



Science and Innovation

Short-answer questions: the James Webb Space Telescope | Cambridge IGCSE ESL 0510/0511

1. Lead-in discussion

Talk with a partner before you read.

1. Why do scientists send telescopes into space?
2. What can pictures of space teach us?
3. Should countries work together on expensive science projects?
4. What space discovery would you like to learn more about?

Exercise 1 at a glance

Read one factual text. Answers are in the text. Copy exact words and check the question carefully before choosing your answer.

2. Read for overall understanding

Read the text. What makes the James Webb Space Telescope important for science?

The James Webb Space Telescope

The James Webb Space Telescope is one of the most important space observatories ever built. It is a partnership between NASA, the European Space Agency and the Canadian Space Agency. Webb was designed to look deeper into space than earlier telescopes and to study objects that are very faint or distant. It is often compared with Hubble, but it was built to observe the universe in a different way.

Webb was launched on 25 December 2021 from Europe's Spaceport in French Guiana. After launch, it travelled to a region of space called L2, about 1.5 million kilometres from Earth. This position helps the telescope keep the Sun, Earth and Moon on one side while it observes the universe. It also helps keep the instruments cold, which is important for infrared observations.

The telescope had to unfold after launch. Its large sunshield, mirrors and instruments were packed tightly inside the rocket. Engineers then spent weeks checking that each part opened and worked correctly. This careful process was important because Webb could not be repaired by astronauts in the same way as the Hubble Space Telescope. A serious fault after launch would have been extremely difficult to fix.

Webb observes mainly in infrared light. This allows it to see through some clouds of dust where stars are forming. It can also study light from very distant galaxies, which has travelled for billions of years before reaching the telescope. Because the universe is expanding, some ancient light has been stretched into infrared wavelengths by the time it reaches us.

In July 2022, the first full-colour images and data from Webb were released. They showed distant galaxies, star-forming regions and information about the atmosphere of a planet outside our solar system. These images were not only beautiful; they also showed what the telescope's instruments could do. For scientists, the data behind the images was as important as the pictures themselves.

The telescope's design is unusual because its mirror is made of separate hexagonal segments. These had to work together like one large mirror after the telescope unfolded in space. The sunshield is also huge, about the size of a tennis court, and protects the instruments from heat and light. Without this shield, Webb would not be able to detect faint infrared signals clearly.

Webb's work is shared by scientists around the world. Researchers apply for observing time and use the data to study different questions. Some projects focus on very distant galaxies, while others look at planets, dust clouds or objects closer to Earth. This means the telescope is not a single experiment but a tool for many investigations. New findings can also lead scientists to change earlier ideas.

Scientists use Webb to investigate many questions. They study how the first galaxies formed, how stars are born, and what some exoplanet atmospheres contain. Webb can also observe objects in our own solar system, such as planets and moons. The telescope is an example of innovation because it combines international cooperation, precise engineering and scientific curiosity.

3. Strategy focus

Use the exact detail

Some questions ask for a very specific detail, such as a distance, place or reason. Copy the exact phrase from the text.

4. Exam-style short-answer questions

Answer the questions using words from the text.

1. Which Canadian organisation is part of the Webb partnership? [1]

2. How far from Earth is L2? [1]

3. Why was the careful unfolding process especially important? [1]

4. Why is some ancient light infrared by the time it reaches us? [1]

5. What was as important as the pictures themselves for scientists? [1]

6. According to the text, what are three things Webb can study or observe? [3]

5. Vocabulary notebook

Underline five useful words or phrases. Check their meaning, then record them in your vocabulary notebook.

6. Follow-up tasks

1. Discussion: Is space research worth the cost?

2. Summary: Summarise Webb's mission in about 50 words.

3. Creative task: Write a short news headline about Webb's first images.

4. Research: Find one recent Webb discovery and explain it simply.

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4. Exam-style short-answer questions

1. the Canadian Space Agency
2. about 1.5 million kilometres from Earth
3. Webb could not be repaired by astronauts in the same way as the Hubble Space Telescope
4. the universe is expanding
5. the data behind the images
6. Any three from: very faint or distant objects; stars forming / how stars are born; very distant galaxies / how the first galaxies formed; what some exoplanet atmospheres contain; objects in our own solar system.

Notes for checking

1. Answers should be short and clearly based on the text.
2. Accept bracketed or optional wording if the meaning is clear.
3. For the final question, learners need three separate details.