READING

READING PASSAGE 1

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

The Dead Sea Scrolls

In late 1946 or early 1947, three Bedouin teenagers were tending their goats and sheep near the ancient settlement of Qumran, located on the northwest shore of the Dead Sea in what is now known as the West Bank. One of these young shepherds tossed a rock into an opening on the side of a cliff and was surprised to hear a shattering sound. He and his companions later entered the cave and stumbled across a collection of large clay jars, seven of which contained scrolls with writing on them. The teenagers took the seven scrolls to a nearby town where they were sold for a small sum to a local antiquities dealer. Word of the find spread, and Bedouins and archaeologists eventually unearthed tens of thousands of additional scroll fragments from 10 nearby caves; together they make up between 800 and 900 manuscripts. It soon became clear that this was one of the greatest archaeological discoveries ever made.

The origin of the Dead Sea Scrolls, which were written around 2,000 years ago between 150 BCE and 70 CE, is still the subject of scholarly debate even today. According to the prevailing theory, they are the work of a population that inhabited the area until Roman troops destroyed the settlement around 70 CE. The area was known as Judea at that time, and the people are thought to have belonged to a group called the Essenes, a devout Jewish sect.

The majority of the texts on the Dead Sea Scrolls are in Hebrew, with some fragments written in an ancient version of its alphabet thought to have fallen out of use in the fifth century BCE. But there are other languages as well. Some scrolls are in Aramaic, the language spoken by many inhabitants of the region from the sixth century BCE to the siege of Jerusalem in 70 CE. In addition, several texts feature translations of the Hebrew Bible into Greek.

The Dead Sea Scrolls include fragments from every book of the Old Testament of the Bible except for the Book of Esther. The only entire book of the Hebrew Bible preserved among the manuscripts from Qumran is Isaiah; this copy, dated to the first century BCE, is considered the earliest biblical manuscript still in existence. Along with biblical texts, the scrolls include documents about sectarian regulations and religious writings that do not appear in the Old Testament.

The writing on the Dead Sea Scrolls is mostly in black or occasionally red ink, and the scrolls themselves are nearly all made of either parchment (animal skin) or an early form of paper called 'papyrus'. The only exception is the scroll numbered 3Q15, which was created out of a combination of copper and tin. Known as the Copper Scroll, this curious document features letters chiselled onto metal – perhaps, as some have theorized, to better withstand the passage of time. One of the most intriguing manuscripts from Qumran, this is a sort of ancient treasure map that lists dozens of gold and silver caches. Using an unconventional vocabulary and odd spelling, it describes 64 underground hiding places that supposedly contain riches buried for safekeeping. None of these hoards have been recovered, possibly because the Romans pillaged Judea during the first century CE. According to various hypotheses, the treasure belonged to local people, or was rescued from the Second Temple before its destruction or never existed to begin with.

Some of the Dead Sea Scrolls have been on interesting journeys. In 1948, a Syrian Orthodox archbishop known as Mar Samuel acquired four of the original seven scrolls from a Jerusalem shoemaker and part-time antiquity dealer, paying less than $100 for them. He then travelled to the United States and unsuccessfully offered them to a number of universities, including Yale. Finally, in 1954, he placed an advertisement in the business newspaper *The Wall Street Journal* – under the category 'Miscellaneous Items for Sale' – that read: 'Biblical Manuscripts dating back to at least 200 B.C. are for sale. This would be an ideal gift to an educational or religious institution by an individual or group.' Fortunately, Israeli archaeologist and statesman Yigael Yadin negotiated their purchase and brought the scrolls back to Jerusalem, where they remain to this day.

In 2017, researchers from the University of Haifa restored and deciphered one of the last untranslated scrolls. The university's Eshbal Ratson and Jonathan Ben-Dov spent one year reassembling the 60 fragments that make up the scroll. Deciphered from a band of coded text on parchment, the find provides insight into the community of people who wrote it and the 364-day calendar they would have used. The scroll names celebrations that indicate shifts in seasons and details two yearly religious events known from another Dead Sea Scroll. Only one more known scroll remains untranslated.

Questions 1–5

Complete the notes below.

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

Write your answers in boxes 1–5 on your answer sheet.

The Dead Sea Scrolls

Discovery

Qumran, 1946/7

- three Bedouin shepherds in their teens were near an opening on side of cliff
- heard a noise of breaking when one teenager threw a **1** .....
- teenagers went into the **2** ..... and found a number of containers made of **3** .....

The scrolls

- date from between 150 BCE and 70 CE
- thought to have been written by group of people known as the **4** .....
- written mainly in the **5** ..... language
- most are on religious topics, written using ink on parchment or papyrus

Questions 6–13

Do the following statements agree with the information given in Reading Passage 1?

In boxes 6–13 on your answer sheet, write

TRUE	*if the statement agrees with the information*
FALSE	*if the statement contradicts the information*
NOT GIVEN	*if there is no information on this*

6 The Bedouin teenagers who found the scrolls were disappointed by how little money they received for them.

7 There is agreement among academics about the origin of the Dead Sea Scrolls.

8 Most of the books of the Bible written on the scrolls are incomplete.

9 The information on the Copper Scroll is written in an unusual way.

10 Mar Samuel was given some of the scrolls as a gift.

11 In the early 1950s, a number of educational establishments in the US were keen to buy scrolls from Mar Samuel.

12 The scroll that was pieced together in 2017 contains information about annual occasions in the Qumran area 2,000 years ago.

13 Academics at the University of Haifa are currently researching how to decipher the final scroll.

READING PASSAGE 2

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

A second attempt at domesticating the tomato

A It took at least 3,000 years for humans to learn how to domesticate the wild tomato and cultivate it for food. Now two separate teams in Brazil and China have done it all over again in less than three years. And they have done it better in some ways, as the re-domesticated tomatoes are more nutritious than the ones we eat at present.

This approach relies on the revolutionary CRISPR genome editing technique, in which changes are deliberately made to the DNA of a living cell, allowing genetic material to be added, removed or altered. The technique could not only improve existing crops, but could also be used to turn thousands of wild plants into useful and appealing foods. In fact, a third team in the US has already begun to do this with a relative of the tomato called the groundcherry.

This fast-track domestication could help make the world's food supply healthier and far more resistant to diseases, such as the rust fungus devastating wheat crops.

'This could transform what we eat,' says Jorg Kudla at the University of Munster in Germany, a member of the Brazilian team. 'There are 50,000 edible plants in the world, but 90 percent of our energy comes from just 15 crops.'

'We can now mimic the known domestication course of major crops like rice, maize, sorghum or others,' says Caixia Gao of the Chinese Academy of Sciences in Beijing. 'Then we might try to domesticate plants that have never been domesticated.'

B Wild tomatoes, which are native to the Andes region in South America, produce pea-sized fruits. Over many generations, peoples such as the Aztecs and Incas transformed the plant by selecting and breeding plants with mutations* in their genetic structure, which resulted in desirable traits such as larger fruit.

But every time a single plant with a mutation is taken from a larger population for breeding, much genetic diversity is lost. And sometimes the desirable mutations come with less desirable traits. For instance, the tomato strains grown for supermarkets have lost much of their flavour.

By comparing the genomes of modern plants to those of their wild relatives, biologists have been working out what genetic changes occurred as plants were domesticated. The teams in Brazil and China have now used this knowledge to reintroduce these changes from scratch while maintaining or even enhancing the desirable traits of wild strains.

* mutations: changes in an organism's genetic structure that can be passed down to later generations

C Kudla's team made six changes altogether. For instance, they tripled the size of fruit by editing a gene called FRUIT WEIGHT, and increased the number of tomatoes per truss by editing another called MULTIFLORA.

While the historical domestication of tomatoes reduced levels of the red pigment lycopene – thought to have potential health benefits – the team in Brazil managed to boost it instead. The wild tomato has twice as much lycopene as cultivated ones; the newly domesticated one has five times as much.

'They are quite tasty,' says Kudla. 'A little bit strong. And very aromatic.'

The team in China re-domesticated several strains of wild tomatoes with desirable traits lost in domesticated tomatoes. In this way they managed to create a strain resistant to a common disease called bacterial spot race, which can devastate yields. They also created another strain that is more salt tolerant – and has higher levels of vitamin C.

D Meanwhile, Joyce Van Eck at the Boyce Thompson Institute in New York state decided to use the same approach to domesticate the groundcherry or goldenberry (*Physalis pruinosa*) for the first time. This fruit looks similar to the closely related Cape gooseberry (*Physalis peruviana*).

Groundcherries are already sold to a limited extent in the US but they are hard to produce because the plant has a sprawling growth habit and the small fruits fall off the branches when ripe. Van Eck's team has edited the plants to increase fruit size, make their growth more compact and to stop fruits dropping. 'There's potential for this to be a commercial crop,' says Van Eck. But she adds that taking the work further would be expensive because of the need to pay for a licence for the CRISPR technology and get regulatory approval.

E This approach could boost the use of many obscure plants, says Jonathan Jones of the Sainsbury Lab in the UK. But it will be hard for new foods to grow so popular with farmers and consumers that they become new staple crops, he thinks.

The three teams already have their eye on other plants that could be 'catapulted into the mainstream', including foxtail, oat-grass and cowpea. By choosing wild plants that are drought or heat tolerant, says Gao, we could create crops that will thrive even as the planet warms.

But Kudla didn't want to reveal which species were in his team's sights, because CRISPR has made the process so easy. 'Any one with the right skills could go to their lab and do this.'

Questions 14–18

Reading Passage 2 has five sections, **A–E**.

Which section contains the following information?

*Write the correct letter, **A–E**, in boxes 14–18 on your answer sheet.*

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

14 a reference to a type of tomato that can resist a dangerous infection

15 an explanation of how problems can arise from focusing only on a certain type of tomato plant.

16 a number of examples of plants that are not cultivated at present but could be useful as food sources

17 a comparison between the early domestication of the tomato and more recent research

18 a personal reaction to the flavour of a tomato that has been genetically edited

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–D**.*

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

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

19 Domestication of certain plants could allow them to adapt to future environmental challenges.

20 The idea of growing and eating unusual plants may not be accepted on a large scale.

21 It is not advisable for the future direction of certain research to be made public.

22 Present efforts to domesticate one wild fruit are limited by the costs involved.

23 Humans only make use of a small proportion of the plant food available on Earth.

List of Researchers

A Jorg Kudla
B Caixia Gao
C Joyce Van Eck
D Jonathan Jones

Questions 24–26

Complete the sentences below.

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

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

24 An undesirable trait such as loss of ..... may be caused by a mutation in a tomato gene.

25 By modifying one gene in a tomato plant, researchers made the tomato three times its original ..... .

26 A type of tomato which was not badly affected by ..... , and was rich in vitamin C, was produced by a team of researchers in China.

READING PASSAGE 3

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

The case for mixed-ability classes

Picture this scene. It's an English literature lesson in a UK school, and the teacher has just read an extract from Shakespeare's *Romeo and Juliet* with a class of 15-year-olds. He's given some of the students copies of *No Fear Shakespeare,* a kid-friendly translation of the original. For three students, even these literacy demands are beyond them. Another girl simply can't focus and he gives her pens and paper to draw with. The teacher can ask the *No Fear* group to identify the key characters and maybe provide a tentative plot summary. He can ask most of the class about character development, and five of them might be able to support their statements with textual evidence. Now two curious students are wondering whether Shakespeare advocates living a life of moderation or one of passionate engagement.

As a teacher myself, I'd think my lesson would be going rather well if the discussion went as described above. But wouldn't this kind of class work better if there weren't such a huge gap between the top and the bottom? If we put all the kids who needed literacy support into one class, and all the students who want to discuss the virtue of moderation into another?

The practice of 'streaming', or 'tracking', involves separating students into classes depending on their diagnosed levels of attainment. At a macro level, it requires the establishment of academically selective schools for the brightest students, and comprehensive schools for the rest. Within schools, it means selecting students into a '...eam' of general ability, or 'sets' of subject-specific ability. The practice is intuitively appealing to almost every stakeholder.

I have heard the mixed-ability model attacked by way of analogy: a group hike. The fittest in the group take the lead and set a brisk pace, only to have to stop and wait every 20 minutes. This is frustrating, and their enthusiasm wanes. Meanwhile, the slowest ones are not only embarrassed but physically struggling to keep up. What's worse, they never get a long enough break. They honestly just want to quit. Hiking, they feel, is not for them.

Mixed-ability classes bore students, frustrate parents and burn out teachers. The brightest ones will never summit Mount Qomolangma, and the stragglers won't enjoy the lovely stroll in the park they are perhaps more suited to. Individuals suffer at the demands of the collective, mediocrity prevails. So: is learning like hiking?

The current pedagogical paradigm is arguably that of constructivism, which emerged out of the work of psychologist Lev Vygotsky. In the 1930s, Vygotsky emphasised the importance of targeting a student's specific 'zone of proximal development' (ZPD). This is the gap between what they can achieve only with support – teachers, textbooks, worked examples, parents and so on – and what they can achieve independently. The purpose of teaching is to provide and then gradually remove this 'scaffolding' until they are autonomous. If we accept this model, it follows that streaming students with similar ZPDs would be an efficient and effective solution. And that forcing everyone on the same hike – regardless of aptitude – would be madness.

Despite all this, there is limited empirical evidence to suggest that streaming results in

better outcomes for students. Professor John Hattie, director of the Melbourne Education Research Institute, notes that 'tracking has minimal effects on learning outcomes'. What is more, streaming appears to significantly – and negatively – affect those students assigned to the lowest sets. These students tend to have much higher representation of low socioeconomic class. Less significant is the small benefit for those lucky clever students in the higher sets. The overall result is that the smart stay smart and the dumb get dumber, further entrenching the social divide.

In the latest update of Hattie's influential meta-analysis of factors influencing student achievement, one of the most significant factors is the teachers' estimate of achievement. Streaming students by diagnosed achievement automatically limits what the teacher feels the student is capable of. Meanwhile, in a mixed environment, teachers' estimates need to be more diverse and flexible.

While streaming might seem to help teachers effectively target a student's ZPD, it can underestimate the importance of peer-to-peer learning. A crucial aspect of constructivist theory is the role of the MKO – 'more-knowledgeable other' – in knowledge construction. While teachers are traditionally the MKOs in classrooms, the value of knowledgeable student peers must not go unrecognised either.

I find it amazing to watch students get over an idea to their peers in ways that I would never think of. They operate with different language tools and different social tools from teachers and, having just learnt it themselves, they possess similar cognitive structures to their struggling classmates. There is also something exciting about passing on skills and knowledge that you yourself have just mastered – a certain pride and zeal, a certain freshness to the interaction between 'teacher' and 'learner' that is often lost by the expert for whom the steps are obvious and the joy of discovery forgotten.

Having a variety of different abilities in a collaborative learning environment provides valuable resources for helping students meet their learning needs, not to mention improving their communication and social skills. And today, more than ever, we need the many to flourish – not suffer at the expense of a few bright stars. Once a year, I go on a hike with my class, a mixed bunch of students. It *is* challenging. The fittest students realise they need to encourage the reluctant. There are lookouts who report back, and extra items to carry for others. We make it – together.

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 The writer describes the *Romeo and Juliet* lesson in order to demonstrate

- **A** how few students are interested in literature.
- **B** how a teacher handles a range of learning needs.
- **C** how unsuitable Shakespeare is for most teenagers.
- **D** how weaker students can disrupt their classmates' learning.

28 What does the writer say about streaming in the third paragraph?

- **A** It has a very broad appeal.
- **B** It favours cleverer students.
- **C** It is relatively simple to implement.
- **D** It works better in some schools than others.

29 What idea is suggested by the reference to Mount Qomolangma in the fifth paragraph?

- **A** students following unsuitable paths
- **B** students attempting interesting tasks
- **C** students not achieving their full potential
- **D** students not being aware of their limitations

30 What does the word 'scaffolding' in the sixth paragraph refer to?

- **A** the factors which prevent a student from learning effectively
- **B** the environment where most of a student's learning takes place
- **C** the assistance given to a student in their initial stages of learning
- **D** the setting of appropriate learning targets for a student's aptitude

Questions 31–35

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

*Write the correct letter, **A–I**, in boxes 31–35 on your answer sheet.*

Is streaming effective?

According to Professor John Hattie of the Melbourne Education Research Institute, there is very little indication that streaming leads to **31** ..... . He points out that, in schools which use streaming, the most significant impact is on those students placed in the **32** ..... , especially where a large proportion of them have **33** ..... . Meanwhile, for the **34** ..... , there appears to be only minimal advantage. A further issue is that teachers tend to have **35** ..... of students in streamed groups.

A	wrong classes	**B**	lower expectations	**C**	average learners
D	bottom sets	**E**	brightest pupils	**F**	disadvantaged backgrounds
G	weaker students	**H**	higher achievements	**I**	positive impressions

Questions 36–40

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

In boxes 36–40 on your answer sheet, write

YES	*if the statement agrees with the views of the writer*
NO	*if the statement contradicts the views of the writer*
NOT GIVEN	*if it is impossible to say what the writer thinks about this*

36 The Vygotsky model of education supports the concept of a mixed-ability class.

37 Some teachers are uncertain about allowing students to take on MKO roles in the classroom.

38 It can be rewarding to teach knowledge which you have only recently acquired.

39 The priority should be to ensure that the highest-achieving students attain their goals.

40 Taking part in collaborative outdoor activities with teachers and classmates can improve student outcomes in the classroom.