them into place using kites. 'We've given him some design hints,' says Gharib. 'We're just waiting for him to report back.' So whether they were actually used to build the pyramids or not, it seems that kites may make sensible construction tools in the 21st century AD.

Questions 1–7

Do the following statements agree with the information given in Reading Passage 1?

In boxes 1–7 on your answer sheet, write

TRUE	*if the statement agrees with the information*
FALSE	*if the statement contradicts the information*
NOT GIVEN	*if there is no information on this*

1 It is generally believed that large numbers of people were needed to build the pyramids.

2 Clemmons found a strange hieroglyph on the wall of an Egyptian monument.

3 Gharib had previously done experiments on bird flight.

4 Gharib and Graff tested their theory before applying it.

5 The success of the actual experiment was due to the high speed of the wind.

6 They found that, as the kite flew higher, the wind force got stronger.

7 The team decided that it was possible to use kites to raise very heavy stones.

Questions 8–13

Complete the summary below.

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

Write your answers in boxes 8–13 on your answer sheet.

Additional evidence for theory of kite-lifting

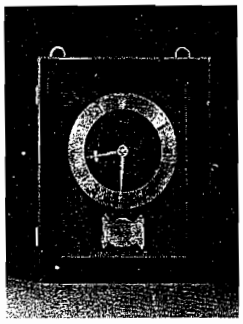
The Egyptians had **8** ..... , which could lift large pieces of **9** ..... , and they knew how to use the energy of the wind from their skill as **10** ..... . The discovery on one pyramid of an object which resembled a **11** ..... suggests they may have experimented with **12** ..... . In addition, over two thousand years ago kites were used in China as weapons, as well as for sending **13** ..... .

TEST 13

READING

READING PASSAGE 1

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



A Chronicle of Timekeeping

Our conception of time depends on the way we measure it

A According to archaeological evidence, at least 5,000 years ago, and long before the advent of the Roman Empire, the Babylonians began to measure time, introducing calendars to co-ordinate communal activities, to plan the shipment of goods and, in particular, to regulate planting and harvesting. They based their calendars on three natural cycles: the solar day, marked by the successive periods of light and darkness as the earth rotates on its axis; the lunar month, following the phases of the moon as it orbits the earth; and the solar year, defined by the changing seasons that accompany our planet's revolution around the sun.

B Before the invention of artificial light, the moon had greater social impact. And, for those living near the equator in particular, its waxing and waning was more conspicuous than the passing of the seasons. Hence, the calendars that were developed at the lower latitudes were influenced more by the lunar cycle than by the solar year. In more northern climes, however, where seasonal agriculture was practised, the solar year became more crucial. As the Roman Empire expanded northward, it organised its activity chart for the most part around the solar year.

C Centuries before the Roman Empire, the Egyptians had formulated a municipal calendar having 12 months of 30 days, with five days added to approximate the solar year. Each period of ten days was marked by the appearance of special groups of stars called decans. At the rise of the star Sirius just before sunrise, which occurred around the all-important annual flooding of the Nile, 12 decans could be seen spanning the heavens. The cosmic significance the Egyptians placed in the 12 decans led them to develop a system in which each interval of darkness (and later, each interval of daylight) was divided into a dozen equal parts. These periods became known as temporal hours because their duration varied according to the changing length of days and nights with the passing of the seasons. Summer hours were long, winter ones short; only at the spring and autumn equinoxes

were the hours of daylight and darkness equal. Temporal hours, which were first adopted by the Greeks and then the Romans, who disseminated them through Europe, remained in use for more than 2,500 years.

D In order to track temporal hours during the day, inventors created sundials, which indicate time by the length or direction of the sun's shadow. The sundial's counterpart, the water clock, was designed to measure temporal hours at night. One of the first water clocks was a basin with a small hole near the bottom through which the water dripped out. The falling water level denoted the passing hour as it dipped below hour lines inscribed on the inner surface. Although these devices performed satisfactorily around the Mediterranean, they could not always be depended on in the cloudy and often freezing weather of northern Europe.

E The advent of the mechanical clock meant that although it could be adjusted to maintain temporal hours, it was naturally suited to keeping equal ones. With these, however, arose the question of when to begin counting, and so, in the early 14th century, a number of systems evolved. The schemes that divided the day into 24 equal parts varied according to the start of the count: Italian hours began at sunset, Babylonian hours at sunrise, astronomical hours at midday and 'great clock' hours, used for some large public clocks in Germany, at midnight. Eventually these were superseded by 'small clock', or French, hours, which split the day into two 12-hour periods commencing at midnight.

F The earliest recorded weight-driven mechanical clock was built in 1283 in Bedfordshire in England. The revolutionary aspect of this new timekeeper was neither the descending weight that provided its motive force nor the gear wheels (which had been around for at least 1,300 years) that transferred the power; it was the part called the escapement. In the early 1400s came the invention of the coiled spring or fusee which maintained constant force to the gear wheels of the timekeeper despite the changing tension of its mainspring. By the 16th century, a pendulum clock had been devised, but the pendulum swung in a large arc and thus was not very efficient.

G To address this, a variation on the original escapement was invented in 1670, in England. It was called the anchor escapement, which was a lever-based device shaped like a ship's anchor. The motion of a pendulum rocks this device so that it catches and then releases each tooth of the escape wheel, in turn allowing it to turn a precise amount. Unlike the original form used in early pendulum clocks, the anchor escapement permitted the pendulum to travel in a very small arc. Moreover, this invention allowed the use of a long pendulum which could beat once a second and thus led to the development of a new floor-standing case design, which became known as the grandfather clock.

H Today, highly accurate timekeeping instruments set the beat for most electronic devices. Nearly all computers contain a quartz-crystal clock to regulate their operation. Moreover, not only do time signals beamed down from Global Positioning System satellites calibrate the functions of precision navigation equipment, they do so as well for mobile phones, instant stock-trading systems and nationwide power-distribution grids. So integral have these time-based technologies become to day-to-day existence that our dependency on them is recognised only when they fail to work.

Questions 1–4

Reading Passage 1 has eight paragraphs, **A–H**.

Which paragraph contains the following information?

*Write the correct letter, **A–H**, in boxes 1–4 on your answer sheet.*

1 a description of an early timekeeping invention affected by cold temperatures

2 an explanation of the importance of geography in the development of the calendar in farming communities

3 a description of the origins of the pendulum clock

4 details of the simultaneous efforts of different societies to calculate time using uniform hours

Questions 5–8

Look at the following events (Questions 5–8) and the list of nationalities below.

*Match each event with the correct nationality, **A–F**.*

*Write the correct letter, **A–F**, in boxes 5–8 on your answer sheet.*

5 They devised a civil calendar in which the months were equal in length.

6 They divided the day into two equal halves.

7 They developed a new cabinet shape for a type of timekeeper.

8 They created a calendar to organise public events and work schedules.

List of Nationalities

A Babylonians
B Egyptians
C Greeks
D English
E Germans
F French

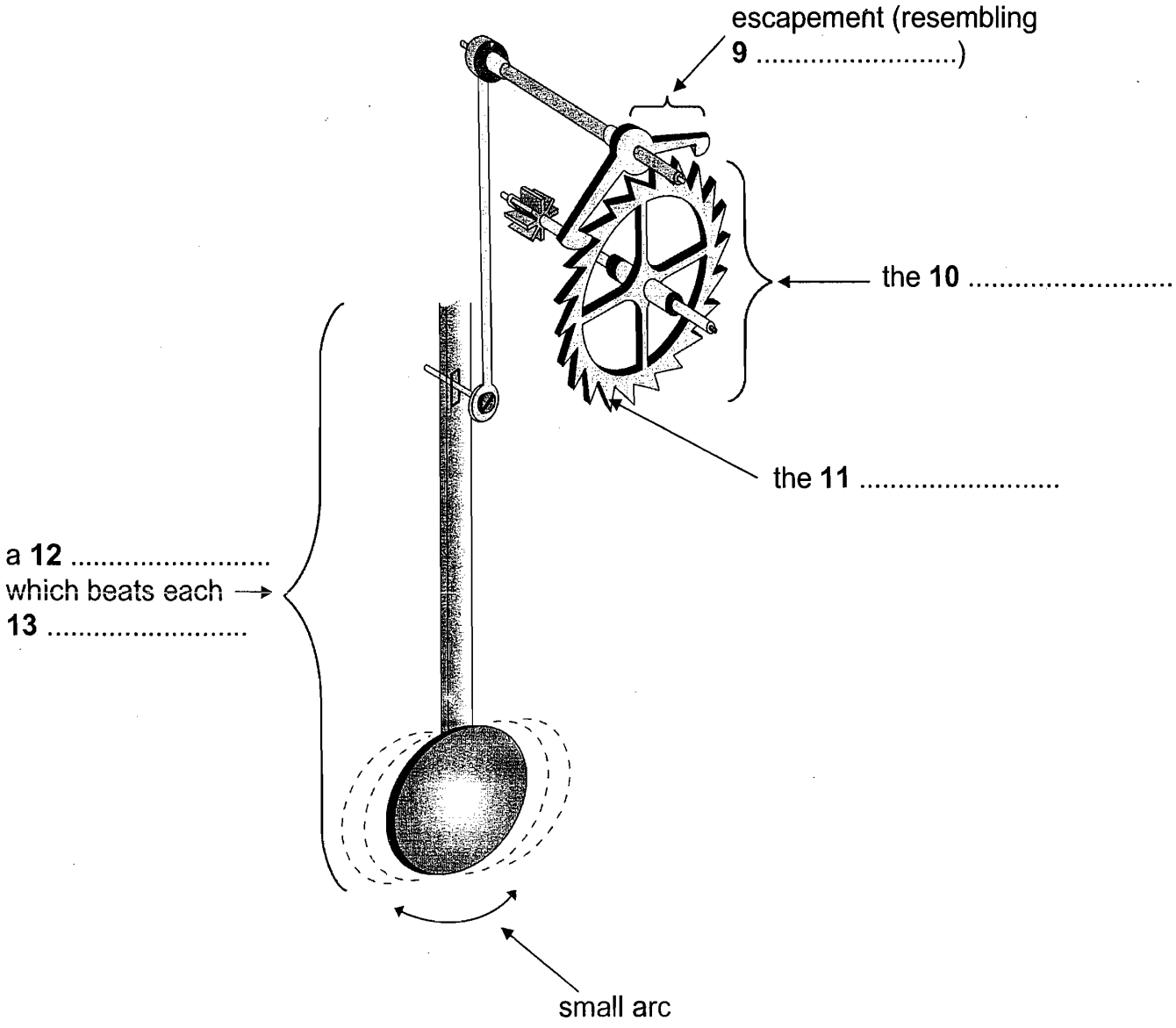
Questions 9–13

Label the diagram below.

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

Write your answers in boxes 9–13 on your answer sheet.

How the 1670 lever-based device worked



READING

READING PASSAGE 1

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

Sheet glass manufacture: the float process

Glass, which has been made since the time of the Mesopotamians and Egyptians, is little more than a mixture of sand, soda ash and lime. When heated to about 1500 degrees Celsius (°C) this becomes a molten mass that hardens when slowly cooled. The first successful method for making clear, flat glass involved spinning. This method was very effective as the glass had not touched any surfaces between being soft and becoming hard, so it stayed perfectly unblemished, with a 'fire finish'. However, the process took a long time and was labour intensive.

Nevertheless, demand for flat glass was very high and glassmakers across the world were looking for a method of making it continuously. The first continuous ribbon process involved squeezing molten glass through two hot rollers, similar to an old mangle. This allowed glass of virtually any thickness to be made non-stop, but the rollers would leave both sides of the glass marked, and these would then need to be ground and polished. This part of the process rubbed away around 20 per cent of the glass, and the machines were very expensive.

The float process for making flat glass was invented by Alistair Pilkington. This process allows the manufacture of clear, tinted and coated glass for buildings, and clear and tinted glass for vehicles. Pilkington had been experimenting with improving the melting process, and in 1952 he had the idea of using a bed of molten metal to form the flat glass, eliminating altogether the need for rollers within the float bath. The metal had to melt at a temperature less than the hardening point of glass (about 600°C), but could not boil at a temperature below the temperature of the molten glass (about 1500°C). The best metal for the job was tin.

The rest of the concept relied on gravity, which guaranteed that the surface of the molten metal was perfectly flat and horizontal. Consequently, when pouring molten glass onto the molten tin, the underside of the glass would also be perfectly flat. If the glass were kept hot enough, it would flow over the molten tin until the top surface was also flat, horizontal and perfectly parallel to the bottom surface. Once the glass cooled to 604°C or less it was too hard to mark and could be transported out of the cooling zone by rollers. The glass settled to a thickness of six millimetres because of surface tension interactions between the glass and the tin. By fortunate coincidence, 60 per cent of the flat glass market at that time was for six-millimetre glass.

Pilkington built a pilot plant in 1953 and by 1955 he had convinced his company to build a full-scale plant. However, it took 14 months of non-stop production, costing the company £100,000 a month, before the plant produced any usable glass. Furthermore, once they succeeded in making marketable flat glass, the machine was turned off for a service to prepare it for years of continuous production. When it started up again it took another four months to get the process right again. They finally succeeded in 1959 and there are now float plants all over the world, with each able to produce around 1000 tons of glass every day, non-stop for around 15 years.

Float plants today make glass of near optical quality. Several processes – melting, refining, homogenising – take place simultaneously in the 2000 tonnes of molten glass in the furnace. They occur in separate zones in a complex glass flow driven by high temperatures. It adds up to a continuous melting process, lasting as long as 50 hours, that delivers glass smoothly and continuously to the float bath, and from there to a coating zone and finally a heat treatment zone, where stresses formed during cooling are relieved.

The principle of float glass is unchanged since the 1950s. However, the product has changed dramatically, from a single thickness of 6.8 mm to a range from sub-millimetre to 25 mm, from a ribbon frequently marred by inclusions and bubbles to almost optical perfection. To ensure the highest quality, inspection takes place at every stage. Occasionally, a bubble is not removed during refining, a sand grain refuses to melt, a tremor in the tin puts ripples into the glass ribbon. Automated on-line inspection does two things. Firstly, it reveals process faults upstream that can be corrected. Inspection technology allows more than 100 million measurements a second to be made across the ribbon, locating flaws the unaided eye would be unable to see. Secondly, it enables computers downstream to steer cutters around flaws.

Float glass is sold by the square metre, and at the final stage computers translate customer requirements into patterns of cuts designed to minimise waste.

Questions 1–8

Complete the table and diagram below.

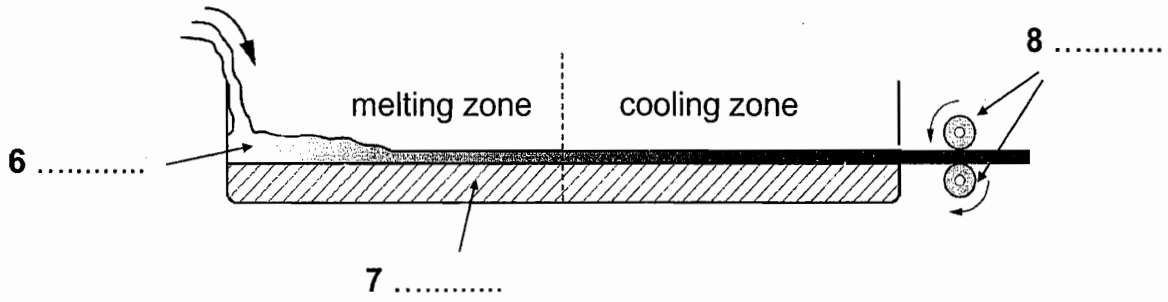
*Choose **NO MORE THAN TWO WORDS** from the passage for each answer.*

Write your answers in boxes 1–8 on your answer sheet.

Early methods of producing flat glass

Method	Advantages	Disadvantages
1	• Glass remained **2**	• Slow • **3** .....
Ribbon	• Could produce glass sheets of varying **4** ..... • Non-stop process	• Glass was **5** ..... • 20% of glass rubbed away • Machines were expensive

Pilkington's float process



Questions 9–13

Do the following statements agree with the information given in Reading Passage 1?

In boxes 9–13 on your answer sheet, write

TRUE	*if the statement agrees with the information*
FALSE	*if the statement contradicts the information*
NOT GIVEN	*if there is no information on this*

9 The metal used in the float process had to have specific properties.

10 Pilkington invested some of his own money in his float plant.

11 Pilkington's first full-scale plant was an instant commercial success.

12 The process invented by Pilkington has now been improved.

13 Computers are better than humans at detecting faults in glass.

READING

READING PASSAGE 1

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

Striking Back at Lightning With Lasers

Seldom is the weather more dramatic than when thunderstorms strike. Their electrical fury inflicts death or serious injury on around 500 people each year in the United States alone. As the clouds roll in, a leisurely round of golf can become a terrifying dice with death – out in the open, a lone golfer may be a lightning bolt's most inviting target. And there is damage to property too. Lightning damage costs American power companies more than $100 million a year.

But researchers in the United States and Japan are planning to hit back. Already in laboratory trials they have tested strategies for neutralising the power of thunderstorms, and this winter they will brave real storms, equipped with an armoury of lasers that they will be pointing towards the heavens to discharge thunderclouds before lightning can strike.

The idea of forcing storm clouds to discharge their lightning on command is not new. In the early 1960s, researchers tried firing rockets trailing wires into thunderclouds to set up an easy discharge path for the huge electric charges that these clouds generate. The technique survives to this day at a test site in Florida run by the University of Florida, with support from the Electrical Power Research Institute (EPRI), based in California. EPRI, which is funded by power companies, is looking at ways to protect the United States' power grid from lightning strikes. 'We can cause the lightning to strike where we want it to using rockets,' says Ralph Bernstein, manager of lightning projects at EPRI. The rocket site is providing precise measurements of lightning voltages and allowing engineers to check how electrical equipment bears up.

Bad behaviour

But while rockets are fine for research, they cannot provide the protection from lightning strikes that everyone is looking for. The rockets cost around $1,200 each, can only be fired at a limited frequency and their failure rate is about 40 per cent. And even when they do trigger lightning, things still do not always go according to plan. 'Lightning is not perfectly well behaved,' says Bernstein. 'Occasionally, it will take a branch and go someplace it wasn't supposed to go.'

And anyway, who would want to fire streams of rockets in a populated area? 'What goes up must come down,' points out Jean-Claude Diels of the University of New Mexico. Diels is leading a project, which is backed by EPRI, to try to use lasers to discharge lightning safely

– and safety is a basic requirement since no one wants to put themselves or their expensive equipment at risk. With around $500,000 invested so far, a promising system is just emerging from the laboratory.

The idea began some 20 years ago, when high-powered lasers were revealing their ability to extract electrons out of atoms and create ions. If a laser could generate a line of ionisation in the air all the way up to a storm cloud, this conducting path could be used to guide lightning to Earth, before the electric field becomes strong enough to break down the air in an uncontrollable surge. To stop the laser itself being struck, it would not be pointed straight at the clouds. Instead it would be directed at a mirror, and from there into the sky. The mirror would be protected by placing lightning conductors close by. Ideally, the cloud-zapper (gun) would be cheap enough to be installed around all key power installations, and portable enough to be taken to international sporting events to beam up at brewing storm clouds.

A stumbling block

However, there is still a big stumbling block. The laser is no nifty portable: it's a monster that takes up a whole room. Diels is trying to cut down the size and says that a laser around the size of a small table is in the offing. He plans to test this more manageable system on live thunderclouds next summer.

Bernstein says that Diels's system is attracting lots of interest from the power companies. But they have not yet come up with the $5 million that EPRI says will be needed to develop a commercial system, by making the lasers yet smaller and cheaper. 'I cannot say I have money yet, but I'm working on it,' says Bernstein. He reckons that the forthcoming field tests will be the turning point – and he's hoping for good news. Bernstein predicts 'an avalanche of interest and support' if all goes well. He expects to see cloud-zappers eventually costing $50,000 to $100,000 each.

Other scientists could also benefit. With a lightning 'switch' at their fingertips, materials scientists could find out what happens when mighty currents meet matter. Diels also hopes to see the birth of 'interactive meteorology' – not just forecasting the weather but controlling it. 'If we could discharge clouds, we might affect the weather,' he says.

And perhaps, says Diels, we'll be able to confront some other meteorological menaces. 'We think we could prevent hail by inducing lightning,' he says. Thunder, the shock wave that comes from a lightning flash, is thought to be the trigger for the torrential rain that is typical of storms. A laser thunder factory could shake the moisture out of clouds, perhaps preventing the formation of the giant hailstones that threaten crops. With luck, as the storm clouds gather this winter, laser-toting researchers could, for the first time, strike back.

Questions 1–3

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

Write the correct letter in boxes 1–3 on your answer sheet.

1 The main topic discussed in the text is

A the damage caused to US golf courses and golf players by lightning strikes.
B the effect of lightning on power supplies in the US and in Japan.
C a variety of methods used in trying to control lightning strikes.
D a laser technique used in trying to control lightning strikes.

2 According to the text, every year lightning

A does considerable damage to buildings during thunderstorms.
B kills or injures mainly golfers in the United States.
C kills or injures around 500 people throughout the world.
D damages more than 100 American power companies.

3 Researchers at the University of Florida and at the University of New Mexico

A receive funds from the same source.
B are using the same techniques.
C are employed by commercial companies.
D are in opposition to each other.

Questions 4–6

Complete the sentences below.

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

Write your answers in boxes 4–6 on your answer sheet.

4 EPRI receives financial support from ..... .

5 The advantage of the technique being developed by Diels is that it can be used ..... .

6 The main difficulty associated with using the laser equipment is related to its ..... .

Questions 7–10

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

*Write the correct letter, **A–I**, in boxes 7–10 on your answer sheet.*

In this method, a laser is used to create a line of ionisation by removing electrons from **7** ..... . This laser is then directed at **8** ..... in order to control electrical charges, a method which is less dangerous than using **9** ..... . As a protection for the lasers, the beams are aimed firstly at **10** ..... .

A	cloud-zappers	**B**	atoms	**C**	storm clouds
D	mirrors	**E**	technique	**F**	ions
G	rockets	**H**	conductors	**I**	thunder

Questions 11–13

Do the following statements agree with the information given in Reading Passage 1?

In boxes 11–13 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*

11 Power companies have given Diels enough money to develop his laser.

12 Obtaining money to improve the lasers will depend on tests in real storms.

13 Weather forecasters are intensely interested in Diels's system.

TEST 16

READING

READING PASSAGE 1

*You should spend about 20 minutes on **Questions 1–13**, which are based on Reading Passage 1 on the following pages.*

Questions 1–5

Reading Passage 1 has six sections, **A–F**.

*Choose the correct heading for sections **B–F** from the list of headings below.*

*Write the correct number, **i–ix**, in boxes 1–5 on your answer sheet.*

List of Headings

i	The influence of Monbusho
ii	Helping less successful students
iii	The success of compulsory education
iv	Research findings concerning achievements in maths
v	The typical format of a maths lesson
vi	Comparative expenditure on maths education
vii	Background to middle-years education in Japan
viii	The key to Japanese successes in maths education
ix	The role of homework correction

Example	*Answer*
Section **A**	**iv**

1 Section **B**

2 Section **C**

3 Section **D**

4 Section **E**

5 Section **F**

LAND OF THE RISING SUM

A Japan has a significantly better record in terms of average mathematical attainment than England and Wales. Large sample international comparisons of pupils' attainments since the 1960s have established that not only did Japanese pupils at age 13 have better scores of average attainment, but there was also a larger proportion of 'low' attainers in England, where, incidentally, the variation in attainment scores was much greater. The percentage of Gross National Product spent on education is reasonably similar in the two countries, so how is this higher and more consistent attainment in maths achieved?

B Lower secondary schools in Japan cover three school years, from the seventh grade (age 13) to the ninth grade (age 15). Virtually all pupils at this stage attend state schools: only 3 per cent are in the private sector. Schools are usually modern in design, set well back from the road and spacious inside. Classrooms are large and pupils sit at single desks in rows. Lessons last for a standardised 50 minutes and are always followed by a 10-minute break, which gives the pupils a chance to let off steam. Teachers begin with a formal address and mutual bowing, and then concentrate on whole-class teaching.

Classes are large – usually about 40 – and are unstreamed. Pupils stay in the same class for all lessons throughout the school and develop considerable class identity and loyalty. Pupils attend the school in their own neighbourhood, which in theory removes ranking by school. In practice in Tokyo, because of the relative concentration of schools, there is some competition to get into the 'better' school in a particular area.

C Traditional ways of teaching form the basis of the lesson and the remarkably quiet classes take their own notes of the points made and the examples demonstrated. Everyone has their own copy of the textbook supplied by the central education authority, Monbusho, as part of the concept of free compulsory education up to the age of 15. These textbooks are, on the whole, small, presumably inexpensive to produce, but well set out and logically developed. (One teacher was particularly keen to introduce colour and pictures into maths textbooks: he felt this would make them more accessible to pupils brought up in a cartoon culture.) Besides approving textbooks, Monbusho also decides the highly centralised national curriculum and how it is to be delivered.

D Lessons all follow the same pattern. At the beginning, the pupils put solutions to the homework on the board, then the teachers comment, correct or elaborate as necessary. Pupils mark their own homework: this is an important principle in Japanese schooling as it enables pupils to see where and why they made a mistake, so that these can be avoided in future. No one minds mistakes or ignorance as long as you are prepared to learn from them.

After the homework has been discussed, the teacher explains the topic of the lesson, slowly and with a lot of repetition and elaboration. Examples are demonstrated on the board; questions from the textbook are worked through first with the class, and then the class is set questions from the textbook to do individually. Only rarely are supplementary worksheets distributed in a maths class. The impression is that the logical nature of the textbooks and their comprehensive coverage of different types of examples, combined with the relative homogeneity of the class, renders work sheets unnecessary. At this point, the teacher would circulate and make sure that all the pupils were coping well.

E It is remarkable that large, mixed-ability classes could be kept together for maths throughout all their compulsory schooling from 6 to 15. Teachers say that they give individual help at the end of a lesson or after school, setting extra work if necessary. In observed lessons, any strugglers would be assisted by the teacher or quietly seek help from their neighbour. Carefully fostered class identity makes pupils keen to help each other – anyway, it is in their interests since the class progresses together.

This scarcely seems adequate help to enable slow learners to keep up. However, the Japanese attitude towards education runs along the lines of 'if you work hard enough, you can do almost anything'. Parents are kept closely informed of their children's progress and will play a part in helping their children to keep up with class, sending them to 'Juku' (private evening tuition) if extra help is needed and encouraging them to work harder. It seems to work, at least for 95 per cent of the school population.

F So what are the major contributing factors in the success of maths teaching? Clearly, attitudes are important. Education is valued greatly in Japanese culture; maths is recognised as an important compulsory subject throughout schooling; and the emphasis is on hard work coupled with a focus on accuracy.

Other relevant points relate to the supportive attitude of a class towards slower pupils, the lack of competition within a class, and the positive emphasis on learning for oneself and improving one's own standard. And the view of repetitively boring lessons and learning the facts by heart, which is sometimes quoted in relation to Japanese classes, may be unfair and unjustified. No poor maths lessons were observed. They were mainly good and one or two were inspirational.

Questions 6–9

Do the following statements agree with the claims of the writer in Reading Passage 1?

In boxes 6–9 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*

6 There is a wider range of achievement amongst English pupils studying maths than amongst their Japanese counterparts.

7 The percentage of Gross National Product spent on education generally reflects the level of attainment in mathematics.

8 Private schools in Japan are more modern and spacious than state-run lower secondary schools.

9 Teachers mark homework in Japanese schools.

READING

READING PASSAGE 1

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

William Henry Perkin

The man who invented synthetic dyes

William Henry Perkin was born on March 12, 1838, in London, England. As a boy, Perkin's curiosity prompted early interests in the arts, sciences, photography, and engineering. But it was a chance stumbling upon a run-down, yet functional, laboratory in his late grandfather's home that solidified the young man's enthusiasm for chemistry.

As a student at the City of London School, Perkin became immersed in the study of chemistry. His talent and devotion to the subject were perceived by his teacher, Thomas Hall, who encouraged him to attend a series of lectures given by the eminent scientist Michael Faraday at the Royal Institution. Those speeches fired the young chemist's enthusiasm further, and he later went on to attend the Royal College of Chemistry, which he succeeded in entering in 1853, at the age of 15.

At the time of Perkin's enrolment, the Royal College of Chemistry was headed by the noted German chemist August Wilhelm Hofmann. Perkin's scientific gifts soon caught Hofmann's attention and, within two years, he became Hofmann's youngest assistant. Not long after that, Perkin made the scientific breakthrough that would bring him both fame and fortune.

At the time, quinine was the only viable medical treatment for malaria. The drug is derived from the bark of the cinchona tree, native to South America, and by 1856 demand for the drug was surpassing the available supply. Thus, when Hofmann made some passing comments about the desirability of a synthetic substitute for quinine, it was unsurprising that his star pupil was moved to take up the challenge.

During his vacation in 1856, Perkin spent his time in the laboratory on the top floor of his family's house. He was attempting to manufacture quinine from aniline, an inexpensive and readily available coal tar waste product. Despite his best efforts, however, he did not end up with quinine. Instead, he produced a mysterious dark sludge. Luckily, Perkin's scientific training and nature prompted him to investigate the substance further. Incorporating potassium dichromate and alcohol into the aniline at various stages of the experimental process, he finally produced a deep purple solution. And, proving the truth of the famous scientist Louis Pasteur's words 'chance favours only the prepared mind', Perkin saw the potential of his unexpected find.

Historically, textile dyes were made from such natural sources as plants and animal excretions. Some of these, such as the glandular mucus of snails, were difficult to obtain and outrageously expensive. Indeed, the purple colour extracted from a snail was once so costly that in society at the time only the rich could afford it. Further, natural dyes tended to be muddy in hue and fade quickly. It was against this backdrop that Perkin's discovery was made.

Perkin quickly grasped that his purple solution could be used to colour fabric, thus making it the world's first synthetic dye. Realising the importance of this breakthrough, he lost no time in patenting it. But perhaps the most fascinating of all Perkin's reactions to his find was his nearly instant recognition that the new dye had commercial possibilities.

Perkin originally named his dye Tyrian Purple, but it later became commonly known as mauve (from the French for the plant used to make the colour violet). He asked advice of Scottish dye works owner Robert Pullar, who assured him that manufacturing the dye would be well worth it if the colour remained fast (i.e. would not fade) and the cost was relatively low. So, over the fierce objections of his mentor Hofmann, he left college to give birth to the modern chemical industry.

With the help of his father and brother, Perkin set up a factory not far from London. Utilising the cheap and plentiful coal tar that was an almost unlimited byproduct of London's gas street lighting, the dye works began producing the world's first synthetically dyed material in 1857. The company received a commercial boost from the Empress Eugénie of France, when she decided the new colour flattered her. Very soon, mauve was the necessary shade for all the fashionable ladies in that country. Not to be outdone, England's Queen Victoria also appeared in public wearing a mauve gown, thus making it all the rage in England as well. The dye was bold and fast, and the public clamoured for more. Perkin went back to the drawing board.

Although Perkin's fame was achieved and fortune assured by his first discovery, the chemist continued his research. Among other dyes he developed and introduced were aniline red (1859) and aniline black (1863) and, in the late 1860s, Perkin's green. It is important to note that Perkin's synthetic dye discoveries had outcomes far beyond the merely decorative. The dyes also became vital to medical research in many ways. For instance, they were used to stain previously invisible microbes and bacteria, allowing researchers to identify such bacilli as tuberculosis, cholera, and anthrax. Artificial dyes continue to play a crucial role today. And, in what would have been particularly pleasing to Perkin, their current use is in the search for a vaccine against malaria.

Questions 1–7

Do the following statements agree with the information given in Reading Passage 1?

In boxes 1–7 on your answer sheet, write

TRUE	*if the statement agrees with the information*
FALSE	*if the statement contradicts the information*
NOT GIVEN	*if there is no information on this*

1 Michael Faraday was the first person to recognise Perkin's ability as a student of chemistry.

2 Michael Faraday suggested Perkin should enrol in the Royal College of Chemistry.

3 Perkin employed August Wilhelm Hofmann as his assistant.

4 Perkin was still young when he made the discovery that made him rich and famous.

5 The trees from which quinine is derived grow only in South America.

6 Perkin hoped to manufacture a drug from a coal tar waste product.

7 Perkin was inspired by the discoveries of the famous scientist Louis Pasteur.

Questions 8–13

Answer the questions below.

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

Write your answers in boxes 8–13 on your answer sheet.

8 Before Perkin's discovery, with what group in society was the colour purple associated?

9 What potential did Perkin immediately understand that his new dye had?

10 What was the name finally used to refer to the first colour Perkin invented?

11 What was the name of the person Perkin consulted before setting up his own dye works?

12 In what country did Perkin's newly invented colour first become fashionable?

13 According to the passage, which disease is now being targeted by researchers using synthetic dyes?

READING

READING PASSAGE 1

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

A Hearing impairment or other auditory function deficit in young children can have a major impact on their development of speech and communication, resulting in a detrimental effect on their ability to learn at school. This is likely to have major consequences for the individual and the population as a whole. The New Zealand Ministry of Health has found from research carried out over two decades that 6–10% of children in that country are affected by hearing loss.

B A preliminary study in New Zealand has shown that classroom noise presents a major concern for teachers and pupils. Modern teaching practices, the organisation of desks in the classroom, poor classroom acoustics, and mechanical means of ventilation such as air-conditioning units all contribute to the number of children unable to comprehend the teacher's voice. Education researchers Nelson and Soli have also suggested that recent trends in learning often involve collaborative interaction of multiple minds and tools as much as individual possession of information. This all amounts to heightened activity and noise levels, which have the potential to be particularly serious for children experiencing auditory function deficit. Noise in classrooms can only exacerbate their difficulty in comprehending and processing verbal communication with other children and instructions from the teacher.

C Children with auditory function deficit are potentially failing to learn to their maximum potential because of noise levels generated in classrooms. The effects of noise on the ability of children to learn effectively in typical classroom environments are now the subject of increasing concern. The International Institute of Noise Control Engineering (I–INCE), on the advice of the World Health Organization, has established an international working party, which includes New Zealand, to evaluate noise and reverberation control for school rooms.

D While the detrimental effects of noise in classroom situations are not limited to children experiencing disability, those with a disability that affects their processing of speech and verbal communication could be extremely vulnerable. The auditory function deficits in question include hearing impairment, autistic spectrum disorders (ASD) and attention deficit disorders (ADD/ADHD).

E Autism is considered a neurological and genetic life-long disorder that causes discrepancies in the way information is processed. This disorder is characterised by interlinking problems with social imagination, social communication and social interaction. According to Janzen, this affects the ability to understand and relate in typical ways to people, understand events and objects in the environment, and understand or respond to sensory stimuli. Autism does not allow learning or thinking in the same ways as in children who are developing normally.

Autistic spectrum disorders often result in major difficulties in comprehending verbal information and speech processing. Those experiencing these disorders often find sounds such as crowd noise and the noise generated by machinery painful and distressing. This is difficult to scientifically quantify as such extra-sensory stimuli vary greatly from one autistic individual to another. But a child who finds any type of noise in their classroom or learning space intrusive is likely to be adversely affected in their ability to process information.

F The attention deficit disorders are indicative of neurological and genetic disorders and are characterised by difficulties with sustaining attention, effort and persistence, organisation skills and disinhibition. Children experiencing these disorders find it difficult to screen out unimportant information, and focus on everything in the environment rather than attending to a single activity. Background noise in the classroom becomes a major distraction, which can affect their ability to concentrate.

G Children experiencing an auditory function deficit can often find speech and communication very difficult to isolate and process when set against high levels of background noise. These levels come from outside activities that penetrate the classroom structure, from teaching activities, and other noise generated inside, which can be exacerbated by room reverberation. Strategies are needed to obtain the optimum classroom construction and perhaps a change in classroom culture and methods of teaching. In particular, the effects of noisy classrooms and activities on those experiencing disabilities in the form of auditory function deficit need thorough investigation. It is probable that many undiagnosed children exist in the education system with 'invisible' disabilities. Their needs are less likely to be met than those of children with known disabilities.

H The New Zealand Government has developed a New Zealand Disability Strategy and has embarked on a wide-ranging consultation process. The strategy recognises that people experiencing disability face significant barriers in achieving a full quality of life in areas such as attitude, education, employment and access to services. Objective 3 of the New Zealand Disability Strategy is to 'Provide the Best Education for Disabled People' by improving education so that all children, youth learners and adult learners will have equal opportunities to learn and develop within their already existing local school. For a successful education, the learning environment is vitally significant, so any effort to improve this is likely to be of great benefit to all children, but especially to those with auditory function disabilities.

I A number of countries are already in the process of formulating their own standards for the control and reduction of classroom noise. New Zealand will probably follow their example. The literature to date on noise in school rooms appears to focus on the effects on schoolchildren in general, their teachers and the hearing impaired. Only limited attention appears to have been given to those students experiencing the other disabilities involving auditory function deficit. It is imperative that the needs of these children are taken into account in the setting of appropriate international standards to be promulgated in future.

Questions 1–6

Reading Passage 1 has nine sections, **A–I**.

Which section contains the following information?

Write the correct letter, ***A–I****, in boxes 1–6 on your answer sheet.*

1 an account of a national policy initiative

2 a description of a global team effort

3 a hypothesis as to one reason behind the growth in classroom noise

4 a demand for suitable worldwide regulations

5 a list of medical conditions which place some children more at risk from noise than others

6 the estimated proportion of children in New Zealand with auditory problems

Questions 7–10

Answer the questions below.

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

Write your answers in boxes 7–10 on your answer sheet.

7 For what period of time has hearing loss in schoolchildren been studied in New Zealand?

8 In addition to machinery noise, what other type of noise can upset children with autism?

9 What term is used to describe the hearing problems of schoolchildren which have not been diagnosed?

10 What part of the New Zealand Disability Strategy aims to give schoolchildren equal opportunity?

Questions 11 and 12

*Choose **TWO** letters, **A–F**.*

Write the correct letters in boxes 11 and 12 on your answer sheet.

The list below includes factors contributing to classroom noise.

Which **TWO** are mentioned by the writer of the passage?

A current teaching methods
B echoing corridors
C cooling systems
D large class sizes
E loud-voiced teachers
F playground games

Question 13

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

Write the correct letter in box 13 on your answer sheet.

What is the writer's overall purpose in writing this article?

A to compare different methods of dealing with auditory problems
B to provide solutions for overly noisy learning environments
C to increase awareness of the situation of children with auditory problems
D to promote New Zealand as a model for other countries to follow

READING

READING PASSAGE 1

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

Attitudes to language

It is not easy to be systematic and objective about language study. Popular linguistic debate regularly deteriorates into invective and polemic. Language belongs to everyone, so most people feel they have a right to hold an opinion about it. And when opinions differ, emotions can run high. Arguments can start as easily over minor points of usage as over major policies of linguistic education.

Language, moreover, is a very public behaviour, so it is easy for different usages to be noted and criticised. No part of society or social behaviour is exempt: linguistic factors influence how we judge personality, intelligence, social status, educational standards, job aptitude, and many other areas of identity and social survival. As a result, it is easy to hurt, and to be hurt, when language use is unfeelingly attacked.

In its most general sense, prescriptivism is the view that one variety of language has an inherently higher value than others, and that this ought to be imposed on the whole of the speech community. The view is propounded especially in relation to grammar and vocabulary, and frequently with reference to pronunciation. The variety which is favoured, in this account, is usually a version of the 'standard' written language, especially as encountered in literature, or in the formal spoken language which most closely reflects this style. Adherents to this variety are said to speak or write 'correctly'; deviations from it are said to be 'incorrect'.

All the main languages have been studied prescriptively, especially in the 18th century approach to the writing of grammars and dictionaries. The aims of these early grammarians were threefold: (a) they wanted to codify the principles of their languages, to show that there was a system beneath the apparent chaos of usage, (b) they wanted a means of settling disputes over usage, and (c) they wanted to point out what they felt to be common errors, in order to 'improve' the language. The authoritarian nature of the approach is best characterised by its reliance on 'rules' of grammar. Some usages are 'prescribed', to be learnt and followed accurately; others are 'proscribed', to be avoided. In this early period, there were no half-measures: usage was either right or wrong, and it was the task of the grammarian not simply to record alternatives, but to pronounce judgement upon them.

These attitudes are still with us, and they motivate a widespread concern that linguistic standards should be maintained. Nevertheless, there is an alternative point of view that is concerned less with standards than with the *facts* of linguistic usage. This approach is summarised in the statement that it is the task of the grammarian to *describe,* not *prescribe*

– to record the facts of linguistic diversity, and not to attempt the impossible tasks of evaluating language variation or halting language change. In the second half of the 18th century, we already find advocates of this view, such as Joseph Priestley, whose *Rudiments of English Grammar* (1761) insists that 'the custom of speaking is the original and only just standard of any language'. Linguistic issues, it is argued, cannot be solved by logic and legislation. And this view has become the tenet of the modern linguistic approach to grammatical analysis.

In our own time, the opposition between 'descriptivists' and 'prescriptivists' has often become extreme, with both sides painting unreal pictures of the other. Descriptive grammarians have been presented as people who do not care about standards, because of the way they see all forms of usage as equally valid. Prescriptive grammarians have been presented as blind adherents to a historical tradition. The opposition has even been presented in quasi-political terms – of radical liberalism vs elitist conservatism.

Questions 1–8

Do the following statements agree with the claims of the writer in Reading Passage 1?

In boxes 1–8 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*

1 There are understandable reasons why arguments occur about language.

2 People feel more strongly about language education than about small differences in language usage.

3 Our assessment of a person's intelligence is affected by the way he or she uses language.

4 Prescriptive grammar books cost a lot of money to buy in the 18th century.

5 Prescriptivism still exists today.

6 According to descriptivists it is pointless to try to stop language change.

7 Descriptivism only appeared after the 18th century.

8 Both descriptivists and prescriptivists have been misrepresented.

Questions 9–12

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

*Write the correct letter, **A–I**, in boxes 9–12 on your answer sheet.*

The language debate

According to **9** ..... , there is only one correct form of language. Linguists who take this approach to language place great importance on grammatical **10** ..... . Conversely, the view of **11** ..... , such as Joseph Priestley, is that grammar should be based on **12** ..... .

A	descriptivists	**B**	language experts	**C**	popular speech
D	formal language	**E**	evaluation	**F**	rules
G	modern linguists	**H**	prescriptivists	**I**	change

Question 13

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

Write the correct letter in box 13 on your answer sheet.

What is the writer's purpose in Reading Passage 1?

A to argue in favour of a particular approach to writing dictionaries and grammar books
B to present a historical account of differing views of language
C to describe the differences between spoken and written language
D to show how a certain view of language has been discredited

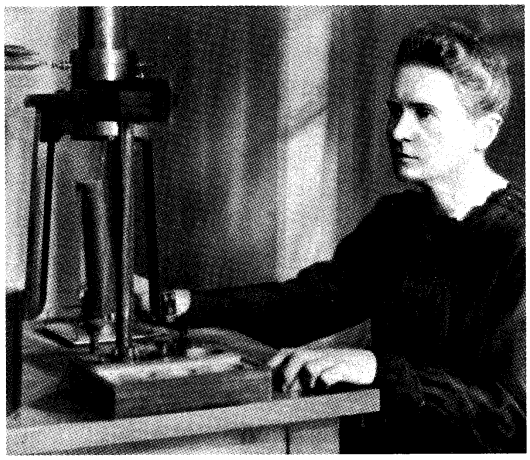
TEST 20

READING

READING PASSAGE 1

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

The life and work of Marie Curie



Marie Curie is probably the most famous woman scientist who has ever lived. Born Maria Sklodowska in Poland in 1867, she is famous for her work on radioactivity, and was twice a winner of the Nobel Prize. With her husband, Pierre Curie, and Henri Becquerel, she was awarded the 1903 Nobel Prize for Physics, and was then sole winner of the 1911 Nobel Prize for Chemistry. She was the first woman to win a Nobel Prize.

From childhood, Marie was remarkable for her prodigious memory, and at the age of 16 won a gold medal on completion of her secondary education. Because her father lost his savings through bad investment, she then had to take work as a teacher. From her earnings she was able to finance her sister Bronia's medical studies in Paris, on the understanding that Bronia would, in turn, later help her to get an education.

In 1891 this promise was fulfilled and Marie went to Paris and began to study at the Sorbonne (the University of Paris). She often worked far into the night and lived on little more than bread and butter and tea. She came first in the examination in the physical sciences in 1893, and in 1894 was placed second in the examination in mathematical sciences. It was not until the spring of that year that she was introduced to Pierre Curie.

Their marriage in 1895 marked the start of a partnership that was soon to achieve results of world significance. Following Henri Becquerel's discovery in 1896 of a new phenomenon, which Marie later called 'radioactivity', Marie Curie decided to find out if the radioactivity discovered in uranium was to be found in other elements. She discovered that this was true for thorium.

Turning her attention to minerals, she found her interest drawn to pitchblende, a mineral whose radioactivity, superior to that of pure uranium, could be explained only by the presence in the ore of small quantities of an unknown substance of very high activity. Pierre Curie joined her in the work that she had undertaken to resolve this problem, and that led to the discovery of the new elements, polonium and radium. While Pierre Curie devoted himself chiefly to the physical study of the new radiations, Marie Curie struggled to obtain pure radium in the metallic state. This was achieved with the help of the chemist André-Louis Debierne, one of

Pierre Curie's pupils. Based on the results of this research, Marie Curie received her Doctorate of Science, and in 1903 Marie and Pierre shared with Becquerel the Nobel Prize for Physics for the discovery of radioactivity.

The births of Marie's two daughters, Irène and Eve, in 1897 and 1904 failed to interrupt her scientific work. She was appointed lecturer in physics at the École Normale Supérieure for girls in Sèvres, France (1900), and introduced a method of teaching based on experimental demonstrations. In December 1904 she was appointed chief assistant in the laboratory directed by Pierre Curie.

The sudden death of her husband in 1906 was a bitter blow to Marie Curie, but was also a turning point in her career: henceforth she was to devote all her energy to completing alone the scientific work that they had undertaken. On May 13, 1906, she was appointed to the professorship that had been left vacant on her husband's death, becoming the first woman to teach at the Sorbonne. In 1911 she was awarded the Nobel Prize for Chemistry for the isolation of a pure form of radium.

During World War I, Marie Curie, with the help of her daughter Irène, devoted herself to the development of the use of X-radiography, including the mobile units which came to be known as 'Little Curies', used for the treatment of wounded soldiers. In 1918 the Radium Institute, whose staff Irène had joined, began to operate in earnest, and became a centre for nuclear physics and chemistry. Marie Curie, now at the highest point of her fame and, from 1922, a member of the Academy of Medicine, researched the chemistry of radioactive substances and their medical applications.

In 1921, accompanied by her two daughters, Marie Curie made a triumphant journey to the United States to raise funds for research on radium. Women there presented her with a gram of radium for her campaign. Marie also gave lectures in Belgium, Brazil, Spain and Czechoslovakia and, in addition, had the satisfaction of seeing the development of the Curie Foundation in Paris, and the inauguration in 1932 in Warsaw of the Radium Institute, where her sister Bronia became director.

One of Marie Curie's outstanding achievements was to have understood the need to accumulate intense radioactive sources, not only to treat illness but also to maintain an abundant supply for research. The existence in Paris at the Radium Institute of a stock of 1.5 grams of radium made a decisive contribution to the success of the experiments undertaken in the years around 1930. This work prepared the way for the discovery of the neutron by Sir James Chadwick and, above all, for the discovery in 1934 by Irène and Frédéric Joliot-Curie of artificial radioactivity. A few months after this discovery, Marie Curie died as a result of leukaemia caused by exposure to radiation. She had often carried test tubes containing radioactive isotopes in her pocket, remarking on the pretty blue-green light they gave off.

Her contribution to physics had been immense, not only in her own work, the importance of which had been demonstrated by her two Nobel Prizes, but because of her influence on subsequent generations of nuclear physicists and chemists.

Questions 1–6

Do the following statements agree with the information given in Reading Passage 1?

In boxes 1–6 on your answer sheet, write

TRUE	*if the statement agrees with the information*
FALSE	*if the statement contradicts the information*
NOT GIVEN	*if there is no information on this*

1 Marie Curie's husband was a joint winner of both Marie's Nobel Prizes.

2 Marie became interested in science when she was a child.

3 Marie was able to attend the Sorbonne because of her sister's financial contribution.

4 Marie stopped doing research for several years when her children were born.

5 Marie took over the teaching position her husband had held.

6 Marie's sister Bronia studied the medical uses of radioactivity.

Questions 7–13

Complete the notes below.

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

Write your answers in boxes 7–13 on your answer sheet.

Marie Curie's research on radioactivity

- When uranium was discovered to be radioactive, Marie Curie found that the element called **7** ..... had the same property.
- Marie and Pierre Curie's research into the radioactivity of the mineral known as **8** ..... led to the discovery of two new elements.
- In 1911, Marie Curie received recognition for her work on the element **9** ..... .
- Marie and Irène Curie developed X-radiography which was used as a medical technique for **10** ..... .
- Marie Curie saw the importance of collecting radioactive material both for research and for cases of **11** ..... .
- The radioactive material stocked in Paris contributed to the discoveries in the 1930s of the **12** ..... and of what was known as artificial radioactivity.
- During her research, Marie Curie was exposed to radiation and as a result she suffered from **13** ..... .

READING

READING PASSAGE 1

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

Stepwells

A millennium ago, stepwells were fundamental to life in the driest parts of India. Richard Cox travelled to north-western India to document these spectacular monuments from a bygone era

During the sixth and seventh centuries, the inhabitants of the modern-day states of Gujarat and Rajasthan in north-western India developed a method of gaining access to clean, fresh groundwater during the dry season for drinking, bathing, watering animals and irrigation. However, the significance of this invention – the stepwell – goes beyond its utilitarian application.

Unique to this region, stepwells are often architecturally complex and vary widely in size and shape. During their heyday, they were places of gathering, of leisure and relaxation and of worship for villagers of all but the lowest classes. Most stepwells are found dotted round the desert areas of Gujarat (where they are called *vav*) and Rajasthan (where they are called *baori),* while a few also survive in Delhi. Some were located in or near villages as public spaces for the community; others were positioned beside roads as resting places for travellers.

As their name suggests, stepwells comprise a series of stone steps descending from ground level to the water source (normally an underground aquifer) as it recedes following the rains. When the water level was high, the user needed only to descend a few steps to reach it; when it was low, several levels would have to be negotiated.

Some wells are vast, open craters with hundreds of steps paving each sloping side, often in tiers. Others are more elaborate, with long stepped passages leading to the water via several storeys. Built from stone and supported by pillars, they also included pavilions that sheltered visitors from the relentless heat. But perhaps the most impressive features are the intricate decorative sculptures that embellish many stepwells, showing activities from fighting and dancing to everyday acts such as women combing their hair or churning butter.

Down the centuries, thousands of wells were constructed throughout north-western India, but the majority have now fallen into disuse; many are derelict and dry, as groundwater has been diverted for industrial use and the wells no longer reach the water table. Their condition

hasn't been helped by recent dry spells: southern Rajasthan suffered an eight-year drought between 1996 and 2004.

However, some important sites in Gujarat have recently undergone major restoration, and the state government announced in June last year that it plans to restore the stepwells throughout the state.

In Patan, the state's ancient capital, the stepwell of *Rani Ki Vav* (Queen's Stepwell) is perhaps the finest current example. It was built by Queen Udayamati during the late 11th century, but became silted up following a flood during the 13th century. But the Archaeological Survey of India began restoring it in the 1960s, and today it is in pristine condition. At 65 metres long, 20 metres wide and 27 metres deep, *Rani Ki Vav* features 500 sculptures carved into niches throughout the monument. Incredibly, in January 2001, this ancient structure survived an earthquake that measured 7.6 on the Richter scale.

Another example is the *Surya Kund* in Modhera, northern Gujarat, next to the Sun Temple, built by King Bhima I in 1026 to honour the sun god Surya. It actually resembles a tank (*kund* means reservoir or pond) rather than a well, but displays the hallmarks of stepwell architecture, including four sides of steps that descend to the bottom in a stunning geometrical formation. The terraces house 108 small, intricately carved shrines between the sets of steps.

Rajasthan also has a wealth of wells. The ancient city of Bundi, 200 kilometres south of Jaipur, is renowned for its architecture, including its stepwells. One of the larger examples is *Raniji Ki Baori*, which was built by the queen of the region, Nathavatji, in 1699. At 46 metres deep, 20 metres wide and 40 metres long, the intricately carved monument is one of 21 *baoris* commissioned in the Bundi area by Nathavatji.

In the old ruined town of Abhaneri, about 95 kilometres east of Jaipur, is *Chand Baori*, one of India's oldest and deepest wells; aesthetically it's perhaps one of the most dramatic. Built in around 850 AD next to the temple of Harshat Mata, the *baori* comprises hundreds of zigzagging steps that run along three of its sides, steeply descending 11 storeys, resulting in a striking pattern when seen from afar. On the fourth side, verandas which are supported by ornate pillars overlook the steps.

Still in public use is *Neemrana Ki Baori*, located just off the Jaipur–Delhi highway. Constructed in around 1700, it is nine storeys deep, with the last two being underwater. At ground level, there are 86 colonnaded openings from where the visitor descends 170 steps to the deepest water source.

Today, following years of neglect, many of these monuments to medieval engineering have been saved by the Archaeological Survey of India, which has recognised the importance of preserving them as part of the country's rich history. Tourists flock to wells in far-flung corners of north-western India to gaze in wonder at these architectural marvels from hundreds of years ago, which serve as a reminder of both the ingenuity and artistry of ancient civilisations and of the value of water to human existence.

Questions 1–5

Do the following statements agree with the information given in Reading Passage 1?

In boxes 1–5 on your answer sheet, write

TRUE	*if the statement agrees with the information*
FALSE	*if the statement contradicts the information*
NOT GIVEN	*if there is no information on this*

1 Examples of ancient stepwells can be found all over the world.

2 Stepwells had a range of functions, in addition to those related to water collection.

3 The few existing stepwells in Delhi are more attractive than those found elsewhere.

4 It took workers many years to build the stone steps characteristic of stepwells.

5 The number of steps above the water level in a stepwell altered during the course of a year.

Questions 6–8

Answer the questions below.

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

Write your answers in boxes 6–8 on your answer sheet.

6 Which part of some stepwells provided shade for people?

7 What type of serious climatic event, which took place in southern Rajasthan, is mentioned in the article?

8 Who are frequent visitors to stepwells nowadays?

Questions 9–13

Complete the table below.

*Choose **ONE WORD AND/OR A NUMBER** from the passage for each answer.*

Write your answers in boxes 9–13 on your answer sheet.

Stepwell	Date	Features	Other notes
Rani Ki Vav	Late 11th century	As many as 500 sculptures decorate the monument	Restored in the 1960s Excellent condition, despite the **9** ..... of 2001
Surya Kund	1026	Steps on the **10** ..... produce a geometrical pattern Carved shrines	Looks more like a **11** ..... than a well
Raniji Ki Baori	1699	Intricately carved monument	One of 21 *baoris* in the area commissioned by Queen Nathavatji
Chand Baori	850 AD	Steps take you down 11 storeys to the bottom	Old, deep and very dramatic Has **12** ..... which provide a view of the steps
Neemrana Ki Baori	1700	Has two **13** ..... levels	Used by public today

READING

READING PASSAGE 1

*You should spend about 20 minutes on **Questions 1–13**, which are based on Reading Passage 1 on the following pages.*

Questions 1–7

Reading Passage 1 has seven paragraphs, **A–G**.

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

*Write the correct number, **i–ix**, in boxes 1–7 on your answer sheet.*

List of Headings

i	The search for the reasons for an increase in population
ii	Industrialisation and the fear of unemployment
iii	The development of cities in Japan
iv	The time and place of the Industrial Revolution
v	The cases of Holland, France and China
vi	Changes in drinking habits in Britain
vii	Two keys to Britain's industrial revolution
viii	Conditions required for industrialisation
ix	Comparisons with Japan lead to the answer

1 Paragraph **A**

2 Paragraph **B**

3 Paragraph **C**

4 Paragraph **D**

5 Paragraph **E**

6 Paragraph **F**

7 Paragraph **G**

Tea and the Industrial Revolution

A Cambridge professor says that a change in drinking habits was the reason for the Industrial Revolution in Britain. Anjana Ahuja reports

A Alan Macfarlane, professor of anthropological science at King's College, Cambridge, has, like other historians, spent decades wrestling with the enigma of the Industrial Revolution. Why did this particular Big Bang – the world-changing birth of industry – happen in Britain? And why did it strike at the end of the 18th century?

B Macfarlane compares the puzzle to a combination lock. 'There are about 20 different factors and all of them need to be present before the revolution can happen,' he says. For industry to take off, there needs to be the technology and power to drive factories, large urban populations to provide cheap labour, easy transport to move goods around, an affluent middle-class willing to buy mass-produced objects, a market-driven economy and a political system that allows this to happen. While this was the case for England, other nations, such as Japan, the Netherlands and France also met some of these criteria but were not industrialising. 'All these factors must have been necessary but not sufficient to cause the revolution,' says Macfarlane. 'After all, Holland had everything except coal, while China also had many of these factors. Most historians are convinced there are one or two missing factors that you need to open the lock.'

C The missing factors, he proposes, are to be found in almost every kitchen cupboard. Tea and beer, two of the nation's favourite drinks, fuelled the revolution. The antiseptic properties of tannin, the active ingredient in tea, and of hops in beer – plus the fact that both are made with boiled water – allowed urban communities to flourish at close quarters without succumbing to water-borne diseases such as dysentery. The theory sounds eccentric but once he starts to explain the detective work that went into his deduction, the scepticism gives way to wary admiration. Macfarlane's case has been strengthened by support from notable quarters – Roy Porter, the distinguished medical historian, recently wrote a favourable appraisal of his research.

D Macfarlane had wondered for a long time how the Industrial Revolution came about. Historians had alighted on one interesting factor around the mid-18th century that required explanation. Between about 1650 and 1740, the population in Britain was static. But then there was a burst in population growth. Macfarlane says: 'The infant mortality rate halved in the space of 20 years, and this happened in both rural areas and cities, and across all classes. People suggested four possible causes. Was there a sudden change in the viruses and bacteria around? Unlikely. Was there a revolution in medical science? But this was a century before Lister's revolution*. Was there a change in environmental conditions? There were improvements in agriculture that wiped out malaria, but these were small gains. Sanitation did not become widespread until the 19th century. The only option left is food. But the height and weight statistics show a decline. So the food must have got worse. Efforts to explain this sudden reduction in child deaths appeared to draw a blank.'

* Joseph Lister was the first doctor to use antiseptic techniques during surgical operations to prevent infections.

E This population burst seemed to happen at just the right time to provide labour for the Industrial Revolution. 'When you start moving towards an industrial revolution, it is economically efficient to have people living close together,' says Macfarlane. 'But then you get disease, particularly from human waste.' Some digging around in historical records revealed that there was a change in the incidence of water-borne disease at that time, especially dysentery. Macfarlane deduced that whatever the British were drinking must have been important in regulating disease. He says, 'We drank beer. For a long time, the English were protected by the strong antibacterial agent in hops, which were added to help preserve the beer. But in the late 17th century a tax was introduced on malt, the basic ingredient of beer. The poor turned to water and gin and in the 1720s the mortality rate began to rise again. Then it suddenly dropped again. What caused this?'

F Macfarlane looked to Japan, which was also developing large cities about the same time, and also had no sanitation. Water-borne diseases had a much looser grip on the Japanese population than those in Britain. Could it be the prevalence of tea in their culture? Macfarlane then noted that the history of tea in Britain provided an extraordinary coincidence of dates. Tea was relatively expensive until Britain started a direct clipper trade with China in the early 18th century. By the 1740s, about the time that infant mortality was dipping, the drink was common. Macfarlane guessed that the fact that water had to be boiled, together with the stomach-purifying properties of tea meant that the breast milk provided by mothers was healthier than it had ever been. No other European nation sipped tea like the British, which, by Macfarlane's logic, pushed these other countries out of contention for the revolution.

G But, if tea is a factor in the combination lock, why didn't Japan forge ahead in a tea-soaked industrial revolution of its own? Macfarlane notes that even though 17th-century Japan had large cities, high literacy rates, even a futures market, it had turned its back on the essence of any work-based revolution by giving up labour-saving devices such as animals, afraid that they would put people out of work. So, the nation that we now think of as one of the most technologically advanced entered the 19th century having 'abandoned the wheel'.

Questions 8–13

Do the following statements agree with the information given in Reading Passage 1?

In boxes 8–13 on your answer sheet, write

TRUE	*if the statement agrees with the information*
FALSE	*if the statement contradicts the information*
NOT GIVEN	*if there is no information on this*

8 China's transport system was not suitable for industry in the 18th century.

9 Tea and beer both helped to prevent dysentery in Britain.

10 Roy Porter disagrees with Professor Macfarlane's findings.

11 After 1740, there was a reduction in population in Britain.

12 People in Britain used to make beer at home.

13 The tax on malt indirectly caused a rise in the death rate.

TEST 23

READING

READING PASSAGE 1

*You should spend about 20 minutes on **Questions 1–13**, which are based on Reading Passage 1 on the following pages.*

Questions 1–4

Reading Passage 1 has five paragraphs, **A–E**.

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

*Write the correct number, **i–vii**, in boxes 1–4 on your answer sheet.*

List of Headings

i	Economic and social significance of tourism
ii	The development of mass tourism
iii	Travel for the wealthy
iv	Earning foreign exchange through tourism
v	Difficulty in recognising the economic effects of tourism
vi	The contribution of air travel to tourism
vii	The world impact of tourism
viii	The history of travel

Example	*Answer*
Paragraph **A**	**viii**

1 Paragraph **B**

2 Paragraph **C**

3 Paragraph **D**

4 Paragraph **E**

The Context, Meaning and Scope of Tourism

A Travel has existed since the beginning of time, when primitive man set out, often traversing great distances in search of game, which provided the food and clothing necessary for his survival. Throughout the course of history, people have travelled for purposes of trade, religious conviction, economic gain, war, migration and other equally compelling motivations. In the Roman era, wealthy aristocrats and high government officials also travelled for pleasure. Seaside resorts located at Pompeii and Herculaneum afforded citizens the opportunity to escape to their vacation villas in order to avoid the summer heat of Rome. Travel, except during the Dark Ages, has continued to grow and, throughout recorded history, has played a vital role in the development of civilisations and their economies.

B Tourism in the mass form as we know it today is a distinctly twentieth-century phenomenon. Historians suggest that the advent of mass tourism began in England during the industrial revolution with the rise of the middle class and the availability of relatively inexpensive transportation. The creation of the commercial airline industry following the Second World War and the subsequent development of the jet aircraft in the 1950s signalled the rapid growth and expansion of international travel. This growth led to the development of a major new industry: tourism. In turn, international tourism became the concern of a number of world governments since it not only provided new employment opportunities but also produced a means of earning foreign exchange.

C Tourism today has grown significantly in both economic and social importance. In most industrialised countries over the past few years the fastest growth has been seen in the area of services. One of the largest segments of the service industry, although largely unrecognised as an entity in some of these countries, is travel and tourism. According to the World Travel and Tourism Council (1992), 'Travel and tourism is the largest industry in the world on virtually any economic measure including value-added capital investment, employment and tax contributions'. In 1992, the industry's gross output was estimated to be $3.5 trillion, over 12 per cent of all consumer spending. The travel and tourism industry is the world's largest employer with almost 130 million jobs, or almost 7 per cent of all employees. This industry is the world's leading industrial contributor, producing over 6 per cent of the world's gross national product and accounting for capital investment in excess of $422 billion in direct, indirect and personal taxes each year. Thus, tourism has a profound impact both on the world economy and, because of the educative effect of travel and the effects on employment, on society itself.

D However, the major problems of the travel and tourism industry that have hidden, or obscured, its economic impact are the diversity and fragmentation of the industry itself. The travel industry includes: hotels, motels and other types of accommodation; restaurants and other food services; transportation services and facilities; amusements, attractions and other leisure facilities; gift shops and a large number of other enterprises. Since many of these businesses also serve local residents, the impact of spending by visitors can easily be overlooked or underestimated. In addition, Meis (1992) points out that the tourism industry involves concepts that have remained amorphous to both analysts and decision makers. Moreover, in all nations this problem has made it difficult for the industry to develop any type of reliable or credible tourism information base in order to estimate the contribution it makes to regional, national and global economies. However, the nature of this very diversity makes travel and tourism ideal vehicles for economic development in a wide variety of countries, regions or communities.

E Once the exclusive province of the wealthy, travel and tourism have become an institutionalised way of life for most of the population. In fact, McIntosh and Goeldner (1990) suggest that tourism has become the largest commodity in international trade for many nations and, for a significant number of other countries, it ranks second or third. For example, tourism is the major source of income in Bermuda, Greece, Italy, Spain, Switzerland and most Caribbean countries. In addition, Hawkins and Ritchie, quoting from data published by the American Express Company, suggest that the travel and tourism industry is the number one ranked employer in the Bahamas, Brazil, Canada, France, (the former) West Germany, Hong Kong, Italy, Jamaica, Japan, Singapore, the United Kingdom and the United States. However, because of problems of definition, which directly affect statistical measurement, it is not possible with any degree of certainty to provide precise, valid or reliable data about the extent of world-wide tourism participation or its economic impact. In many cases, similar difficulties arise when attempts are made to measure domestic tourism.

Questions 5–10

Do the following statements agree with the information given in Reading Passage 1?

In boxes 5–10 on your answer sheet, write

TRUE	*if the statement agrees with the information*
FALSE	*if the statement contradicts the information*
NOT GIVEN	*if there is no information on this*

5 The largest employment figures in the world are found in the travel and tourism industry.

6 Tourism contributes over six per cent of the Australian gross national product.

7 Tourism has a social impact because it promotes recreation.

8 Two main features of the travel and tourism industry make its economic significance difficult to ascertain.

9 Visitor spending is always greater than the spending of residents in tourist areas.

10 It is easy to show statistically how tourism affects individual economies.

Questions 11–13

Complete the sentences below.

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

Write your answers in boxes 11–13 on your answer sheet.

11 In Greece, tourism is the most important ..... .

12 The travel and tourism industry in Jamaica is the major ..... .

13 The problems associated with measuring international tourism are often reflected in the measurement of ..... .

TEST 24

READING

READING PASSAGE 1

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

The megafires of California

Drought, housing expansion, and oversupply of tinder make for bigger, hotter fires in the western United States

Wildfires are becoming an increasing menace in the western United States, with Southern California being the hardest hit area. There's a reason fire squads battling more frequent blazes in Southern California are having such difficulty containing the flames, despite better preparedness than ever and decades of experience fighting fires fanned by the 'Santa Ana Winds'. The wildfires themselves, experts say, are generally hotter, faster, and spread more erratically than in the past.

Megafires, also called 'siege fires', are the increasingly frequent blazes that burn 500,000 acres or more – 10 times the size of the average forest fire of 20 years ago. Some recent wildfires are among the biggest ever in California in terms of acreage burned, according to state figures and news reports.

One explanation for the trend to more superhot fires is that the region, which usually has dry summers, has had significantly below normal precipitation in many recent years. Another reason, experts say, is related to the century-long policy of the US Forest Service to stop wildfires as quickly as possible. The unintentional consequence has been to halt the natural eradication of underbrush, now the primary fuel for megafires.

Three other factors contribute to the trend, they add. First is climate change, marked by a 1-degree Fahrenheit rise in average yearly temperature across the western states. Second is fire seasons that on average are 78 days longer than they were 20 years ago. Third is increased construction of homes in wooded areas.

'We are increasingly building our homes in fire-prone ecosystems,' says Dominik Kulakowski, adjunct professor of biology at Clark University Graduate School of Geography in Worcester, Massachusetts. 'Doing that in many of the forests of the western US is like building homes on the side of an active volcano.'

In California, where population growth has averaged more than 600,000 a year for at least a decade, more residential housing is being built. 'What once was open space is now residential homes providing fuel to make fires burn with greater intensity,' says Terry McHale of the California Department of Forestry firefighters' union. 'With so

much dryness, so many communities to catch fire, so many fronts to fight, it becomes an almost incredible job.'

That said, many experts give California high marks for making progress on preparedness in recent years, after some of the largest fires in state history scorched thousands of acres, burned thousands of homes, and killed numerous people. Stung in the past by criticism of bungling that allowed fires to spread when they might have been contained, personnel are meeting the peculiar challenges of neighborhood – and canyon- hopping fires better than previously, observers say.

State promises to provide more up-to-date engines, planes, and helicopters to fight fires have been fulfilled. Firefighters' unions that in the past complained of dilapidated equipment, old fire engines, and insufficient blueprints for fire safety are now praising the state's commitment, noting that funding for firefighting has increased, despite huge cuts in many other programs. 'We are pleased that the current state administration has been very proactive in its support of us, and [has] come through with budgetary support of the infrastructure needs we have long sought,' says Mr. McHale of the firefighters' union.

Besides providing money to upgrade the fire engines that must traverse the mammoth state and wind along serpentine canyon roads, the state has invested in better command-and-control facilities as well as in the strategies to run them. 'In the fire sieges of earlier years, we found that other jurisdictions and states were willing to offer mutual-aid help, but we were not able to communicate adequately with them,' says Kim Zagaris, chief of the state's Office of Emergency Services Fire and Rescue Branch. After a commission examined and revamped communications procedures, the statewide response 'has become far more professional and responsive,' he says. There is a sense among both government officials and residents that the speed, dedication, and coordination of firefighters from several states and jurisdictions are resulting in greater efficiency than in past 'siege fire' situations.

In recent years, the Southern California region has improved building codes, evacuation procedures, and procurement of new technology. 'I am extraordinarily impressed by the improvements we have witnessed,' says Randy Jacobs, a Southern California-based lawyer who has had to evacuate both his home and business to escape wildfires. 'Notwithstanding all the damage that will continue to be caused by wildfires, we will no longer suffer the loss of life endured in the past because of the fire prevention and firefighting measures that have been put in place,' he says.

Questions 1–6

Complete the notes below.

*Choose **ONE WORD AND/OR A NUMBER** from the passage for each answer.*

Write your answers in boxes 1–6 on your answer sheet.

Wildfires

- Characteristics of wildfires and wildfire conditions today compared to the past:
  - occurrence: more frequent
  - temperature: hotter
  - speed: faster
  - movement: **1** ..... more unpredictably
  - size of fires: **2** ..... greater on average than two decades ago
- Reasons wildfires cause more damage today compared to the past:
  - rainfall: **3** ..... average
  - more brush to act as **4** .....
  - increase in yearly temperature
  - extended fire **5** .....
  - more building of **6** ..... in vulnerable places

Questions 7–13

Do the following statements agree with the information given in Reading Passage 1?

In boxes 7–13 on your answer sheet, write

TRUE	*if the statement agrees with the information*
FALSE	*if the statement contradicts the information*
NOT GIVEN	*if there is no information on this*

7 The amount of open space in California has diminished over the last ten years.

8 Many experts believe California has made little progress in readying itself to fight fires.

9 Personnel in the past have been criticised for mishandling fire containment.

10 California has replaced a range of firefighting tools.

11 More firefighters have been hired to improve fire-fighting capacity.

12 Citizens and government groups disapprove of the efforts of different states and agencies working together.

13 Randy Jacobs believes that loss of life from fires will continue at the same levels, despite changes made.

TEST 25

READING

READING PASSAGE 1

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

Crop-growing skyscrapers

By the year 2050, nearly 80% of the Earth's population will live in urban centres. Applying the most conservative estimates to current demographic trends, the human population will increase by about three billion people by then. An estimated 10^9 hectares of new land (about 20% larger than Brazil) will be needed to grow enough food to feed them, if traditional farming methods continue as they are practised today. At present, throughout the world, over 80% of the land that is suitable for raising crops is in use. Historically, some 15% of that has been laid waste by poor management practices. What can be done to ensure enough food for the world's population to live on?

The concept of indoor farming is not new, since hothouse production of tomatoes and other produce has been in vogue for some time. What is new is the urgent need to scale up this technology to accommodate another three billion people. Many believe an entirely new approach to indoor farming is required, employing cutting-edge technologies. One such proposal is for the 'Vertical Farm'. The concept is of multi-storey buildings in which food crops are grown in environmentally controlled conditions. Situated in the heart of urban centres, they would drastically reduce the amount of transportation required to bring food to consumers. Vertical farms would need to be efficient, cheap to construct and safe to operate. If successfully implemented, proponents claim, vertical farms offer the promise of urban renewal, sustainable production of a safe and varied food supply (through year-round production of all crops), and the eventual repair of ecosystems that have been sacrificed for horizontal farming.

It took humans 10,000 years to learn how to grow most of the crops we now take for granted. Along the way, we despoiled most of the land we worked, often turning verdant, natural ecozones into semi-arid deserts. Within that same time frame, we evolved into an urban species, in which 60% of the human population now lives vertically in cities. This means that, for the majority, we humans have shelter from the elements, yet we subject our food-

bearing plants to the rigours of the great outdoors and can do no more than hope for a good weather year. However, more often than not now, due to a rapidly changing climate, that is not what happens. Massive floods, long droughts, hurricanes and severe monsoons take their toll each year, destroying millions of tons of valuable crops.

The supporters of vertical farming claim many potential advantages for the system. For instance, crops would be produced all year round, as they would be kept in artificially controlled, optimum growing conditions. There would be no weather-related crop failures due to droughts, floods or pests. All the food could be grown organically, eliminating the need for herbicides, pesticides and fertilisers. The system would greatly reduce the incidence of many infectious diseases that are acquired at the agricultural interface. Although the system would consume energy, it would return energy to the grid via methane generation from composting non-edible parts of plants. It would also dramatically reduce fossil fuel use, by cutting out the need for tractors, ploughs and shipping.

A major drawback of vertical farming, however, is that the plants would require artificial light. Without it, those plants nearest the windows would be exposed to more sunlight and grow more quickly, reducing the efficiency of the system. Single-storey greenhouses have the benefit of natural overhead light: even so, many still need artificial lighting. A multi-storey facility with no natural overhead light would require far more. Generating enough light could be prohibitively expensive, unless cheap, renewable energy is available, and this appears to be rather a future aspiration than a likelihood for the near future.

One variation on vertical farming that has been developed is to grow plants in stacked trays that move on rails. Moving the trays allows the plants to get enough sunlight. This system is already in operation, and works well within a single-storey greenhouse with light reaching it from above: it is not certain, however, that it can be made to work without that overhead natural light.

Vertical farming is an attempt to address the undoubted problems that we face in producing enough food for a growing population. At the moment, though, more needs to be done to reduce the detrimental impact it would have on the environment, particularly as regards the use of energy. While it is possible that much of our food will be grown in skyscrapers in future, most experts currently believe it is far more likely that we will simply use the space available on urban rooftops.

Questions 1–7

Complete the sentences below.

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

Write your answers in boxes 1–7 on your answer sheet.

Indoor farming

1 Some food plants, including ..... , are already grown indoors.

2 Vertical farms would be located in ..... , meaning that there would be less need to take them long distances to customers.

3 Vertical farms could use methane from plants and animals to produce ..... .

4 The consumption of ..... would be cut because agricultural vehicles would be unnecessary.

5 The fact that vertical farms would need ..... light is a disadvantage.

6 One form of vertical farming involves planting in ..... which are not fixed.

7 The most probable development is that food will be grown on ..... in towns and cities.

Questions 8–13

Do the following statements agree with the information given in Reading Passage 1?

In boxes 8–13 on your answer sheet, write

TRUE	*if the statement agrees with the information*
FALSE	*if the statement contradicts the information*
NOT GIVEN	*if there is no information on this*

8 Methods for predicting the Earth's population have recently changed.

9 Human beings are responsible for some of the destruction to food-producing land.

10 The crops produced in vertical farms will depend on the season.

11 Some damage to food crops is caused by climate change.

12 Fertilisers will be needed for certain crops in vertical farms.

13 Vertical farming will make plants less likely to be affected by infectious diseases.

READING

READING PASSAGE 1

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

Raising the *Mary Rose*

How a sixteenth-century warship was recovered from the seabed

On 19 July 1545, English and French fleets were engaged in a sea battle off the coast of southern England in the area of water called the Solent, between Portsmouth and the Isle of Wight. Among the English vessels was a warship by the name of *Mary Rose*. Built in Portsmouth some 35 years earlier, she had had a long and successful fighting career, and was a favourite of King Henry VIII. Accounts of what happened to the ship vary: while witnesses agree that she was not hit by the French, some maintain that she was outdated, overladen and sailing too low in the water, others that she was mishandled by undisciplined crew. What is undisputed, however, is that the *Mary Rose* sank into the Solent that day, taking at least 500 men with her. After the battle, attempts were made to recover the ship, but these failed.

The *Mary Rose* came to rest on the seabed, lying on her starboard (right) side at an angle of approximately 60 degrees. The hull (the body of the ship) acted as a trap for the sand and mud carried by Solent currents. As a result, the starboard side filled rapidly, leaving the exposed port (left) side to be eroded by marine organisms and mechanical degradation. Because of the way the ship sank, nearly all of the starboard half survived intact. During the seventeenth and eighteenth centuries, the entire site became covered with a layer of hard grey clay, which minimised further erosion.

Then, on 16 June 1836, some fishermen in the Solent found that their equipment was caught on an underwater obstruction, which turned out to be the *Mary Rose*. Diver John Deane happened to be exploring another sunken ship nearby, and the fishermen approached him, asking him to free their gear. Deane dived down, and found the equipment caught on a timber protruding slightly from the seabed. Exploring further, he uncovered several other timbers and a bronze gun. Deane continued diving on the site intermittently until 1840, recovering several more guns, two bows, various timbers, part of a pump and various other small finds.

The *Mary Rose* then faded into obscurity for another hundred years. But in 1965, military historian and amateur diver Alexander McKee, in conjunction with the British Sub-Aqua Club, initiated a project called 'Solent Ships'. While on paper this was a plan to examine a number of known wrecks in the Solent, what McKee

really hoped for was to find the *Mary Rose*. Ordinary search techniques proved unsatisfactory, so McKee entered into collaboration with Harold E. Edgerton, professor of electrical engineering at the Massachusetts Institute of Technology. In 1967, Edgerton's side-scan sonar systems revealed a large, unusually shaped object, which McKee believed was the *Mary Rose*.

Further excavations revealed stray pieces of timber and an iron gun. But the climax to the operation came when, on 5 May 1971, part of the ship's frame was uncovered. McKee and his team now knew for certain that they had found the wreck, but were as yet unaware that it also housed a treasure trove of beautifully preserved artefacts. Interest in the project grew, and in 1979, The Mary Rose Trust was formed, with Prince Charles as its President and Dr Margaret Rule its Archaeological Director. The decision whether or not to salvage the wreck was not an easy one, although an excavation in 1978 had shown that it might be possible to raise the hull. While the original aim was to raise the hull if at all feasible, the operation was not given the go-ahead until January 1982, when all the necessary information was available.

An important factor in trying to salvage the *Mary Rose* was that the remaining hull was an open shell. This led to an important decision being taken: namely to carry out the lifting operation in three very distinct stages. The hull was attached to a lifting frame via a network of bolts and lifting wires. The problem of the hull being sucked back downwards into the mud was overcome by using 12 hydraulic jacks. These raised it a few centimetres over a period of several days, as the lifting frame rose slowly up its four legs. It was only when the hull was hanging freely from the lifting frame, clear of the seabed and the suction effect of the surrounding mud, that the salvage operation progressed to the second stage. In this stage, the lifting frame was fixed to a hook attached to a crane, and the hull was lifted completely clear of the seabed and transferred underwater into the lifting cradle. This required precise positioning to locate the legs into the 'stabbing guides' of the lifting cradle. The lifting cradle was designed to fit the hull using archaeological survey drawings, and was fitted with air bags to provide additional cushioning for the hull's delicate timber framework. The third and final stage was to lift the entire structure into the air, by which time the hull was also supported from below. Finally, on 11 October 1982, millions of people around the world held their breath as the timber skeleton of the *Mary Rose* was lifted clear of the water, ready to be returned home to Portsmouth.

Questions 1–4

Do the following statements agree with the information given in Reading Passage 1?

In boxes 1–4 on your answer sheet, write

TRUE	*if the statement agrees with the information*
FALSE	*if the statement contradicts the information*
NOT GIVEN	*if there is no information on this*

1 There is some doubt about what caused the *Mary Rose* to sink.

2 The *Mary Rose* was the only ship to sink in the battle of 19 July 1545.

3 Most of one side of the *Mary Rose* lay undamaged under the sea.

4 Alexander McKee knew that the wreck would contain many valuable historical objects.

Questions 5–8

Look at the following statements (Questions 5–8) and the list of dates below.

Match each statement with the correct date, ***A–G****.*

Write the correct letter, ***A–G****, in boxes 5–8 on your answer sheet.*

5 A search for the *Mary Rose* was launched.

6 One person's exploration of the *Mary Rose* site stopped.

7 It was agreed that the hull of the *Mary Rose* should be raised.

8 The site of the *Mary Rose* was found by chance.

List of Dates

A	1836	**E**	1971
B	1840	**F**	1979
C	1965	**G**	1982
D	1967		

Test 2

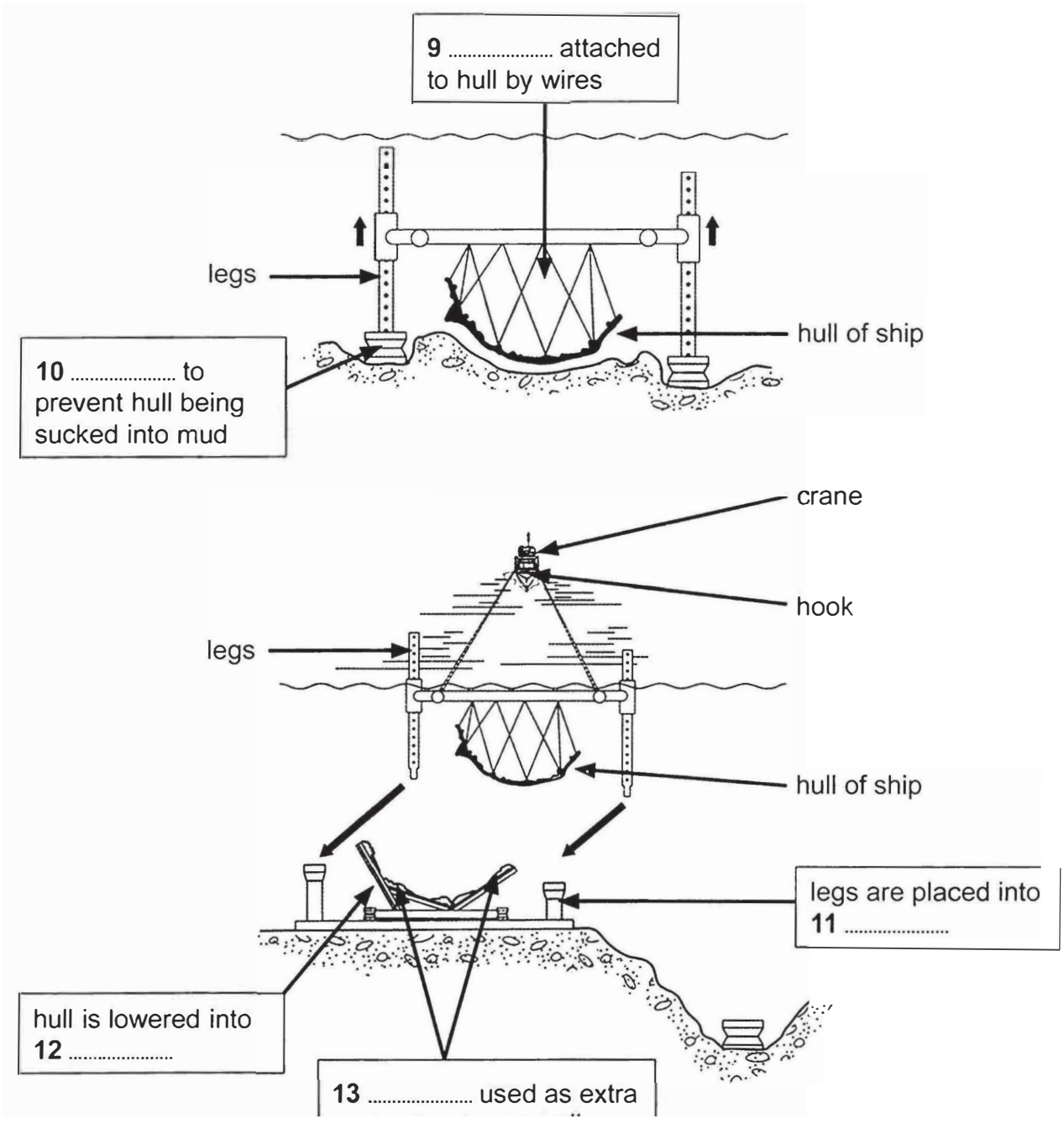
Questions 9–13

Label the diagram below.

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

Write your answers in boxes 9–13 on your answer sheet.

Raising the hull of the *Mary Rose*: Stages one and two



READING

READING PASSAGE 1

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

THE STORY OF SILK

The history of the world's most luxurious fabric, from ancient China to the present day

Silk is a fine, smooth material produced from the cocoons – soft protective shells – that are made by mulberry silkworms (insect larvae). Legend has it that it was Lei Tzu, wife of the Yellow Emperor, ruler of China in about 3000 BC, who discovered silkworms. One account of the story goes that as she was taking a walk in her husband's gardens, she discovered that silkworms were responsible for the destruction of several mulberry trees. She collected a number of cocoons and sat down to have a rest. It just so happened that while she was sipping some tea, one of the cocoons that she had collected landed in the hot tea and started to unravel into a fine thread. Lei Tzu found that she could wind this thread around her fingers. Subsequently, she persuaded her husband to allow her to rear silkworms on a grove of mulberry trees. She also devised a special reel to draw the fibres from the cocoon into a single thread so that they would be strong enough to be woven into fabric. While it is unknown just how much of this is true, it is certainly known that silk cultivation has existed in China for several millennia.

Originally, silkworm farming was solely restricted to women, and it was they who were responsible for the growing, harvesting and weaving. Silk quickly grew into a symbol of status, and originally, only royalty were entitled to have clothes made of silk. The rules were gradually relaxed over the years until finally during the Qing Dynasty (1644–1911 AD), even peasants, the lowest caste, were also entitled to wear silk. Sometime during the Han Dynasty (206 BC–220 AD), silk was so prized that it was also used as a unit of currency. Government officials were paid their salary in silk, and farmers paid their taxes in grain and silk. Silk was also used as diplomatic gifts by the emperor. Fishing lines, bowstrings, musical instruments and paper were all made using silk. The earliest indication of silk paper being used was discovered in the tomb of a noble who is estimated to have died around 168 AD.

Demand for this exotic fabric eventually created the lucrative trade route now known as the Silk Road, taking silk westward and bringing gold, silver and

wool to the East. It was named the Silk Road after its most precious commodity, which was considered to be worth more than gold. The Silk Road stretched over 6,000 kilometres from Eastern China to the Mediterranean Sea, following the Great Wall of China, climbing the Pamir mountain range, crossing modern-day Afghanistan and going on to the Middle East, with a major trading market in Damascus. From there, the merchandise was shipped across the Mediterranean Sea. Few merchants travelled the entire route; goods were handled mostly by a series of middlemen.

With the mulberry silkworm being native to China, the country was the world's sole producer of silk for many hundreds of years. The secret of silk-making eventually reached the rest of the world via the Byzantine Empire, which ruled over the Mediterranean region of southern Europe, North Africa and the Middle East during the period 330–1453 AD. According to another legend, monks working for the Byzantine emperor Justinian smuggled silkworm eggs to Constantinople (Istanbul in modern-day Turkey) in 550 AD, concealed inside hollow bamboo walking canes. The Byzantines were as secretive as the Chinese, however, and for many centuries the weaving and trading of silk fabric was a strict imperial monopoly. Then in the seventh century, the Arabs conquered Persia, capturing their magnificent silks in the process. Silk production thus spread through Africa, Sicily and Spain as the Arabs swept through these lands. Andalusia in southern Spain was Europe's main silk-producing centre in the tenth century. By the thirteenth century, however, Italy had become Europe's leader in silk production and export. Venetian merchants traded extensively in silk and encouraged silk growers to settle in Italy. Even now, silk processed in the province of Como in northern Italy enjoys an esteemed reputation.

The nineteenth century and industrialisation saw the downfall of the European silk industry. Cheaper Japanese silk, trade in which was greatly facilitated by the opening of the Suez Canal, was one of the many factors driving the trend. Then in the twentieth century, new manmade fibres, such as nylon, started to be used in what had traditionally been silk products, such as stockings and parachutes. The two world wars, which interrupted the supply of raw material from Japan, also stifled the European silk industry. After the Second World War, Japan's silk production was restored, with improved production and quality of raw silk. Japan was to remain the world's biggest producer of raw silk, and practically the only major exporter of raw silk, until the 1970s. However, in more recent decades, China has gradually recaptured its position as the world's biggest producer and exporter of raw silk and silk yarn. Today, around 125,000 metric tons of silk are produced in the world, and almost two thirds of that production takes place in China.

Questions 1–9

Complete the notes below.

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

Write your answers in boxes 1–9 on your answer sheet.

THE STORY OF SILK

Early silk production in China

- Around 3000 BC, according to legend:
  - silkworm cocoon fell into emperor's wife's **1** .....
  - emperor's wife invented a **2** ..... to pull out silk fibres
- Only **3** ..... were allowed to produce silk
- Only **4** ..... were allowed to wear silk
- Silk used as a form of **5** .....
  - e.g. farmers' taxes consisted partly of silk
- Silk used for many purposes

  e.g. evidence found of **6** ..... made from silk around 168 AD

Silk reaches rest of world

- Merchants use Silk Road to take silk westward and bring back **7** ..... and precious metals
- 550 AD: **8** ..... hide silkworm eggs in canes and take them to Constantinople
- Silk production spreads across Middle East and Europe
- 20th century: **9** ..... and other manmade fibres cause decline in silk production

Questions 10–13

Do the following statements agree with the information in Reading Passage 1?

In boxes 10–13 on your answer sheet, write

TRUE	*if the statement agrees with the information*
FALSE	*if the statement contradicts the information*
NOT GIVEN	*if there is no information on this*

10 Gold was the most valuable material transported along the Silk Road.

11 Most tradesmen only went along certain sections of the Silk Road.

12 The Byzantines spread the practice of silk production across the West.

13 Silk yarn makes up the majority of silk currently exported from China.

TEST 28

READING

READING PASSAGE 1

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

Research using twins

To biomedical researchers all over the world, twins offer a precious opportunity to untangle the influence of genes and the environment – of nature and nurture. Because identical twins come from a single fertilized egg that splits into two, they share virtually the same genetic code. Any differences between them – one twin having younger looking skin, for example – must be due to environmental factors such as less time spent in the sun.

Alternatively, by comparing the experiences of identical twins with those of fraternal twins, who come from separate eggs and share on average half their DNA, researchers can quantify the extent to which our genes affect our lives. If identical twins are more similar to each other with respect to an ailment than fraternal twins are, then vulnerability to the disease must be rooted at least in part in heredity.

These two lines of research – studying the differences between identical twins to pinpoint the influence of environment, and comparing identical twins with fraternal ones to measure the role of inheritance – have been crucial to understanding the interplay of nature and nurture in determining our personalities, behavior, and vulnerability to disease.

The idea of using twins to measure the influence of heredity dates back to 1875, when the English scientist Francis Galton first suggested the approach (and coined the phrase 'nature and nurture'). But twin studies took a surprising twist in the 1980s, with the arrival of studies into identical twins who had been separated at birth and reunited as adults. Over two decades 137 sets of twins eventually visited Thomas Bouchard's lab in what became known as the Minnesota Study of Twins Reared Apart. Numerous tests were carried out on the twins, and they were each asked more than 15,000 questions.

Bouchard and his colleagues used this mountain of data to identify how far twins were affected by their genetic makeup. The key to their approach was a statistical concept called heritability. In broad terms, the heritability of a trait measures the extent to which differences among members of a population can be explained by differences in their genetics. And wherever Bouchard and other scientists looked, it seemed, they found the invisible hand of genetic influence helping to shape our lives.

Lately, however, twin studies have helped lead scientists to a radical new conclusion: that nature and nurture are not the only

elemental forces at work. According to a recent field called epigenetics, there is a third factor also in play, one that in some cases serves as a bridge between the environment and our genes, and in others operates on its own to shape who we are.

Epigenetic processes are chemical reactions tied to neither nature nor nurture but representing what researchers have called a 'third component'. These reactions influence how our genetic code is expressed: how each gene is strengthened or weakened, even turned on or off, to build our bones, brains and all the other parts of our bodies.

If you think of our DNA as an immense piano keyboard and our genes as the keys – each key symbolizing a segment of DNA responsible for a particular note, or trait, and all the keys combining to make us who we are – then epigenetic processes determine when and how each key can be struck, changing the tune being played.

One way the study of epigenetics is revolutionizing our understanding of biology is by revealing a mechanism by which the environment directly impacts on genes. Studies of animals, for example, have shown that when a rat experiences stress during pregnancy, it can cause epigenetic changes in a fetus that lead to behavioral problems as the rodent grows up. Other epigenetic processes appear to occur randomly, while others are normal, such as those that guide embryonic cells as they become heart, brain, or liver cells, for example.

Geneticist Danielle Reed has worked with many twins over the years and thought deeply about what twin studies have taught us. 'It's very clear when you look at twins that much of what they share is hardwired,' she says. 'Many things about them are absolutely the same and unalterable. But it's also clear, when you get to know them, that other things about them are different. Epigenetics is the origin of a lot of those differences, in my view.'

Reed credits Thomas Bouchard's work for today's surge in twin studies. 'He was the trailblazer,' she says. 'We forget that 50 years ago things like heart disease were thought to be caused entirely by lifestyle. Schizophrenia was thought to be due to poor mothering. Twin studies have allowed us to be more reflective about what people are actually born with and what's caused by experience.'

Having said that, Reed adds, the latest work in epigenetics promises to take our understanding even further. 'What I like to say is that nature writes some things in pencil and some things in pen,' she says. 'Things written in pen you can't change. That's DNA. But things written in pencil you can. That's epigenetics. Now that we're actually able to look at the DNA and see where the pencil writings are, it's sort of a whole new world.'

Questions 1–4

Do the following statements agree with the information given in Reading Passage 1?

In boxes 1–4 on your answer sheet, write

TRUE	*if the statement agrees with the information*
FALSE	*if the statement contradicts the information*
NOT GIVEN	*if there is no information on this*

1 There may be genetic causes for the differences in how young the skin of identical twins looks.

2 Twins are at greater risk of developing certain illnesses than non-twins.

3 Bouchard advertised in newspapers for twins who had been separated at birth.

4 Epigenetic processes are different from both genetic and environmental processes.

Questions 5–9

Look at the following statements (Questions 5–9) and the list of researchers below.

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

Write the correct letter, ***A, B*** *or* ***C****, in boxes 5–9 on your answer sheet.*

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

List of Researchers

A	Francis Galton
B	Thomas Bouchard
C	Danielle Reed

5 invented a term used to distinguish two factors affecting human characteristics

6 expressed the view that the study of epigenetics will increase our knowledge

7 developed a mathematical method of measuring genetic influences

8 pioneered research into genetics using twins

9 carried out research into twins who had lived apart

Questions 10–13

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

*Write the correct letter, **A–F**, in boxes 10–13 on your answer sheet.*

Epigenetic processes

In epigenetic processes, **10** ..... influence the activity of our genes, for example in creating our internal **11** ..... . The study of epigenetic processes is uncovering a way in which our genes can be affected by our **12** ..... . One example is that if a pregnant rat suffers stress, the new-born rat may later show problems in its **13** ..... .

A	nurture	**B**	organs	**C**	code
D	chemicals	**E**	environment	**F**	behaviour/behavior

TEST 29

Test 5

READING

READING PASSAGE 1

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

Cork

Cork – the thick bark of the cork oak tree (*Quercus suber)* – is a remarkable material. It is tough, elastic, buoyant, and fire-resistant, and suitable for a wide range of purposes. It has also been used for millennia: the ancient Egyptians sealed their sarcophagi (stone coffins) with cork, while the ancient Greeks and Romans used it for anything from beehives to sandals.

And the cork oak itself is an extraordinary tree. Its bark grows up to 20 cm in thickness, insulating the tree like a coat wrapped around the trunk and branches and keeping the inside at a constant 20°C all year round. Developed most probably as a defence against forest fires, the bark of the cork oak has a particular cellular structure – with about 40 million cells per cubic centimetre – that technology has never succeeded in replicating. The cells are filled with air, which is why cork is so buoyant. It also has an elasticity that means you can squash it and watch it spring back to its original size and shape when you release the pressure.

Cork oaks grow in a number of Mediterranean countries, including Portugal, Spain, Italy, Greece and Morocco. They flourish in warm, sunny climates where there is a minimum of 400 millimetres of rain per year, and not more than 800 millimetres. Like grape vines, the trees thrive in poor soil, putting down deep roots in search of moisture and nutrients. Southern Portugal's Alentejo region meets all of these requirements, which explains why, by the early 20th century, this region had become the world's largest producer of cork, and why today it accounts for roughly half of all cork production around the world.

Most cork forests are family-owned. Many of these family businesses, and indeed many of the trees themselves, are around 200 years old. Cork production is, above all, an exercise in patience. From the planting of a cork sapling to the first harvest takes 25 years, and a gap of approximately a decade must separate harvests from an individual tree. And for top-quality cork, it's necessary to wait a further 15 or 20 years. You even have to wait for the right kind of summer's day to harvest cork. If the bark is stripped on a day when it's too cold – or when the air is damp – the tree will be damaged.

Cork harvesting is a very specialised profession. No mechanical means of stripping cork bark has been invented, so the job is done by teams of highly skilled workers. First, they make vertical cuts down the bark using small sharp axes, then lever it away in pieces as large as they can manage. The most skilful cork-strippers prise away a semi-circular husk that runs the length of the trunk from just above ground level to the first branches. It is then dried on the ground for about four months, before being taken to factories, where it is boiled to kill any insects that might remain in the cork. Over 60% of cork then goes on to be made into traditional bottle stoppers, with most of the remainder being used in the construction trade. Corkboard and cork tiles are ideal for thermal and acoustic insulation, while granules of cork are used in the manufacture of concrete.

Recent years have seen the end of the virtual monopoly of cork as the material for bottle stoppers, due to concerns about the effect it may have on the contents of the bottle. This is caused by a chemical compound called 2,4,6-trichloroanisole (TCA), which forms through the interaction of plant phenols, chlorine and mould. The tiniest concentrations – as little as three or four parts to a trillion – can spoil the taste of the product contained in the bottle. The result has been a gradual yet steady move first towards plastic stoppers and, more recently, to aluminium screw caps. These substitutes are cheaper to manufacture and, in the case of screw caps, more convenient for the user.

The classic cork stopper does have several advantages, however. Firstly, its traditional image is more in keeping with that of the type of high quality goods with which it has long been associated. Secondly – and very importantly – cork is a sustainable product that can be recycled without difficulty. Moreover, cork forests are a resource which support local biodiversity, and prevent desertification in the regions where they are planted. So, given the current concerns about environmental issues, the future of this ancient material once again looks promising.

Questions 1–5

Do the following statements agree with the information given in Reading Passage 1?

In boxes 1–5 on your answer sheet, write

TRUE	*if the statement agrees with the information*
FALSE	*if the statement contradicts the information*
NOT GIVEN	*if there is no information on this*

1 The cork oak has the thickest bark of any living tree.

2 Scientists have developed a synthetic cork with the same cellular structure as natural cork.

3 Individual cork oak trees must be left for 25 years between the first and second harvest.

4 Cork bark should be stripped in dry atmospheric conditions.

5 The only way to remove the bark from cork oak trees is by hand.

Questions 6–13

Complete the notes below.

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

Write your answers in boxes 6–13 on your answer sheet.

Comparison of aluminium screw caps and cork bottle stoppers

Advantages of aluminium screw caps

- do not affect the **6** ..... of the bottle contents
- are **7** ..... to produce
- are **8** ..... to use

Advantages of cork bottle stoppers

- suit the **9** ..... of quality products
- made from a **10** ..... material
- easily **11** .....
- cork forests aid **12** .....
- cork forests stop **13** ..... happening

TEST 30

READING

READING PASSAGE 1

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

The risks agriculture faces in developing countries

*Synthesis of an online debate**

A Two things distinguish food production from all other productive activities: first, every single person needs food each day and has a right to it; and second, it is hugely dependent on nature. These two unique aspects, one political, the other natural, make food production highly vulnerable and different from any other business. At the same time, cultural values are highly entrenched in food and agricultural systems worldwide.

B Farmers everywhere face major risks, including extreme weather, long-term climate change, and price volatility in input and product markets. However, smallholder farmers in developing countries must in addition deal with adverse environments, both natural, in terms of soil quality, rainfall, etc., and human, in terms of infrastructure, financial systems, markets, knowledge and technology. Counter-intuitively, hunger is prevalent among many smallholder farmers in the developing world.

C Participants in the online debate argued that our biggest challenge is to address the underlying causes of the agricultural system's inability to ensure sufficient food for all, and they identified as drivers of this problem our dependency on fossil fuels and unsupportive government policies.

D On the question of mitigating the risks farmers face, most essayists called for greater state intervention. In his essay, Kanayo F. Nwanze, President of the International Fund for Agricultural Development, argued that governments can significantly reduce risks for farmers by providing basic services like roads to get produce more efficiently to markets, or water and food storage facilities to reduce losses. Sophia Murphy, senior advisor to the Institute for Agriculture and Trade Policy, suggested that the procurement and holding of stocks by governments can also help mitigate wild swings in food prices by alleviating uncertainties about market supply.

* The personal names in the text refer to the authors of written contributions to the online debate.

E Shenggen Fan, Director General of the International Food Policy Research Institute, held up social safety nets and public welfare programmes in Ethiopia, Brazil and Mexico as valuable ways to address poverty among farming families and reduce their vulnerability to agriculture shocks. However, some commentators responded that cash transfers to poor families do not necessarily translate into increased food security, as these programmes do not always strengthen food production or raise incomes. Regarding state subsidies for agriculture, Rokeya Kabir, Executive Director of Bangladesh Nari Progati Sangha, commented in her essay that these 'have not compensated for the stranglehold exercised by private traders. In fact, studies show that sixty percent of beneficiaries of subsidies are not poor, but rich landowners and non-farmer traders.'

F Nwanze, Murphy and Fan argued that private risk management tools, like private insurance, commodity futures markets, and rural finance can help small-scale producers mitigate risk and allow for investment in improvements. Kabir warned that financial support schemes often encourage the adoption of high-input agricultural practices, which in the medium term may raise production costs beyond the value of their harvests. Murphy noted that when futures markets become excessively financialised they can contribute to short-term price volatility, which increases farmers' food insecurity. Many participants and commentators emphasised that greater transparency in markets is needed to mitigate the impact of volatility, and make evident whether adequate stocks and supplies are available. Others contended that agribusiness companies should be held responsible for paying for negative side effects.

G Many essayists mentioned climate change and its consequences for small-scale agriculture. Fan explained that 'in addition to reducing crop yields, climate change increases the magnitude and the frequency of extreme weather events, which increase smallholder vulnerability.' The growing unpredictability of weather patterns increases farmers' difficulty in managing weather-related risks. According to this author, one solution would be to develop crop varieties that are more resilient to new climate trends and extreme weather patterns. Accordingly, Pat Mooney, co-founder and executive director of the ETC Group, suggested that 'if we are to survive climate change, we must adopt policies that let peasants diversify the plant and animal species and varieties/breeds that make up our menus.'

H Some participating authors and commentators argued in favour of community-based and autonomous risk management strategies through collective action groups, co-operatives or producers' groups. Such groups enhance market opportunities for small-scale producers, reduce marketing costs and synchronise buying and selling with seasonal price conditions. According to Murphy, 'collective action offers an important way for farmers to strengthen their political and economic bargaining power, and to reduce their business risks.' One commentator, Giel Ton, warned that collective action does not come as a free good. It takes time, effort and money to organise, build trust and to experiment. Others, like Marcel Vernooij and Marcel Beukeboom, suggested that in order to 'apply what we already know', all stakeholders, including business, government, scientists and civil society, must work together, starting at the beginning of the value chain.

I Some participants explained that market price volatility is often worsened by the presence of intermediary purchasers who, taking advantage of farmers' vulnerability, dictate prices. One commentator suggested farmers can gain greater control over prices and minimise price volatility by selling directly to consumers. Similarly, Sonali Bisht, founder and advisor to the Institute of Himalayan Environmental Research and Education (INHERE), India, wrote that community-supported agriculture, where consumers invest in local farmers by subscription and guarantee producers a fair price, is a risk-sharing model worth more attention. Direct food distribution systems not only encourage small-scale agriculture but also give consumers more control over the food they consume, she wrote.

Questions 1–3

Reading Passage 1 has nine paragraphs, **A–I**.

Which paragraph contains the following information?

*Write the correct letter, **A–I**, in boxes 1–3 on your answer sheet.*

1 a reference to characteristics that only apply to food production

2 a reference to challenges faced only by farmers in certain parts of the world

3 a reference to difficulties in bringing about co-operation between farmers

Questions 4–9

Look at the following statements (Questions 4–9) and the list of people below.

Match each statement with the correct person, ***A–G****.*

Write the correct letter, ***A–G****, in boxes 4–9 on your answer sheet.*

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

4 Financial assistance from the government does not always go to the farmers who most need it.

5 Farmers can benefit from collaborating as a group.

6 Financial assistance from the government can improve the standard of living of farmers.

7 Farmers may be helped if there is financial input by the same individuals who buy from them.

8 Governments can help to reduce variation in prices.

9 Improvements to infrastructure can have a major impact on risk for farmers.

	List of People
A	Kanayo F. Nwanze
B	Sophia Murphy
C	Shenggen Fan
D	Rokeya Kabir
E	Pat Mooney
F	Giel Ton
G	Sonali Bisht

Questions 10 and 11

*Choose **TWO** letters, **A–E**.*

Write the correct letters in boxes 10 and 11 on your answer sheet.

Which **TWO** problems are mentioned which affect farmers with small farms in developing countries?

A lack of demand for locally produced food
B lack of irrigation programmes
C being unable to get insurance
D the effects of changing weather patterns
E having to sell their goods to intermediary buyers

Questions 12 and 13

*Choose **TWO** letters, **A–E**.*

Write the correct letters in boxes 12 and 13 on your answer sheet.

Which **TWO** actions are recommended for improving conditions for farmers?

A reducing the size of food stocks
B attempting to ensure that prices rise at certain times of the year
C organising co-operation between a wide range of interested parties
D encouraging consumers to take a financial stake in farming
E making customers aware of the reasons for changing food prices

READING

READING PASSAGE 1

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

Questions 1–7

Reading Passage 1 has seven paragraphs, **A–G**.

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

*Write the correct number, **i–viii**, in boxes 1–7 on your answer sheet.*

List of Headings

i	The importance of getting the timing right
ii	Young meets old
iii	Developments to the disadvantage of tortoise populations
iv	Planning a bigger idea
v	Tortoises populate the islands
vi	Carrying out a carefully prepared operation
vii	Looking for a home for the islands' tortoises
viii	The start of the conservation project

1 Paragraph **A**

2 Paragraph **B**

3 Paragraph **C**

4 Paragraph **D**

5 Paragraph **E**

6 Paragraph **F**

7 Paragraph **G**

Flying tortoises

An airborne reintroduction programme has helped conservationists take significant steps to protect the endangered Galápagos tortoise.

A Forests of spiny cacti cover much of the uneven lava plains that separate the interior of the Galápagos island of Isabela from the Pacific Ocean. With its five distinct volcanoes, the island resembles a lunar landscape. Only the thick vegetation at the skirt of the often cloud-covered peak of Sierra Negra offers respite from the barren terrain below. This inhospitable environment is home to the giant Galápagos tortoise. Some time after the Galápagos's birth, around five million years ago, the islands were colonised by one or more tortoises from mainland South America. As these ancestral tortoises settled on the individual islands, the different populations adapted to their unique environments, giving rise to at least 14 different subspecies. Island life agreed with them. In the absence of significant predators, they grew to become the largest and longest-living tortoises on the planet, weighing more than 400 kilograms, occasionally exceeding 1.8 metres in length and living for more than a century.

B Before human arrival, the archipelago's tortoises numbered in the hundreds of thousands. From the 17th century onwards, pirates took a few on board for food, but the arrival of whaling ships in the 1790s saw this exploitation grow exponentially. Relatively immobile and capable of surviving for months without food or water, the tortoises were taken on board these ships to act as food supplies during long ocean passages. Sometimes, their bodies were processed into high-grade oil. In total, an estimated 200,000 animals were taken from the archipelago before the 20th century. This historical exploitation was then exacerbated when settlers came to the islands. They hunted the tortoises and destroyed their habitat to clear land for agriculture. They also introduced alien species – ranging from cattle, pigs, goats, rats and dogs to plants and ants – that either prey on the eggs and young tortoises or damage or destroy their habitat.

C Today, only 11 of the original subspecies survive and of these, several are highly endangered. In 1989, work began on a tortoise-breeding centre just outside the town of Puerto Villamil on Isabela, dedicated to protecting the island's tortoise populations. The centre's captive-breeding programme proved to be extremely successful, and it eventually had to deal with an overpopulation problem.

D The problem was also a pressing one. Captive-bred tortoises can't be reintroduced into the wild until they're at least five years old and weigh at least 4.5 kilograms, at which point their size and weight – and their hardened shells – are sufficient to protect them from predators. But if people wait too long after that point, the tortoises eventually become too large to transport.

E For years, repatriation efforts were carried out in small numbers, with the tortoises carried on the backs of men over weeks of long, treacherous hikes along narrow trails. But in November 2010, the environmentalist and Galápagos National Park liaison officer Godfrey Merlin, a visiting private motor yacht captain and a helicopter pilot gathered around a table in a small café in Puerto Ayora on the island of Santa Cruz to work out more ambitious reintroduction. The aim was to use a helicopter to move 300 of the breeding centre's tortoises to various locations close to Sierra Negra.

F This unprecedented effort was made possible by the owners of the 67-metre yacht White Cloud, who provided the Galápagos National Park with free use of their helicopter and its experienced pilot, as well as the logistical support of the yacht, its captain and crew. Originally an air ambulance, the yacht's helicopter has a rear double door and a large internal space that's well suited for cargo, so a custom crate was designed to hold up to 33 tortoises with a total weight of about 150 kilograms. This weight, together with that of the fuel, pilot and four crew, approached the helicopter's maximum payload, and there were times when it was clearly right on the edge of the helicopter's capabilities. During a period of three days, a group of volunteers from the breeding centre worked around the clock to prepare the young tortoises for transport. Meanwhile, park wardens, dropped off ahead of time in remote locations, cleared landing sites within the thick brush, cacti and lava rocks.

G Upon their release, the juvenile tortoises quickly spread out over their ancestral territory, investigating their new surroundings and feeding on the vegetation. Eventually, one tiny tortoise came across a fully grown giant who had been lumbering around the island for around a hundred years. The two stood side by side, a powerful symbol of the regeneration of an ancient species.

Questions 8–13

Complete the notes below.

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

Write your answers in boxes 8–13 on your answer sheet.

The decline of the Galápagos tortoise

- Originally from mainland South America
- Numbers on Galápagos islands increased, due to lack of predators
- 17th century: small numbers taken onto ships used by **8** .....
- 1790s: very large numbers taken onto whaling ships, kept for **9** ..... , and also used to produce **10** .....
- Hunted by **11** ..... on the islands
- Habitat destruction: for the establishment of agriculture and by various **12** ..... not native to the islands, which also fed on baby tortoises and tortoises' **13** .....

READING

READING PASSAGE 1

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

The History of Glass

From our earliest origins, man has been making use of glass. Historians have discovered that a type of natural glass – obsidian – formed in places such as the mouth of a volcano as a result of the intense heat of an eruption melting sand – was first used as tips for spears. Archaeologists have even found evidence of man-made glass which dates back to 4000 BC; this took the form of glazes used for coating stone beads. It was not until 1500 BC, however, that the first hollow glass container was made by covering a sand core with a layer of molten glass.

Glass blowing became the most common way to make glass containers from the first century BC. The glass made during this time was highly coloured due to the impurities of the raw material. In the first century AD, methods of creating colourless glass were developed, which was then tinted by the addition of colouring materials. The secret of glass making was taken across Europe by the Romans during this century. However, they guarded the skills and technology required to make glass very closely, and it was not until their empire collapsed in 476 AD that glass-making knowledge became widespread throughout Europe and the Middle East. From the 10th century onwards, the Venetians gained a reputation for technical skill and artistic ability in the making of glass bottles, and many of the city's craftsmen left Italy to set up glassworks throughout Europe.

A major milestone in the history of glass occurred with the invention of lead crystal glass by the English glass manufacturer George Ravenscroft (1632–1683). He attempted to counter the effect of clouding that sometimes occurred in blown glass by introducing lead to the raw materials used in the process. The new glass he created was softer and easier to decorate, and had a higher refractive index, adding to its brilliance and beauty, and it proved invaluable to the optical industry. It is thanks to Ravenscroft's invention that optical lenses, astronomical telescopes, microscopes and the like became possible.

In Britain, the modern glass industry only really started to develop after the repeal of the Excise Act in 1845. Before that time, heavy taxes had been placed on the amount of glass melted in a glasshouse, and were levied continuously from 1745 to 1845. Joseph Paxton's Crystal Palace at London's Great Exhibition of 1851 marked the beginning of glass as a material used in the building industry. This revolutionary new building encouraged the use of glass in public, domestic and horticultural architecture. Glass

manufacturing techniques also improved with the advancement of science and the development of better technology.

From 1887 onwards, glass making developed from traditional mouth-blowing to a semi-automatic process, after factory-owner HM Ashley introduced a machine capable of producing 200 bottles per hour in Castleford, Yorkshire, England – more than three times quicker than any previous production method. Then in 1907, the first fully automated machine was developed in the USA by Michael Owens – founder of the Owens Bottle Machine Company (later the major manufacturers Owens-Illinois) – and installed in its factory. Owens' invention could produce an impressive 2,500 bottles per hour. Other developments followed rapidly, but it was not until the First World War, when Britain became cut off from essential glass suppliers, that glass became part of the scientific sector. Previous to this, glass had been seen as a craft rather than a precise science.

Today, glass making is big business. It has become a modern, hi-tech industry operating in a fiercely competitive global market where quality, design and service levels are critical to maintaining market share. Modern glass plants are capable of making millions of glass containers a day in many different colours, with green, brown and clear remaining the most popular. Few of us can imagine modern life without glass. It features in almost every aspect of our lives – in our homes, our cars and whenever we sit down to eat or drink. Glass packaging is used for many products, many beverages are sold in glass, as are numerous foodstuffs, as well as medicines and cosmetics.

Glass is an ideal material for recycling, and with growing consumer concern for green issues, glass bottles and jars are becoming ever more popular. Glass recycling is good news for the environment. It saves used glass containers being sent to landfill. As less energy is needed to melt recycled glass than to melt down raw materials, this also saves fuel and production costs. Recycling also reduces the need for raw materials to be quarried, thus saving precious resources.

Questions 1–8

Complete the notes below.

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

Write your answers in boxes 1–8 on your answer sheet.

The History of Glass

- Early humans used a material called **1** ..... to make the sharp points of their **2** ..... .
- 4000 BC: **3** ..... made of stone were covered in a coating of man-made glass.
- First century BC: glass was coloured because of the **4** ..... in the material.
- Until 476 AD: Only the **5** ..... knew how to make glass.
- From 10th century: Venetians became famous for making bottles out of glass.
- 17th century: George Ravenscroft developed a process using **6** ..... to avoid the occurrence of **7** ..... in blown glass.
- Mid-19th century: British glass production developed after changes to laws concerning **8** ..... .

Questions 9–13

In boxes 9–13 on your answer sheet, write

TRUE	*if the statement agrees with the information*
FALSE	*if the statement contradicts the information*
NOT GIVEN	*if there is no information on this*

9 In 1887, HM Ashley had the fastest bottle-producing machine that existed at the time.

10 Michael Owens was hired by a large US company to design a fully-automated bottle manufacturing machine for them.

11 Nowadays, most glass is produced by large international manufacturers.

12 Concern for the environment is leading to an increased demand for glass containers.

13 It is more expensive to produce recycled glass than to manufacture new glass.

READING

READING PASSAGE 1

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

Case Study: *Tourism New Zealand* website

New Zealand is a small country of four million inhabitants, a long-haul flight from all the major tourist-generating markets of the world. Tourism currently makes up 9% of the country's gross domestic product, and is the country's largest export sector. Unlike other export sectors, which make products and then sell them overseas, tourism brings its customers to New Zealand. The product is the country itself – the people, the places and the experiences. In 1999, Tourism New Zealand launched a campaign to communicate a new brand position to the world. The campaign focused on New Zealand's scenic beauty, exhilarating outdoor activities and authentic Maori culture, and it made New Zealand one of the strongest national brands in the world.

A key feature of the campaign was the website www.newzealand.com, which provided potential visitors to New Zealand with a single gateway to everything the destination had to offer. The heart of the website was a database of tourism services operators, both those based in New Zealand and those based abroad which offered tourism services to the country. Any tourism-related business could be listed by filling in a simple form. This meant that even the smallest bed and breakfast address or specialist activity provider could gain a web presence with access to an audience of long-haul visitors. In addition, because participating businesses were able to update the details they gave on a regular basis, the information provided remained accurate. And to maintain and improve standards, Tourism New Zealand organised a scheme whereby organisations appearing on the website underwent an independent evaluation against a set of agreed national standards of quality. As part of this, the effect of each business on the environment was considered.

To communicate the New Zealand experience, the site also carried features relating to famous people and places. One of the most popular was an interview with former New Zealand All Blacks rugby captain Tana Umaga. Another feature that attracted a lot of attention was an interactive journey through a number of the locations chosen for blockbuster films which had made use of New Zealand's stunning scenery as a backdrop. As the site developed, additional features were added to help independent travellers devise their own customised itineraries. To make it easier to plan motoring holidays, the site catalogued the most popular driving routes in the country, highlighting different routes according to the season and indicating distances and times.

Later, a Travel Planner feature was added, which allowed visitors to click and 'bookmark' places or attractions they were interested in, and then view the results on a map. The Travel Planner offered suggested routes and public transport options between the chosen locations. There were also links to accommodation in the area. By registering with the website, users could save their Travel Plan and return to it later, or print it out to take on the visit. The website also had a 'Your Words' section where anyone could submit a blog of their New Zealand travels for possible inclusion on the website.

The Tourism New Zealand website won two Webby awards for online achievement and innovation. More importantly perhaps, the growth of tourism to New Zealand was impressive. Overall tourism expenditure increased by an average of 6.9% per year between 1999 and 2004. From Britain, visits to New Zealand grew at an average annual rate of 13% between 2002 and 2006, compared to a rate of 4% overall for British visits abroad.

The website was set up to allow both individuals and travel organisations to create itineraries and travel packages to suit their own needs and interests. On the website, visitors can search for activities not solely by geographical location, but also by the particular nature of the activity. This is important as research shows that activities are the key driver of visitor satisfaction, contributing 74% to visitor satisfaction, while transport and accommodation account for the remaining 26%. The more activities that visitors undertake, the more satisfied they will be. It has also been found that visitors enjoy cultural activities most when they are interactive, such as visiting a *marae* (meeting ground) to learn about traditional Maori life. Many long-haul travellers enjoy such learning experiences, which provide them with stories to take home to their friends and family. In addition, it appears that visitors to New Zealand don't want to be 'one of the crowd' and find activities that involve only a few people more special and meaningful.

It could be argued that New Zealand is not a typical destination. New Zealand is a small country with a visitor economy composed mainly of small businesses. It is generally perceived as a safe English-speaking country with a reliable transport infrastructure. Because of the long-haul flight, most visitors stay for longer (average 20 days) and want to see as much of the country as possible on what is often seen as a once-in-a-lifetime visit. However, the underlying lessons apply anywhere – the effectiveness of a strong brand, a strategy based on unique experiences and a comprehensive and user-friendly website.

Test 1

Questions 1–7

Complete the table below.

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

Write your answers in boxes 1–7 on your answer sheet.

Section of website	Comments
Database of tourism services	• easy for tourism-related businesses to get on the list • allowed businesses to **1** ..... information regularly • provided a country-wide evaluation of businesses, including their impact on the **2** .....
Special features on local topics	• e.g. an interview with a former sports **3** ....., and an interactive tour of various locations used in **4** .....
Information on driving routes	• varied depending on the **5** .....
Travel Planner	• included a map showing selected places, details of public transport and local **6** .....
'Your Words'	• travellers could send a link to their **7** .....

Questions 8–13

Do the following statements agree with the information given in Reading Passage 1?

In boxes 8–13 on your answer sheet, write

TRUE	*if the statement agrees with the information*
FALSE	*if the statement contradicts the information*
NOT GIVEN	*if there is no information on this*

8 The website www.newzealand.com aimed to provide ready-made itineraries and packages for travel companies and individual tourists.

9 It was found that most visitors started searching on the website by geographical location.

10 According to research, 26% of visitor satisfaction is related to their accommodation.

11 Visitors to New Zealand like to become involved in the local culture.

12 Visitors like staying in small hotels in New Zealand rather than in larger ones.

13 Many visitors feel it is unlikely that they will return to New Zealand after their visit.

READING

READING PASSAGE 1

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

Bringing cinnamon to Europe

Cinnamon is a sweet, fragrant spice produced from the inner bark of trees of the genus Cinnamomum, which is native to the Indian sub-continent. It was known in biblical times, and is mentioned in several books of the Bible, both as an ingredient that was mixed with oils for anointing people's bodies, and also as a token indicating friendship among lovers and friends. In ancient Rome, mourners attending funerals burnt cinnamon to create a pleasant scent. Most often, however, the spice found its primary use as an additive to food and drink. In the Middle Ages, Europeans who could afford the spice used it to flavour food, particularly meat, and to impress those around them with their ability to purchase an expensive condiment from the 'exotic' East. At a banquet, a host would offer guests a plate with various spices piled upon it as a sign of the wealth at his or her disposal. Cinnamon was also reported to have health benefits, and was thought to cure various ailments, such as indigestion.

Toward the end of the Middle Ages, the European middle classes began to desire the lifestyle of the elite, including their consumption of spices. This led to a growth in demand for cinnamon and other spices. At that time, cinnamon was transported by Arab merchants, who closely guarded the secret of the source of the spice from potential rivals. They took it from India, where it was grown, on camels via an overland route to the Mediterranean. Their journey ended when they reached Alexandria. European traders sailed there to purchase their supply of cinnamon, then brought it back to Venice. The spice then travelled from that great trading city to markets all around Europe. Because the overland trade route allowed for only small quantities of the spice to reach Europe, and because Venice had a virtual monopoly of the trade, the Venetians could set the price of cinnamon exorbitantly high. These prices, coupled with the increasing demand, spurred the search for new routes to Asia by Europeans eager to take part in the spice trade.

Seeking the high profits promised by the cinnamon market, Portuguese traders arrived on the island of Ceylon in the Indian Ocean toward the end of the 15th century. Before Europeans arrived on the island, the state had organized the cultivation of cinnamon. People belonging to the ethnic group called the Salagama would peel the bark off young shoots of the cinnamon plant in the rainy season, when the wet bark was more pliable. During the peeling process, they curled the bark into the 'stick' shape still associated with the spice today. The Salagama then gave the finished product to the king as a form of tribute. When the Portuguese arrived, they needed to increase

production significantly, and so enslaved many other members of the Ceylonese native population, forcing them to work in cinnamon harvesting. In 1518, the Portuguese built a fort on Ceylon, which enabled them to protect the island, so helping them to develop a monopoly in the cinnamon trade and generate very high profits. In the late 16th century, for example, they enjoyed a tenfold profit when shipping cinnamon over a journey of eight days from Ceylon to India.

When the Dutch arrived off the coast of southern Asia at the very beginning of the 17th century, they set their sights on displacing the Portuguese as kings of cinnamon. The Dutch allied themselves with Kandy, an inland kingdom on Ceylon. In return for payments of elephants and cinnamon, they protected the native king from the Portuguese. By 1640, the Dutch broke the 150-year Portuguese monopoly when they overran and occupied their factories. By 1658, they had permanently expelled the Portuguese from the island, thereby gaining control of the lucrative cinnamon trade.

In order to protect their hold on the market, the Dutch, like the Portuguese before them, treated the native inhabitants harshly. Because of the need to boost production and satisfy Europe's ever-increasing appetite for cinnamon, the Dutch began to alter the harvesting practices of the Ceylonese. Over time, the supply of cinnamon trees on the island became nearly exhausted, due to systematic stripping of the bark. Eventually, the Dutch began cultivating their own cinnamon trees to supplement the diminishing number of wild trees available for use.

Then, in 1796, the English arrived on Ceylon, thereby displacing the Dutch from their control of the cinnamon monopoly. By the middle of the 19th century, production of cinnamon reached 1,000 tons a year, after a lower grade quality of the spice became acceptable to European tastes. By that time, cinnamon was being grown in other parts of the Indian Ocean region and in the West Indies, Brazil, and Guyana. Not only was a monopoly of cinnamon becoming impossible, but the spice trade overall was diminishing in economic potential, and was eventually superseded by the rise of trade in coffee, tea, chocolate, and sugar.

Test 2

Questions 1–9

Complete the notes below.

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

Write your answers in boxes 1–9 on your answer sheet.

The Early History of Cinnamon

Biblical times: added to **1** .....

used to show **2** ..... between people

Ancient Rome: used for its sweet smell at **3** .....

Middle Ages: added to food, especially meat

was an indication of a person's **4** .....

known as a treatment for **5** ..... and other health problems

grown in **6** .....

merchants used **7** ..... to bring it to the Mediterranean

arrived in the Mediterranean at **8** .....

traders took it to **9** ..... and sold it to destinations around Europe

Questions 10–13

Do the following statements agree with the information given in Reading Passage 1?

In boxes 10–13 on your answer sheet, write

TRUE	*if the statement agrees with the information*
FALSE	*if the statement contradicts the information*
NOT GIVEN	*if there is no information on this*

10 The Portuguese had control over the cinnamon trade in Ceylon throughout the 16th century.

11 The Dutch took over the cinnamon trade from the Portuguese as soon as they arrived in Ceylon.

12 The trees planted by the Dutch produced larger quantities of cinnamon than the wild trees.

13 The spice trade maintained its economic importance during the 19th century.

TEST 35

READING

READING PASSAGE 1

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

The coconut palm

For millennia, the coconut has been central to the lives of Polynesian and Asian peoples. In the western world, on the other hand, coconuts have always been exotic and unusual, sometimes rare. The Italian merchant traveller Marco Polo apparently saw coconuts in South Asia in the late 13th century, and among the mid-14th-century travel writings of Sir John Mandeville there is mention of 'great Notes of Ynde' (great Nuts of India). Today, images of palm-fringed tropical beaches are clichés in the west to sell holidays, chocolate bars, fizzy drinks and even romance.

Typically, we envisage coconuts as brown cannonballs that, when opened, provide sweet white flesh. But we see only part of the fruit and none of the plant from which they come. The coconut palm has a smooth, slender, grey trunk, up to 30 metres tall. This is an important source of timber for building houses, and is increasingly being used as a replacement for endangered hardwoods in the furniture construction industry. The trunk is surmounted by a rosette of leaves, each of which may be up to six metres long. The leaves have hard veins in their centres which, in many parts of the world, are used as brushes after the green part of the leaf has been stripped away. Immature coconut flowers are tightly clustered together among the leaves at the top of the trunk. The flower stems may be tapped for their sap to produce a drink, and the sap can also be reduced by boiling to produce a type of sugar used for cooking.

Coconut palms produce as many as seventy fruits per year, weighing more than a kilogram each. The wall of the fruit has three layers: a waterproof outer layer, a fibrous middle layer and a hard, inner layer. The thick fibrous middle layer produces coconut fibre, 'coir', which has numerous uses and is particularly important in manufacturing ropes. The woody innermost layer, the shell, with its three prominent 'eyes', surrounds the seed. An important product obtained from the shell is charcoal, which is widely used in various industries as well as in the home as a cooking fuel. When broken in half, the shells are also used as bowls in many parts of Asia.

Inside the shell are the nutrients (endosperm) needed by the developing seed. Initially, the endosperm is a sweetish liquid, coconut water, which is enjoyed as a drink, but also provides the hormones which encourage other plants to grow more rapidly and produce higher yields. As the fruit matures, the coconut water gradually solidifies to form the brilliant white, fat-rich, edible flesh or meat. Dried coconut flesh, 'copra', is made into coconut oil and coconut milk, which are widely used in cooking in different parts of the world, as well as in cosmetics. A derivative of coconut fat, glycerine, acquired strategic

importance in a quite different sphere, as Alfred Nobel introduced the world to his nitroglycerine-based invention: dynamite.

Their biology would appear to make coconuts the great maritime voyagers and coastal colonizers of the plant world. The large, energy-rich fruits are able to float in water and tolerate salt, but cannot remain viable indefinitely; studies suggest after about 110 days at sea they are no longer able to germinate. Literally cast onto desert island shores, with little more than sand to grow in and exposed to the full glare of the tropical sun, coconut seeds are able to germinate and root. The air pocket in the seed, created as the endosperm solidifies, protects the embryo. In addition, the fibrous fruit wall that helped it to float during the voyage stores moisture that can be taken up by the roots of the coconut seedling as it starts to grow.

There have been centuries of academic debate over the origins of the coconut. There were no coconut palms in West Africa, the Caribbean or the east coast of the Americas before the voyages of the European explorers Vasco da Gama and Columbus in the late 15th and early 16th centuries. 16th century trade and human migration patterns reveal that Arab traders and European sailors are likely to have moved coconuts from South and Southeast Asia to Africa and then across the Atlantic to the east coast of America. But the origin of coconuts discovered along the west coast of America by 16th century sailors has been the subject of centuries of discussion. Two diametrically opposed origins have been proposed: that they came from Asia, or that they were native to America. Both suggestions have problems. In Asia, there is a large degree of coconut diversity and evidence of millennia of human use – but there are no relatives growing in the wild. In America, there are close coconut relatives, but no evidence that coconuts are indigenous. These problems have led to the intriguing suggestion that coconuts originated on coral islands in the Pacific and were dispersed from there.

Test 3

Questions 1–8

Complete the table below.

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

Write your answers in boxes 1–8 on your answer sheet.

THE COCONUT PALM		
Part	**Description**	**Uses**
trunk	up to 30 metres	timber for houses and the making of **1** .....
leaves	up to 6 metres long	to make brushes
flowers	at the top of the trunk	stems provide sap, used as a drink or a source of **2** .....
fruits	outer layer	
	middle layer (coir fibres)	used for **3** ..... , etc.
	inner layer (shell)	a source of **4** ..... (when halved) for **5** .....
	coconut water	a drink a source of **6** ..... for other plants
	coconut flesh	oil and milk for cooking and **7** ..... glycerine (an ingredient in **8** .....)

Questions 9–13

Do the following statements agree with the information given in Reading Passage 1?

In boxes 9–13 on your answer sheet, write

TRUE	*if the statement agrees with the information*
FALSE	*if the statement contradicts the information*
NOT GIVEN	*if there is no information on this*

9 Coconut seeds need shade in order to germinate.

10 Coconuts were probably transported to Asia from America in the 16th century.

11 Coconuts found on the west coast of America were a different type from those found on the east coast.

12 All the coconuts found in Asia are cultivated varieties.

13 Coconuts are cultivated in different ways in America and the Pacific.

TEST 36

Test 4

READING

READING PASSAGE 1

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

Cutty Sark: the fastest sailing ship of all time

The nineteenth century was a period of great technological development in Britain, and for shipping the major changes were from wind to steam power, and from wood to iron and steel.

The fastest commercial sailing vessels of all time were clippers, three-masted ships built to transport goods around the world, although some also took passengers. From the 1840s until 1869, when the Suez Canal opened and steam propulsion was replacing sail, clippers dominated world trade. Although many were built, only one has survived more or less intact: *Cutty Sark*, now on display in Greenwich, southeast London.

Cutty Sark's unusual name comes from the poem *Tam O'Shanter* by the Scottish poet Robert Burns. Tam, a farmer, is chased by a witch called Nannie, who is wearing a '*cutty sark*' – an old Scottish name for a short nightdress. The witch is depicted in *Cutty Sark*'s figurehead – the carving of a woman typically at the front of old sailing ships. In legend, and in Burns's poem, witches cannot cross water, so this was a rather strange choice of name for a ship.

Cutty Sark was built in Dumbarton, Scotland, in 1869, for a shipping company owned by John Willis. To carry out construction, Willis chose a new shipbuilding firm, Scott & Linton, and ensured that the contract with them put him in a very strong position. In the end, the firm was forced out of business, and the ship was finished by a competitor.

Willis's company was active in the tea trade between China and Britain, where speed could bring shipowners both profits and prestige, so *Cutty Sark* was designed to make the journey more quickly than any other ship. On her maiden voyage, in 1870, she set sail from London, carrying large amounts of goods to China. She returned laden with tea, making the journey back to London in four months. However, *Cutty Sark* never lived up to the high expectations of her owner, as a result of bad winds and various misfortunes. On one occasion, in 1872, the ship and a rival clipper, *Thermopylae*, left port in China on the same day. Crossing the Indian Ocean, *Cutty Sark* gained a lead of over 400 miles, but then her rudder was severely damaged in stormy seas, making her impossible to steer. The ship's crew had the daunting task of repairing the rudder at sea, and only succeeded at the second attempt. *Cutty Sark* reached London a week after *Thermopylae*.

Steam ships posed a growing threat to clippers, as their speed and cargo capacity increased. In addition, the opening of the Suez Canal in 1869, the same year that *Cutty Sark* was launched, had a serious impact. While steam ships could make use of the quick, direct route between the Mediterranean and the Red Sea, the canal was of no use to sailing ships, which needed the much stronger winds of the oceans, and so had to sail a far greater distance. Steam ships reduced the journey time between Britain and China by approximately two months.

By 1878, tea traders weren't interested in *Cutty Sark*, and instead, she took on the much less prestigious work of carrying any cargo between any two ports in the world. In 1880, violence aboard the ship led ultimately to the replacement of the captain with an incompetent drunkard who stole the crew's wages. He was suspended from service, and a new captain appointed. This marked a turnaround and the beginning of the most successful period in *Cutty Sark*'s working life, transporting wool from Australia to Britain. One such journey took just under 12 weeks, beating every other ship sailing that year by around a month.

The ship's next captain, Richard Woodget, was an excellent navigator, who got the best out of both his ship and his crew. As a sailing ship, *Cutty Sark* depended on the strong trade winds of the southern hemisphere, and Woodget took her further south than any previous captain, bringing her dangerously close to icebergs off the southern tip of South America. His gamble paid off, though, and the ship was the fastest vessel in the wool trade for ten years.

As competition from steam ships increased in the 1890s, and *Cutty Sark* approached the end of her life expectancy, she became less profitable. She was sold to a Portuguese firm, which renamed her *Ferreira*. For the next 25 years, she again carried miscellaneous cargoes around the world.

Badly damaged in a gale in 1922, she was put into Falmouth harbour in southwest England, for repairs. Wilfred Dowman, a retired sea captain who owned a training vessel, recognised her and tried to buy her, but without success. She returned to Portugal and was sold to another Portuguese company. Dowman was determined, however, and offered a high price: this was accepted, and the ship returned to Falmouth the following year and had her original name restored.

Dowman used *Cutty Sark* as a training ship, and she continued in this role after his death. When she was no longer required, in 1954, she was transferred to dry dock at Greenwich to go on public display. The ship suffered from fire in 2007, and again, less seriously, in 2014, but now *Cutty Sark* attracts a quarter of a million visitors a year.

Test 4

Questions 1–8

Do the following statements agree with the information given in Reading Passage 1?

In boxes 1–8 on your answer sheet, write

TRUE	*if the statement agrees with the information*
FALSE	*if the statement contradicts the information*
NOT GIVEN	*if there is no information on this*

1 Clippers were originally intended to be used as passenger ships.

2 *Cutty Sark* was given the name of a character in a poem.

3 The contract between John Willis and Scott & Linton favoured Willis.

4 John Willis wanted *Cutty Sark* to be the fastest tea clipper travelling between the UK and China.

5 Despite storm damage, *Cutty Sark* beat *Thermopylae* back to London.

6 The opening of the Suez Canal meant that steam ships could travel between Britain and China faster than clippers.

7 Steam ships sometimes used the ocean route to travel between London and China.

8 Captain Woodget put *Cutty Sark* at risk of hitting an iceberg.

Questions 9–13

Complete the sentences below.

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

Write your answers in boxes 9–13 on your answer sheet.

9 After 1880, *Cutty Sark* carried ..... as its main cargo during its most successful time.

10 As a captain and ..... , Woodget was very skilled.

11 *Ferreira* went to Falmouth to repair damage that a ..... had caused.

12 Between 1923 and 1954, *Cutty Sark* was used for .....

13 *Cutty Sark* has twice been damaged by ..... in the 21st century.

TEST 37

READING PASSAGE 1

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

THE IMPORTANCE OF CHILDREN'S PLAY

Brick by brick, six-year-old Alice is building a magical kingdom. Imagining fairy-tale turrets and fire-breathing dragons, wicked witches and gallant heroes, she's creating an enchanting world. Although she isn't aware of it, this fantasy is helping her take her first steps towards her capacity for creativity and so it will have important repercussions in her adult life.

Minutes later, Alice has abandoned the kingdom in favour of playing schools with her younger brother. When she bosses him around as his 'teacher', she's practising how to regulate her emotions through pretence. Later on, when they tire of this and settle down with a board game, she's learning about the need to follow rules and take turns with a partner.

'Play in all its rich variety is one of the highest achievements of the human species,' says Dr David Whitebread from the Faculty of Education at the University of Cambridge, UK. 'It underpins how we develop as intellectual, problem-solving adults and is crucial to our success as a highly adaptable species.'

Recognising the importance of play is not new: over two millennia ago, the Greek philosopher Plato extolled its virtues as a means of developing skills for adult life, and ideas about play-based learning have been developing since the 19th century.

But we live in changing times, and Whitebread is mindful of a worldwide decline in play, pointing out that over half the people in the world now live in cities. 'The opportunities for free play, which I experienced almost every day of my childhood, are becoming increasingly scarce,' he says. Outdoor play is curtailed by perceptions of risk to do with traffic, as well as parents' increased wish to protect their children from being the victims of crime, and by the emphasis on 'earlier is better' which is leading to greater competition in academic learning and schools.

International bodies like the United Nations and the European Union have begun to develop policies concerned with children's right to play, and to consider implications for leisure facilities and educational programmes. But what they often lack is the evidence to base policies on.

'The type of play we are interested in is child-initiated, spontaneous and unpredictable – but, as soon as you ask a five-year-old "to play", then you as the researcher have intervened,' explains Dr Sara Baker. 'And we want to know what the long-term impact of play is. It's a real challenge.'

Dr Jenny Gibson agrees, pointing out that although some of the steps in the puzzle of how and why play is important have been looked at, there is very little data on the impact it has on the child's later life.

Now, thanks to the university's new Centre for Research on Play in Education, Development and Learning (PEDAL), Whitebread, Baker, Gibson and a team of researchers hope to provide evidence on the role played by play in how a child develops.

'A strong possibility is that play supports the early development of children's self-control,' explains Baker. 'This is our ability to develop awareness of our own thinking processes – it influences how effectively we go about undertaking challenging activities.'

In a study carried out by Baker with toddlers and young pre-schoolers, she found that children with greater self-control solved problems more quickly when exploring an unfamiliar set-up requiring scientific reasoning. 'This sort of evidence makes us think that giving children the chance to play will make them more successful problem-solvers in the long run.'

If playful experiences do facilitate this aspect of development, say the researchers, it could be extremely significant for educational practices, because the ability to self-regulate has been shown to be a key predictor of academic performance.

Gibson adds: 'Playful behaviour is also an important indicator of healthy social and emotional development. In my previous research, I investigated how observing children at play can give us important clues about their well-being and can even be useful in the diagnosis of neurodevelopmental disorders like autism.'

Whitebread's recent research has involved developing a play-based approach to supporting children's writing. 'Many primary school children find writing difficult, but we showed in a previous study that a playful stimulus was far more effective than an instructional one.' Children wrote longer and better-structured stories when they first played with dolls representing characters in the story. In the latest study, children first created their story with Lego*, with similar results. 'Many teachers commented that they had always previously had children saying they didn't know what to write about. With the Lego building, however, not a single child said this through the whole year of the project.'

Whitebread, who directs PEDAL, trained as a primary school teacher in the early 1970s, when, as he describes, 'the teaching of young children was largely a quiet backwater, untroubled by any serious intellectual debate or controversy.' Now, the landscape is very different, with hotly debated topics such as school starting age.

'Somehow the importance of play has been lost in recent decades. It's regarded as something trivial, or even as something negative that contrasts with "work". Let's not lose sight of its benefits, and the fundamental contributions it makes to human achievements in the arts, sciences and technology. Let's make sure children have a rich diet of play experiences.'

* Lego: coloured plastic building blocks and other pieces that can be joined together

Questions 1–8

Complete the notes below.

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

Write your answers in boxes 1–8 on your answer sheet.

Children's play

Uses of children's play

- building a 'magical kingdom' may help develop **1** .....
- board games involve **2** ..... and turn-taking

Recent changes affecting children's play

- populations of **3** ..... have grown
- opportunities for free play are limited due to
  - fear of **4** .....
  - fear of **5** .....
  - increased **6** ..... in schools

International policies on children's play

- it is difficult to find **7** ..... to support new policies
- research needs to study the impact of play on the rest of the child's **8** .....

Questions 9–13

Do the following statements agree with the information given in Reading Passage 1?

In boxes 9–13 on your answer sheet, write

TRUE	*if the statement agrees with the information*
FALSE	*if the statement contradicts the information*
NOT GIVEN	*if there is no information on this*

9 Children with good self-control are known to be likely to do well at school later on.

10 The way a child plays may provide information about possible medical problems.

11 Playing with dolls was found to benefit girls' writing more than boys' writing.

12 Children had problems thinking up ideas when they first created the story with Lego.

13 People nowadays regard children's play as less significant than they did in the past.

READING

READING PASSAGE 1

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

Alexander Henderson (1831–1913)

Born in Scotland, Henderson emigrated to Canada in 1855 and became a well-known landscape photographer

Alexander Henderson was born in Scotland in 1831 and was the son of a successful merchant. His grandfather, also called Alexander, had founded the family business, and later became the first chairman of the National Bank of Scotland. The family had extensive landholdings in Scotland. Besides its residence in Edinburgh, it owned Press Estate, 650 acres of farmland about 35 miles southeast of the city. The family often stayed at Press Castle, the large mansion on the northern edge of the property, and Alexander spent much of his childhood in the area, playing on the beach near Eyemouth or fishing in the streams nearby.

Even after he went to school at Murcheston Academy on the outskirts of Edinburgh, Henderson returned to Press at weekends. In 1849 he began a three-year apprenticeship to become an accountant. Although he never liked the prospect of a business career, he stayed with it to please his family. In October 1855, however, he emigrated to Canada with his wife Agnes Elder Robertson and they settled in Montreal.

Henderson learned photography in Montreal around the year 1857 and quickly took it up as a serious amateur. He became a personal friend and colleague of the Scottish–Canadian photographer William Notman. The two men made a photographic excursion to Niagara Falls in 1860 and they cooperated on experiments with magnesium flares as a source of artificial light in 1865. They belonged to the same societies and were among the founding members of the Art Association of Montreal. Henderson acted as chairman of the association's first meeting, which was held in Notman's studio on 11 January 1860.

In spite of their friendship, their styles of photography were quite different. While Notman's landscapes were noted for their bold realism, Henderson for the first 20 years of his career produced romantic images, showing the strong influence of the British landscape tradition. His artistic and technical progress was rapid and in 1865 he published his first major collection of landscape photographs. The publication had limited circulation (only seven copies have ever been found), and was called *Canadian Views and Studies*. The contents of each copy vary significantly and have proved a useful source for evaluating Henderson's early work.

In 1866, he gave up his business to open a photographic studio, advertising himself as a portrait and landscape photographer. From about 1870 he dropped portraiture to specialize in landscape photography and other views. His numerous photographs of city life revealed in street scenes, houses, and markets are alive with human activity, and although his favourite subject was landscape he usually composed his scenes around such human pursuits as farming the land, cutting ice on a river, or sailing down a woodland stream. There was sufficient demand for these types of scenes and others he took depicting the lumber trade, steamboats and waterfalls to enable him to make a living. There was little competing hobby or amateur photography before the late 1880s because of the time-consuming techniques involved and the weight of the equipment. People wanted to buy photographs as souvenirs of a trip or as gifts, and catering to this market, Henderson had stock photographs on display at his studio for mounting, framing, or inclusion in albums.

Henderson frequently exhibited his photographs in Montreal and abroad, in London, Edinburgh, Dublin, Paris, New York, and Philadelphia. He met with greater success in 1877 and 1878 in New York when he won first prizes in the exhibition held by E and H T Anthony and Company for landscapes using the Lambertype process. In 1878 his work won second prize at the world exhibition in Paris.

In the 1870s and 1880s Henderson travelled widely throughout Quebec and Ontario, in Canada, documenting the major cities of the two provinces and many of the villages in Quebec. He was especially fond of the wilderness and often travelled by canoe on the Blanche, du Lièvre, and other noted eastern rivers. He went on several occasions to the Maritimes and in 1872 he sailed by yacht along the lower north shore of the St Lawrence River. That same year, while in the lower St Lawrence River region, he took some photographs of the construction of the Intercolonial Railway. This undertaking led in 1875 to a commission from the railway to record the principal structures along the almost-completed line connecting Montreal to Halifax. Commissions from other railways followed. In 1876 he photographed bridges on the Quebec, Montreal, Ottawa and Occidental Railway between Montreal and Ottawa. In 1885 he went west along the Canadian Pacific Railway (CPR) as far as Rogers Pass in British Columbia, where he took photographs of the mountains and the progress of construction.

In 1892 Henderson accepted a full-time position with the CPR as manager of a photographic department which he was to set up and administer. His duties included spending four months in the field each year. That summer he made his second trip west, photographing extensively along the railway line as far as Victoria. He continued in this post until 1897, when he retired completely from photography.

When Henderson died in 1913, his huge collection of glass negatives was stored in the basement of his house. Today collections of his work are held at the National Archives of Canada, Ottawa, and the McCord Museum of Canadian History, Montreal.

Questions 1–8

Do the following statements agree with the information given in Reading Passage 1?

In boxes 1–8 on your answer sheet, write

TRUE	*if the statement agrees with the information*
FALSE	*if the statement contradicts the information*
NOT GIVEN	*if there is no information on this*

1 Henderson rarely visited the area around Press estate when he was younger.

2 Henderson pursued a business career because it was what his family wanted.

3 Henderson and Notman were surprised by the results of their 1865 experiment.

4 There were many similarities between Henderson's early landscapes and those of Notman.

5 The studio that Henderson opened in 1866 was close to his home.

6 Henderson gave up portraiture so that he could focus on taking photographs of scenery.

7 When Henderson began work for the Intercolonial Railway, the Montreal to Halifax line had been finished.

8 Henderson's last work as a photographer was with the Canadian Pacific Railway.

Questions 9–13

Complete the notes below.

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

Write your answers in boxes 9–13 on your answer sheet.

Alexander Henderson

Early life

- was born in Scotland in 1831 –father was a **9** ..... .
- trained as an accountant, emigrated to Canada in 1855

Start of a photographic career

- opened up a photographic studio in 1866
- took photos of city life, but preferred landscape photography
- people bought Henderson's photos because photography took up considerable time and the **10** ..... was heavy
- the photographs Henderson sold were **11** ..... or souvenirs

Travelling as a professional photographer

- travelled widely in Quebec and Ontario in 1870s and 1880s
- took many trips along eastern rivers in a **12** ..... .
- worked for Canadian railways between 1875 and 1897
- worked for CPR in 1885 and photographed the **13** ..... . and the railway at Rogers Pass

TEST 39

READING PASSAGE 1

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

The concept of intelligence

A Looked at in one way, everyone knows what intelligence is; looked at in another way, no one does. In other words, people all have unconscious notions – known as 'implicit theories' – of intelligence, but no one knows for certain what it actually is. This chapter addresses how people conceptualize intelligence, whatever it may actually be.

But why should we even care what people think intelligence is, as opposed only to valuing whatever it actually is? There are at least four reasons people's conceptions of intelligence matter.

B First, implicit theories of intelligence drive the way in which people perceive and evaluate their own intelligence and that of others. To better understand the judgments people make about their own and others' abilities, it is useful to learn about people's implicit theories. For example, parents' implicit theories of their children's language development will determine at what ages they will be willing to make various corrections in their children's speech. More generally, parents' implicit theories of intelligence will determine at what ages they believe their children are ready to perform various cognitive tasks. Job interviewers will make hiring decisions on the basis of their implicit theories of intelligence. People will decide who to be friends with on the basis of such theories. In sum, knowledge about implicit theories of intelligence is important because this knowledge is so often used by people to make judgments in the course of their everyday lives.

C Second, the implicit theories of scientific investigators ultimately give rise to their explicit theories. Thus it is useful to find out what these implicit theories are. Implicit theories provide a framework that is useful in defining the general scope of a phenomenon – especially a not-well-understood phenomenon. These implicit theories can suggest what aspects of the phenomenon have been more or less attended to in previous investigations.

D Third, implicit theories can be useful when an investigator suspects that existing explicit theories are wrong or misleading. If an investigation of implicit theories reveals little correspondence between the extant implicit and explicit theories, the implicit theories may be wrong. But the possibility also needs to be taken into account that the explicit theories are wrong and in need of correction or supplementation. For example, some implicit theories of intelligence suggest the need for expansion of some of our explicit theories of the construct.

E Finally, understanding implicit theories of intelligence can help elucidate developmental and cross-cultural differences. As mentioned earlier, people have expectations for intellectual performances that differ for children of different ages. How these expectations differ is in part a function of culture. For example, expectations for children who participate in Western-style schooling are almost certain to be different from those for children who do not participate in such schooling.

F I have suggested that there are three major implicit theories of how intelligence relates to society as a whole (Sternberg, 1997). These might be called Hamiltonian, Jeffersonian, and Jacksonian. These views are not based strictly, but rather, loosely, on the philosophies of Alexander Hamilton, Thomas Jefferson, and Andrew Jackson, three great statesmen in the history of the United States.

G The Hamiltonian view, which is similar to the Platonic view, is that people are born with different levels of intelligence and that those who are less intelligent need the good offices of the more intelligent to keep them in line, whether they are called government officials or, in Plato's term, philosopher-kings. Herrnstein and Murray (1994) seem to have shared this belief when they wrote about the emergence of a cognitive (high-IQ) elite, which eventually would have to take responsibility for the largely irresponsible masses of non-elite (low-IQ) people who cannot take care of themselves. Left to themselves, the unintelligent would create, as they always have created, a kind of chaos.

H The Jeffersonian view is that people should have equal opportunities, but they do not necessarily avail themselves equally of these opportunities and are not necessarily equally rewarded for their accomplishments. People are rewarded for what they accomplish, if given equal opportunity. Low achievers are not rewarded to the same extent as high achievers. In the Jeffersonian view, the goal of education is not to favor or foster an elite, as in the Hamiltonian tradition, but rather to allow children the opportunities to make full use of the skills they have. My own views are similar to these (Sternberg, 1997).

The Jacksonian view is that all people are equal, not only as human beings but in terms of their competencies – that one person would serve as well as another in government or on a jury or in almost any position of responsibility. In this view of democracy, people are essentially intersubstitutable except for specialized skills, all of which can be learned. In this view, we do not need or want any institutions that might lead to favoring one group over another.

J Implicit theories of intelligence and of the relationship of intelligence to society perhaps need to be considered more carefully than they have been because they often serve as underlying presuppositions for explicit theories and even experimental designs that are then taken as scientific contributions. Until scholars are able to discuss their implicit theories and thus their assumptions, they are likely to miss the point of what others are saying when discussing their explicit theories and their data.

Questions 1–3

Reading Passage 1 has ten sections, **A–J**.

Which section contains the following information?

*Write the correct letter, **A–J**, in boxes 1–3 on your answer sheet.*

1 information about how non-scientists' assumptions about intelligence influence their behaviour towards others

2 a reference to lack of clarity over the definition of intelligence

3 the point that a researcher's implicit and explicit theories may be very different

Questions 4–6

Do the following statements agree with the claims of the writer in Reading Passage 1?

In boxes 4–6 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*

4 Slow language development in children is likely to prove disappointing to their parents.

5 People's expectations of what children should gain from education are universal.

6 Scholars may discuss theories without fully understanding each other.

Questions 7–13

Look at the following statements (Questions 7–13) and the list of theories below.

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

Write the correct letter, ***A****,* ***B****, or* ***C****, in boxes 7–13 on your answer sheet.*

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

7 It is desirable for the same possibilities to be open to everyone.

8 No section of society should have preferential treatment at the expense of another.

9 People should only gain benefits on the basis of what they actually achieve.

10 Variation in intelligence begins at birth.

11 The more intelligent people should be in positions of power.

12 Everyone can develop the same abilities.

13 People of low intelligence are likely to lead uncontrolled lives.

List of Theories

A Hamiltonian

B Jeffersonian

C Jacksonian

READING

TEST 40

READING PASSAGE 1

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

The secret of staying young

Pheidole dentata, a native ant of the south-eastern U.S., isn't immortal. But scientists have found that it doesn't seem to show any signs of aging. Old worker ants can do everything just as well as the youngsters, and their brains appear just as sharp. 'We get a picture that these ants really don't decline,' says Ysabel Giraldo, who studied the ants for her doctoral thesis at Boston University.

Such age-defying feats are rare in the animal kingdom. Naked mole rats can live for almost 30 years and stay fit for nearly their entire lives. They can still reproduce even when old, and they never get cancer. But the vast majority of animals deteriorate with age just like people do. Like the naked mole rat, ants are social creatures that usually live in highly organised colonies. 'It's this social complexity that makes *P. dentata* useful for studying aging in people,' says Giraldo, now at the California Institute of Technology. Humans are also highly social, a trait that has been connected to healthier aging. By contrast, most animal studies of aging use mice, worms or fruit flies, which all lead much more isolated lives.

In the lab, *P. dentata* worker ants typically live for around 140 days. Giraldo focused on ants at four age ranges: 20 to 22 days, 45 to 47 days, 95 to 97 days and 120 to 122 days. Unlike all previous studies, which only estimated how old the ants were, her work tracked the ants from the time the pupae became adults, so she knew their exact ages. Then she put them through a range of tests.

Giraldo watched how well the ants took care of the young of the colony, recording how often each ant attended to, carried and fed them. She compared how well 20-day-old and 95-day-old ants followed the telltale scent that the insects usually leave to mark a trail to food. She tested how ants responded to light and also measured how active they were by counting how often ants in a small dish walked across a line. And she experimented with how ants react to live prey: a tethered fruit fly. Giraldo expected the older ants to perform poorly in all these tasks. But the elderly insects were all good caretakers and trail-followers—the 95-day-old ants could track the scent even longer than their younger counterparts. They all responded to light well, and the older ants were more active. And when it came to reacting to prey, the older ants attacked the poor fruit fly just as aggressively as the young ones did, flaring their mandibles or pulling at the fly's legs.

Then Giraldo compared the brains of 20-day-old and 95-day-old ants, identifying any cells that were close to death. She saw no major differences with age, nor was there any difference in the location of the dying cells, showing that age didn't seem to affect specific brain functions. Ants and other insects have structures in their brains called mushroom bodies, which are important for

processing information, learning and memory. She also wanted to see if aging affects the density of synaptic complexes within these structures—regions where neurons come together. Again, the answer was no. What was more, the old ants didn't experience any drop in the levels of either serotonin or dopamine—brain chemicals whose decline often coincides with aging. In humans, for example, a decrease in serotonin has been linked to Alzheimer's disease.

'This is the first time anyone has looked at both behavioral and neural changes in these ants so thoroughly,' says Giraldo, who recently published the findings in the *Proceedings of the Royal Society B*. Scientists have looked at some similar aspects in bees, but the results of recent bee studies were mixed—some studies showed age-related declines, which biologists call senescence, and others didn't. 'For now, the study raises more questions than it answers,' Giraldo says, 'including how *P. dentata* stays in such good shape.'

Also, if the ants don't deteriorate with age, why do they die at all? Out in the wild, the ants probably don't live for a full 140 days thanks to predators, disease and just being in an environment that's much harsher than the comforts of the lab. 'The lucky ants that do live into old age may suffer a steep decline just before dying,' Giraldo says, but she can't say for sure because her study wasn't designed to follow an ant's final moments.

'It will be important to extend these findings to other species of social insects,' says Gene E. Robinson, an entomologist at the University of Illinois at Urbana-Champaign. This ant might be unique, or it might represent a broader pattern among other social bugs with possible clues to the science of aging in larger animals. Either way, it seems that for these ants, age really doesn't matter.

Questions 1–8

Complete the notes below.

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

Write your answer in boxes 1–8 on your answer sheet.

Ysabel Giraldo's research

Focused on a total of **1** ..... different age groups of ants, analysing

Behaviour:

- how well ants looked after their **2** .....
- their ability to locate **3** ..... using a scent trail
- the effect that **4** ..... had on them
- how **5** ..... they attacked prey

Brains:

- comparison between age and the **6** ..... of dying cells in the brains of ants
- condition of synaptic complexes (areas in which **7** ..... meet) in the brain's 'mushroom bodies'
- level of two **8** ..... in the brain associated with ageing

Questions 9–13

Do the following statements agree with the information given in Reading Passage 1?

In boxes 9–13 on your answer sheet, write

TRUE	*if the statement agrees with the information*
FALSE	*if the statement contradicts the information*
NOT GIVEN	*if there is no information on this*

9 *Pheidole dentata* ants are the only known animals which remain active for almost their whole lives.

10 Ysabel Giraldo was the first person to study *Pheidole dentata* ants using precise data about the insects' ages.

11 The ants in Giraldo's experiments behaved as she had predicted that they would.

12 The recent studies of bees used different methods of measuring age-related decline.

13 *Pheidole dentata* ants kept in laboratory conditions tend to live longer lives.

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

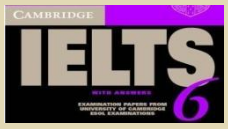
14 G
15 A
16 H
17 C
18 F
19 I
20 C
21 K
22 E
23 L
24 TRUE
25 NOT GIVEN
26 FALSE

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.



BRITISH COUNCIL IELTS AUSTRALIA UNIVERSITY of CAMBRIDGE ESOL Examinations

Answers

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
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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.

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
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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.

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.

TEST 15

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
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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
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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
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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
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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.

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.

TEST 29

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.

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.

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 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 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 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 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

TEST 37

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

TEST 38

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.

TEST 39

TEST 3

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

TEST 40

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.