1

READING PASSAGE 1

*You should spend about 20 minutes on **Questions 1-13**, which are based on Reading Passage 1 on pages 2 and 3.*

Sweet Trouble

Problems in the Australian sugar industry

The Australian town of Mossman in the state of Queensland sits in a tropical landscape between the rainforest and the Great Barrier Reef. Eco-tourism is important there; more than 80% of Douglas Shire, of which Mossman is the administrative centre, is protected by World Heritage listing. But for most of the town's history, forest and reef have been largely irrelevant: since the sugar mill was built in 1894, the town has relied on sugarcane. Now Mossman is holding its breath. For two years the mill used by all the farms has been close to bankruptcy. It is at the centre of the economic shocks that have shaken Australia's sugar industry, and for lifetime farmers and a long list of cane industry workers a way of life will disappear if the mill closes. Mossman has roughly 160 growers, who now produce less than one million of the nation's annual cane harvest of 30–40 million tonnes. But it is a microcosm of the industry. All across Australia, the cane-growing business is being squeezed between the pincers of economics and the environment.

The ten-year average return to sugar growers throughout the 1990s was about $350 a tonne. In early 2004, sugar prices plummeted, resulting in a 25-year-low average price for Australian sugar of about $232 a tonne. Although figures vary widely across farms and regions, that was about what it cost to grow a tonne of sugar in Australia. To forestall social and economic disaster, the Government offered more than $400 million to encourage growers to leave the industry. By the end of the year, 21 farmers had taken up the offer to leave, but another 1,000 are thought to be seriously considering it, allowing those remaining to buy the vacated land and improve their economies of scale.

Fourth-generation Mossman grower Bill Phillips-Turner is one who plans to fight on. 'The consequences of losing the mill would be catastrophic,' Bill says. 'Sugar has a big economic multiplier effect: for every dollar generated from sugar, an additional $7 is generated in the wider community. Because of limited options around here, most people now employed by the industry would have to leave the area to find work.' The farmer-shareholders have so far saved the mill by accepting substantial cuts to cane payments, but this has come at a big cost to everyone. As chairman of the board of the mill, Bill has presided over some tough and unpopular decisions; the hardest was slashing the mill workforce. Assets were sold and maintenance costs cut. The board has also worked hard to find new ways of doing business. Ethanol production, where sugar is used to produce fuel, has potential, and co-generation, using cane waste to generate electric power, is another possibility. However, the most radical but preferred alternative is to create a

future for the mill as a food factory, turning out quality sugar-based foods.

In addition to the economic struggle, there is the environmental one. The sugar industry has the reputation of being environmentally damaging, but it has some surprising supporters. Douglas Shire mayor, Mike Berwick, is a well-known environmentalist, and might be expected to be anti-cane. 'There's no question of the past damage it's done to the reef through chemical and nutrient run-off*,' he says. 'But there's a formula for sustainable cane production and Mossman has nearly reached it.' Another surprise endorsement for cane comes from the Queensland Environmental Protection Agency's sugar liaison officer, Karen Benn. 'I'm less worried about the effect of cane on the environment than I am about other agriculture,' she says. 'There are good growers everywhere, but at Mossman they seem to have taken up the challenges faster.' For example, sediment run-off, previously one of the main environmental problems caused by cane growing, is now nothing like it once was, according to Dr Brian Roberts, co-ordinator of the Douglas Shire Water Quality Improvement Program. 'North Queensland used to hold the record for soil loss,' he says. 'Now ... cane country is accumulating soil.'

However, these improvements have been achieved at a great cost to growers. Now in his 60s, Tom Watters has spent a lifetime on the same farm. Fourteen years ago, he was alerted to the effect his cane could be having on Mackay Creek, the narrow waterway that receives all his run-off, and so Tom planted a 5,000-tree buffer along the edge of the creek, built up the edges of the creek with rocks to prevent erosion, and began exploring farming methods that cause minimal soil disturbance. However, none of these costly initiatives has helped him get better cane prices. Another cane grower, Doug Crees, comments that 'Economically, it [cane growing] doesn't make much sense. But there's more to life than money.' It's this addiction to the way of life that keeps many cane farmers growing an under-performing crop. 'It's a good lifestyle,' Doug says. 'I spend eight months working on the farm and four months looking after our kids while my wife works in town. I've been looking at alternative crops, like forestry and cocoa, and it turns out that working away from the farm is the best diversification we could do. However, I still don't want to do that.'

It is difficult to see how anyone can deal satisfactorily with the passing of a way of life. Cane farmers have been part of eastern Queensland for more than a century, but despite the efforts they have put into fighting the good environmental fight, there is no guarantee that the new way of life evolving there will include cane.

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* run-off: water that is used for agriculture and then passes into waterways, carrying soil and agricultural chemicals with it

Questions 5 – 8

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

Write the correct letter in boxes 5-8 on your answer sheet.

5 In the first paragraph, the writer says that the town is 'holding its breath' because

- **A** it has environmental problems.
- **B** its tourism business is threatened.
- **C** most of its people have left the town.
- **D** a key processing plant may shut down.

6 According to the writer, cane growers who refuse the government offer are expected to

- **A** expand their farms.
- **B** sell their land at a low price.
- **C** find jobs in other industries.
- **D** seek financial help from banks.

7 Which of the following did Bill Phillips-Turner find most difficult to do?

- **A** sell mill property
- **B** reduce spending on upkeep
- **C** lower mill workers' wages
- **D** cut the number of mill staff

8 Cane grower Doug Crees says that he

- **A** would prefer to grow cocoa.
- **B** wants to remain on his farm.
- **C** wants his family to live together.
- **D** will look for part-time work in town.

A closer examination of a study on verbal and non-verbal messages

A study of non-verbal communication carried out in 1967 continues to be widely quoted today. David Lapakko looks at limitations in the original study

Description of the Study

The findings of a study on verbal and non-verbal messages in communication by Albert Mehrabian and his colleagues at UCLA* in 1967 have been quoted so frequently that they are now often regarded as a self-evident truth.

In the first experiment, subjects were asked to listen to a recording of a female saying the word '*maybe*' in three tones of voice to convey liking, neutrality and disliking. The subjects were then shown photos of female faces expressing the same three emotions and were asked to guess the emotions in the recorded voice and the photos. It was found that the photos got more accurate responses than the voices. In the second experiment, subjects listened to nine recorded words spoken in different tones of voice. Three words had positive meanings (e.g. *honey*), three were neutral (e.g. *oh*) and three were negative (e.g. *terrible*). Again, the subjects had to guess the speaker's emotions. It was found that tone of voice carried more meaning than the individual words. From these experiments the researchers concluded that 7% of our feeling towards a speaker is based on the actual words they use, 38% on their tone of voice, and 55% on their body language (e.g. facial expression).

Methodological Issues

However, a closer look at the study reveals several limitations. The first is that the entire study involved only 62 subjects. Of these, 25 were used to select the word for the first experiment, while the key issue – comparing verbal and non-verbal communication – was determined by only the 37 remaining subjects. All were female undergraduates who participated as part of their introductory psychology course, and their ages and academic qualifications seem remarkably uniform. Thus, the findings may simply be a product of the nature of the sample.

Critics have also pointed out that the 7-38-55 formula is flawed since it was pieced together from two different experiments, neither of which involved all three channels (verbal, vocal, and facial). In addition, in the first experiment the single word *maybe* was used throughout so it was impossible for the effects of changes in verbal input to be assessed. The researchers intentionally used a 'neutral' word so naturally the subjects found little meaning there. Clearly, such a methodology lacks validity. In the real world, people communicate in a particular context and speak in phrases and full-blown sentences, making extensive use of the multi-faceted vehicle of language.

My concern is that interpretations of this study have gained such prominence in our pedagogical literature. This 7-38-55 formula appears in many basic texts, used for training in public speaking, interpersonal communication and organizational communication.

* UCLA: University of California at Los Angeles

Lessons to consider

Clearly, one appealing aspect of the Mehrabian study is its numerical precision. Communication is a complex phenomenon, but it seems less so when we can rely on these three magical numbers. In contrast to the ambiguities of language, numbers seem to possess exactness. And the popular appeal of the study has given the 7-38-55 formula enormous credibility. There is a certain mystique about non-verbal communication, and the continued references to this research sustain it, encouraging people to believe in the overwhelming importance of the non-verbal message compared with the verbal one. Yet we know that even one ill-chosen word to a colleague or friend can make or break a communicative effort. Words do matter. Bradley (1991), one of the few textbook writers to criticize the Mehrabian study, makes the same point when he observes, 'If we could communicate 93% of information and attitudes with vocal and facial cues, it would be wasteful to spend time learning a language'.

Mehrabian himself believes his research should not be interpreted to devalue the role of language in communication, saying:

> *Please remember that all my findings... dealt with communications of feelings and attitudes... it is absurd to imply or suggest that the verbal portion of all communication constitutes only 7% of the message... anytime we communicate abstract relationships (e.g., x = y – the square of z) clearly 100% of the entire communication is verbal.* (Mehrabian, 1995)

To be fair, many textbook writers attempt to be faithful to the context of Mehrabian's research. For example, Stewart and D'Angelo (1988) write: 'Mehrabian argues that when we're uncertain about what someone's feeling, or about how much we like him or her, we rely...only 7% on the words that are spoken'. Others try to play down the specific percentages, saying that an understanding of the general importance of non-verbal cues is more important. Nonetheless, other textbook authors simply use the numbers without placing any limits on their meaning.

Conclusion

Since this relatively small study was first published it has achieved an influence far beyond its intended scope. We need to put it into its proper perspective and learn some important lessons from it regarding social science research, communication pedagogy, and the forces which have created widespread misunderstanding about communication.

Questions 36 – 40

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

Write the correct letter in boxes 36-40 on your answer sheet.

36 What does the writer say about the 'numerical precision' of Mehrabian's study?

A It makes the claims more attractive.
B It is the strongest point of the study.
C It will appeal to superstitious people.
D It allows comparison between languages.

37 What does the writer say about the popularity of the 7-38-55 formula?

A It is unlikely to maintain its present status.
B It is leading to an undervaluing of language.
C It should be applied in a more practical way.
D It may help understanding of non-verbal messages.

38 What point is Bradley making about language learning?

A Language could be learned more efficiently than it is.
B More research is needed into attitudes to communication.
C More time should be spent looking at tone and body language.
D Language must be important since we make an effort to acquire it.

39 What does Mehrabian himself say about his findings?

A They are relevant to only one area of communication.
B It is only in maths that 100% of communication is verbal.
C Feelings are more difficult to communicate than numerical facts.
D Non-verbal communication is the main part of the message.

40 What is the writer's purpose in the paragraph beginning 'To be fair…'?

A to justify the strong points of Mehrabian's study
B to outline other research on non-verbal behaviour
C to present varying interpretations of Mehrabian's study
D to show that textbooks tend to ignore non-verbal behaviour

5

READING PASSAGE 3

*You should spend about 20 minutes on **Questions 27-40**, which are based on Reading Passage 3 on pages 9 and 10.*

Crossing the Threshold

The renovated Auckland Art Gallery in New Zealand unites old and new, creating an irresistible urge to step inside

Architects are finding it very difficult in today's cultural landscape. The profession faces a three-way threat: a public that apparently doesn't understand what architects do, developers who couldn't care less what they do, and overbearing councils micromanaging every single aspect of what they do. According to sources within the architectural profession, the situation is much worse when architects work on municipal buildings, as architects FJMT and Archimedia discovered with their Auckland Gallery makeover, where a vast number of external pressures threatened the project, and with so many bureaucratic difficulties it looked doomed to fail.

The major challenge of the gallery renovation project was that it involved two parts. The first was to restore the heritage building, dating back to 1888, which contained a network of small spaces, refurbished so often it contained 17 different floor heights. The second was to deliver a new extension that would not only double floor and exhibition space but also attract new patrons, a total necessity. While the old building's circulation was off-putting, so was something intangible yet just as powerful: its atmosphere. For many, Auckland Art Gallery was just an old building that served a limited range of patrons with highbrow interests, missing its chance to engage with new audiences.

A 2003 survey of young people's impressions of the gallery confirmed this opinion, sounding more like references to an abandoned building. For the survey authors, 'threshold fear' – where certain groups are intimidated from entering certain spaces by their off-putting atmosphere – was the institution's undoing, something no architect wants anything to do with. For those young people Auckland Art Gallery was undemocratic, 'dusty' and 'cold' – the epitome of threshold fear. Also, 16% of the sample group had no idea where it even was, despite being interviewed on the pavement right outside it. Clearly, the gallery was fatally out of step at a time when New Zealand's national museum in Wellington was successfully engaging broader audiences with contemporary branding and marketing, interactive displays and temporary events.

The decision to evolve the gallery was actually made in 2000, although it took eight years for building to commence, as the architects fought off heritage committees and conservationists trying to stop them. The architects were not just dealing with a disillusioned public, but also with precious timber and the parkland which surrounds the building. Pushing the design through the Environment Court, the body which approves renovations of this scale, alone took three years. During this time the budget blew out by several million dollars, the funding dried up, and the new wing had to be completely redesigned. Even after the redesign, the use of kauri timber, with its significance to New

Zealand's Maori people*, stirred up political debate. In the new building the architects have used kauri to produce a canopy with a curving interior roof supported by tapered, steel columns, also clad in kauri. The canopy represents a signature public face, its curvature filtering light to the forecourt to the west and creating a visual echo of the canopy of pohutukawa trees in Albert Park to the east. The park also has cultural significance to Maori as it was the site of early settlements.

The connection is reinforced by sculptures from Maori artist Arnold Wilson decorating the columns, while fellow artist Bernard Makoare was a consultant, ensuring the gallery emphasised Maori beliefs. Still that didn't stop the conservationist Stephen King from accusing the architects of 'throwing' kauri at a 'mediocre building' and of misappropriating the 'mana' (spiritual energy) of the precious material (which is almost extinct: harvesting of both petrified and swamp kauri has been likened to a gold rush). However, the kauri that was used here was from the forest floor, and King's misconceptions sum up the prejudice that surrounded the project.

Objections also came from the Auckland Regional Council, worrying about the extension's impact on Albert Park, yet the project's relationship with parkland is one of the most successful outcomes. Impact is not only minimal, but improves the park's social function. The extension's enormous glass atrium opens up the building by directing the gaze from street level to the parkland beyond, while inside, the new art space is fronted along the east by a continuous glass wall incorporating the park into the gallery. The glass becomes a 'screen' for viewing the outside world and makes the art accessible to those in the park, a far cry from both 'white cube' galleries worldwide, the plain boxes where paintings are hung in antiseptic white surroundings, and also the dusty impermeable Auckland Gallery of old.

Another success is the refurbishment of the heritage building, especially the Mackelvie Gallery, in disrepair after its characteristic early twentieth-century Edwardian decoration had been stripped out or walled away in previous renovations. Remarkably the Mackelvie space has been reconstructed from two old photos, although the problem of multiple floor levels was so serious that scaffolding had to be erected at the highest level, with work progressing downwards, the reverse of normal practice. When it was over, a fascinating detail was retained: the lowest level visible under glass embedded in the new floor, the building itself as artwork, while elsewhere columns from the old gallery have been exposed in the walls of the new wing.

In 2008 the gallery averaged just 190,000 visitors annually. After reopening, it had 300,000 in five months. Cynics will chalk that up to novelty of the new, but the fact is the gallery is now an alluring cultural space which is crawling with young people.

* Maori: an indigenous people who were already living in New Zealand when Europeans arrived

Questions 27 – 31

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

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

27 What is the writer's main point in the first paragraph?

- **A** Criticism of architects by different groups is unfair.
- **B** The architectural profession is generally well respected.
- **C** The most difficult projects for architects are public buildings.
- **D** Failure to deliver buildings is a result of poor communication.

28 The Auckland Gallery project was particularly difficult because

- **A** the existing building was old and parts of it had fallen down.
- **B** there was a high number of floors in the building.
- **C** it needed to satisfy the requirements of the existing patrons.
- **D** it involved renovating the existing building and adding a new one.

29 What disturbing information did the architects find out from the survey of young people?

- **A** They did not visit the gallery because of the way it made them feel.
- **B** They thought that the gallery buildings were not in use.
- **C** The gallery had the reputation of being dirty.
- **D** They did not like the entrance.

30 What point is the writer making when he says that 16% of the sample group did not know where the museum was?

- **A** Young people are not interested in galleries.
- **B** The gallery was not reaching out to involve young people.
- **C** The entrance to the gallery was not well signposted.
- **D** The location of the gallery was difficult to access.

31 Maori artists were used on this project to

- **A** satisfy the concerns of conservationists.
- **B** protect sacred materials in the Albert Park site.
- **C** make sure the gallery respects Maori culture.
- **D** ensure that certain sources of kauri were not used.

READING PASSAGE 3

*You should spend about 20 minutes on **Questions 27-40**, which are based on Reading Passage 3 on pages 10 and 11.*

Innovation in Business

Innovation describes the way that we develop new ideas, products and approaches, and it is one of the most vital human endeavours. Over the history of humanity, innovation has made life better in so many different ways. It is part of human nature to recognise the benefits of innovation; however, the majority of us have little comprehension of the processes that actually lead to innovation occurring. It is a frequent topic for discussion in journals and university lecture theatres. However, in company boardrooms across New Zealand, the term is heard far too frequently and more caution should be applied. Certainly, a recent international survey showed that the idea of innovation is so broad as to appear almost meaningless, with different sectors of the business world – or different divisions inside the same business – often defining innovation in their own way.

While there is an obvious attraction to the new, innovation is not always about large scale research and development projects or revolutionary business models; it can be on a small, highly localised scale and involve a step-by-step approach. The famous case study of the drinks company Lucozade shows it can be as simple as adding a screw top to a bottle. This carefully managed change in packaging shifted the public perception of the product from a medicine to a sports drink and Lucozade profited handsomely, clearly showing their approach was successful. So what steps can businesses take to keep ahead in the innovation game?

There seems to be a widespread belief that the world's best ideas are sudden and intuitive. Thomas Edison supposedly invented the light bulb with a sudden moment of clarity, but in fact the book *Edison: His Life and Inventions* shows that Edison's own inspiration usually resulted from laborious experimentation, rather than a moment of genius. Thus, business managers are at risk of overestimating the pace of development while underestimating the amount of perseverance needed. This is why we must reject the false assumption that innovation is just a moment of brilliance waiting to strike.

No exploration of innovation is complete without mention of Steve Jobs, the late chief executive officer (CEO) of Apple. No-one encapsulated the creative essence of Silicon Valley, the home of many global tech companies, better than Jobs, but he has also been accused of arrogance. Jobs' managerial approach often irritated his co-workers but, in part, it was the fuel for his visionary innovations. He felt it his duty to make society a better place, but his egotistical behaviour could have undesirable consequences, too. Jobs' former employees have suggested this type of demanding behaviour affects sickness rates and group morale, which in turn may squash creativity and innovation.

In his 2011 TED (Technology, Entertainment, Design) Talk, economist Tim Harford made this statement: 'Show me a successful complex system, and I will show you a system that has evolved through trial and error.' It sounds like common sense, and some commentators have claimed Harford's TED Talk was not persuasive, because it was stating the obvious. But he responds that a trial and error approach is not all that obvious, because society expects all problems to have a quick and simple solution. Harford is right to point out that both consumers and investors expect consistent and clear breakthroughs. But the value of step-by-step innovation is often underrated and failure may in fact be crucial to eventual success.

Former chief solutions officer at Yahoo, Tim Sanders, believes that innovation is only 'little ideas that combine with other little ideas that improve themselves into game-changing ideas'. This snowballing effect has similarities to the phenomenon that author and broadcaster Steven Johnson calls the 'hummingbird effect' of innovation. This points out that progress in a specific area or discipline can end up triggering small but significant developments elsewhere entirely. A good case to cite in support of this universal truth would be Gutenberg's printing press, which was revolutionary in itself for making books accessible to the masses. However, the press also affected an unrelated industry by causing a rise in demand for reading glasses.

This highlights the wider idea of connectivity, which is an essential component of innovation. When Kode Biotech won a recent innovation award, CEO Steve Henry had this to say: 'Most people think innovation is invention, but they don't understand that innovation is the conversion of invention into something useful.' This is particularly true when it comes to Kode's highly specialised use of nano-technology. Henry says that Kode cannot chase all the opportunities it has created. Instead, Kode's approach is to collaborate with similar nano-technology businesses, which take its innovations and develop them into commodities that can be sold in the marketplace.

Innovation can be hectic and disorganised, but that is the way that radical new ideas sometimes come about. But, for established businesses, the disorderly nature of innovation can seem discouraging. Previously Unavailable, a specialist innovation consultancy, says that while 84% of businesses consider innovation critical to their future, only 6% are satisfied with their innovation efforts. Previously Unavailable uses a process called Black Box, which was developed following a study at Harvard Business School. Black Box was formed to overcome the barriers that prevent innovation in larger organisations. Using this unique system, Previously Unavailable will lease a team of innovation experts on a short-term basis to client organisations to assist with conceiving, developing and launching new products and business innovation. It seems probable that this sort of innovation consultancy will become increasingly common, just as businesses already employ specialist consultants for legal, financial or marketing services.

Questions 31 – 35

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

Write the correct letter in boxes 31-35 on your answer sheet.

31 What is the writer doing in the third paragraph?

A criticising the conclusions of one publication

B praising the contribution of a famous inventor

C dismissing one common idea about innovation

D suggesting that innovation changes over time

32 What is the writer's main point in the fourth paragraph?

A Each industry will innovate in its own way.

B There are pros and cons to strong leaders.

C Some individuals are more innovative than others.

D Leadership requires building teams that work together.

33 The writer refers to Gutenberg's printing press in order to

A compare how two different innovations developed.

B illustrate an exception to his point about innovation.

C show why one approach to innovation was controversial.

D give an example of a general rule about innovation.

34 What is the writer's main point in the seventh paragraph?

A Companies should cooperate to turn ideas into products.

B A company tends to make profits from its own innovations.

C Science and business can often have common goals.

D Competition between businesses produces innovation.

35 According to the writer, companies like Previously Unavailable

A have published valuable research about innovation.

B help companies recruit people with skills in innovation.

C run university courses teaching innovation skills.

D can be hired to give businesses advice about innovation.

READING PASSAGE 3

*You should spend about 20 minutes on **Questions 27-40**, which are based on Reading Passage 3 on pages 10 and 11.*

The strange world of sight

Seeing is believing, it is said. But, asks Richard Gregory, could it be the other way round?

Two of the great British men of the 17th century, the philosopher John Locke and the physicist Isaac Newton, were both aware that objects are not coloured, and that against all appearances light is not coloured either. This is still not generally recognised even now, 400 years later, because it seems so implausible. Yet it tells us something very important – that perceptions are not identical with what we perceive, and may be very different.

The most accurate historical account of perception is that of the 19th-century German scientist Hermann von Helmholtz. However, it was ridiculed at the time. Von Helmholtz thought that perceptions are unconscious inferences we make based on a combination of clues provided by the eyes and other senses, and knowledge of the world. This idea of unconscious inference for perception preceded, by several years, the psychoanalyst Freud's notion of the unconscious, which was also initially treated with derision because it undermined the notion of humans as pre-eminently rational beings who could be held responsible for their actions and awarded blame or praise accordingly.

Crucially, perception of the present depends on rich, though of course not always correct or appropriate, knowledge from the past. We interpret sense data (what we hear, touch, taste, see and smell) from the present according to what we already know. This raises the question: if we see the present through memory, why aren't past and present confused? The pioneering Russian neurologist Alexander Luria described the case of Mr S, who had a remarkable memory. However, he was prone to just such confusions, for example mistaking seeing his clock for remembering it, and so failing to get up in the morning. This suggests that perhaps an important function of perception is to underline the present. Individual perceptions have a vividness that is rare for memories, which might be how we are able to separate them. Try this: look at something for a few seconds, and then shut your eyes and visualise it in memory. You will almost certainly find that the memory is pale by comparison with the perception. Perhaps this is why past and present are not normally confused. Luria's Mr S had exceptionally vivid memories, and rich synaesthesia (experiencing perceptions from another sense as well as the one being stimulated, such as musical notes experienced as colours), which may be why he confused seeing with having seen.

The complexity of processes involved in how we see first impressed itself on me 45 years ago. With my colleague Jean Wallace, I studied the rare case of Sydney Bradford, a man who had been born blind but, through a corneal graft at the age of 52, suddenly found himself able to see. Almost immediately after the operation he was able to 'see' but he could only see those things that he already knew about, having experienced them through touch. It was his touch memories that enabled him to perceive them with his eyes. When Bradford was first taken to the zoo, he proved utterly unable to see an elephant as he had no knowledge to make sense of his perceptions.

The more recent case in California of Mike May, who was also born blind, is similar. Since his operation, his sight has gradually improved as he learns to see, for example, by understanding how shadows represent depth and tell us about the shape of things. Some of the consequences of May's new-found vision were less happy. He had been a champion blind skier, but following the operation, he would have to shut his eyes while skiing to block out what he now found was a terrifying sight.

But acceptance of this intimate connection between memory and perception, even though it was first noticed in the 17th century, has been slow in brain science. Despite the fact that state-of-the-art brain imaging shows that perception animates parts of the brain associated with both present information and memory, most research on memory and perception is still undertaken as if these were separate processes. Seeing used to be thought of as taking place only in the eyes, and in quite specialised brain regions; but now it seems that half the brain is occupied with seeing, requiring a lot of energy. Perhaps this is why we shut our eyes for a rest.

It is not just extreme cases like Mike May, but also much more common errors of seeing – illusions – that can reveal the crucial role of memory in governing what we (think we) see. Perception depends on specific knowledge and probabilities. Our brains calculate the likelihood of what is out there, and when too far-fetched, perceptions are rejected.

A dramatic and discomforting example is looking at the two sides of a face-mask. From the front it is a convex shape with the nose sticking out. Then if the mask is rotated, the back of the mask will be seen as convex, though we know that it must be concave. It is almost, if not quite, impossible to sketch the back of a hollow mask to look as it is – hollow. Science often learns from what does not happen: people not seeing a hollow face as hollow is the most revealing experiment on perception. The unsettling truth from brain science is that even people with no visual impairment see what, at some level, they expect to see, and often miss things as they really are.

Questions 27 – 30

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

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

27 Why does the writer refer to Locke and Newton in the first paragraph?

- **A** to indicate that his article will cover several scientific fields
- **B** to stress how much physics has changed in 400 years
- **C** to persuade the reader to take him seriously
- **D** to point out that his notions are not new

28 According to the writer, why was Freud's theory of the unconscious mocked?

- **A** It was too complex for his contemporaries to understand.
- **B** It involved criticism of the way people behaved in society.
- **C** People felt that it devalued the accepted concept of humanity.
- **D** People assumed that it was intended as a joke.

29 The writer describes Mr S failing to get up in order to demonstrate

- **A** how realistic most people's memories are.
- **B** how hard it is to tell dreaming and waking apart.
- **C** how unusual it is to mistake a perception for a memory.
- **D** how valuable knowledge of the past can be.

30 What point is the writer making in the text as a whole?

- **A** Perception involves much more than the data collected by the eyes.
- **B** Learning to see as an adult can be a time-consuming process.
- **C** Science is failing to devote enough attention to sight.
- **D** Human perception is remarkably reliable.

READING PASSAGE 2

You should spend about 20 minutes on **Questions 14-26**, which are based on Reacting Passage 2 on pages 6 and 7.

Why do we need the arts?

Sometimes people question why we need 'the arts'; what functions do art, music, dance and literature serve?

A. Imagine a world in which people spend hours working in offices or factories, and then go home in the evening to sit down to dinner, after which they sleep until it's time to get up and work again. In this world, people do not read or watch TV, listen to music, play computer games or have pictures to decorate their homes. In fact, there are no pictures in this world – not even advertisements are illustrated, but all are words, and very plain ones at that, with no playfulness left in them. The buildings are completely functional without a single decorative feature anywhere, and there is no music to dance to and enjoy. Such a world is a world without the arts in any form.

B. To ask what the arts are good for is not exactly the same as asking what their purpose is. The arts do not have to have a purpose – they do not exist in order to teach, to make a moral point. to entertain, to distract, to amuse, to support a revolution, to disgust, to challenge, to stimulate or to cheer; they exist chiefly for their own sake. It is artists, not the arts as such, that may have an aim in mind, and their aim may be to do any of the things just listed. But equally, artists may just make a work of art because they feel compelled to. Because the work is its own justification, no aim or goal is necessarily required to explain or, still less, to justify its existence.

C. But to say that the arts do not have to serve an aim beyond themselves, even though they may sometimes do so, is not to say that they are good for nothing. On the contrary, as such an important part of human experience, they are good for many things. The distinction here lies between things that are instrumental and things that are ends in themselves. An instrument exists for something beyond itself – namely, for what it can be used to do. We know that pictures are used as instruments in advertising, and the objective is always to persuade us to buy something. Similarly, music can be written chiefly to accompany dancing, or as a soundtrack to a movie. A play can be written to point out to the theatre audience a social injustice or other problems that should be dealt with. But even though the arts can sometimes be instrumental, that fact is not essential to their nature. What the arts are 'good for' arises from their being an end in themselves, or more accurately, representing many different things that are valuable for their own sakes – such as, for instance, the creation of beauty.

D. The phrase 'the arts' includes painting, sculpture, music, literature, dance and theatre performance, and whatever else (to quote the famous US artist Andy Warhol) anyone can get away with in calling their creation a contribution to 'the arts'. But the generalisation that the arts, whatever else they are, are always an end in themselves, applies to them all. The arts are one major form of response to the world. They are often an attempt to capture an aspect of the world, to draw attention to something about it to comment on it, to

present a surprising or fresh angle on it, to represent it for the sake of exploring something about it, or enjoying or celebrating it. They can help people to focus on, for example, the colour or shape of an object, its eccentricity or typicality, and the interest or perhaps disgust it provokes in them.

E. For a loose comparison, think of laughing at a joke. We do not laugh so that we can achieve a further goal – in order to be healthy or relaxed, say, even if we thereby succeed in being healthier or more relaxed – but simply because the joke has elicited that reaction. But although it is merely a reaction. laughing is, in fact, good for something nevertheless; it does make people feel better. The arts are a reaction in the same way. French artist Cézanne painted Mont Sainte-Victoire repeatedly because he was fascinated by it, not because he thought that painting it would say something about politics or society or human hopes. Being fascinated by something, attracted to it, repelled by it, keen to reveal an unusual aspect of it, are all responses to that thing; the making of the arts is one outstanding way of expressing such responses.

F. But the arts are a response not only to things in the world but also to experience of the world, which lies inside the artist himself. And they are also often an expression of what presses from within the artist without being elicited by externals. Music is a prime example. A symphony, unless it is devised to represent bird song, rain, the sea and the like, is an abstract expression of a composers conception. We may be able to describe what the Russian composer Tchaikovsky is doing in his ballet music, but how can we describe what he is expressing in his piano concertos? Composers may experiment with melody and rhythm in very abstract, sometimes mathematical, ways.

G. When artists get to work responding to and expressing ideas, whether or not they also want to make a point. entertain, distract, support a revolution and the rest, they are producing something that someone else will react to in some way. They seek to connect with their audience and express an idea or emotion which has the capacity to enrich our experience of life itself.

Questions 23 and 24

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

Write the correct letters in boxes 23 and 24 on your answer sheet.

In paragraph **D**, which **TWO** of the following effects does the writer say the arts can have?

A They can interest people from all over the world.
B They can make us see things from a different perspective.
C They can inspire us to take up an artistic activity ourselves.
D They can encourage us to think about our reactions to things around us.
E They can draw our attention to serious global issues.

Questions 25 and 26

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

Write the correct letters in boxes 25 and 26 on your answer sheet.

Which **TWO** of the following statements about composers and music does the writer make?

A Music tends to spring from the composer's individual experiences.
B Composers need to structure music very carefully.
C Music can be quite unrelated to the natural world.
D Music finds its best expression in a symphony.
E Composers are good at depicting the world around us.