

4 Moments in science



UNIT OBJECTIVES

LS **YOUR PROJECT** Create a science timeline

Project Builders 1-5:

- 1 Agree on an area of science for your group's presentation.
- 2 Create a timeline with interesting moments.
- 3 Make notes on a key figure.
- 4 Think about future scientific developments.
- 5 Write an essay to propose a key figure for an exhibition.

Create and present your timeline.

VOCABULARY

- Science collocations
- Space

GRAMMAR

- Passives: all forms review
- Passives: advanced forms



LESSON OBJECTIVES

- Learn about different areas of science
- Learn science collocations

WARM-UP

Warm-up

- Discuss the questions.
 - How important is science to our lives?
 - In your opinion, what has been the most important scientific discovery ever? Why?
- Match photos 1–5 with five of the areas of science in the box. What other areas of science do you know?

aeronautics entomology genetics meteorology
nutrition palaeontology robotics virology

- 0.0 Read the *Pronunciation*. Can you predict where the stress is on each of the words in exercise 2? Listen and check.

PRONUNCIATION Stress on long words

For long words with a suffix, e.g., *-logy*, *-graphy*, *-ity*, *-tic(s)* and *-tion*, the stress is usually on the syllable before the suffix.



- Watch Nathan and Lara's vlog. What is their theory? Do they manage to prove it?
- Watch again. Read the theories 1–5 and match them to the items A–E that are used in each experiment.
 - Internal pressure will open a can if the metal near the opening is weakened.
 - The balancing point of an item is not always where you expect it to be.
 - Static electricity can move flowing water.
 - Delicate objects can be caught safely if their momentum is reduced gradually.
 - Water molecules stick to each other.

A two forks and a toothpick D a soda can and a pen
B a balloon and a running tap E an egg and a sheet
C glasses of water and some string

VOCABULARY

Vocabulary presentation

- Copy and complete the collocations from the video with the verbs in the box.

| | | | |
|---------|-----------|--------------|---------|
| analyze | carry out | come up with | conduct |
| draw | indicate | make | prove |
| record | write up | | |

- | | | | |
|---------|---------------|----------|-----------------------|
| 1 (...) | some research | 6 (...) | the data |
| 2 (...) | a theory | 7 (...) | the data |
| 3 (...) | an experiment | 8 (...) | conclusions |
| 4 (...) | a theory | 9 | results (...) that... |
| 5 (...) | observations | 10 (...) | my notes |

- Watch again and check your answers.

Vocabulary practice

- MEDIATION** Write an email to a classmate who missed this lesson. Describe one of the experiments in Nathan and Lara's vlog, and how successful you think it was. Use the collocations in exercise 6 to help you.

PROJECT BUILDER 1

Agree on an area of science for your group's presentation.

Workbook **Project Log** p16

- You are going to research and present information about an area of science. Think about these questions individually.
 - Which areas of science do you know a lot about? Make a list.
 - Are there areas of science you would like to find out more about? Make a list.



- Discuss the lists with your group. Work together to agree on your chosen area for your group.

- Work individually. In preparation for Project Builder 2, research two interesting 'moments' that have happened in this area. They can be discoveries, inventions or events. For each one, note:

- what happened.
- when it happened.
- who was involved.
- why it was important or interesting.



4.2 THE RACE TO SPACE

LESSON OBJECTIVES

- Learn about moments in space exploration
- Learn space vocabulary
- Review all forms of the passive

1 Discuss the questions.

- 1 How much do you know about space exploration? Does it interest you? Why? / Why not?
- 2 Read the headlines below. Which articles are for space exploration and which are against?
- 3 Which headlines do you agree with? Why? In pairs, think of three advantages and three disadvantages of space exploration.

1 Forget life on Mars, it's closer to home that matters

2 Space missions represent the very best side of human nature

3 SPACE CAN WAIT. OCEANS CAN'T

4 The space race is a pointless waste of money

5 Humans have no future if we don't go to space

VOCABULARY

i Vocabulary presentation

- 2 Look at the words in the box and the photos in the timeline on the right. Which of the words are shown in the photos?

| | | |
|-----------|--------------|------------|
| asteroid | comet | fuel |
| landing | launch | mission |
| orbit | probe | rocket |
| satellite | solar system | spacecraft |
| spacesuit | | |

i Vocabulary practice

- 3 Now read the timeline. Which moment in space exploration do you think is the most interesting? Which surprised you the most? Why?

4 Discuss the questions.

- 1 Why do you think each moment was selected for the timeline?
- 2 Which do you think is the most important? Why?

Key moments in space exploration



1972 Moon buggies!

On the fourth mission to the moon, an electricity-powered Lunar Rover (LRV) was used for the first time to allow astronauts to see much more on their visits. More than 50 years later, plans ¹are being made to use moon cars that ²will be designed for astronauts to live and work inside them for up to two weeks.



1981 Repurposed shuttles

The first space shuttle was launched in 1981. Five ³were built; they flew 135 missions between them but they ⁴aren't used anymore. Some shuttles were used as science laboratories and they also launched satellites.



2001 On holiday... to space!

The first space tourist, Dennis Tito, paid around 20 million dollars for a ride in a Russian Soyuz spacecraft. He spent a week in space, orbiting Earth. He had to train for 900 hours just to be a passenger!



2017 Recycled rockets

SpaceX flew a mission to the International Space Station. The rocket was the first that ⁵had been made of 100% recycled components (they were all taken from previously-flown spacecraft).



2017 Nearly two years in space

Peggy Whitson has spent more time in space than any other US astronaut. By the time she ⁶was being brought back to Earth on 3 September 2017, she had spent over 665 days orbiting the planet.



2019 The very edge of our solar system

The New Horizons probe set off to explore Pluto in 2006, with enough fuel to last into the 2030s. The probe's journey took about ten years! New Horizons then continued its journey beyond Pluto and on New Year's Day 2019, it flew by Arrokoth, the most distant object that ⁷has ever been explored by a spacecraft.

GRAMMAR

Grammar animation

Passives

5 Match the highlighted passive verb forms 1–7 in the text with the tenses A–G.

- | | | |
|----------------------|-------------------|-----------------|
| A present simple | C past simple | F past perfect |
| B present continuous | D past continuous | G future simple |
| | E present perfect | |

6 Copy and complete the rules about the passive.

| Passives: review |
|---|
| A We form the passive with the verb (1.) and the past (2.) of the main verb. <i>The launches are watched on TVs all around the world.</i> <i>The rocket hasn't been tested yet.</i> |
| B We use the passive when we don't know, or it's not important to specify, who does something. <i>Some parts of a spacesuit are made of 16 layers of material.</i> |
| C We can include the agent (who or what does something) with the preposition (3.). <i>The spacecraft was designed by engineers at NASA.</i> |
| D We don't use the passive with the present/past/future perfect continuous tenses. We use the active form instead. <i>Articles have been being written all month.</i> X <i>They have been writing articles all month.</i> ✓ |

CHECK IT! MY GRAMMAR REFERENCE & PRACTICE p112

7 Read the text about how the dwarf planet Pluto was named. Choose the correct verb forms.



What's in a name?

On 14 March 1930, an 11-year-old girl, Venetia Burney, was at home with her grandfather. He was reading in the newspaper that a new planet had just ¹ **discovered / been discovered**. Venetia ² **suggested / was suggested** the name *Pluto*. Pluto was the Roman god of the underworld and

she assumed that this planet must be a cold and dark place. Venetia's grandfather contacted an astronomer friend, who ³ **passed / was passed** the suggestion on to the space observatory in Arizona. The name Pluto ⁴ **chose / was chosen** and Venetia ⁵ **credits / is credited** with it officially.

Venetia is the only child who has ⁶ **named / been named** a planet, and she has ⁷ **honoured / been honoured** for it too. In July 2015, when the New Horizons probe finally ⁸ **reached / was reached** Pluto, a large area of craters was named Burney Basin after Venetia. And as data is still ⁹ **sending back / being sent back** to Earth from the probe, maybe more things ¹⁰ **were / will be** named after her too.

8 **MEDIATION** Go online and find out how one of the other planets in our solar system got its name. Tell the class about it.

9 Rewrite the sentences in the passive. Only include the agent with *by* if necessary.

- The famous Italian astronomer, Galileo, discovered Jupiter's moons.
- Scientists are making more advances in space science all the time.
- The rover will record data and scientists will then analyze it.
- Astronauts haven't visited the moon since 1972.
- People were cheering the astronauts in the mission control centre when they landed.

Grammar practice

10 Discuss the questions. Do you know the answers?

- When was the first manmade object sent into space: 1937, 1947 or 1957?
- How many times is Earth orbited by the moon every year: 11, 12 or 13?

The first person was sent into space in 1961, so I think that...

PROJECT BUILDER 2

Create a timeline of interesting moments.

Workbook **Project Log** p16

11 Share your individual research from Project Builder 1 with your group. Explain:

- why you chose each moment in science.
- what happened, when and where.
- why you think it would be good to include on the timeline.

12 Agree on four or more events from your research for your group timeline.

- Do a rough sketch of a timeline and include your events. Make some notes on each event.
- Look for opportunities to use the passive form in your notes.
- Research more information and images if you can.

13 Work alone. In preparation for Project Builder 3, research two key figures from your area of science. Try to find people who are not very famous but have done important work.


- When did they live?
- What did they do?
- Why was their work important?

4.3 UNSUNG HEROES?

LESSON OBJECTIVES

- Learn about successful female scientists
- Use advanced passive structures: present and past modals, infinitive and *-ing* forms, impersonal passives

READING

- 1  0.0 Match the female scientists in the box to their achievements A–C. Then listen and check. Which country is each scientist from?

Françoise Barré-Sinoussi Rosalind Franklin
Katherine Johnson

- A She discovered that the disease AIDS was caused by a virus, HIV.
B Her calculations helped NASA launch astronauts into space and to the moon.
C She was part of the team who discovered the structure of DNA.

Lise Meitner: the discovery of nuclear energy

Early female professors

For hundreds of years, the world of scientific discovery was a male-dominated area, as were many areas of working life. The first female science professor is thought to have been the Italian physicist Laura Bassi, who was appointed by Bologna University in 1732. But this was a rarity. For example, it wasn't until 1889 that a woman first became a maths professor.

Fighting to be educated

During the 19th century, women struggled to be given opportunities to study at a high level. Lise Meitner was born in Vienna, Austria in 1878. Her dream was to be accepted by a university to study science, but for all Austrian girls at that time, school stopped at the age of 14. Her parents felt that girls should be encouraged to study just as boys were. They helped her pass the university entrance exam and she went to the University of Vienna to study physics.

Work without money

But even after being awarded a doctorate, Meitner couldn't find work. Eventually, a German physicist called Max Planck invited her to Berlin to work at the university. Women weren't allowed to work there officially, but she did so for five years – without being paid!

Recognition at last

Eventually, at the age of 34 Meitner was offered a job at the new chemical institute and earned money for the first time. She did her research with Otto Hahn. Their interest was radioactivity and they conducted experiments with the element uranium. Their work was recognized around the world and they were nominated ten times for the Nobel Prize, but without success.

- 2 **THINK** Discuss the questions.


- 1 Some female scientists, like Rosalind Franklin and Katherine Johnson, were not recognized for their work at the time. Why do you think that is?
- 2 Who, past or present, would you describe as an unsung hero? Explain your reasons to a partner.

- 3 Read the *Skill UP!* Look at the subheadings in the article. Decide which paragraph might contain the answers to the questions below.

- 1 Where did Lise Meitner go to university?
- 2 What was her biggest scientific achievement?
- 3 Where did she go to live before the Second World War?



The subheadings in an article can be used to help you find specific information in the text.

- 4  0.0 Read and listen to the article and check your answers to exercise 3.

The rise of Hitler and escape

Life then changed dramatically. In 1933, Adolf Hitler became Germany's leader, and Germans with Jewish ancestry started being treated as second-class citizens. Many lost their jobs. Meitner's family were Jewish, but as she was an Austrian citizen, she was able to continue her research in Berlin for the moment. But she knew that life would become dangerous there. In 1938, she escaped to the Netherlands and then travelled to Sweden to start a new job.

A great discovery

It was in Sweden in the winter of 1938 that Meitner made her important discovery. She calculated that uranium atoms could be split, making huge amounts of energy. This was called nuclear fission. She shared and analyzed the results with Hahn, who then did more experiments on nuclear fission. Hahn was awarded the Nobel Prize for Chemistry in 1944. However, he might not have achieved this recognition without Meitner's contribution and Meitner was upset that she wasn't given the award too.

A technology for good or for bad?


Nuclear technology led to the building of the atom bombs that were used at the end of the Second World War. Meitner was even nicknamed 'The Mother of the Atom Bomb', which she hated being called. She always felt that nuclear energy should be used for peace rather than war.

A posthumous award

Thirty years after her death, in 1997, Meitner's work was finally recognized by having an element named after her – meitnerium. For many scientists, this is considered to be the ultimate award.



- 5 Read the article again and answer the questions.
- 1 Find three things that Lise Meitner was unable to do because she was female.
 - 2 What was unusual about the attitude of Lise's parents at the time?
 - 3 Why did she leave Berlin in 1938?
 - 4 How did Lise feel about the use of nuclear fission to make bombs?
 - 5 Which awards did Lise receive, and not receive?
 - 6 What do you think is the most impressive part of Lise's story?


 Reading extra

- 6 Copy and complete the sentences using past simple passive or active forms of the verbs in the box.

appoint award nominate recognize treat

- 1 He (...) for the Nobel Prize, but he didn't win.
- 2 The university (...) a new professor last week.
- 3 Some female scientists were (...) for their work many years later.
- 4 They (...) the inventors with a special prize.
- 5 Some people might say that Lise Meitner (...) unfairly.

GRAMMAR

 Grammar animation

The passive: Advanced forms

- 7 Find at least one example of passive forms A–E in the article. Use the explanations below to help you.
- | | |
|-------------------------|--|
| A present modal passive | D <i>-ing</i> form passive |
| B past modal passive | E impersonal passive with <i>it</i> or a subject |
| C infinitive passive | |

| |
|--|
| Passives with modal verbs |
| We can use passive forms with modal verbs in the present and the past. <i>Atom bombs might not have been developed without Meitner's work.</i> |
| Passive infinitives and <i>-ing</i> forms |
| We can use an infinitive or <i>-ing</i> form in the passive after certain verbs, adjectives, prepositions, etc. <i>He expects to be awarded the prize this year.</i> <i>She remembered being given the ring by her friend.</i> |
| Impersonal passives |
| We can use passive forms of <i>think</i> , <i>believe</i> , <i>know</i> , <i>say</i> , <i>estimate</i> , etc. to introduce impersonal ideas. We can do this with <i>it</i> or with a subject. <i>It is thought that many scientists escaped to Sweden.</i> <i>Nuclear fission is considered to be one of the 20th century's great discoveries.</i> |


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- 8 Complete the text using the correct passive form of the verbs in brackets.

Nuclear power – the debate

Few energy topics seem (1.) (discuss) as widely as nuclear power. (2.) (estimate) that about 10% of global electricity is generated by nuclear power plants. For some, it's a source of energy that (3.) (should/use) more. It doesn't produce greenhouse gases, so nuclear energy (4.) (think) to be less damaging to the environment. But others worry about the safety. (5.) (believe) that more than 4,000 deaths (6.) (may/cause) by a nuclear accident in Chernobyl, Ukraine, in 1986. And in 2011, the world watched lives (7.) (affect) by the nuclear accident in Fukushima in Japan. So, is nuclear power worth the risk if people (8.) (might/force) to move out of their homes and money needs (9.) (spend) on repairs?



 Grammar practice

LIFE SKILLS Achievements, whether big or small, should be acknowledged. It's motivating and great for self-confidence to be given compliments. How do you feel when a teacher or friend tells you that you have done well?



Find out about another female scientist. Tell the class about her.

PROJECT BUILDER 3

Make notes on a key figure.


 Workbook Project Log p17



- 9  Tell your group about the key figures that you researched as part of Project Builder 2.

- 1 What did they do?
- 2 Were they unrecognized during their lives? How about now?
- 3 Where would they go on the rough timeline you prepared in Project Builder 2?
- 4 Use these structures to give information about them:
It is thought / considered / believed that ...
He / She is believed / known to have ...



- 10  Agree on three key figures for your project. They can be unsung heroes or figures who were recognized during their life. Work as a group to write notes about them. Do further research if necessary.

4.4 THE FUTURE IS ... PREDICTING THE FUTURE!

LESSON OBJECTIVES

- Learn about the power of computers to predict the future
- Learn compound adjectives

LISTENING

- 1  Read the introduction to the podcast. Discuss the questions in the introduction.



Can computers predict the future?

If a computer were shown a photo of two people, could it tell what was going to happen next?

And could computers predict future scientific discoveries or inventions?

For this podcast, we look at computer science. Can we use computers to see just a few seconds ahead ... or possibly many years ahead?

43 min



32 min left

- 2  Look at the photos. Discuss the questions.

- 1 In each photo, what kind of greeting do you think is going to happen next: a handshake, a 'high-five', a hug or a kiss? Why?
- 2 How sure are you?
- 3 How could a computer help to make these predictions?



- 3  0.0 Listen to the first part of a podcast. Check your ideas for question 3 in exercise 2.

- 4  0.0 Listen to the first part again. Answer the questions.

- 1 What reasons does the presenter give for each of the following?
 - A Humans are good at reading situations and recognizing body language.
 - B Scientists used YouTube videos.
 - C They only used American clips.
- 2 How well did the computer do in the test?
- 3 Would a computer or a human have done better in the test?



5 0.0 Read the *Skill UP!* and opinions 1–4. Then listen to the second part of the podcast and decide if each opinion is: the presenter’s own view, the view of researchers, or the view of most people.

- 1 Predicting a handshake isn’t particularly useful.
- 2 The consequences of the ‘greetings research’ could be far-reaching.
- 3 Many of our greatest discoveries have been made because of our passion and creativity.
- 4 Surely computers can’t compete with humans when it comes to making discoveries and inventing things.



In an informative podcast, a presenter may be expressing opinions and assumptions of their own or the views of others. Listen out for clues to recognize whose view is being expressed. Does the speaker say where the views come from? Listen out for passive forms with *it* or a subject, e.g., *It is thought that ...*, *This research is considered ...*

6 Look at the compound adjectives from the podcast. Answer the questions.

far-reaching hard-wired highly respected
time-saving well-informed widely recognized

- 1 Which of these compound adjectives were used in the podcast to describe these things?

| | |
|--------------------------------------|---------------------------|
| A a guess | C a university in the USA |
| B the consequences of the technology | D computers |
- 2 Copy the table below and put each compound adjective into the correct column.

| noun/adjective + <i>-ing</i> form | adverb + past participle |
|-----------------------------------|--------------------------|
| | |

Listening extra

7 Copy and complete the sentences using compound adjectives from exercise 6.

- 1 My brother likes to keep up-to-date with the news so that he’s (...).
- 2 It’s (...) that the use of social media can be addictive.
- 3 I find that shopping online is a (...) way to buy clothes. I’m too busy to go to the shops.
- 4 Animals are (...) with a survival instinct.
- 5 The effects of the virus outbreak are likely to be (...). It could affect every country in the world.
- 6 The head teacher of the school had a good reputation. He was (...) amongst both teachers and students.

8 **MEDIATION** Work in pairs. Take turns to explain the main ideas from the podcast to a friend who doesn’t speak English.

9 **THINK** Discuss the questions.

- 1 What do you think about the research into whether computers can learn to predict human interactions? Do the results surprise you?
- 2 Do you think computers will be able to learn to predict events before they happen? Why / Why not?

PROJECT BUILDER 4

 Think about future scientific developments.

Workbook **Project Log** p17

10 Discuss your chosen area of science and possible future developments.

- 1 Write a list of things that you think could happen in the future.
- 2 Choose five things from your list. Put them in order of how likely they are to happen.

11 Choose one of your ideas and write some more detailed notes about this prediction.



4.5 YOU CAN'T BE SERIOUS!

LESSON OBJECTIVES

- Learn about how to agree and disagree
- Use phrases for returning to a topic

SPEAKING

- 1 Read the comment. Then discuss the meaning of the phrase 'devil's advocate'. In what situations might you play devil's advocate?

- I sometimes play devil's advocate in order to get a discussion going. I don't always believe in what I am saying!

- 2 Look at the photo. Megan, Finn and Jayden are playing a game called Devil's Advocate. How do you think you play the game?

- 3 Watch the first part of the video. Answer the questions.

- 1 Which two topics do they discuss?
- 2 For each topic, who is on which side of the argument?

- 4 Watch again. What are the arguments for and against? Copy and complete the table. Then compare your answers with a partner.

| | For | Against |
|---------|-----|---------|
| Topic 1 | | |
| Topic 2 | | |

- 5 Copy and complete the *Key phrases*. Then watch again and check.

KEY PHRASES

Agreeing and disagreeing

Agreeing

Absolutely! / Exactly!
 I couldn't (1.) more.
 That's (2.) what I was thinking.
 That's a good point.
 I suppose so.

Disagreeing

I'm not sure about that. / I don't (3.) about that.
 I totally/completely disagree.
 That's not how I (4.) it.
 You (5.) be serious!

Partly agreeing

I know what you (6.), but ...
 I see your (7.), but ...
 That's partly true, but ...
 Maybe. But it could be said ...



- 6 Read the *Skill UP!* In the video, who tries to return to a topic? What does he/she say?



If you want to move the conversation back to the topic you were talking about, use phrases like:

Anyway, where was I?

To get back to what I was saying ...

- 7 Watch the second part of the video. Where is Jayden going?

Dialogue builder

- 8 Play the game in small groups. Look at the photos and decide what topics they represent. Choose one of the topics and decide who is the devil's advocate.



- 9 Discuss the topic for two or three minutes. Use the *Key phrases* to agree and disagree with each other.
- 10 Now choose a different topic. Change the devil's advocate and discuss for two or three minutes.

4.6 A PERSUASIVE ESSAY

LESSON OBJECTIVES

- Write a persuasive essay
- Learn to plan an essay before you write

WRITING

1 Read the online post and the essay. Find the answers to these questions.

- 1 Who is the essay for and what is the writer's aim?
- 2 What is in the introductory paragraph?
- 3 Which paragraph do you think makes the strongest argument for why Kapany should appear in the exhibition?
- 4 What is the purpose of the conclusion?

i Mediation skills

THE CITY MUSEUM

VISIT EXHIBITIONS LEARN NEWS

Coming soon: Unsung Heroes

Our forthcoming exhibition will be about great unsung heroes of science. We invite students from the community to propose people they believe should appear in the exhibition. Please send your essays to info@citymuseum.org.uk

Narinder Singh Kapany

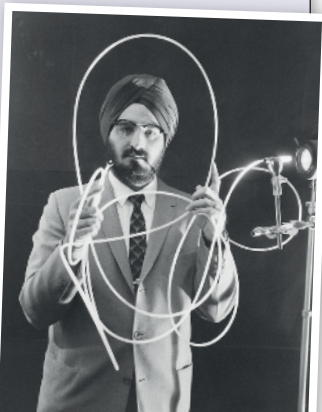
I would like to propose that Narinder Singh Kapany is part of the *Unsung Heroes* exhibition that is due to take place at your museum next spring. Kapany's work is not widely known, but he deserves to be included in the exhibition for the following reasons.

Kapany's contribution to science is seen by all of us every day. Without his work on fibre-optics, which allows a large quantity of information to travel at speed down thin glass wires, it is possible the internet would not exist.

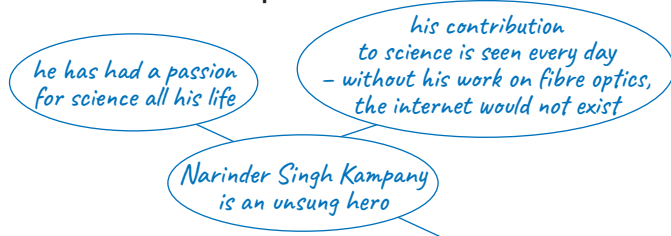
Kapany has had a passion for science all his life. When he was a child, Kapany was told by a teacher that light could only travel in straight lines. He spent his life searching for ways that light could bend. He made his first ground-breaking discoveries in the 1950s and 1960s. His work led to fibre optics being used in medicine and in the communications industry.

Kapany's work has not always been recognized. In 2009, another physicist, Charles Kuen Kao, won the Nobel Prize for his work on fibre optic cables. It was surprising that Kapany didn't share the prize with Kao, but he has never complained and has always said that Kao deserved the award.

In conclusion, for the reasons stated above, I firmly believe that Kapany would be an excellent choice for the exhibition. Learning more about him would inspire young scientists to try to make a difference.



2 Read the *Skill UP!* Copy and complete the spidergram plan for the essay about Narinder Singh Kapany with statements and examples.



Skill UP!

Before you start to write, plan your essay by making notes. You can use a spidergram to help you.

- What's the main argument?
- Choose 2–3 good statements that support the main argument, one for each paragraph.
- Identify reasons or examples that support or explain each statement.

3 Complete the formal alternatives for the words and phrases in the essay.

- | | |
|-------------------------------|-----------------------|
| 1 I want to suggest | I would like to (...) |
| 2 is going to happen | is (...) to (...) |
| 3 a lot of | a (...) of |
| 4 I strongly think think that | I (...) that |

PROJECT BUILDER 5

Write an essay to propose a key figure for an exhibition.

➔ Workbook **Project Log** p18



4 Write an essay to propose a figure in an exhibition on heroes of science.

A Plan

- Look at Project builder 3. Use your notes for the key figures you chose. Each group member selects a different person. Do more research if necessary.
- Use a spidergram to plan your paragraphs. For each, include a statement, with reasons or examples.
- Make notes for a conclusion.

B Write

- Use your plan to write the essay.
- Try to use formal language.

C Read and check

- Check your spelling and grammar.
- Compare your essays in your group. In what ways are they similar and different?



4 PROJECT

LS

Create a science timeline

SHARE AND REVIEW

Use your Project Log


➔ p 16-18

1 Look back at your Project Builders 1-5 and gather the following material:

- 1 A rough timeline with special moments from your chosen area of science.
- 2 Notes on your key figures and your essays about them.
- 3 Your predictions for the future in your chosen area.



DECIDE

2  You are going to create and present a timeline with information about your chosen area of science. In your group, decide how you are going to put together your material. Use these ideas to help you.

- You could make a series of digital slides in chronological order. Include information about key figures on a slide at the correct point on the timeline. This can include where your future predictions might go on the timeline.
- You could create a visual timeline, like the one shown here. You can do this digitally or in the form of a poster.



1783

1903

1912

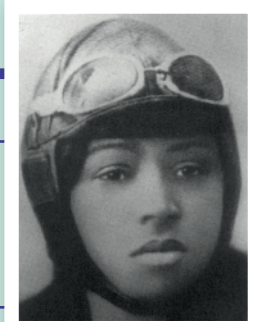
1921

The Montgolfier brothers fly a hot-air balloon in France with just a sheep, a rooster and a duck on board.


The first powered flight in a plane.

The first parachute jump from a plane.

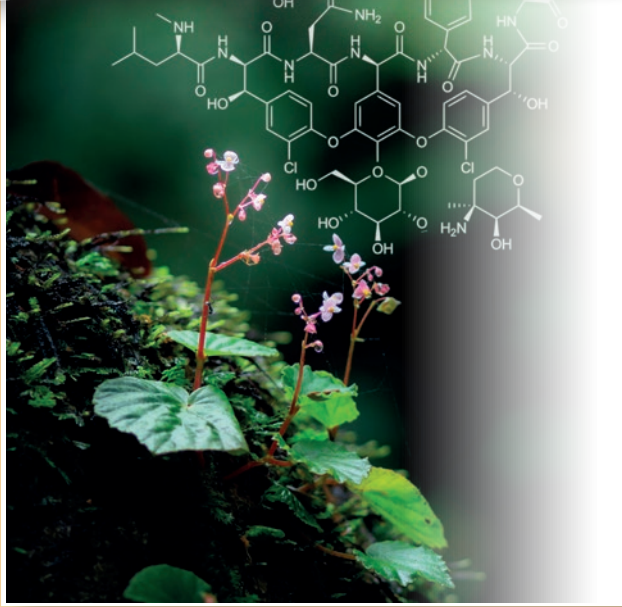
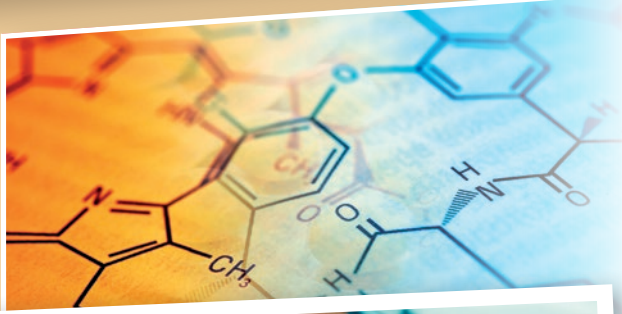
Key figure: Bessie Coleman. She was the first black person to be given an international pilot licence.



CREATE

3  Work together to create a final version of the timeline for your presentation.





PRESENT

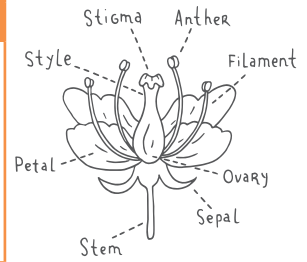
- 4 0.0 Listen to Theo, Ivy and Ethan discussing the presentation of their timeline. Answer the questions.
- 1 How long should the presentation be?
 - 2 What do they decide to do with their introduction?
 - 3 Why don't they want to spend time on all the events on the timeline?
 - 4 How many of their predictions do they decide to include?
- 5 Agree how to prioritize the information when you present it. Your presentation should be the same length as Theo, Ivy and Ethan's. Use the *Key phrases* to help you.



KEY PHRASES

Prioritizing information

- It's better / more important to ... than ...
- Let's spend more time on ...
- They won't know much about ... so let's ...
- They'll find ... interesting.
- Don't you think ... will have more impact?
- Let's focus on ...



- 6 Read the *Project skills*. Use these ideas and practise your presentation.

PROJECT SKILLS

Presenting effectively as a group

It is very typical for a group of three people to divide their presentation into three separate parts. This can lead to a boring and formulaic presentation. Try using these tips to interact with each other during your presentation:

- Include questions that you ask each other.
- Acknowledge each other as each new section of the presentation begins:
And now I'll pass you to Julia ...
Thanks for that information about ..., Leon.
- Present together at the beginning and end of the presentation.



- 7 Give your presentation to the class.



REFLECT

- 8 Think about your project work in this unit. Read the statements and choose your reaction.

CREATIVITY

1 Our group can present information about a scientific area in a visually clear and interesting way.



COLLABORATION

2 Our group can work together to deliver a group presentation.



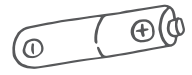
DIGITAL LITERACY

3 Our group can use appropriate digital tools to present information.



- 9 Copy and complete these sentences for you.

- 1 I was pleased with our timeline because ...
- 2 The thing I enjoyed learning about the most in this project was ...
- 3 One thing I could improve is ...



4 MY GRAMMAR REFERENCE AND PRACTICE

Passives

- We can often talk about actions or processes in two ways, in the active or in the passive. We often use the passive when the agent (who or what does the action) is unknown or unimportant.
- An active sentence answers the question, 'Who does the action?' (Who is the agent?)
My mother cooks chicken every Sunday.
- A passive sentence answers the question, 'What happens to the person or thing?'
The chicken is always served with potatoes.
- We form the passive with the correct tense of the verb *be* + the past participle of the main verb.

| Tense | Passive form |
|-------------------------|--|
| Present simple | The launches are monitored at the control centre. |
| Present continuous | Plans are being made to go to the moon. |
| Past simple | The Rover was launched last year. |
| Past continuous | The data was being analyzed . |
| Present perfect | A mission has been launched to find life. |
| Past perfect | We hadn't been told about the virology lecture. |
| Future with <i>will</i> | Research will be carried out next year. |

REMEMBER! If we want to say who does an action in the passive, we use the preposition *by*.

Television was invented by John Logie Baird.

But often, we don't need to say who does the action.

The oranges are grown in Spain. (by Spanish farmers)

- We often use a preposition to say where or when something happens.

The best pasta is produced in Italy.

This castle was built in the 13th century.

The passive: advanced forms

- We form the present passive of modals with *may / might / should / must*, etc + *be* + past participle.
They should be taught science in primary school.
- We form the past passive of modals with *may / might / should / must*, etc + *have* + *been* + past participle.
She's late. She might have been delayed by the traffic.
Your photos are brilliant. They could have been taken by a professional.

- We can use *to be* + past participle in structures where *to* + infinitive is used.
The decision needs to be taken today.
I'm taking my dog to be microchipped.
- We can use *being* + past participle in structures where the *-ing* form is used.
Being awarded the Nobel Prize is an incredible achievement.
I hate being woken up early.
- We use reporting verbs such as *believe, claim, consider, know, report, say* and *think* in the passive to talk about general beliefs and ideas. The subject of the sentence can be the main noun (or pronoun), or *it*. These structures are common in news reports and formal written English.
It is believed that no one has been seriously injured.
In some cultures, coins are considered to bring you good luck.
- We can use reporting verbs in the passive with the subject pronoun *it*: *It* + *be* + past participle of reporting verb + (*that*) ...

| <i>It</i> | <i>be</i> | Past participle of reporting verb | (<i>that</i>) | |
|-----------|-----------|-----------------------------------|-----------------|---|
| It | is | thought | (that) | the virus will spread. |
| | was | claimed | | the police destroyed the report. |
| | has been | said | | he's the best footballer of his generation. |

- We can use reporting verbs in the passive after other subjects: Subject + *be* + past participle of reporting verb + *to* infinitive ...

| It | <i>be</i> | Past participle of reporting verb | <i>to</i> + infinitive | |
|-----------|-----------|-----------------------------------|------------------------|-------------------|
| Singing | is | known | to relieve | stress. |
| This drug | was | considered | to be | safe at the time. |

REMEMBER! We use *to* + infinitive in the structure with an ordinary subject but a *that*-clause in the structure starting with *it*.

Passives

1 Choose the correct options.

- 1 The gym is closed this week because it **'s being** / **is** updated.
- 2 How many cars **were** / **are** made in Britain every year?
- 3 The money **wasn't** / **hasn't been** found. The police are still looking for it.
- 4 The match **has been** / **was** watched by millions last night.
- 5 Our team **hasn't been** / **wasn't being** awarded a gold medal. We came second.
- 6 The final episode of the series **is** / **will** be filmed in London.
- 7 The new train station **was being** / **has been** built when I was in London last June.

2 Copy and complete the sentences with the passive form of the verbs in the box in the correct tense.

check name not choose not consider
not see photograph **release** write

- 1 His research **will be released** next month.
- 2 A meteor (...) at about 9 p.m. last night shooting through the skies.
- 3 The rocket (...) by the engineers when they found a fault.
- 4 The report (...) by scientists as we speak.
- 5 Astronauts (...) for the mission until next month.
- 6 The moon (...) since last Tuesday – it's been cloudy!
- 7 A UK polar research ship (...) *Boaty McBoatface* before its name was changed to *RRS Sir David Attenborough*.
- 8 Space missions (...) important by some people.

3 In your notebook, complete the text with the correct form of the passive and the verbs in brackets.

Mars is the fourth planet from the sun and ¹ **is named** (name) after the Roman God of War. It ^(2.) (also / know) as the red planet. Before 2018, it ^(3.) (not think) that there was water on Mars, but evidence of a lake ^(4.) (find) under the planet's south polar ice cap. Although humans haven't been to Mars, spacecraft ^(5.) (sent) there to research the planet. In 2020 the Perseverance Mars rover ^(6.) (launch) into space. Its progress ^(7.) (analyze) every minute of its seven-month journey to the planet. After a successful landing, photos ^(8.) (take) daily and sent back to the control centre. Soil and rocks ^(9.) (test) over the next few months so scientists can better understand the Martian landscape and atmosphere.



The passive: advanced forms

4 Copy and complete the sentences with present or past passive modals and the verbs in brackets.

- 1 Mr Kirk is great – he **should be appointed** (should / appoint) as head teacher easily.
- 2 No one knows for sure whether this play was written by Shakespeare. It (...) (might not / write) by him.
- 3 It's awful that he didn't invite you to the wedding. You really (...) (should / invite).
- 4 Where are my black trousers? Do you think (...) (could / put) in the wash?
- 5 The exam (...) (may not / set) next week. Our teacher will decide tomorrow.
- 6 The animals (...) (must / treat) with care.

5 Copy and complete the sentences with the infinitive or -ing form of the verbs in brackets.

- 1 He's expecting **to be nominated** (nominate) for an award.
- 2 She's hoping (...) (choose) for the mission.
- 3 The probe needs (...) (launch) within the next two weeks.
- 4 Leah was disappointed (...) (not consider) for the job.
- 5 (...) (send) into space has been my dream since I was a young child.
- 6 Alice was worried about (...) (treat) unfairly.

6 Copy and complete the sentence so that it means the same as the first sentence. Use the verbs and other words in brackets in the correct form.

- 1 Everyone thinks the Prime Minister is going to make an announcement this afternoon.
The Prime Minister **is expected** to make an announcement this afternoon. (expect)
- 2 Most people agree that human actions are responsible for global warming. (widely / accept)
It (...) human actions are responsible for global warming.
- 3 Evidence suggests that certain types of music help people concentrate better. (understand)
Certain types of music (...) people concentrate better.
- 4 Scientists believe that regular exercise improves people's moods. (claim)
Regular exercise (...) people's moods.
- 5 People are starting to accept that technology is changing how we think. (now / recognize)
It (...) technology is changing how we think.
- 6 Scientists thought that the moon was dry until they found water and ice on it. (be)
The moon (...) dry, until water and ice were discovered.

3-4 REVIEW AND EXAM PRACTICE

EXAM PREPARATION

- Exercise 1: *Oxford Test of English for Schools* Listening Part 4
- Exercise 2: *Cambridge B2 First for Schools* Reading and Use of English Part 6
- Exercise 3: *Cambridge B2 First for Schools* Reading and Use of English Part 2
- Exercise 4: *Oxford Test of English for Schools* Writing Part 2 – Review
- Exercise 5: *Cambridge B2 First for Schools* Speaking Part 2

LISTENING

1  0.0 Listen and choose the correct answer: A, B or C.

- Two scientists are discussing a study. When will the results be ready?
A the following day
B at the end of the week
C the following week
- Max and his father are talking about computer games. What agreement do they reach?
A Max can play on the condition that he does certain things first.
B Max is going to give up playing during the week for a while.
C Max will limit the amount of time that he spends playing at weekends.
- A tour guide is explaining an exhibition. What can visitors do?
A watch scenes from the first space landing
B try on some clothing that is worn in space
C experience controlling a vehicle in space
- A girl is talking to her skateboarding coach. What does he offer her?
A encouragement in preparing for a competition
B suggestions for doing well in a competition
C congratulations on winning a competition
- An expert is talking about cleaning. What, according to her, is the best way to kill bacteria?
A with products that contain chemicals
B with products that contain alcohol
C with simply soap and water



The speakers may mention all of the multiple-choice options. Make sure you listen to the whole conversation rather than choosing the first option you hear.

READING

2 Read the article about a science competition and decide which sentence (A–G) fits in each gap. There is one extra sentence which you do not need to use.

Are you America's next Top Young Scientist?

Do you have an idea that could change the world? If so, the brains behind the annual Young Scientist Challenge want to hear from you!

The competition, founded in 1999, aims to uncover the most promising talent from across the country and inspire more young people to get into science. Students in grades 5 to 8 are invited to submit a video lasting up to two minutes that presents an original solution to a real-world problem. (1) It should be something that affects you, your family or your wider community, and covers one of six specified topic areas.

Among the hundreds of entries received, ten finalists will be selected by a panel of expert judges. (2) It's an opportunity to conduct experiments in a practical setting, carry out research with other young talents, and work on something that could make a difference to our planet.

At the end of the coaching programme, the Grand Prize will be awarded to America's Top Young Scientist. This is based on factors including the young person's knowledge of science, their creativity and ability to communicate their ideas. (3) This acknowledges the innovation that will have the most far-reaching impact on people around the world.

Ideas that have reached previous finals range from a way to identify disease in farming and prevent food waste, to a robotic glove that helps people to recover the use of their hands following a brain injury. Their creators have been a great success over the years and made remarkable achievements in the field of scientific research. It would seem, then, that the sky's the limit for those who do well in the competition.



(4.) 2018 winner Rishab Jain, for example, was chosen as one of 'Time's 25 Most Influential Teens' in the same year, and other winners over the last decade have won further scientific awards, appeared on television and even presented their ideas to the President at the White House.

The winner in 2020, fourteen-year-old Anika Chebrolu from Texas, came up with an innovative way of developing a cure for the influenza virus. (5.) Anika plans to follow a career in medical research and would one day like to become a professor. She thinks that it is important to never stop asking questions.

Further details of the competition can be found on the Young Scientist Challenge website, along with many more inspiring stories from previous finalists. (6.) Surely that's enough motivation to get some ideas flowing! The closing date for entries is April 27, so get thinking!



- A An additional prize, the Improving Lives Award, is decided by a public vote via the competition website.
- B And if all of that doesn't convince you, you might be interested to learn that the winner also receives a \$25,000 prize.
- C In recent years, America's Top Young Scientists have certainly gone on to win the respect of the scientific community.
- D These young people will be invited to take part in a summer coaching programme, during which they will develop their projects with the help of some of the country's most highly-respected scientists.
- E The judges found it more difficult to choose a winner than in any other year so far.
- F She became interested after suffering from it herself and worked with her coach to investigate the idea further.
- G This should be a real innovation rather than a variation on an idea or product that already exists.



Look for clues in the information before and after each gap to help you choose the missing sentence.

USE OF ENGLISH

- 3 Read the text and complete each gap with one word only.

What's so 'super' about a supermoon?

Everybody seems to be talking ⁰about tonight's supermoon, but (1.) you be watching the skies at 9:14 p.m. to see this wonder of our (2.) system?

The moon is Earth's only natural (3.); a rock that moves around our planet in a cycle lasting approximately 27 days. The moon does not (4.) Earth in a perfect circle, however: it actually travels on an elliptical path similar (5.) the shape of an egg.

When the moon is full and at the nearest point on its journey around Earth, it seems to be larger and shine (6.) brightly than when it's further away. This is known as a supermoon and can (7.) seen around three or four times a year.

It (8.) often thought that a supermoon is even bigger thanks to an optical trick created when the moon is rising or setting against an object on the horizon. Definitely something to stay awake for!

WRITING

- 4 You have seen the following post on a popular science blog. Write a review of 100–160 words.

Stories in space



Can you think of a book, film or TV series set in space? Write a review for our readers! What happens in the story? How does being set in space make it interesting? We'll share our favourite reviews in next week's blog.

SPEAKING

- 5 The photographs below show people studying science. Compare the photographs and say which you think is the best way to learn about the subject and why.

