

GIÁO TRÌNH
KHÓA HỌC
IELTS
READING

Sách sử dụng song song với các bài giảng trong khóa học IELTS Reading.

Bạn nên làm các bài tập này trước khi bắt đầu học các bài giảng trong khóa học.

Sau khi làm xong, bạn có thể xem bài giảng để có đáp án và hướng dẫn cách làm bài cho từng dạng.

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BÀI GIẢNG

KEYWORDS

BÀI TẬP 01

Chỉ ra các từ khóa biến đổi được và không biến đổi được và dự đoán các cách biến đổi các từ khóa biến đổi được.

Heilmann rejected Huxley's theory because of the apparent absence of in dinosaurs.

Feduccia and Martin believe that the ancestor of today's birds was a kind of early

In cladistics, the between organisms' characteristics are of major importance.

The dangerous on a primitive bird from Madagascar adds weight to the 'dino-bird' argument.

BÀI GIẢNG

SCAN & SKIM

BÀI TẬP 01

Xác định các loại keywords trong các câu hỏi sau và xác định vị trí của chúng trong bài đọc dưới đây.

- 1 Huxley formulated his theory while studying a dinosaur belonging to a group called
- 2 Heilmann rejected Huxley's theory because of the apparent absence of in dinosaurs.
- 3 Feduccia and Martin believe that the ancestor of today's birds was a kind of early
- 4 In cladistics, the between organisms' characteristics are of major importance.
- 5 The dangerous on a primitive bird from Madagascar adds weight to the 'dino-bird' argument.

The origins of birds

The science of evolutionary relationships has undergone a major change in recent decades. It used to be the case that all the features of organisms were important in working out their family tree. But following the work of German entomologist Willi Hennig, many evolutionary scientists now believe that the only features which carry any useful information are the evolutionary 'novelties' shared between organisms. Mice, lizards and fish, for example, all have backbones – so the feature 'backbone' tells us nothing about their evolutionary relationship. But the feature 'four legs' is useful because it's an evolutionary novelty – a characteristic shared only between the lizard and the mouse. This would suggest that the lizard and mouse are more closely related to each other than either is to the fish. This revolutionary approach is called cladistics, and it has been central to the idea that birds evolved from dinosaurs.

The 'birds are dinosaurs' theory was first developed by English palaeontologist Thomas Huxley (1825–1895). According to some accounts, one evening Huxley went to dinner still thinking about a mystery dinosaur bone in his lab. He knew he was dealing with the lower leg bone (tibia) of a meat-eating, two-legged dinosaur belonging to the classification known as theropods, but attached to the tibia was an unidentified extra bone. On the menu that evening was quail, a small bird similar to a pheasant, and Huxley noticed the same strange bone, attached to the quail tibia on his plate. He later realised that it was in fact the bird's anklebone. More importantly, Huxley concluded that its forms in both dinosaur and bird skeletons were so similar that they must be closely related.

Huxley's idea fell out of favour for fifty years following the 1916 publication of *The Origin of Birds* by the Danish doctor Gerhard Heilmann. During this time, Heilmann's theory was widely accepted. Heilmann had noted that two-legged, meat-eating dinosaurs lacked collarbones. In later evolutionary stages these bones fuse together to form the distinctive 'Y'-shaped bone in a bird's neck, known as the furcula. Heilmann proposed the notion that such a feature could not be lost and then re-evolve at a later date, so dinosaurs could not be the ancestors of birds.

Then, in the late 1960s, John Ostrom from Yale University in the US, noted 22 features in the skeletons of meat-eating dinosaurs that were also found in birds and nowhere else. This reset

the thinking on bird ancestry and once again Huxley's ideas caught the attention of the scientific community. Subsequent work has found up to 85 characteristics that tie dinosaurs and birds together. But what of Heilmann's missing bones? It turns out that not only did many dinosaurs have collarbones, these were also fused together into a furcula. Unfortunately for Heilmann, the fossil evidence was somewhat lacking in his day, and the few furculae that had been found were misidentified, usually as belly ribs.

US ornithologist Alan Feduccia and palaeontologist Larry Martin are two vocal opponents of the dinosaur theory. They contend that birds evolved from some unknown reptile at a time long before dinosaurs. Their reasoning is that flight is most likely to have started from a tree climbing ancestor, yet all the proposed dinosaurian ancestors were ground-dwellers. But the dino-bird supporters contend that an unknown dinosaurian bird-ancestor could have been tree-dwelling, or that birds evolved flight from the ground up by chasing and leaping after insects. Most of Feduccia and Martin's case against the 'birds-are-dinosaurs' hypothesis is based on differences between birds and dinosaurs. Supporters of cladistics, however, maintain that differences between organisms do not matter, as it is the similarities between them that count. Evolution dictates that organisms will change through time, so it is only the features which persist that carry useful information about their origins.

Most people on either side of the debate do accept, however, that the ancient winged creature known as Archaeopteryx is an ancestor of today's birds. This is in spite of the fact that its form is distinctly non-bird-like, with a long bony tail, and teeth instead of a beak. The 'birds are-dinosaurs' supporters contend that, if clearly-preserved feathers had not been found alongside two of the seven Archaeopteryx specimens, it would probably have been identified as a small dinosaur. However, Archaeopteryx does have some bird-like features, such as a furcula and bird-like feet, that suggest that it is too bird-like to be considered a dinosaur.

Over the last few decades several dinosaurs with bird-like features and primitive birds with dinosaur-like features have been found in several countries, connecting Archaeopteryx back to dinosaurs, and forwards to modern birds. Sinosauropteryx, excavated from 130-million year-old rocks in northeast China, is one example. It is a dinosaur skeleton surrounded by a halo of fuzz, thought to be primitive feathers. And a reassessment of other dinosaurs reveals such bird-like features as hollow bones and a foot with three functional toes, characteristics that appeared over 50 million years before Archaeopteryx took to the air. And Rahonavis, a primitive bird from Madagascar is more bird-like than Archaeopteryx, yet retains some distinctive dinosaur features, including a long and vicious claw at the end of its wing. Over a century since Huxley's discovery, it seems that cladistics may have finally settled the 'dino bird' debate.

BÀI GIẢNG

GAP

FILLING

BÀI TẬP 01

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 Irene 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**

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.

BÀI TẬP 02

Introducing dung beetles into a pasture is a simple process: approximately 1,500 beetles are released, a handful at a time, into fresh cow pats in the cow pasture. The beetles immediately disappear beneath the pats digging and tunnelling and, if they successfully adapt to their new environment, soon become a permanent, self-sustaining part of the local ecology. In time they multiply and within three or four years the benefits to the pasture are obvious.

Dung beetles work from the inside of the pat so they are sheltered from predators such as birds and foxes. Most species burrow into the soil and bury dung in tunnels directly underneath the pats, which are hollowed out from within. Some large species originating from France excavate tunnels to a depth of approximately 30 cm below the dung pat. These beetles make sausage-shaped brood chambers along the tunnels. The shallowest tunnels belong to a much smaller Spanish species that buries dung in chambers that hang like fruit from the branches of a pear tree. South African beetles dig narrow tunnels of approximately 20 cm below the surface of the pat. Some surface-dwelling beetles, including a South African species, cut perfectly-shaped balls from the pat, which are rolled away and attached to the bases of plants.

For maximum dung burial in spring, summer and autumn, farmers require a variety of species with overlapping periods of activity. In the cooler environments of the state of Victoria, the large French species (2.5 cms long), is matched with smaller (half this size), temperate-climate Spanish species. The former are slow to recover from the winter cold and produce only one or two generations of offspring from late spring until autumn. The latter, which multiply rapidly in early spring, produce two to five generations annually. The South African ball-rolling species, being a sub-tropical beetle, prefers the climate of northern and coastal New South Wales where it commonly works with the South African tunneling species. In warmer climates, many species are active for longer periods of the year.

Question 9 – 13

Complete the table below.

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

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

Species	Size	Preferred climate	Complementary species	Start of active period	Number of generations per year
French	2.5 cm	cool	Spanish	late spring	1 - 2
Spanish	1.25 cm	9		10	11
South African ball roller		12	13		

BÀI GIẢNG

LABELLING

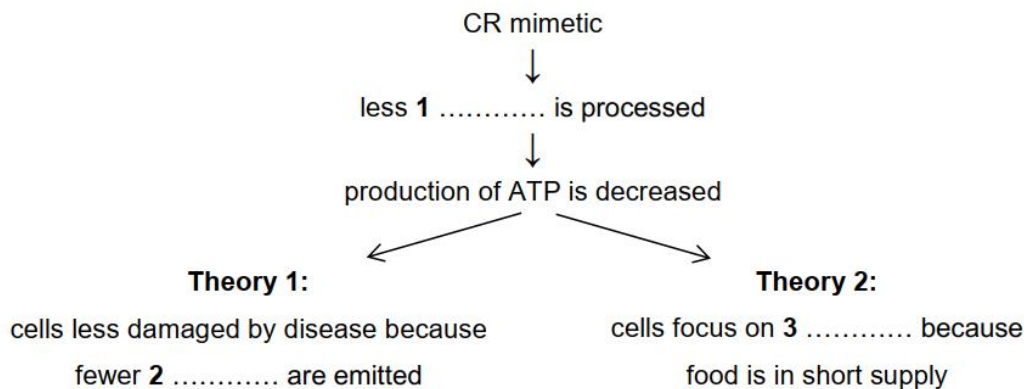
BÀI TẬP 01

Questions 1 – 3

Complete the flow-chart below.

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

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

How a caloric-restriction mimetic works

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

BÀI TẬP 02

Questions 10-13

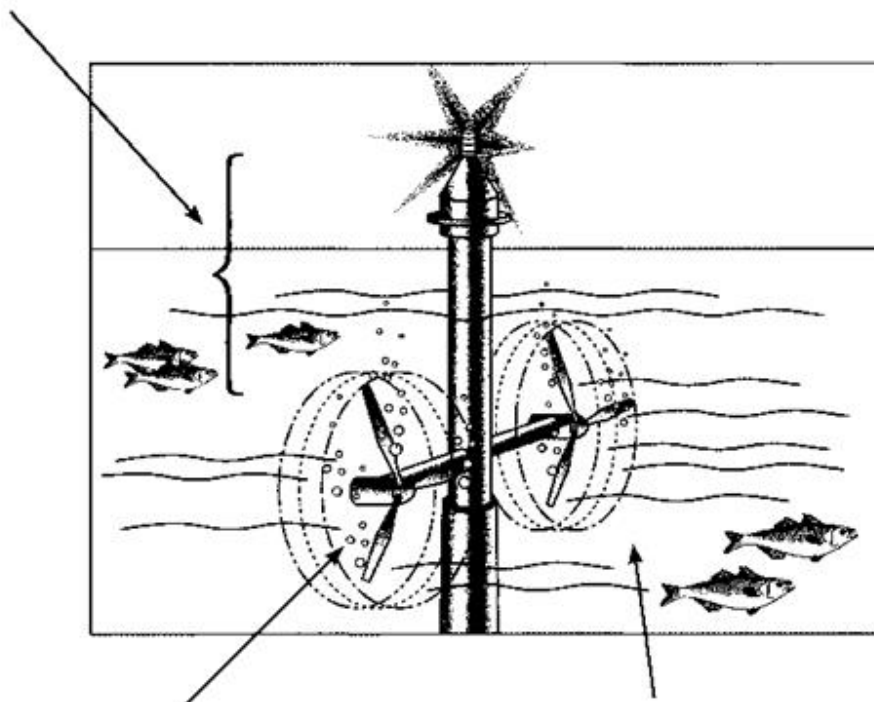
Label the diagram below.

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

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

An Undersea Turbine

Whole tower can be raised
for 10 and the extraction
of seaweed from the blades



Air bubbles result from
the 12 behind blades.
This is known as 13

Sea life not in danger due to the
fact that blades are comparatively
11

D

A marine turbine blade needs to be only one third of the size of a wind generator to produce three times as much power. The blades will be about 20 metres in diameter, so around 30 metres of water is required. Unlike wind power, there are unlikely to be environmental objections. Fish and other creatures are thought unlikely to be at risk from the relatively slow turning blades. Each turbine will be mounted on a tower which will connect to the national power supply grid via underwater cables. The towers will stick out of the water and be lit, to warn shipping, and also be designed to be lifted out of the water for maintenance and to clean seaweed from the blades.

E

Dr Bahaj has done most work on the Alderney site, where there are powerful currents. The single undersea turbine farm would produce far more power than needed for the Channel Islands and most would be fed into the French Grid and be re-imported into Britain via the cable under the Channel.

F

One technical difficulty is cavitation, where low pressure behind a turning blade causes air bubbles. These can cause vibration and damage the blades of the turbines. Dr Bahaj said: 'We have to test a number of blade types to avoid this happening or at least make sure it does not damage the turbines or reduce performance. Another slight concern is submerged debris floating into the blades. So far we do not know how much of a problem it might be. We will have to make the turbines robust because the sea is a hostile environment, but all the signs that we can do it are good.'

BÀI TẬP 03

Questions 8-13

Complete the flow-chart below.

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

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

Method of determining where the ancestors of turtles and tortoises come from
Step 1 71 species of living turtles and tortoises were examined and a total of 8 were taken from the bones of their forelimbs.
↓
Step 2 The data was recorded on a 9 (necessary for comparing the information). Outcome: Land tortoises were represented by a dense 10 of points towards the top. Sea turtles were grouped together in the bottom part.
↓
Step 3 The same data was collected from some living 11 species and added to the other results. Outcome: The points for these species turned out to be positioned about 12 up the triangle between the land tortoises and the sea turtles.
↓
Step 4 Bones of <i>P. quenstedti</i> and <i>P. tampanensis</i> were examined in a similar way and the results added. Outcome: The position of the points indicated that both these ancient creatures were 13

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

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

BÀI GIẢNG

SHORT

ANSWER

BÀI TẬP 01

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?

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 by product 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 Eugenie 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.

BÀI TẬP 02

Questions 1-4

Answer the questions below.

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

Write your answers in boxes 1-4 on your answer sheet.

- 1 What had to transfer from sea to land before any animals could migrate?
- 2 Which TWO processes are mentioned as those in which animals had to make big changes as they moved onto land?
- 3 Which physical feature, possessed by their ancestors, do whales lack?
- 4 Which animals might ichthyosaurs have resembled?

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

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

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

BÀI GIẢNG

MATCHING FEATURES

(Dạng Matching name/classification/Sentence Ending)

BÀI TẬP 01

Venus in transit

B

For centuries, transits of Venus have drawn explorers and astronomers alike to the four corners of the globe. And you can put it all down to the extraordinary polymath Edmond Halley. In November 1677, Halley observed a transit of the innermost planet, Mercury, from the desolate island of St Helena in the South Pacific. He realised that, from different latitudes, the passage of the planet across the Sun's disc would appear to differ. By timing the transit from two widely-separated locations, teams of astronomers could calculate the parallax angle - the apparent difference in position of an astronomical body due to a difference in the observer's position. Calculating this angle would allow astronomers to measure what was then the ultimate goal: the distance of the Earth from the Sun. This distance is known as the astronomical unit' or AU.

C

Halley was aware that the AU was one of the most fundamental of all astronomical measurements. Johannes Kepler, in the early 17th century, had shown that the distances of the planets from the Sun governed their orbital speeds, which were easily measurable. But no-one had found a way to calculate accurate distances to the planets from the Earth. The goal was to measure the AU; then, knowing the orbital speeds of all the other planets round the Sun, the scale of the Solar System would fall into place. However, Halley realised that Mercury was so far away that its parallax angle would be very difficult to determine. As Venus was closer to the Earth, its parallax angle would be larger, and Halley worked out that by using Venus it would be possible to measure the Sun's distance to 1 part in 500. But there was a problem: transits of Venus, unlike those of Mercury, are rare, occurring in pairs roughly eight years apart every hundred or so years. Nevertheless, he accurately predicted that Venus would cross the face of the Sun in both 1761 and 1769 - though he didn't survive to see either.

D

Inspired by Halley's suggestion of a way to pin down the scale of the Solar System, teams of British and French astronomers set out on expeditions to places as diverse as India and Siberia. But things weren't helped by Britain and France being at war. The person who deserves most sympathy is the French astronomer Guillaume Le Gentil. He was thwarted by the fact that the British were besieging his observation site at Pondicherry in India. Fleeing on a French warship crossing the Indian Ocean, Le Gentil saw a wonderful transit - but the ship's pitching and rolling ruled out any attempt at making accurate observations. Undaunted, he remained south of the equator, keeping himself busy by studying the islands of Mauritius and Madagascar before setting off to observe the next transit in the Philippines. Ironically after travelling nearly 50,000 kilometres, his view was clouded out at the last moment, a very dispiriting experience.

E

While the early transit timings were as precise as instruments would allow, the measurements were dogged by the 'black drop' effect. When Venus begins to cross the Sun's disc, it looks smeared not circular - which makes it difficult to establish timings. This is due to diffraction of light. The second problem is that Venus exhibits a halo of light when it is seen just outside the Sun's disc. While this showed astronomers that Venus was surrounded by a thick layer of gases refracting sunlight around it, both effects made it impossible to obtain accurate timings.

F

But astronomers laboured hard to analyse the results of these expeditions to observe Venus transits. Johann Franz Encke, Director of the Berlin Observatory, finally determined a value for the AU based on all these parallax measurements: 153,340,000 km. Reasonably accurate for the time, that is quite close to today's value of 149,597,870 km, determined by radar, which has now superseded transits and all other methods in accuracy. The AU is a cosmic measuring rod, and the basis of how we scale the Universe today. The parallax principle can be extended to measure the distances to the stars. If we look at a star in January - when Earth is at one point in its orbit - it will seem to be in a different position from where it appears six months later. Knowing the width of Earth's orbit, the parallax shift lets astronomers calculate the distance.

Questions 5-8

Look at the following statements (Questions 5-8) and the list of people below.

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

Write the correct letter, A, B, C or D, in boxes 5-8 on your answer sheet.

5 - He calculated the distance of the Sun from the Earth based on observations of Venus with a fair degree of accuracy.

6 - He understood that the distance of the Sun from the Earth could be worked out by comparing observations of a transit.

7 - He realised that the time taken by a planet to go round the Sun depends on its distance from the Sun.

8 - He witnessed a Venus transit but was unable to make any calculations.

List of People	
A	Edmond Halley
B	Johannes Kepler
C	Guillaume Le Gentil
D	Johann Franz Encke

BÀI TẬP 02

Animal migration, however it is defined, is far more than just the movement of animals. It can loosely be described as travel that takes place at regular intervals - often in an annual cycle - that may involve many members of a species, and is rewarded only after a long journey. It suggests inherited instinct. The biologist Hugh Dingle has identified five characteristics that apply, in varying degrees and combinations, to all migrations. They are prolonged movements that carry animals outside familiar habitats; they tend to be linear, not zigzaggy; they involve special behaviours concerning preparation (such as overfeeding) and arrival; they demand special allocations of energy. And one more: migrating animals maintain an intense attentiveness to the greater mission, which keeps them undistracted by temptations and undeterred by challenges that would turn other animals aside.

An arctic tern, on its 20,000 km flight from the extreme south of South America to the Arctic circle, will take no notice of a nice smelly herring offered from a bird-watcher's boat along the way. While local gulls will dive voraciously for such handouts, the tern flies on. Why? The arctic tern resists distraction because it is driven at that moment by an instinctive sense of something we humans find admirable: larger purpose. In other words, it is determined to reach its destination. The bird senses that it can eat, rest and mate later. Right now it is totally focused on the journey; its undivided intent is arrival.

Questions 6-9

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

Write the correct letter, A-G, in boxes 6-9 on your answer sheet

- A** be discouraged by difficulties.
- B** travel on open land where they can look out for predators.
- C** eat more than they need for immediate purposes.
- D** be repeated daily. '
- E** ignore distractions.
- F** be governed by the availability of water.
- G** follow a straight line.

- 6** According to Dingle, migratory routes are likely to
- 7** To prepare for migration, animals are likely to
- 8** During migration, animals are unlikely to
- 9** Arctic terns illustrate migrating animals' ability to

BÀI GIẢNG

MULTIPLE CHOICE

BÀI TẬP 01

A neuroscientist reveals how to think differently

In the last decade a revolution has occurred in the way that scientists think about the brain.

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

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

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

Perception is central to iconoclasm. Iconoclasts see things differently to other people. Their brains do not fall into efficiency pitfalls as much as the average person's brain. Iconoclasts, either because they were born that way or through learning, have found ways to work around the perceptual shortcuts that plague most people. Perception is not something that is hardwired into the brain. It is a learned process, which is both a curse and an opportunity for change. The brain faces the fundamental problem of interpreting physical stimuli from the senses. Everything the brain sees, hears, or touches has multiple interpretations. The one that is ultimately chosen is simply the brain's best theory. In technical terms, these conjectures have their basis in the statistical likelihood of one interpretation over another and are heavily influenced by past experience and, importantly for potential iconoclasts, what other people say.

Questions 1-5

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

Write the correct letter in boxes 1-5 on your answer sheet.

1. Neuroeconomics is a field of study which seeks to
 - A cause a change in how scientists understand brain chemistry.
 - B understand how good decisions are made in the brain.
 - C understand how the brain is linked to achievement in competitive fields.
 - D trace the specific firing patterns of neurons in different areas of the brain.
2. According to the writer, iconoclasts are distinctive because
 - A they create unusual brain circuits.
 - B their brains function differently.
 - C their personalities are distinctive.
 - D they make decisions easily.
3. According to the writer, the brain works efficiently because
 - A it uses the eyes quickly.
 - B it interprets data logically.
 - C it generates its own energy.
 - D it relies on previous events.
4. The writer says that perception is
 - A a combination of photons and sound waves.
 - B a reliable product of what your senses transmit.
 - C a result of brain processes.
 - D a process we are usually conscious of.
5. According to the writer, an iconoclastic thinker
 - A centralises perceptual thinking in one part of the brain.
 - B avoids cognitive traps.
 - C has a brain that is hardwired for learning.
 - D has more opportunities than the average person.

BÀI TẬP 02

The Development of Museums

A

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

B

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

C

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

D

Theme parks are undergoing other changes, too, as they try to present more serious social and cultural issues, and move away from fantasy. This development is a response to market

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

E

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

F

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

Questions 5-10

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

Write the correct letter in boxes 5-10 on your answer sheet.

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

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

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

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

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

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

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

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

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

- A fail to match visitor expectations.
- B are based on the false assumptions of professionals.

- C reveal more about present beliefs than about the past.
- D allow visitors to make more use of their imagination.

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

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

BÀI GIẢNG

TRUE/FALSE

NOT

GIVEN

YES/NO/NOT GIVEN

BÀI TẬP 01

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

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

Questions 5-7

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

In boxes 5-7 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

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

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

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

BÀI TẬP 02

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

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

Questions 6-11

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

In boxes 6-11 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** Exposure to different events forces the brain to think differently.
- 7** Iconoclasts are unusually receptive to new experiences.
- 8** Most people are too shy to try different things.
- 9** If you think in an iconoclastic way, you can easily overcome fear.
- 10** When concern about embarrassment matters less, other fears become irrelevant.
- 11** Fear of public speaking is a psychological illness.

BÀI GIẢNG

MULTIPLE CHOICE

**WITH 2 OR MORE
ANSWERS**

BÀI TẬP 01

Questions 11-12

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

Write the correct letters in boxes 11-12 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

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.

BÀI TẬP 02

Questions 5-9

Choose **FIVE** letters, A-J.

Write the correct letters in boxes 5-9 on your answer sheet.

Which **FIVE** of the following claims about tidal power are made by the writer?

- A It is a more reliable source of energy than wind power.
- B It would replace all other forms of energy in Britain.
- C Its introduction has come as a result of public pressure.
- D It would cut down on air pollution.
- E It could contribute to the closure of many existing power stations in Britain.
- F It could be a means of increasing national income.
- G It could face a lot of resistance from other fuel industries.
- H It could be sold more cheaply than any other type of fuel.
- I It could compensate for the shortage of inland sites for energy production.
- J It is best produced in the vicinity of coastlines with particular features.

A

Operating on the same principle as wind turbines, the power in sea turbines comes from tidal currents which turn blades similar to ships' propellers, but, unlike wind, the tides are predictable and the power input is constant. The technology raises the prospect of Britain becoming self-sufficient in renewable energy and drastically reducing its carbon dioxide emissions. If tide, wind and wave power are all developed, Britain would be able to close gas, coal and nuclear power plants and export renewable power to other parts of Europe. Unlike wind power, which Britain originally developed and then abandoned for 20 years allowing the Dutch to make it a major industry, undersea turbines could become a big export earner to island nations such as Japan and New Zealand.

C

Work on designs for the new turbine blades and sites are well advanced at the University of Southampton's sustainable energy research group. The first station is expected to be installed off Lynmouth in Devon shortly to test the technology in a venture jointly funded by the department of Trade and Industry and the European Union. AbuBakr Bahaj, in charge of the Southampton research, said: The prospects for energy from tidal currents are far better than from wind because the flows of water are predictable and constant. The technology for dealing with the hostile saline environment under the sea has been developed in the North Sea oil industry and much is already known about turbine blade design, because of wind

power and ship propellers. There are a few technical difficulties, but I believe in the next five to ten years we will be installing commercial marine turbine farms.' Southampton has been awarded £215,000 over three years to develop the turbines and is working with Marine Current Turbines, a subsidiary of IT power, on the Lynmouth project. EU research has now identified 106 potential sites for tidal power, 80% round the coasts of Britain. The best sites are between islands or around heavily indented coasts where there are strong tidal currents.

BÀI GIẢNG

MATCHING

INFORMATION

BÀI TẬP 01

Children with auditory problems

A

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

B

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

C

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

D

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

E

Autism is considered a neurological and genetic life-long disorder that causes discrepancies in the way information is processed. This disorder is characterised by interlinking problems with social imagination, social communication and social interaction. According to Janzen, this affects the ability to understand and relate in typical ways to people, understand events

and objects in the environment, and understand or respond to sensory stimuli. Autism does not allow learning or thinking in the same ways as in children who are developing normally.

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

F

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

G

Children experiencing an auditory function deficit can often find speech and communication very difficult to isolate and process when set against high levels of background noise.

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

H

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

I

A number of countries are already in the process of formulating their own standards for the control and reduction of classroom noise. New Zealand will probably follow their example.

The literature to date on noise in school rooms appears to focus on the effects on schoolchildren in general, their teachers and the hearing impaired. Only limited attention appears to have been given to those students experiencing the other disabilities involving auditory function deficit. It is imperative that the needs of these children are taken into account in the setting of appropriate international standards to be promulgated in future.

Questions 1-6

Reading Passage 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

BÀI TẬP 02

Venus in transit

June 2004 saw the first passage, known as a 'transit', of the planet Venus across the face of the Sun in 122 years. Transits have helped shape our view of the whole Universe, as Heather Cooper and Nigel Henbest explain.

A

On 8 June 2004, more than half the population of the world were treated to a rare astronomical event. For over six hours, the planet Venus steadily inched its way over the surface of the Sun. This 'transit' of Venus was the first since 6 December 1882. On that occasion, the American astronomer Professor Simon Newcomb led a party to South Africa to observe the event. They were based at a girls' school, where - it is alleged - the combined forces of three schoolmistresses outperformed the professionals with the accuracy of their observations.

B

For centuries, transits of Venus have drawn explorers and astronomers alike to the four corners of the globe. And you can put it all down to the extraordinary polymath Edmond Halley. In November 1677, Halley observed a transit of the innermost planet, Mercury, from the desolate island of St Helena in the South Pacific. He realised that, from different latitudes, the passage of the planet across the Sun's disc would appear to differ. By timing the transit from two widely-separated locations, teams of astronomers could calculate the parallax angle - the apparent difference in position of an astronomical body due to a difference in the observer's position. Calculating this angle would allow astronomers to measure what was then the ultimate goal: the distance of the Earth from the Sun. This distance is known as the astronomical unit' or AU.

C

Halley was aware that the AU was one of the most fundamental of all astronomical measurements. Johannes Kepler, in the early 17th century, had shown that the distances of the planets from the Sun governed their orbital speeds, which were easily measurable. But no-one had found a way to calculate accurate distances to the planets from the Earth. The goal was to measure the AU; then, knowing the orbital speeds of all the other planets round the Sun, the scale of the Solar System would fall into place. However, Halley realised that Mercury was so far away that its parallax angle would be very difficult to determine. As Venus was closer to the Earth, its parallax angle would be larger, and Halley worked out that by using Venus it would be possible to measure the Sun's distance to 1 part in 500. But there was a problem: transits of Venus, unlike those of Mercury, are rare, occurring in pairs roughly eight years apart every hundred or so years. Nevertheless, he accurately predicted that Venus would cross the face of the Sun in both 1761 and 1769 - though he didn't survive to see either.

D

Inspired by Halley's suggestion of a way to pin down the scale of the Solar System, teams of British and French astronomers set out on expeditions to places as diverse as India and

Siberia. But things weren't helped by Britain and France being at war. The person who deserves most sympathy is the French astronomer Guillaume Le Gentil.

He was thwarted by the fact that the British were besieging his observation site at Pondicherry in India. Fleeing on a French warship crossing the Indian Ocean, Le Gentil saw a wonderful transit - but the ship's pitching and rolling ruled out any attempt at making accurate observations. Undaunted, he remained south of the equator, keeping himself busy by studying the islands of Mauritius and Madagascar before setting off to observe the next transit in the Philippines. Ironically after travelling nearly 50,000 kilometres, his view was clouded out at the last moment, a very dispiriting experience.

E

While the early transit timings were as precise as instruments would allow, the measurements were dogged by the 'black drop' effect. When Venus begins to cross the Sun's disc, it looks smeared not circular - which makes it difficult to establish timings. This is due to diffraction of light. The second problem is that Venus exhibits a halo of light when it is seen just outside the Sun's disc. While this showed astronomers that Venus was surrounded by a thick layer of gases refracting sunlight around it, both effects made it impossible to obtain accurate timings.

F

But astronomers laboured hard to analyse the results of these expeditions to observe Venus transits. Johann Franz Encke, Director of the Berlin Observatory, finally determined a value for the AU based on all these parallax measurements: 153,340,000 km. Reasonably accurate for the time, that is quite close to today's value of 149,597,870 km, determined by radar, which has now superseded transits and all other methods in accuracy. The AU is a cosmic measuring rod, and the basis of how we scale the Universe today. The parallax principle can be extended to measure the distances to the stars. If we look at a star in January - when Earth is at one point in its orbit - it will seem to be in a different position from where it appears six months later. Knowing the width of Earth's orbit, the parallax shift lets astronomers calculate the distance.

G

June 2004's transit of Venus was thus more of an astronomical spectacle than a scientifically important event. But such transits have paved the way for what might prove to be one of the most vital breakthroughs in the cosmos - detecting Earth-sized planets orbiting other stars.

Questions 1-4

Reading Passage has seven paragraphs, A-G.

Which paragraph contains the following information?

Write the correct letter, A-G, in boxes 1-4 on your answer sheet.

- 1 examples of different ways in which the parallax principle has been applied.
- 2 a description of an event which prevented a transit observation.
- 3 a statement about potential future discoveries leading on from transit observations.
- 4 a description of physical states connected with Venus which early astronomical instruments failed to overcome.

BÀI GIẢNG

MATCHING HEADINGS

BÀI TẬP 01

The Search for Extraterrestrial Intelligence

The question of whether we are alone in the Universe has haunted humanity for centuries, but we may now stand poised on the brink of the answer to that question, as we search for radio signals from other intelligent civilisations. This search, often known by the acronym SETI (search for extraterrestrial intelligence), is a difficult one. Although groups around the world have been searching intermittently for three decades, it is only now that we have reached the level of technology where we can make a determined attempt to search all nearby stars for any sign of life.

A

The primary reason for the search is basic curiosity - the same curiosity about the natural world that drives all pure science. We want to know whether we are alone in the Universe. We want to know whether life evolves naturally if given the right conditions, or whether there is something very special about the Earth to have fostered the variety of life forms that we see around us on the planet. The simple detection of a radio signal will be sufficient to answer this most basic of all questions. In this sense, SETI is another cog in the machinery of pure science which is continually pushing out the horizon of our knowledge. However, there are other reasons for being interested in whether life exists elsewhere. For example, we have had civilisation on Earth for perhaps only a few thousand years, and the threats of nuclear war and pollution over the last few decades have told us that our survival may be tenuous. Will we last another two thousand years or will we wipe ourselves out? Since the lifetime of a planet like ours is several billion years, we can expect that, if other civilisations do survive in our galaxy, their ages will range from zero to several billion years. Thus any other civilisation that we hear from is likely to be far older, on average, than ourselves. The mere existence of such a civilisation will tell us that long-term survival is possible, and gives us some cause for optimism. It is even possible that the older civilisations may pass on the benefits of their experience in dealing with threats to survival such as nuclear war and global pollution, and other threats that we haven't yet discovered.

B

In discussing whether we are alone, most SETI scientists adopt two ground rules. First, UFOs (Unidentified Flying Objects) are generally ignored since most scientists don't consider the evidence for them to be strong enough to bear serious consideration (although it is also important to keep an open mind in case any really convincing evidence emerges in the future). Second, we make a very conservative assumption that we are looking for a life form that is pretty well like us, since if it differs radically from us we may well not recognise it as a life form, quite apart from whether we are able to communicate with it. In other words, the life form we are looking for may well have two green heads and seven fingers, but it will nevertheless resemble us in that it should communicate with its fellows, be interested in the Universe, live on a planet orbiting a star like our Sun, and perhaps most restrictively, have a chemistry, like us, based on carbon and water.

C

Even when we make these assumptions, our understanding of other life forms is still severely limited. We do not even know, for example, how many stars have planets, and we certainly do not know how likely it is that life will arise naturally, given the right conditions. However, when we look at the 100 billion stars in our galaxy (the Milky Way), and 100 billion galaxies in the observable Universe, it seems inconceivable that at least one of these planets does not have a life form on it; in fact, the best educated guess we can make, using the little that we do know about the conditions for carbon-based life, leads us to estimate that perhaps one in 100,000 stars might have a life-bearing planet orbiting it. That means that our nearest neighbours are perhaps 100 light years away, which is almost next door in astronomical terms.

D

An alien civilisation could choose many different ways of sending information across the galaxy, but many of these either require too much energy, or else are severely attenuated while traversing the vast distances across the galaxy. It turns out that, for a given amount of transmitted power, radio waves in the frequency range 1000 to 3000 MHz travel the greatest distance, and so all searches to date have concentrated on looking for radio waves in this frequency range. So far there have been a number of searches by various groups around the world, including Australian searches using the radio telescope at Parkes, New South Wales. Until now there have not been any detections from the few hundred stars which have been searched. The scale of the searches has been increased dramatically since 1992, when the US Congress voted NASA \$10 million per year for ten years to conduct a thorough search for extra-terrestrial life. Much of the money in this project is being spent on developing the special hardware needed to search many frequencies at once. The project has two parts. One part is a targeted search using the world's largest radio telescopes, the American-operated telescope in Arecibo, Puerto Rico and the French telescope in Nancy in France. This part of the project is searching the nearest 1000 likely stars with high sensitivity for signals in the frequency range 1000 to 3000 MHz. The other part of the project is an undirected search which is monitoring all of space with a lower sensitivity, using the smaller antennas of NASA's Deep Space Network.

E

There is considerable debate over how we should react if we detect a signal from an alien civilisation. Everybody agrees that we should not reply immediately. Quite apart from the impracticality of sending a reply over such large distances at short notice, it raises a host of ethical questions that would have to be addressed by the global community before any reply could be sent. Would the human race face culture shock if faced with a superior and much older civilisation? Luckily, there is no urgency about this. The stars being searched are hundreds of light years away, so it takes hundreds of years for their signal to reach us, and a further few hundred years for our reply to reach them. It's not important, then, if there's a delay of a few years, or decades, while the human race debates the question of whether to reply, and perhaps carefully drafts a reply.

Questions 1-4

Reading Passage 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 Seeking the transmission of radio signals from planets
- ii Appropriate responses to signals from other civilisations
- iii Vast distances to Earth's closest neighbours
- iv Assumptions underlying the search for extra-terrestrial intelligence
- v Reasons for the search for extra-terrestrial intelligence
- vi Knowledge of extra-terrestrial life forms
- vii Likelihood of life on other planets

Example

Paragraph A

Answer

v

1 Paragraph B

2 Paragraph C

3 Paragraph D

4 Paragraph E

BÀI TẬP 02

The Development of Museums

A

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

B

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

C

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

D

Theme parks are undergoing other changes, too, as they try to present more serious social and cultural issues, and move away from fantasy. This development is a response to market forces and, although museums and heritage sites have a special, rather distinct, role to fulfil,

they are also operating in a very competitive environment, where visitors make choices on how and where to spend their free time. Heritage and museum experts do not have to invent stories and recreate historical environments to attract their visitors: their assets are already in place. However, exhibits must be both based on artefacts and facts as we know them, and attractively presented. Those who are professionally engaged in the art of interpreting history are thus in a difficult position, as they must steer a narrow course between the demands of 'evidence' and 'attractiveness', especially given the increasing need in the heritage industry for income-generating activities.

E

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

F

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

Questions 1-4

Reading Passage has six paragraphs, A-F.

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

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

List of Headings

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

Example

Paragraph A

Answer

v

1 Paragraph B

2 Paragraph C

3 Paragraph D

4 Paragraph E