READING

READING PASSAGE 1

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

Materials to take us beyond concrete

Concrete is everywhere, but it's bad for the planet, generating large amounts of carbon dioxide – alternatives are being developed

A Concrete is the second most used substance in the global economy, after water – and one of the world's biggest single sources of greenhouse gas emissions. The chemical process by which cement, the key ingredient of concrete, is created results in large quantities of carbon dioxide. The UN estimates that there will be 9.8 billion people living on the planet by mid-century. They will need somewhere to live. If concrete is the only answer to the construction of new cities, then carbon emissions will soar, aggravating global warming. And so scientists have started innovating with other materials, in a scramble for alternatives to a universal commodity that has underpinned our modern life for many years.

B The problem with replacing concrete is that it is so very good at what it does. Chris Cheeseman, an engineering professor at Imperial College London, says the key thing to consider is the extent to which concrete is used around the world, and is likely to continue to be used. 'Concrete is not a high-carbon product. Cement is high carbon, but concrete is not. But it is the scale on which it is used that makes it high carbon. The sheer scale of manufacture is so huge, that is the issue.'

C Not only are the ingredients of concrete relatively cheap and found in abundance in most places around the globe, the stuff itself has marvellous properties: Portland cement, the vital component of concrete, is mouldable and pourable, but quickly sets hard. Cheeseman also notes another advantage: concrete and steel have similar thermal expansion properties, so steel can be used to reinforce concrete, making it far stronger and more flexible as a building material than it could be on its own. According to Cheeseman, all these factors together make concrete hard to beat. 'Concrete is amazing stuff. Making anything with similar properties is going to be very difficult.'

D A possible alternative to concrete is wood. Making buildings from wood may seem like a rather medieval idea, but climate change is driving architects to turn to treated timber as a possible resource. Recent years have seen the emergence of tall buildings constructed almost entirely from timber. Vancouver, Vienna and Brumunddal in Norway are all home to constructed tall, wooden buildings.

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E Using wood to construct buildings, however, is not straightforward. Wood expands as it absorbs moisture from the air and is susceptible to pests, not to mention fire. But treating wood and combining it with other materials can improve its properties. Cross-laminated timber is engineered wood. An adhesive is used to stick layers of solid-sawn timber together, crosswise, to form building blocks. This material is light but has the strength of concrete and steel. Construction experts say that wooden buildings can be constructed at a greater speed than ones of concrete and steel and the process, it seems, is quieter.

F Stora Enso is Europe's biggest supplier of cross-laminated timber, and its vice-president Markus Mannström reports that the company is seeing increasing demand globally for building in wood, with climate change concerns the key driver. Finland, with its large forests, where Stora Enso is based, has been leading the way, but the company is seeing a rise in demand for its timber products across the world, including in Asia. Of course, using timber in a building also locks away the carbon that it absorbed as it grew. But even treated wood has its limitations and only when a wider range of construction projects has been proven in practice will it be possible to see wood as a real alternative to concrete in constructing tall buildings.

G Fly ash and slag from iron ore are possible alternatives to cement in a concrete mix. Fly ash, a byproduct of coal-burning power plants, can be incorporated into concrete mixes to make up as much as 15 to 30% of the cement, without harming the strength or durability of the resulting mix. Iron-ore slag, a byproduct of the iron-ore smelting process, can be used in a similar way. Their incorporation into concrete mixes has the potential to reduce greenhouse gas emissions.

But Anna Surgenor, of the UK's Green Building Council, notes that although these waste products can save carbon in the concrete mix, their use is not always straightforward. 'It's possible to replace the cement content in concrete with waste products to lower the overall carbon impact. But there are several calculations that need to be considered across the entire life cycle of the building – these include factoring in where these materials are being shipped from. If they are transported over long distances, using fossil fuels, the use of alternative materials might not make sense from an overall carbon reduction perspective.'

H While these technologies are all promising ideas, they are either unproven or based on materials that are not abundant. In their overview of innovation in the concrete industry, Felix Preston and Johanna Lehne of the UK's Royal Institute of International Affairs reached the conclusion that, 'Some novel cements have been discussed for more than a decade within the research community, without breaking through. At present, these alternatives are rarely as cost-effective as conventional cement, and they face raw-material shortages and resistance from customers.'

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Questions 1–4

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

Which section contains the following information?

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

1 an explanation of the industrial processes that create potential raw materials for concrete

2 a reference to the various locations where high-rise wooden buildings can be found

3 an indication of how widely available the raw materials of concrete are

4 the belief that more high-rise wooden buildings are needed before wood can be regarded as a viable construction material

Questions 5–8

Complete the summary below.

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

Write your answers in boxes 5–8 on your answer sheet.

Making buildings with wood

Wood is a traditional building material, but current environmental concerns are encouraging **5** ..... to use wood in modern construction projects. Using wood, however, has its challenges. For example, as **6** ..... in the atmosphere enters wood, it increases in size. In addition, wood is prone to pests and the risk of fire is greater. However, wood can be turned into a better construction material if it is treated and combined with other materials. In one process, **7** ..... of solid wood are glued together to create building blocks. These blocks are lighter than concrete and steel but equal them in strength. Experts say that wooden buildings are an improvement on those made of concrete and steel in terms of the **8** ..... with which they can be constructed and how much noise is generated by the process.

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Questions 9–13

Look at the following statements (Questions 9–13) 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 9–13 on your answer sheet.*

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

9 The environmental advantage of cement alternatives may not be as great as initially assumed.

10 It would be hard to create a construction alternative to concrete that offers so many comparable benefits.

11 Worries about the environment have led to increased interest in wood as a construction material.

12 Expense has been a factor in the negative response to the development of new cements.

13 The environmental damage caused by concrete is due to it being produced in large quantities.

List of People

A Chris Cheeseman

B Markus Mannström

C Anna Surgenor

D Felix Preston and Johanna Lehne

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READING PASSAGE 2

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

The pirates of the ancient Mediterranean

In the first and second millennia BCE, pirates sailed around the Mediterranean, attacking ships and avoiding pursuers

A When one mentions pirates, an image springs to most people's minds of a crew of misfits, daredevils and adventurers in command of a tall sailing ship in the Caribbean Sea. Yet from the first to the third millennium BCE, thousands of years before these swashbucklers began spreading fear across the Caribbean, pirates prowled the Mediterranean, raiding merchant ships and threatening vital trade routes. However, despite all efforts and the might of various ancient states, piracy could not be stopped. The situation remained unchanged for thousands of years. Only when the pirates directly threatened the interests of ancient Rome did the Roman Republic organise a massive fleet to eliminate piracy. Under the command of the Roman general Pompey, Rome eradicated piracy, transforming the Mediterranean into *'Mare Nostrum'* (Our Sea).

B Although piracy in the Mediterranean is first recorded in ancient Egypt during the reign of Pharaoh Amenhotep III (c 1390–1353 BCE), it is reasonable to assume it predated this powerful civilisation. This is partly due to the great importance the Mediterranean held at this time, and partly due to its geography. While the Mediterranean region is predominantly fertile, some parts are rugged and hilly, even mountainous. In the ancient times, the inhabitants of these areas relied heavily on marine resources, including fish and salt. Most had their own boats, possessed good seafaring skills, and unsurpassed knowledge of the local coastline and sailing routes. Thus, it is not surprising that during hardships, these men turned to piracy. Geography itself further benefited the pirates, with the numerous coves along the coast providing places for them to hide their boats and strike undetected. Before the invention of ocean-going caravels* in the 15th century, ships could not easily cross long distances over open water. Thus, in the ancient world most were restricted to a few well-known navigable routes that followed the coastline. Caught in a trap, a slow merchant ship laden with goods had no other option but to surrender. In addition, knowledge of the local area helped the pirates to avoid retaliation once a state fleet arrived.

C One should also add that it was not unknown in the first and second millennia BCE for governments to resort to pirates' services, especially during wartime, employing their skills and numbers against their opponents. A pirate fleet would serve in the first wave of attack, preparing the way for the navy. Some of the regions were known for providing safe harbours to pirates, who, in return, boosted the local economy.

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* caravel: a small, highly manoeuvrable sailing ship developed by the Portuguese

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D The first known record of a named group of Mediterranean pirates, made during the rule of ancient Egyptian Pharaoh Akhenaten (c 1353–1336 BCE), was in the Amarna Letters. These were extracts of diplomatic correspondence between the pharaoh and his allies, and covered many pressing issues, including piracy. It seems the pharaoh was troubled by two distinct pirate groups, the Lukka and the Sherden. Despite the Egyptian fleet's best efforts, the pirates continued to cause substantial disruption to regional commerce. In the letters, the king of Alashiya (modern Cyprus) rejected Akhenaten's claims of a connection with the Lukka (based in modern-day Turkey). The king assured Akhenaten he was prepared to punish any of his subjects involved in piracy.

E The ancient Greek world's experience of piracy was different from that of Egyptian rulers. While Egypt's power was land-based, the ancient Greeks relied on the Mediterranean in almost all aspects of life, from trade to warfare. Interestingly, in his works the *Iliad* and the *Odyssey*, the ancient Greek writer Homer not only condones, but praises the lifestyle and actions of pirates. The opinion remained unchanged in the following centuries. The ancient Greek historian Thucydides, for instance, glorified pirates' daring attacks on ships or even cities. For Greeks, piracy was a part of everyday life. Even high-ranking members of the state were not beyond engaging in such activities. According to the Greek orator Demosthenes, in 355 BCE, Athenian ambassadors made a detour from their official travel to capture a ship sailing from Egypt, taking the wealth found onboard for themselves! The Greeks' liberal approach towards piracy does not mean they always tolerated it, but attempts to curtail piracy were hampered by the large number of pirates operating in the Mediterranean.

F The rising power of ancient Rome required the Roman Republic to deal with piracy in the Mediterranean. While piracy was a serious issue for the Republic, Rome profited greatly from its existence. Pirate raids provided a steady source of slaves, essential for Rome's agriculture and mining industries. But this arrangement could work only while the pirates left Roman interests alone. Pirate attacks on grain ships, which were essential to Roman citizens, led to angry voices in the Senate, demanding punishment of the culprits. Rome, however, did nothing, further encouraging piracy. By the 1st century BCE, emboldened pirates kidnapped prominent Roman dignitaries, asking for a large ransom to be paid. Their most famous hostage was none other than Julius Caesar, captured in 75 BCE.

G By now, Rome was well aware that pirates had outlived their usefulness. The time had come for concerted action. In 67 BCE, a new law granted Pompey vast funds to combat the Mediterranean menace. Taking personal command, Pompey divided the entire Mediterranean into 13 districts, assigning a fleet and commander to each. After cleansing one district of pirates, the fleet would join another in the next district. The process continued until the entire Mediterranean was free of pirates. Although thousands of pirates died at the hands of Pompey's troops, as a long-term solution to the problem, many more were offered land in fertile areas located far from the sea. Instead of a maritime menace, Rome got productive farmers that further boosted its economy.

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Questions 14–19

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

Which paragraph contains the following information?

*Write the correct letter, **A–G**, in boxes 14–19 on your answer sheet.*

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

14 a reference to a denial of involvement in piracy

15 details of how a campaign to eradicate piracy was carried out

16 a mention of the circumstances in which states in the ancient world would make use of pirates

17 a reference to how people today commonly view pirates

18 an explanation of how some people were encouraged not to return to piracy

19 a mention of the need for many sailing vessels to stay relatively close to land

Questions 20 and 21

*Choose **TWO** letters, **A–E**.*

Write the correct letters in boxes 20 and 21 on your answer sheet.

Which **TWO** of the following statements does the writer make about inhabitants of the Mediterranean region in the ancient world?

A They often used stolen vessels to carry out pirate attacks.
B They managed to escape capture by the authorities because they knew the area so well.
C They paid for information about the routes merchant ships would take.
D They depended more on the sea for their livelihood than on farming.
E They stored many of the goods taken in pirate attacks in coves along the coastline.

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Questions 22 and 23

*Choose **TWO** letters, **A–E**.*

Write the correct letters in boxes 22 and 23 on your answer sheet.

Which **TWO** of the following statements does the writer make about piracy and ancient Greece?

A The state estimated that very few people were involved in piracy.
B Attitudes towards piracy changed shortly after the *Iliad* and the *Odyssey* were written.
C Important officials were known to occasionally take part in piracy.
D Every citizen regarded pirate attacks on cities as unacceptable.
E A favourable view of piracy is evident in certain ancient Greek texts.

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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.

Ancient Rome and piracy

Piracy was an issue ancient Rome had to deal with, but it also brought some benefits for Rome. For example, pirates supplied slaves that were important for Rome's industries. However, attacks on vessels transporting **24** ..... to Rome resulted in calls for **25** ..... for the pirates responsible. Nevertheless, piracy continued, with some pirates demanding a **26** ..... for the return of the Roman officials they captured.

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READING PASSAGE 3

*You should spend about 20 minutes on **Questions 27–40**, which are based on Reading Passage 3 below.*

The persistence and peril of misinformation

Brian Southwell looks at how human brains verify information and discusses some of the challenges of battling widespread falsehoods

Misinformation – both deliberately promoted and accidentally shared – is perhaps an inevitable part of the world in which we live, but it is not a new problem. People likely have lied to one another for roughly as long as verbal communication has existed. Deceiving others can offer an apparent opportunity to gain strategic advantage, to motivate others to action, or even to protect interpersonal bonds. Moreover, people inadvertently have been sharing inaccurate information with one another for thousands of years.

However, we currently live in an era in which technology enables information to reach large audiences distributed across the globe, and thus the potential for immediate and widespread effects from misinformation now looms larger than in the past. Yet the means to correct misinformation might, over time, be found in those same patterns of mass communication and of the facilitated spread of information.

The main worry regarding misinformation is its potential to unduly influence attitudes and behavior, leading people to think and act differently than they would if they were correctly informed, as suggested by the research teams of Stephan Lewandowsky of the University of Bristol and Elizabeth Marsh of Duke University, among others. In other words, we worry that misinformation might lead people to hold misperceptions (or false beliefs) and that these misperceptions, especially when they occur among large groups of people, may have detrimental, downstream consequences for health, social harmony, and the political climate.

At least three observations related to misinformation in the contemporary mass-media environment warrant the attention of researchers, policy makers, and really everyone who watches television, listens to the radio, or reads information online. First of all, people who encounter misinformation tend to believe it, at least initially. Secondly, electronic and print media often do not block many types of misinformation before it appears in content available to large audiences. Thirdly, countering misinformation once it has enjoyed wide exposure can be a resource-intensive effort.

Knowing what happens when people initially encounter misinformation holds tremendous importance for estimating the potential for subsequent problems. Although it is fairly routine for individuals to come across information that is false, the question of exactly how – and when – we mentally label information as true or false has garnered philosophical debate. The dilemma is neatly summarized by a contrast between how the 17th-century philosophers René Descartes and Baruch Spinoza described human information engagement, with conflicting predictions that only

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recently have been empirically tested in robust ways. Descartes argued that a person only accepts or rejects information after considering its truth or falsehood; Spinoza argued that people accept all encountered information (or misinformation) by default and then subsequently verify or reject it through a separate cognitive process. In recent decades, empirical evidence from the research teams of Erik Asp of the University of Chicago and Daniel Gilbert at Harvard University, among others, has supported Spinoza's account: people appear to encode all new information as if it were true, even if only momentarily, and later tag the information as being either true or false, a pattern that seems consistent with the observation that mental resources for skepticism physically reside in a different part of the brain than the resources used in perceiving and encoding.

What about our second observation that misinformation often can appear in electronic or print media without being preemptively blocked? In support of this, one might consider the nature of regulatory structures in the United States: regulatory agencies here tend to focus on post hoc detection of broadcast information. Organizations such as the Food and Drug Administration (FDA) offer considerable monitoring and notification functions, but these roles typically do not involve preemptive censoring. The FDA oversees direct-to-consumer prescription drug advertising, for example, and has developed mechanisms such as the 'Bad Ad' program, through which people can report advertising in apparent violation of FDA guidelines on drug risks. Such programs, although laudable and useful, do not keep false advertising off the airwaves. In addition, even misinformation that is successfully corrected can continue to affect attitudes.

This leads us to our third observation: a campaign to correct misinformation, even if rhetorically compelling, requires resources and planning to accomplish necessary reach and frequency. For corrective campaigns to be persuasive, audiences need to be able to comprehend them, which requires either effort to frame messages in ways that are accessible or effort to educate and sensitize audiences to the possibility of misinformation. That some audiences might be unaware of the potential for misinformation also suggests the utility of media literacy efforts as early as elementary school. Even with journalists and scholars pointing to the phenomenon of 'fake news', people do not distinguish between demonstrably false stories and those based in fact when scanning and processing written information.

We live at a time when widespread misinformation is common. Yet at this time many people also are passionately developing potential solutions and remedies. The journey forward undoubtedly will be a long and arduous one. Future remedies will require not only continued theoretical consideration but also the development and maintenance of consistent monitoring tools – and a recognition among fellow members of society that claims which find prominence in the media that are insufficiently based in scientific consensus and social reality should be countered. Misinformation arises as a result of human fallibility and human information needs. To overcome the worst effects of the phenomenon, we will need coordinated efforts over time, rather than any singular one-time panacea we could hope to offer.

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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 What point does the writer make about misinformation in the first paragraph?

A Misinformation is a relatively recent phenomenon.
B Some people find it easy to identify misinformation.
C Misinformation changes as it is passed from one person to another.
D There may be a number of reasons for the spread of misinformation.

28 What does the writer say about the role of technology?

A It may at some point provide us with a solution to misinformation.
B It could fundamentally alter the way in which people regard information.
C It has changed the way in which organisations use misinformation.
D It has made it easier for people to check whether information is accurate.

29 What is the writer doing in the fourth paragraph?

A comparing the different opinions people have of misinformation
B explaining how the effects of misinformation have changed over time
C outlining which issues connected with misinformation are significant today
D describing the attitude of policy makers towards misinformation in the media

30 What point does the writer make about regulation in the USA?

A The guidelines issued by the FDA need to be simplified.
B Regulation does not affect people's opinions of new prescription drugs.
C The USA has more regulatory bodies than most other countries.
D Regulation fails to prevent misinformation from appearing in the media.

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Questions 31–36

*Complete the summary using the list of phrases, **A–J**, below.*

*Write the correct letter, **A–J**, in boxes 31–36 on your answer sheet.*

What happens when people encounter misinformation?

Although people have **31** ..... to misinformation, there is debate about precisely how and when we label something as true or untrue. The philosophers Descartes and Spinoza had **32** ..... about how people engage with information. While Descartes believed that people accept or reject information after considering whether it is true or not, Spinoza argued that people accepted *all* information they encountered (and by default misinformation) and did not verify or reject it until afterwards. Moreover, Spinoza believed that a distinct **33** ..... is involved in these stages. Recent research has provided **34** ..... for Spinoza's theory and it would appear that people accept all encountered information as if it were true, even if this is for an extremely **35** ..... , and do not label the information as true or false until later. This is consistent with the fact that the resources for scepticism and the resources for perceiving and encoding are in **36** ..... in the brain.

A	constant conflict	**B**	additional evidence	**C**	different locations
D	experimental subjects	**E**	short period	**F**	extreme distrust
G	frequent exposure	**H**	mental operation	**I**	dubious reason
J	different ideas				

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Questions 37–40

Do the following statements agree with the claims of the writer in Reading Passage 3?

In boxes 37–40 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*

37 Campaigns designed to correct misinformation will fail to achieve their purpose if people are unable to understand them.

38 Attempts to teach elementary school students about misinformation have been opposed.

39 It may be possible to overcome the problem of misinformation in a relatively short period.

40 The need to keep up with new information is hugely exaggerated in today's world.

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