READING PASSAGE 2

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

Biomimicry

A Velcro, now commonly used instead of buttons and zippers, is probably the most famous example of 'biomimicry', where technologists turn to nature for inspiration. In 1948, scientist Georges de Mestral was walking through long grass when he noticed that dozens of seeds had attached themselves to his trousers. Under a microscope, de Mestral noted the hook-and-loop system the seed cases used to stick so firmly, and was inspired.

B US biologist Janine Benyus wrote a book on the subject called *Biomimicry: Innovation Inspired by Nature*. Published in 1997, the book set off the current wave of technology modelled on nature. According to Benyus, our ancestors were practised in the art of biomimicry. 'I think it's an old impulse for humans to take their cues from other organisms,' she says, referring to African tribes that found edible plants by observing the dining habits of chimpanzees. But lately we've become more focused on what we can make ourselves. Benyus thinks our drift away from nature started with the advent of agriculture: 'When we broke free from the challenges of hunting and gathering and learnt to stock our cupboards, we fooled ourselves into believing that we didn't need other organisms at all,' she says.

C The scientific, industrial, petrochemical and genetic engineering revolutions have repeatedly reinforced the idea that we are liberated from biological constraints. In recent years, however, the illusion that we are independent of nature has been shattered by the spectre of global warming and the looming end to fossil fuel supplies. Since few of us would be willing to forgo the products and services we've grown accustomed to – food, water, shelter, the conveniences that modern technology brings – the challenge is to meet the complex demands of civilisation within the bounds of sustainability. 'Nature has learnt to fly, live in the depths of the ocean and craft miracle materials,' writes Benyus. 'Living creatures have done everything we want to do, without guzzling fossil fuel or polluting the planet. What better models could there be?'

D There are no better models, according to Tim Finnigan, a marine engineer at the University of Sydney. In his quest to harness the world's waves and tides for renewable energy more efficiently, Finnigan has taken his cues from aquatic life. With their streamlined bodies and stiff, high tail fins, sharks convert up to 90 per cent of their body energy into forward thrust. Inspired by such efficient hydrodynamics, but turning the theory on its head, Finnigan designed his tidal stream generator: an 18-metre-long biomimetic shark tail with a fin spanning 15 metres. 'Rather than have a body moving through a stationary fluid, we have fluid that's moving past a stationary body,' says Finnigan.

E Then there's Finnigan's biomimetic forest of giant seaweed. 'As a diver I've looked at the way motions occur under water in the presence of waves,' he says. 'I see plants that move quite dramatically and yet they never seem to be pulled out, even in the most dramatic waves.' The trouble with conventional designs, according to Finnigan, is that they're made to stand rigidly against the power of the ocean. 'The structures we try to build in the ocean just never end up being strong enough to survive out there,' says Finnigan. In the manner of aquatic plants and animals, Finnigan's designs respond to changing current or wave conditions by reorienting to maximise energy capture. And in severe weather, to avoid a battering, his wave energy generator will lie flat against the ocean floor.

F While conventional architects were designing buildings dependent on expensive air conditioning systems, when Mick Pearce tried to do the same, he struck a problem. 'We were building office blocks for a client in Zimbabwe and we ran out of funds. So we looked for ways to make a building without traditional air conditioning.' One day, driving through the grasslands, he saw a large mound created by termites, the ant-like insect common in Africa. He noticed that air entering at the base of the mound was mixed with water drawn from subterranean levels by the termites, causing evaporative cooling. Pearce wanted to reproduce this principle but he needed an alternative system, and in his building massive fans were employed at the base of the structure to lower the temperature of the circulating air. Pearce's termite-inspired cooling system cut energy use to 10 per cent of a similar air-conditioned building.

G Photosynthesis is the process by which green plants use energy from the sun to convert water and carbon dioxide into carbohydrates and oxygen. Plants can manage it with humbling ease. But, as the 40 researchers from 11 institutes who have collaborated to form the Australian Artificial Photosynthesis Network have realised, it is very complex. However, there is one aspect working in our favour. In nature, environmental variables like temperature, carbon dioxide and light availability limit the rate of photosynthesis. In a laboratory these variables can be optimized. 'We don't have to cope with drought or frost. We can work with a highly controlled, specified set of conditions,' says Tom Collings, the group's spokesman.

Questions 14-18

Reading Passage 2 has seven paragraphs, ***A–G****.*

Which paragraph contains the following information?

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

14 a reference to a natural process that appears simpler than it actually is

15 a description of an invention that can protect itself under extreme conditions

16 the reasons why humans no longer feel they are free from nature

17 a reference to an animal that influenced the diet of some humans

18 specific reasons why science should copy nature

Questions 19-23

Look at the following statements (Questions 19-23) and the list of researchers below.

Match each statement with the correct researcher, ***A–E****.*

Write the correct letter, ***A–E****, in boxes 19-23 on your answer sheet.*

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

19 Designs often fail when they try to resist natural forces.

20 Science has certain key advantages over nature.

21 People have been copying nature for thousands of years.

22 A shortage of money can inspire innovative design.

23 The discovery that humans could produce food themselves caused them to turn away from nature.

List of Researchers

A Georges de Mestral
B Janine Benyus
C Tim Finnigan
D Mick Pearce
E Tom Collings

Questions 24-26

Complete the summary below.

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

Write your answers in boxes 24-26 on your answer sheet.

A building project in Zimbabwe

Mick Pearce designed a cooling system radically different from those usually used by architects. The design of his office block can be compared to that of a termite's **24** _____. Termites use **25** _____ to cool the air, but in Pearce's system this cooling effect was produced by **26** _____.

Questions 14–18 — “Which paragraph contains…?”

题号	答案	精确定位句（段落）	解释
14	**G**	“Photosynthesis … Plants can manage it with humbling ease. **But … it is very complex.**” （第 G 段）	先说光合作用看似容易，紧接着指出其实“very complex”，符合“看似简单却并不简单的自然过程”。
15	**E**	“…to avoid a battering, **his wave energy generator will lie flat against the ocean floor**.” （第 E 段）	这款仿巨藻的发电装置在极端海况下可“躺平”自保，正是“能在恶劣条件下自我保护的发明”。
16	**C**	“The illusion that we are independent of nature **has been shattered by the spectre of global warming and the looming end to fossil fuel supplies.**” （第 C 段）	句中给出了人类再也无法自称摆脱自然的两大原因——气候变暖与化石燃料枯竭。
17	**B**	“…African tribes that found edible plants by **observing the dining habits of chimpanzees**.” （第 B 段）	提到黑猩猩（动物）如何影响人类的饮食选择。
18	**C**	**“Nature has learnt to fly, live in the depths of the ocean and craft miracle materials**… What better models could there be?” （第 C 段）	逐条列举自然值得模仿的“具体理由”，呼应题干。

Questions 19–23 — “Match each statement with the researcher”

题号	答案	定位句（段落/研究者）	解释
19	**C – Tim Finnigan**	**“The trouble with conventional designs … they’re made to stand rigidly against the power of the ocean … never strong enough to survive** out there.” （第 E 段）	说明当设计尝试“抗拒”自然力量时常常失败。
20	**E – Tom Collings**	“In a laboratory **these variables can be optimised … We don’t have to cope with drought or frost.**” （第 G 段）	指出现代科学可控制环境条件，这是自然不具备的优势。
21	**B – Janine Benyus**	“According to Benyus, **our ancestors were practised in the art of biomimicry.**” （第 B 段）	直言人类“几千年前就开始模仿自然”。
22	**D – Mick Pearce**	**“We ran out of funds. So we looked for ways to make a building without traditional air-conditioning.**” （第 F 段）	资金短缺触发了其仿白蚁巢的创新制冷设计。
23	**B – Janine Benyus**	**“When we broke free from … hunting and gathering … we fooled ourselves into believing that we didn’t need other organisms at all.**” （第 B 段）	将人类开始农业种植（自给自足）视为远离自然的转折点。

Questions 24–26 — Summary completion

提示：每空 **只填一个单词**，答案均来自原文第 *F* 段。

题号	答案	定位句	解释
24	**mound**	“…he saw a large **mound** created by termites…”	Pearce 的写字楼比作白蚁的“mound”。
25	**water**	“…air entering at the base of the mound was mixed with **water** drawn from subterranean levels…”	白蚁利用水进行蒸发冷却。
26	**fans**	“…in his building **massive fans** were employed at the base of the structure to lower the temperature…”	Pearce 用风扇取代白蚁的水来产生冷却效果。