



40 IELTS READING TESTS

PASSAGE 1

Compiled By:
O'KTAMJON
DILBAROV



With Explained Answers

About this book

This book contains 40 tests of IELTS Reading. All reading tests are brought from official Cambridge IELTS Books .

I highly recommend to print this book.

Who this book is for?

To all IELTS candidates who wants to improve reading skills.

How to connect with us?

You can send your review about this book via Telegram:

https://t.me/ielts40tests_bot

You can see other reviews via Telegram:

<https://t.me/ielts40tests>

If you aim band 9 in listening and reading sections of the IELTS, you should listen to podcasts and read articles every single day. This is because IELTS is the test of your English language proficiency and is all about English. It is not a special test that checks whether you have a particular strategy or not.

And you can find podcasts and articles on our channel! Make sure to subscribe! The link below to follow:

<https://t.me/PowerfulIELTS>

THIS BOOK CANNOT BE SOLD THIRD PARTY WITHOUT AUTHOR PERMISSION

©Dilbarov O. All rights reserved. 2020

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 Cawdrey, 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, Cawdrey'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 Dodsley 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	<i>if the statement agrees with the information</i>
FALSE	<i>if the statement contradicts the information</i>
NOT GIVEN	<i>if there is no information on this</i>

- 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.

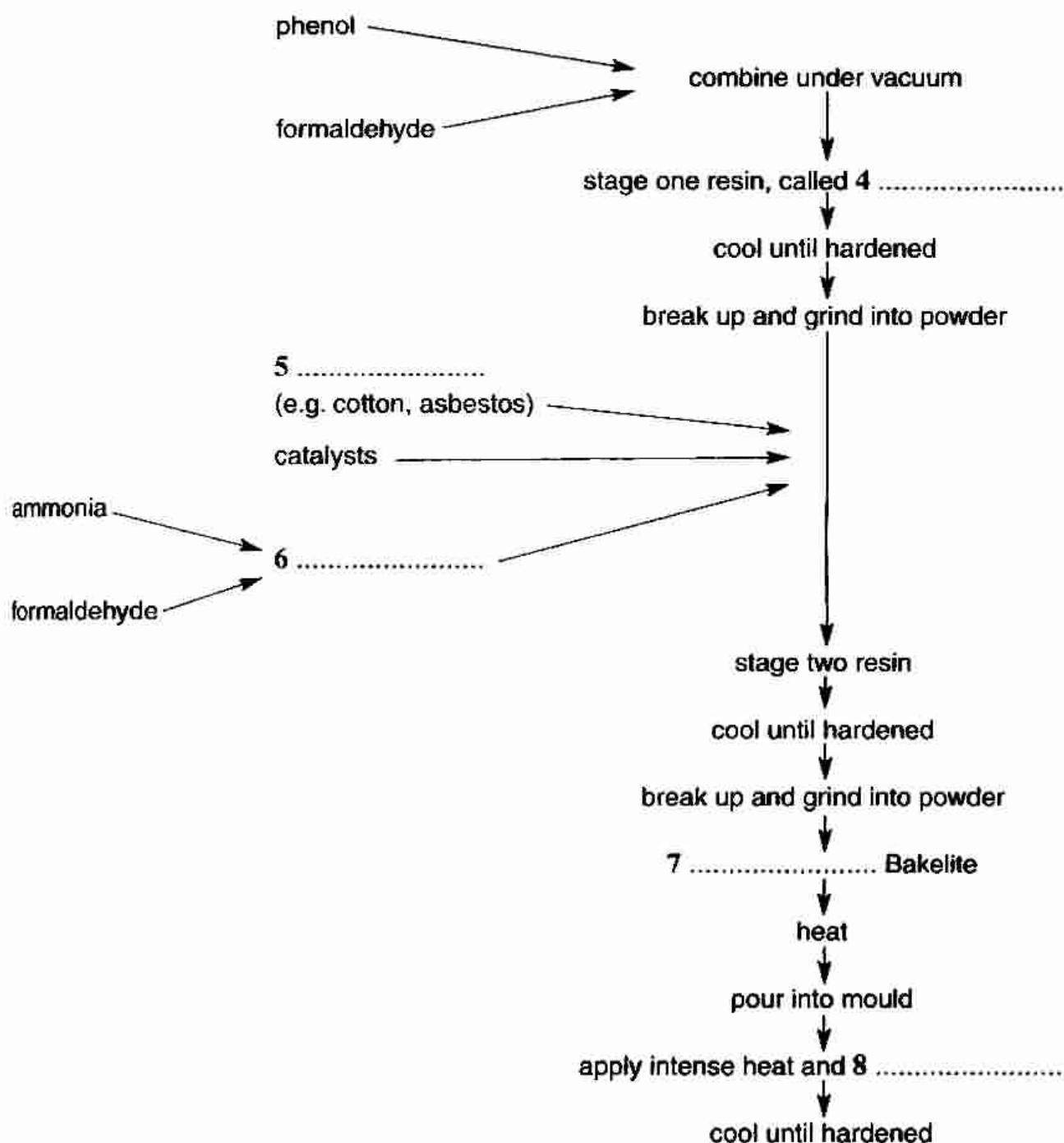
Questions 4–8

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	<i>if the statement agrees with the information</i>
FALSE	<i>if the statement contradicts the information</i>
NOT GIVEN	<i>if there is no information on this</i>

- 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.

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	<i>if the statement agrees with the information</i>
FALSE	<i>if the statement contradicts the information</i>
NOT GIVEN	<i>if there is no information on this</i>

- 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.

TEST 4

Reading

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

TEST 5

Test 1

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.

Test 1

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

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 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 A successful 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 telecommunications 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, ISTP 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'.

It 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 too 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'.

Test 2

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 Hong 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 is 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 pushing 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 | <i>if the statement agrees with the information</i> |
| FALSE | <i>if the statement contradicts the information</i> |
| NOT GIVEN | <i>if there is no information on this</i> |

- 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

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, to 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 modern 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

Test3

born in 1910. Film personalities have such an immediate presence that inevitably, they become super-real. Because we watch them so closely and 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 100 years since that train arrived and the 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 letter, 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	<i>if the statement agrees with the views of the writer if the</i>
NO	<i>statement contradicts the views of the writer if it is</i>
NOT GIVEN	<i>impossible to say what the writer thinks about this</i>

- 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.

Test 3

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 to the film of the train in order to 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 to impress its audience.
 - B tells stories better than books.
 - C illustrates the passing of time.
 - 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

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 small 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 won't 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.

Test 4

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.

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? 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

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 Hölldobler 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 Clemons 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, Clemons contacted Morteza Gharib, aerodynamics 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 Clemons'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	<i>if the statement agrees with the information</i>
FALSE	<i>if the statement contradicts the information</i>
NOT GIVEN	<i>if there is no information on this</i>

- 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

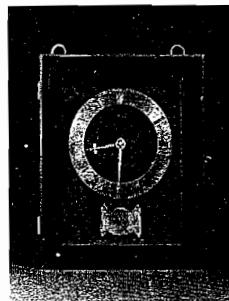
TEST 13

Test 1

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.

Test 1

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

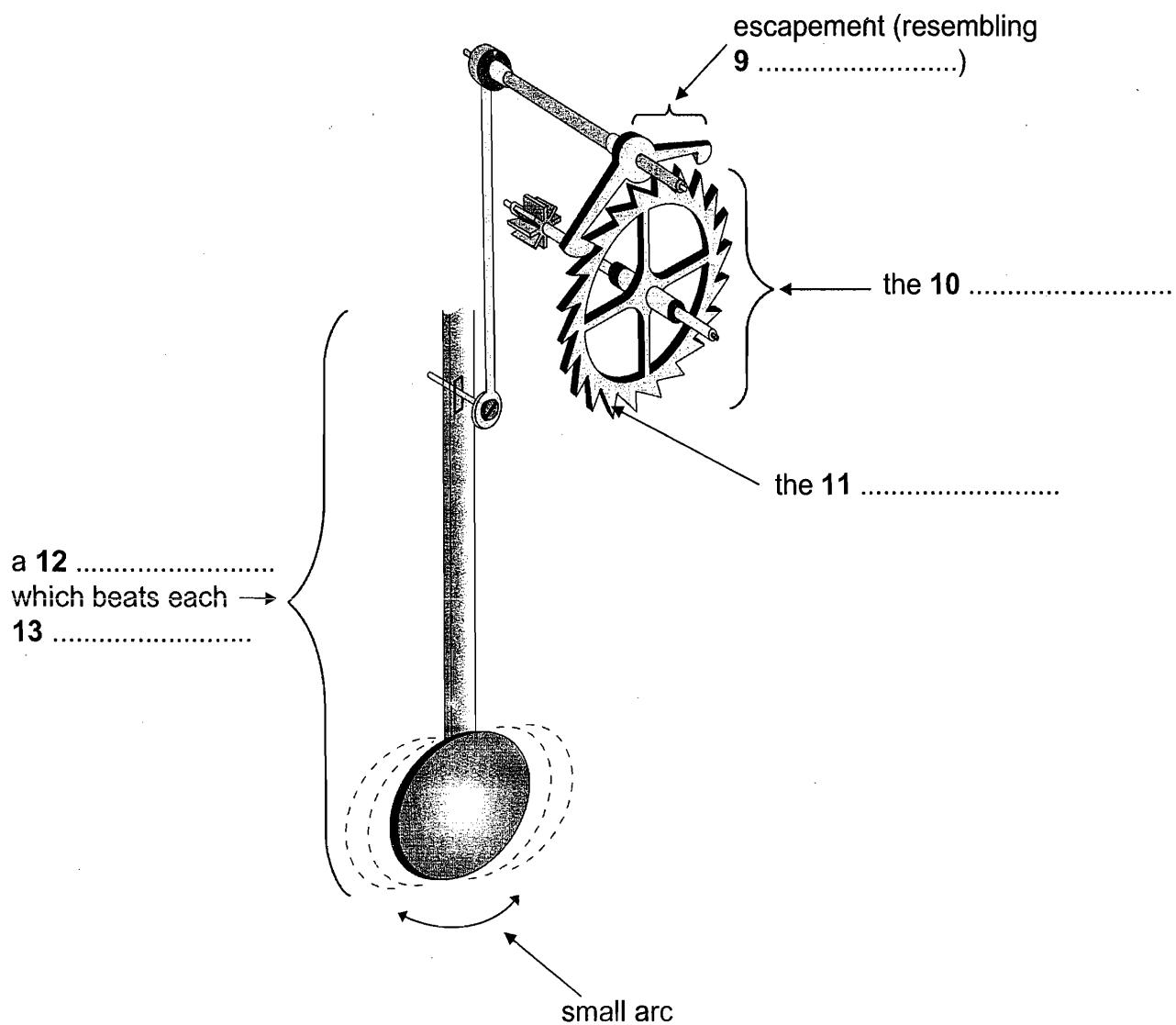
Questions 9–13

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



TEST 14

Reading

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 ($^{\circ}\text{C}$) 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.

Test 2

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.

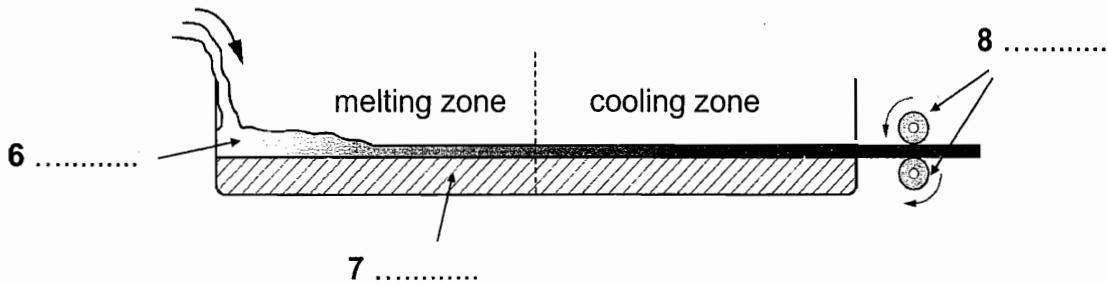
Choose **NO MORE THAN TWO WORDS** from the passage for each answer.

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

Early methods of producing flat glass

Method	Advantages	Disadvantages
1	<ul style="list-style-type: none"> Glass remained 2 	<ul style="list-style-type: none"> Slow 3
Ribbon	<ul style="list-style-type: none"> Could produce glass sheets of varying 4 Non-stop process 	<ul style="list-style-type: none"> Glass was 5 20% of glass rubbed away Machines were expensive

Pilkington's float process



Test 2

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.

TEST 15

Reading

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

Test 3

– 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

Test 3

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 | <i>if the statement agrees with the claims of the writer</i> |
| NO | <i>if the statement contradicts the claims of the writer</i> |
| NOT GIVEN | <i>if it is impossible to say what the writer thinks about this</i> |

- 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

Test 4

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

<i>Example</i> Section A	Answer 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.

Test 1

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.

Test 1

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.

Test 2

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?

Test 2

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

tailieutienganh.net | up-to-date IELTS materials

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

TEST 19

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*.

Test 3

- 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 Skłodowska 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	<i>if the statement agrees with the information</i>
FALSE	<i>if the statement contradicts the information</i>
NOT GIVEN	<i>if there is no information on this</i>

- 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.

Test 4

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

TEST 21

Reading

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

Test 1

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 | <i>if the statement agrees with the information</i> |
| FALSE | <i>if the statement contradicts the information</i> |
| NOT GIVEN | <i>if there is no information on this</i> |

- 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?

Test 1

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 <i>baoris</i> 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

TEST 22

Reading

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’.

Test 2

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

<i>Example</i> Paragraph A	<i>Answer</i> 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.

Test 3

- 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

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

Test 1

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-