

4 Moments in science

VOCABULARY

Science collocations

➔ Student's Book p45

- 1 ☆☆☆ Look at the pictures. Complete the collocations with the verbs below.

analyse conduct come up with make record
write up



- 1 a theory
- 2 an experiment
- 3 observations
- 4 the data
- 5 the data
- 6 your notes

- 2 ☆☆☆ Complete the sentences with verbs and nouns to form collocations.

- 1 We used special software to a
the d
- 2 We've collected some interesting data, but it's too early
to d c from it.
- 3 We don't have enough evidence to be able to
p our t
- 4 The r i that the new
treatment may be effective.
- 5 We need to c o more
r into the effects of air pollution.
- 6 What o did you m when
you looked at the survey data?

- 3 ☆☆☆ Complete the science report with suitable nouns.



Aim: To carry out ¹ into the effect of light intensity on photosynthesis in plants.

Materials: 1 x lamp, 1 x aquatic plant, 1 x glass container filled with water

Method:

To conduct the ², we put the lamp 10 cm from the container and counted the number of bubbles the plant produced in one minute. We then repeated this process another four times, each time moving the lamp 10 cm further from the container and making the same ³

Results and conclusion:

When we analysed the ⁴ that we had recorded, we noticed a pattern: the closer the plant was to the lamp, the more bubbles it produced. These ⁵ indicate that plants produce more oxygen in more intense light. We can draw the ⁶ that light intensity affects the rate of photosynthesis.

- 4 ☆☆☆ Rewrite the sentences using the word in brackets and any other necessary words.

- 1 What did you conclude from your experiment?
(conclusions)
What conclusions did you draw from your experiment?
- 2 Einstein formulated his theory of relativity in 1915. (up)
.....
- 3 What can we observe from this graph? (observations)
.....
- 4 Why did you do this experiment? (out)
.....

Space

➔ Student's Book p46

- 5 ☆☆☆ Label the pictures with the words below. There are two words that you do not need to use.

asteroid comet fuel landing satellite
launch solar system spacesuit



1



2



3



4



5



6

- 6 ☆☆☆ Complete the text with the missing words.

What are satellites?

A ¹s_____ is anything that moves around a planet or a star. For example, the moon is a natural satellite because it ²o_____ the Earth. However, the word is often used to refer to artificial satellites – machines which have been built and ³l_____ into space by humans. Some of these are used for everyday purposes, such as telecommunications and weather forecasting. Others are used for research ⁵m_____ – for instance, to help space scientists learn more about other planets and other space objects, such as asteroids and ⁵c_____.

Artificial satellites are taken into space on ⁶r_____. Once a satellite is in orbit, the forces acting on it will keep it moving around the Earth at a constant speed. This makes a satellite different from other kinds of ⁷s_____, such as ⁸p_____, which travel through deep space and therefore require a lot of power. However, satellites still need some power – for example, to change speed and direction or to send data back to Earth. Because it is not practical for them to carry ⁹f_____, they often have solar panels to generate electricity.



- 7 ☆☆☆ Describe the plot of a film that is set in space (or invent your own). Use the questions below to help you.

- Is the film set in the past, present or future?
- Who are the main characters?
- What do they wear?
- What do they travel in and what do they see in space?
- What is their mission?
- What problems do the characters face and how are these problems resolved?

'The Martian' is set in 2035 and the main character is an astronaut called Mark Watney.

EXTRA Compound adjectives

➔ Student's Book p51

- 8 ☆☆☆ Complete the compound adjectives in the sentences with the words below.

far highly hard time well widely

- 1 My aunt is a _____ respected nuclear physicist.
- 2 You have produced a really interesting and _____-informed report. Well done!
- 3 Margarita Salas was a _____ recognized biologist who made an important contribution to the study of genetics.
- 4 Human beings have a _____-wired ability to learn language and babies can recognize some sounds even before they're born.
- 5 Some people claim that genetic engineering could have _____-reaching consequences that we do not fully understand.
- 6 The invention of the washing machine and other _____-saving devices transformed many people's lives in the 20th century.

4 GRAMMAR

Passives: review

➔ Student's Book p47

- 1 ☆☆☆ Complete the sentences with the forms of *be* below.

are be been been was were

- 1 Ada Lovelace has _____ described as the first computer programmer.
- 2 The first artificial satellite, Sputnik 1, _____ launched on 4 October 1957.
- 3 New treatments for serious diseases _____ being developed all the time.
- 4 It is likely that many new planets will _____ discovered in the next decade.
- 5 Telescopes _____ being used by astronomers in the 1600s.
- 6 When Mendeleev created the first periodic table, not all of the chemical elements had _____ discovered.

- 2 ☆☆☆ Write passive sentences using the tenses in brackets. Use *by* + agent where necessary.

- 1 a new species / identify / zoologists (present perfect)

A new species has been identified by zoologists.

- 2 driverless cars / develop / right now (present continuous)

.....

.....

- 3 the documentary / present / famous scientist / ? (will future)

.....

.....

- 4 some interesting observations / make (past simple)

.....

.....

- 5 the earthquake / not predict / seismologists (past perfect)

.....

.....

- 6 the experiments / carry out / in the lab / ? (past continuous)

.....

.....

- 3 ☆☆☆ Complete the article using the correct passive form of the verbs in brackets.

What is entomology and why is it important?

Entomology is the study of insects. It is important because it can help us understand how diseases ¹ **are spread** (spread) by insects such as mosquitos. In 2019, over 200 million cases of malaria ² _____ (record) worldwide, so this is a huge problem. However, insects aren't all bad – they are also crucial to our ecosystem. Many essential activities ³ _____ (carry out) by insects and if insect species die out, the whole planet ⁴ _____ (affect).

Are there a lot of insect species?

Yes! More than 1 million species of insects ⁵ _____ (discover) so far and new ones ⁶ _____ (find) all the time. Entomologists predict that that at least 9 million more species ⁷ _____ (identify) in the future.

Is entomology a new science?

No, not at all. Insects ⁸ _____ (study) since ancient times and they ⁹ _____ (use) for many different purposes, from agriculture to medicine. As a modern science, entomology probably dates back to the early 19th century, when entomological societies ¹⁰ _____ (establish) in Paris and London.

- 4 ☆☆☆ Write about an area of science that interests you. You can choose one of the areas below or your own idea. Answer some or all of the questions below.

aeronautics genetics meteorology
oceanography palaeontology robotics virology

- What is studied in this area of science?
- How is it applied to solving problems in the real world?
- Who or what is affected by these problems?
- What discoveries have been made recently?
- What new discoveries do you think will be made in the future?

Virology is the study of viruses ...

.....

.....

.....



Passives: advanced forms

Student's Book p49



5 ☆☆☆ Choose the correct answers.

- My grandma remembers ... told that women couldn't have a career in science.
A to be B be C being
- It would be incredible to be ... to go into space.
A chosen B choose C chose
- Astronauts need ... given a lot of training.
A be B to be C being
- The probe ... have landed successfully on Mars.
A is report B is reported C is reported to
- ... that extra-terrestrial life may exist in another galaxy.
A Is believed B It believes C It is believed
- We think the satellite may ... by an asteroid while it was in orbit.
A hit B be hit C have been hit

6 ☆☆☆ Complete the sentences with the correct passive form of the verbs in brackets.

- Being offered** a job at NASA would be amazing. (offer)
- The research should have _____ with a more varied group of participants. (conduct)
- These notes will need to _____ by the end of the day. (write up)
- This medicine must _____ in the fridge. (keep)
- We were really excited about _____ the school science prize. (award)
- I don't want to be famous, but I want _____ for the work I do. (respect)
- I don't understand these results at all. The data can't have _____ accurately. (record)

7 ☆☆☆ Correct the mistakes in the text.



Women in science

Although gender equality in science is **widely believe** ¹ **widely believed** to have improved in recent years, a report published by UNESCO in 2021 indicates that women are still underrepresented in scientific careers. Across the world, is estimated ² _____ that only one in three research scientists is female and this figure is thought that is ³ _____ even lower in many countries.

It sometimes argue ⁴ _____ that this gender gap results from fewer women choosing science-related jobs. However, women who work in science also appear to make less progress in their careers. Overall, they found ⁵ _____ to earn less, to publish fewer scientific papers and to be employed in less senior positions. It believed ⁶ _____ that this may be partly due to the time taken off by women if they have children. However, women consider ⁷ _____ to face greater discrimination in the workplace and this may be another factor that affects their progression in science, as in other types of careers.

8 ☆☆☆ Choose one of the issues below and answer the question, giving reasons for your opinion.

- It is claimed that animal testing is crucial for developing new drugs and medical treatments. Should animals be used for this kind of research?
- Although it is believed that genetically modified (GM) foods could offer a solution to world hunger, it is also argued that their effects on the human body are not yet known. Should GM foods be grown and sold?
- It is estimated that only one in three research scientists is female. What should be done to reduce the gender gap?

I think / don't think animals should be used for medical research because ...

.....

.....

.....

.....

.....



A brief history of Mars exploration

With detailed photos now being sent back from Mars all the time, it's hard to believe that only 50 years ago, no spacecraft had even got close to its surface. Before the 1960s, little was known about Mars and it was widely believed that it might be inhabited. We look at some of the breakthroughs that have transformed our understanding of the Red Planet and prepared the ground for today's missions.

The first images of Mars



The first six missions to Mars had failed, so it was a historic moment when, in 1965, the Mariner 4 probe became the first spacecraft to photograph another planet from deep space. Mariner 4 didn't land on Mars, but flew close to it and took 21 photographs of its surface. Mars was revealed to be a dry, empty planet, which disappointed people who had hoped that extra-terrestrial life might be discovered.

A spacecraft finally lands on Mars

In 1976, the first successful landing on Mars was made by Viking 1. This was soon followed by an identical spacecraft, which landed in a different location. Numerous photos were taken and experiments were conducted to look for signs of life in Martian soil. Some interesting observations were made, and a conclusion was even drawn by some scientists that the soil might contain micro-organisms, although the evidence was generally considered to be inconclusive.

The first mobile Mars rover

Mars Pathfinder landed on Mars in 1997, accompanied by Sojourner – the first wheeled rover to travel around the surface of Mars. Research carried out by Sojourner seemed to indicate that there may once have been water on Mars. For example, it found rock formations that may have been created by flowing water.

Growing evidence of water

In the early 2000s, more evidence was found to support the theory that water used to flow on Mars. This was thanks to several successful rovers, including Spirit and Opportunity (launched in 2003) and Curiosity (launched in 2011). In 2015, NASA made the exciting announcement that a small quantity of liquid water was thought to exist on Mars today.

Perseverance and beyond

The search for water remains a key focus for today's Mars missions because it has such far-reaching consequences. Water could be used by astronauts on human missions to Mars and might even support extra-terrestrial life. There is much more to be learned about the Red Planet, but with technology developing rapidly, who knows what breakthroughs will be made in our lifetime?



An online article



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

1 ☆☆☆ Read the *Skill UP!* Then read the article quickly and find the information to complete the sentences. Use the subheadings to help you.

- 1 In _____, NASA announced that there may still be small amounts of water flowing on Mars.
- 2 The name of the first Mars rover was _____.
- 3 The first spacecraft to photograph Mars from deep space was called _____.
- 4 The first successful Mars landing took place in _____.
- 5 The rovers Spirit, Opportunity and _____ helped scientists to demonstrate that there was once water on Mars.
- 6 In the future, water might be helpful on _____ missions to Mars.

2 ☆☆☆ Now read the whole article more carefully. Choose the correct options to complete the sentences.

- 1 Until the 1960s, many people thought that ...
 - A it would never be possible to land on Mars.
 - B there might be life on Mars.
 - C there were rivers and lakes on Mars.
- 2 The photos that were taken by Mariner 4 showed that ...
 - A the surface of Mars appeared to be wet.
 - B it might be possible for Mars to support life.
 - C there wasn't very much on the surface of Mars.
- 3 Most scientists thought that Viking 1 had ...
 - A not found clear evidence of life on Mars.
 - B found tiny microbes in the soil on Mars.
 - C not provided any useful data.
- 4 By the end of the 20th century, ...
 - A scientists had proved that there was water on Mars.
 - B the first rover had been sent to Mars.
 - C liquid water had been found on Mars.
- 5 The writer says that finding water on Mars ...
 - A might one day be useful for human explorers.
 - B will definitely happen in the next few years.
 - C would prove that Martian life exists.

3 ☆☆☆ Read the questions and match them to the Mars missions: Mariner (M), Viking (V) or Pathfinder (P).

- 1 Which mission did not aim to land on Mars? M V P
- 2 Which mission involved two similar spacecraft? M V P
- 3 Which mission transported the first rover to Mars? M V P
- 4 Which mission was the first success after a long series of failures? M V P
- 5 Which mission found some evidence that there was water on Mars in the past? M V P
- 6 Which mission carried out the first experiments on the surface of Mars? M V P

4 ☆☆☆ At the end of the article, the writer asks, 'who knows what breakthroughs will be made in our lifetime?' What are your predictions for the future of Mars exploration? What new discoveries and observations might be made in the next 50 years?

I think that in the next 50 years, scientists will ...

.....

.....

.....

.....

5 ☆☆☆ If you had the opportunity to speak to a scientist who studies Mars, what would you like to ask? Write a list of questions.

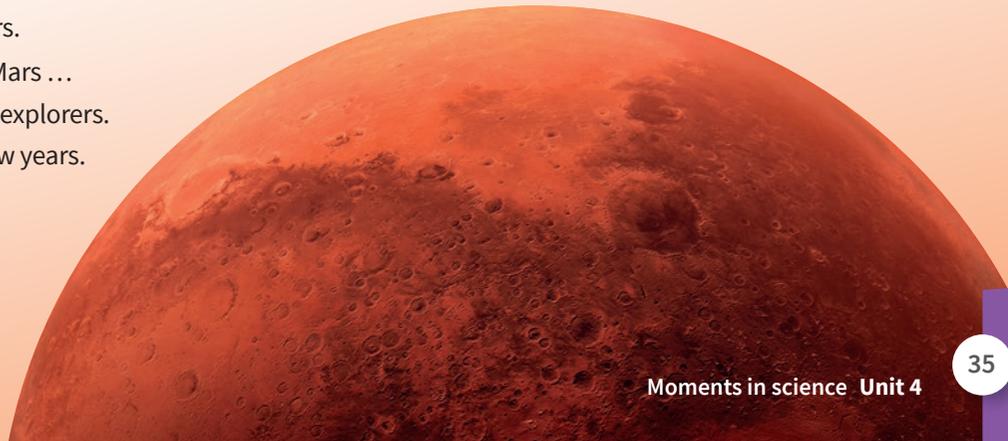
How long is a day on Mars?

.....

.....

.....

.....



4 REVIEW

EXAM PREPARATION

- Exercise 1: Cambridge B2 First for Schools Reading and Use of English Part 1
- Exercise 2: Cambridge B2 First for Schools Reading and Use of English Part 2
- Exercise 3: Cambridge B2 First for Schools Reading and Use of English Part 4

1 Choose the correct words to complete the text.

Rocks from outer space

An asteroid is a rocky object that ¹ the sun. Most asteroids are found between Mars and Jupiter, but they can also travel to other parts of the solar ² and come closer to Earth. Sometimes, when two asteroids crash into each other, a small piece is broken off and we call this a meteoroid. Meteoroids can also come from ³, which are made of ice and dust rather than rock.

When a meteoroid enters the Earth's atmosphere, we might see it as a meteor – a flash of light in the sky. If the rock is not completely destroyed, it can fall to Earth and we then call it a meteorite. Although meteorite ⁴ are fairly common, these rocks are still among the rarest materials on our planet.

So if you find a rock that you believe might be a meteorite, how can you test this ⁵? The first step is to ⁶ out an experiment to see if it sticks to a magnet. This is because meteorites usually contain iron and other metals. However, many Earth rocks are also attracted to magnets, so you cannot necessarily ⁷ the conclusion that it has come from outer space. You will also need to look at the appearance and weight of the rock and do other kinds of experiments to be able to ⁸ that it is definitely a meteorite.

- | | | |
|---------------|-----------|--------------|
| 1 A lands | B orbits | C launches |
| 2 A spacesuit | B system | C spacecraft |
| 3 A comets | B probes | C satellites |
| 4 A missions | B rockets | C landings |
| 5 A theory | B data | C result |
| 6 A write | B carry | C conduct |
| 7 A draw | B make | C take |
| 8 A analyse | B prove | C record |

2 Complete the article. Write one word in each gap.

Jocelyn Bell Burnell

Jocelyn Bell Burnell is a highly respected astrophysicist who is known for discovering the first pulsar.

The discovery, which Bell Burnell made in 1967 when she was a 24-year-old graduate student, was considered ¹ be extremely important. However, her contribution ² not recognized by the Nobel Prize committee, and although the observations ³ been made by Bell Burnell, the 1974 Nobel Prize in Physics was given to two male astronomers that she had worked with. ⁴ was thought by some that Bell Burnell should ⁵ been awarded the prize. However, she did not complain. Instead, she has spent her career working to improve diversity in science.

In 2018, it was announced ⁶ Bell Burnell had won a Breakthrough prize and that she had decided to donate all \$3 million of the prize money to help graduate students. She wanted it to ⁷ used to make careers in physics more accessible for women and other groups in society who are underrepresented in the scientific community. She believes that everyone ⁸ be given an equal chance to contribute to science and to be recognized for their work.

3 Complete the second sentence so that it has a similar meaning to the first sentence. Use between two and five words, including the word in brackets.

- They have just launched the probe into deep space. (been)
The probe into deep space.
- The comet is thought to be about a kilometre wide. (that)
..... the comet is about a kilometre wide.
- A team of geneticists will conduct the experiment. (out)
The experiment a team of geneticists.
- It is believed that an asteroid hit the Earth over 66 million years ago. (to)
An asteroid the Earth over 66 million years ago.
- It's possible that they won't find water on Mars. (might)
Water on Mars.

4 LANGUAGE SUMMARY

VOCABULARY

Science collocations

➔ Student's Book p45

analyse the data	results indicate that
carry out some research	make observations
come up with a theory	prove a theory
conduct an experiment	record the data
draw conclusions	write up my notes

Space

➔ Student's Book p46

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

EXTRA Compound adjectives

➔ Student's Book p51

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

GRAMMAR

Passives: review

➔ Student's Book p47

- We can talk about actions or processes in two ways: in the active or in the passive. We often use the passive when who or what causes the action is unknown or unimportant. 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 analysed .
Present perfect	A mission has been launched to find life.
Past perfect	We hadn't been told about the lecture.
Future with <i>will</i>	Research will be carried out next year.

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

Television was invented by John Logie Baird.

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

This spacecraft was launched in 2011.

Passives: 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.

- We use reporting verbs 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 thought that the mission will be a remarkable achievement.

- 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 ...

Subject	<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.

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