



9 Science and technology

LISTENING



Science vocabulary

- 1 Work in small groups. Make sure you understand these words, then discuss the questions.

analysis approach concept criteria
deduction evaluation factors features
hypothesis method principle procedure
relevance significance theory variables

- 1 Which picture shows the way you are or were usually taught science? Which do you think is more effective?
- 2 Which is or was your favourite science subject at school? Which did you like least?
- 3 Which was the most interesting scientific experiment you have ever done?
- 4 What would you like to use science to find out? How would you do it?

Part 3

- 2 Discuss these questions.

- 1 What do you think happens at a science fair (a competitive exhibition of science projects) for young people, and how do students prepare for it?
- 2 Have you ever taken part in one? If not, would you like to? Why? / Why not?

Quick steps to Listening Part 3

- Read the questions in the pause after the instructions.
- Decide what kind of information, e.g. a regret, is needed.
- The first time you listen, don't worry if you miss a question. Leave it and go on to the next one.
- On the second listening, answer questions you missed.

Exam task

2.11 You will hear an interview with physics teacher Kieran Shaw, who has taken his students to a Science Fair. For questions 1–6, choose the answer (A, B, C or D) which fits best according to what you hear.

- 1 What does Kieran criticise about the previous Science Fair?
A the number of prizes
B the standard of judging
C the quality of the projects
D the number of projects
- 2 Kieran says the fall in the number of participants at some science fairs might be caused by
A a belief that science fairs are old-fashioned.
B worry among parents about the cost of projects.
C reluctance to attend science fairs at weekends.
D a general reduction in schools' budgets.
- 3 Which does Kieran believe is a problem among his students?
A parents giving students too much help
B more boys than girls involved in projects
C rich students having more resources for projects
D too much emphasis on competition rather than cooperation
- 4 Kieran says the most important factor in choosing a topic is whether it is likely to
A need expensive equipment in order to do experiments.
B keep the students interested throughout the project.
C be sufficiently simple for students of that age group.
D differ significantly from the topics chosen by others.
- 5 According to Kieran, what mistake do some students make during their presentation?
A They don't go into enough detail about their project.
B They can't remember the speech they memorised.
C They tend to speak too slowly to the judges.
D They use words they don't fully understand.
- 6 Kieran predicts that this year's winner will be the project about
A the variation in people's eyesight during the day.
B the relative cleanliness of different objects.
C the coolest clothes to wear in summer.
D the best place to store fruit.

Exam tip

Remember that the questions follow the order of the information in the recording.

Modal verbs Page 96

1  Correct the mistakes in these sentences written by exam candidates. Explain why each sentence is wrong.

- In the end I could solve the problem by paying cash.
- Suddenly the lights went out and I must find my way out in the dark.
- In this catalogue there is a printer that can interest us.
- You mustn't bring much money because you'll be staying at my house.
- You've been overworking so you can have developed some health problems.
- It had to be very hard to survive in prehistoric times with those dangerous animals around.
- Yesterday's accident can be prevented.
- They left the refrigerator full of food so we needn't go to the supermarket when we arrived.

2 Choose the correct option and say why it is right.

- Free samples of this product *must* / *can* / *need* to be obtained by going to our website.
- Jeremy copied his biology essay from the Internet. He *may not* / *shouldn't* / *mustn't* have done that.
- In those days, dangerous chemicals *could* / *may* / *were able to* be bought in the shops.
- I heard your company is closing down. You *have to* / *should* / *must* be very worried.
- Students *shouldn't* / *mustn't* / *needn't* pay to go into the Science Museum.
- You *can* / *might* / *must* have burnt your hands if you hadn't been wearing gloves.
- That group only started their project last week. They *mustn't* / *mightn't* / *can't* have finished already!
- The lab has been completely destroyed. There *might* / *must* / *should* have been a huge explosion.
- If you're not feeling well, Annie, I think you *should* / *must* / *have to* stay at home today.
- You *didn't need to take* / *needn't have taken* / *didn't have to take* a taxi. I could have picked you up from the station.

3 Reply to the comments by using a form of the modal in brackets.

Example: I think I saw you downtown last night. (could)
You *couldn't have done*. I was at home all the time.

- This crowd is huge. I wonder how many people are here? (must)
- I've got no money at all left. (should)
- It was compulsory at my school to do double maths from the age of 14. (have to)
- I left my phone on the bar and now it's gone! (must)
- Marcos and Anna set off in the car six hours ago, but they still haven't arrived. (might)

- The chemistry exam was so difficult, wasn't it? (be able to)
- Mr Grey always carries his umbrella. He even took it with him to Dubai! (need)
- I'm sure I've just seen a family of aliens! (can)



4 Complete the second sentence so that it has a similar meaning to the first sentence, using the word given. Do not change the word given. You must use between three and six words, including the word given.

- I think it was a mistake to send that email to her.
SHOULD
I don't think that email.
- I regret not being able to complete my project on time.
COMPLETED
I wish my project on time.
- It would be fairer to candidates if making a speech were voluntary.
HAVE
It would be fairer if candidates a speech.
- It's possible that I broke the glass by accident, though I didn't notice doing so.
MIGHT
I the glass, though I didn't notice doing so.
- It was wrong to let people take part in such a dangerous experiment.
ALLOWED
People take part in such a dangerous experiment.
- Carmela said that she was going to call me, but it looks like she's forgotten.
MUST
Carmela that she would call me.

9

READING AND USE OF ENGLISH

Part 5



Exam task

You are going to read a newspaper article about science on television. For questions 1–6, choose the answer (A, B, C or D) which you think fits best according to the text.

Science on TV: it's not dumb, but it could be smarter

Science broadcasting would be greatly improved by involving viewers in the experimental process, says Alice Bell

A new science series started on television last month. Cue lots of people muttering about dumbing down, casting disapproving looks in the presenting scientist's direction. They shouldn't. Complaining about dumbing down is dumb. It misses what all good popularisation does. It also detracts from other questions about science programmes. Is there too much focus on what scientific thought delivers, not the methods, processes and politics that make it? Does television too often package science as a pantomime set of characters rather than connect the public to the reality of research? Is it stuck in line 13 the past?

Science changes as it makes its way on to television, just as it does as it travels to newspapers, magazines, books, exams and through the various media of the scientific community (journals, emails, gossip over coffee at a conference). People who take a dim view of media professors need to get over themselves and stop assuming the difference between professional and popular science sits on a hierarchical frame that places the former on top. Popularisation doesn't make knowledge something less than it was. Often it picks up new perspectives as well as simply inviting more people to support or even be part of the enterprise. Done well, popularisation isn't pathological to research; it's lifeblood.

Still, there are problems with many traditional approaches to the way we share science. There is a history of snobbishness against scientists who take time to talk to the public, but equally silly is a snobbishness against presenters who aren't actually scientists. These days the more

1 Discuss the questions.

- Compare the pictures. What impression of science and scientists does each give? Which do you think is closer to the reality of working in science?
- What are TV science programmes like in your country? How could they be improved?

2 Quickly read the exam text and answer these questions.

- What are the meanings of a) *dumb* in the title and b) *dumbing down* in the first paragraph?
- What does the introduction tell you about the purpose of the text?
- In what ways are the writer's views similar or different to your answers to question 2 in Exercise 1?

Quick steps to Reading and Use of English Part 5

- For items like *The word 'this' in line 5 refers to ...*, study the sentences immediately before and after it.
- If an item says the writer aims to *show* something, look for an example.
- Where an item says the writer *implies* something, look for what they indicate about it without saying so directly.
- Don't leave any blanks, make an intelligent guess.

3 Study the Quick steps, then look at the beginning of each question. Which focus on:

- the writer's opinion or attitude?
- a suggestion by the writer?
- an example?
- a reference word?

4 Do the exam task.

Exam tip

Choose your answers by focusing on what the text says, not on your own knowledge of or opinions about the topic.

serious TV channels favour professional scientists to present, even if they rarely write the script and often stray outside their area of expertise. It's a shallow form of scientific authenticity, and one that patronises the audience and curtails scientific expertise.

I especially worry that science is often rendered as something to be simply consumed by the public. If we're using the metaphor of scientific literacy, in a sense it's 'read-only' research. Retelling science for explanatory or entertainment purposes might give us a great picture of what the scientific idea looks like, but often removes a lot about how the scientists got to these conclusions. It doesn't show the workings of science or share the science-in-the-making, meaning it's harder to critique or get involved with – or simply enjoy as entertaining and educational in itself. I'd like to see an attempt to share the means of production of science, not just sell its products.

The interviews with working scientists on a current radio series bring out the texture of science, a sense of what drives scientists, the frustrations, boredom, adventure and accidents their work can include. But this is still a matter of telling a story rather than involving audiences. That's not to say I'm against storytelling science, just that we have to be aware of the narrative forces in play. Some time ago there was a lot of fuss about a nature documentary filming polar bear cubs in a wildlife centre rather than in the wild, as appeared to be the case. But this sort of fabrication is routine, just as we routinely leave out bits of science to tell interesting, exciting and useful stories. We'd get lost otherwise. Televisual science is always a construction, and it's often worth deconstructing and arguing over how we choose to do this. But it can be a meaningful and necessary construction too, just as a scientific paper is a meaningful construction we might argue over.

I don't mind the odd bit of sparkle and showmanship around science. Nor do I mind shows that just invite audiences to passively watch or listen – as long as we have more critical and interactive projects too. We might be in a golden age of science television but we shouldn't stop asking questions about it. We need to be imaginative about what science is, who it talks to and how it might be better; not simply find ever more ways to spread the status quo.

- 1 The word 'it' in line 13 refers to
 - A the current approach to research in science.
 - B the way the broadcast media cover science.
 - C the attitude of politicians towards science.
 - D how the public see science and scientists.
- 2 What point is the writer making in the second paragraph?
 - A Science can benefit from becoming more popular.
 - B Popular science is inferior to professional science.
 - C Scientific journals report on science without altering it.
 - D The quality of research is being harmed by popular science.
- 3 What is the writer's attitude to the presenting of science programmes?
 - A Science programmes should always be presented by actual scientists.
 - B Presenters often seem to assume that viewers know nothing about science.
 - C Television scientists should talk only about their own branch of science.
 - D Scientists should be working in science, not presenting TV shows.
- 4 The writer believes that the public are frequently being denied
 - A the opportunity to enjoy programmes about science.
 - B information about the results of scientific research.
 - C the experience of hearing scientists talk about their work.
 - D an insight into how the scientific process works.
- 5 The writer mentions the programme about polar bears to show that
 - A scientists often find it impossible to agree with one another.
 - B the makers of science documentaries are often untrustworthy.
 - C in science it is impossible to report every detail of the story.
 - D documentaries cannot show the scientific process realistically.
- 6 What does the writer call for in the last paragraph?
 - A an end to the trivialisation of science in television programmes
 - B a more balanced approach when covering science on television
 - C greater public awareness of the current nature of science
 - D television quiz shows that focus exclusively on science
- 5 Find expressions in the text with these meanings (paragraph numbers in brackets).
 - 1 this is the signal for (something to begin) (1)
 - 2 show disapproval (2)
 - 3 the first of two (previously mentioned things or people) (2)
 - 4 considered in a particular way (4)
 - 5 involves (5)
 - 6 that are having an effect (5)
 - 7 an occasional (6)
 - 8 existing situation (6)

Part 2

Dependent prepositions

- 1 Look at these extracts from the Reading text on page 75.

We have to be aware of the narrative forces ...

We need to be imaginative about what science is ...

Which preposition, *about, against, by, for, in, of, to, or with*, often follows each of the C1-level adjectives in the box?

alert biased compatible deprived eligible
equivalent frustrated hostile inadequate
insensitive knowledgeable notorious prejudiced
protective resident restricted superior untouched

- 2  Which of these sentences written by exam candidates contain an incorrect preposition? Correct any errors.

- 1 The village is adjacent by the sea.
- 2 That information is not consistent with the truth.
- 3 A smart phone would be very handy to reading my e-mails.
- 4 Some people are ignorant of the basic principles of science.
- 5 The ideal candidate has to be receptive of new ideas.
- 6 Japan is renowned for its innovations in technology.
- 7 Alfonso, horrified of what he had seen, called the police.
- 8 At first, Elena was sceptical to what the archaeologist was telling her.

- 3 Complete the sentences with the adjectives in the box plus suitable prepositions.

eligible equivalent handy ignorant notorious
renowned restricted sceptical

- 1 To avoid overcrowding, the number of visitors was six hundred.
- 2 This little device is measuring height and distance.
- 3 One mile is about 1.6 kilometres.
- 4 The research was flawed so we are the results.
- 5 You have to be aged 18 or over to be this competition.
- 6 That man is either the facts, or simply not telling the truth.
- 7 It's a particularly dangerous road, serious accidents.
- 8 Cambridge University is academic excellence in teaching and research.

Quick steps to Reading and Use of English Part 2

- Remember that every gap must be filled in.
- Pencil in your answers on the question paper so you can easily check the completed text makes sense.
- Never write two answers.
- Check your spelling.

- 4 Read the text quickly. How does the writer answer the question in the title?

- 5 The example answer completes the expression *distracted by*. As you do the exam task, decide which prepositions can go with the words next to gaps 2, 4, 5 and 7.

Exam tip >

Use capital letters when you write on the answer sheet.

Exam task

For questions 1–8, read the text below and think of the word that best fits each gap. Use only **one** word in each gap. There is an example at the beginning (0).

Example: 0 **BY**

Why are overheard calls so annoying?

People are more distracted (0) mobile phone conversations than background chat in the same room, (1) to a study at San Diego University.

The research also shows that an overheard phone conversation is significantly more memorable (2) someone involuntarily listening in than if the conversation (3) place between people in the same location.

Volunteers were asked to do anagram puzzles while, unknown (4) them, researchers conducted a scripted conversation in the background, either between two people in the room or between someone on a mobile phone and an unknown caller.

Participants only heard the conversation once and were unaware (5) the fact it was part of the study. Those (6) overheard the one-sided conversation found it more distracting and annoying, and remembered more words from it.

A possible explanation is that we keep trying to figure out what is going on, becoming frustrated (7) our failure to do so. (8) knowing where the conversation is heading is what makes overheard cell-phone calls so irritating.



SPEAKING

Speculating

- 1 **2.12** Use modal verbs to complete this conversation between two bus passengers. Then listen to check your answers.

A: 'Hey, that's a long queue!'
 B: 'Some of them are looking fed up. They (1) standing there for hours.'
 A: 'Yes, they (2) been. I wonder why?'
 B: 'They (3) hoping to get tickets for that concert.'
 A: 'I suppose they (4) be. Or they (5) queuing for the sales. They start later today.'

- 2 In pairs, use modals with *-ing* to speculate about these situations.

*Example: You see two people looking angry with each other.
 They might have been arguing. OR
 They must be getting on badly.*

- It's nearly exam time and your classmate is looking very tired.
- There's a big football match on but you don't know how your team is doing.
- You're phoning a friend who's on a train, but you lose the connection.
- You get up in the morning and see there's half a metre of snow outside.
- You call round at friend's house on a Saturday morning but there's no-one in.
- You wake up in the middle of the night thinking you've just won the lottery.

Part 2 Page 108

- 3 **2.13** Read the exam task instructions. Then listen to two strong students, Nico and Mia, talking about two of these pictures and answer these questions.

- Which photos does Nico compare?
- How does he say those jobs were done in the past?
- What difficulties nowadays does he mention?
- Which technological advance does Mia choose? Why?

- 4 **2.13** Listen again. Which of these do Nico and Mia use to speculate about the pictures?

- modal + *be* + *-ing*
- modal + *have* + past participle

Quick steps to Speaking Part 2

- Use modal forms + *ing* to speculate about present and recent events.
- If you make a mistake, you can correct it, but don't keep stopping or you won't have time to complete the task.
- Talk until the examiner stops you.

Exam task

Each of you will be given three pictures. You have to talk about **two** of them on your own for about a minute, and also to answer a question briefly about your partner's pictures.

Candidate A, it's your turn first. Here are your pictures. They show people **working with different kinds of technology**. Compare **two** of the pictures, and say **how the jobs might have been done in the past, and how difficult it might be for the people to work with this technology**.

Candidate B, which of these technological advances do you think is the **most beneficial to society**?

How might the jobs have been done in the past?
 How difficult might it be for the people to work with this technology?



- Work in groups of three and do the exam task using pictures 1 and 2. Then change roles and do the task twice more, using pictures 2 and 3 and then pictures 1 and 3.
- Tell the others in your group how well you think they did Part 2, and listen to their comments on your speaking.

Exam tip

Practise for the exam by timing yourself speaking for 60 seconds.



WRITING

Result links

- 1 Complete the sentences with the words in the box. Which are formal? Which form fixed phrases? Underline these, as in the example.

account consequence consequently else otherwise
owing reason result so such view

Example: Sales of the device have fallen as a result of price rises.

- There is less rainfall nowadays and for that the desert is growing.
 - Robots are now sophisticated that they can carry out many household tasks.
 - Some people prefer not to use credit cards online to the risk of theft.
 - More tests must be done on this new medicine. , people's health could be at risk.
 - The new device was found to be unsafe and in production was ended.
 - On of the high radiation levels, long-distance space travel may be impossible.
 - It's a great invention that I don't know how I managed without it!
 - We must build higher sea defences or the city will one day be flooded.
 - More and more people are shopping online. , some stores have gone out of business.
 - In of the fact that people can watch TV online, television sets may become obsolete.
- 2 Rewrite the sentences using the words in brackets.
- The project was abandoned as it had gone over budget. (consequence)
 - The instructions were too complicated for me to understand. (so)
 - There was a defect in the device so it was withdrawn from sale. (account)
 - If you don't charge your phone up soon, the battery will run out. (else)
 - A virus got into the system, leading to all the computers crashing. (consequently)
 - I can't stop playing that game because it's so addictive. (such)
 - The temperature suddenly rose so the machine stopped working. (owing)
 - If I kept looking at my email, I'd spend all day answering messages. (otherwise)

Part 2: report

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- 3 Look at the pictures and answer the questions.

- What do you think these astronomers enjoy about their work?
- Which other jobs in science do you think would be interesting and/or rewarding?
- Have you ever considered a career in science? Why? / Why not?



- 4 Answer the questions about this exam task.

- What is the topic of the report?
- Who are you writing for and why do they want a report?
- What points must you include?

Exam task

Your school wants to increase the percentage of its students studying science subjects to advanced level. The head teacher has asked you to write a report on attitudes towards science among the students.

Your report should evaluate the appeal of science at the school, explain why comparatively few students want to become scientists, and suggest ways of encouraging more of them to consider a future career in science.

Write your **report**.

- 5 Quickly read the model report on page 79 and write a brief heading above each paragraph.

Science at school and at work

A

Concern has been expressed about a relative lack of interest in science as a school subject or future career. This report focuses on the views of students and puts forward suggestions for improving the image of science.

B

The vast majority of students who opt for science subjects feel they made the right decision. They enjoy conducting experiments in the well-equipped laboratories and appreciate the fact that the teaching staff are more highly qualified than their counterparts in arts subjects. In consequence, science students believe they are learning in a more stimulating environment.

C

Unfortunately, however, some students think twice before choosing sciences, owing to their reputation as comparatively difficult subjects that involve memorising facts and figures. Moreover, there is a widespread belief that high marks are harder to obtain in the sciences.

D

In addition, science has a serious image problem. Many are discouraged by the perceived lack of glamour of science as a profession, by film stereotypes of mad professors and computer geeks, and by the suspicion with which the media often treat scientific research, for instance concerning genetically modified food.

E

To create a more positive impression of science, students should be invited to participate in Science Fair projects, scientific work experience programmes and virtual Open Days at university science faculties. They should also be made aware of the benefits of studying science, such as developing thinking skills, discovering how things work and – one day – finding real solutions to real problems.

6 Read the model report again and answer the questions.

- 1 Which paragraph deals with each of the points in the exam task instructions?
- 2 How does the writer introduce the topic of the report?
- 3 What style is the report written in? Give some examples.
- 4 Which result links are used in paragraphs B and C?
- 5 What four suggestions are there in the final paragraph? Do you agree with them?

7 Look at these exam task instructions and answer the questions in Exercise 4 about it.

Exam task

Your job involves making long-distance business trips. Colleagues who are about to begin making similar trips have asked you which electronic device you always take with you when you travel. Now they have requested a report on that device.

Your report should explain why you chose that kind of device, evaluate its usefulness in practice, and suggest how it could be improved.

Write your **report**.

8 In pairs, think of three kinds of portable electronic device and discuss these questions about each.

- 1 How convenient is it to carry?
- 2 How easy is it to use?
- 3 What drawbacks or limitations does it have?
- 4 How could these problems be overcome?

9 Choose one of the types of device you discussed in Exercise 8. Then look at the Quick steps and plan your report.

Quick steps to writing a Part 2 report

- Underline the key words as you read the instructions.
- Think about who you are writing for and what they will want to know.
- Use your own words, not those in the instructions.
- Use a variety of structures and vocabulary.
- Check that any headings reflect the content of the paragraphs.

10 Write your **report** in 220–260 words in an appropriate style. When you have finished, check your work as in Unit 1, Writing Exercise 8 on page 15.

Exam tip >

If you don't know enough facts about the topic to write a report on it, choose another question.