James Webb Space Telescope
DEEP SPACE DIARY

ACTIVITY 1.1
TO SPACE AND BEYOND

From Chapter One of the Deep Space Diary discoverydiaries.org/activities/to-space-and-beyond/

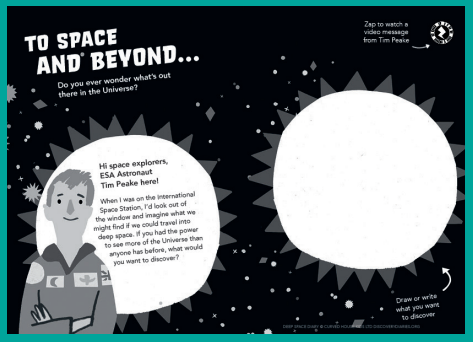
LEARNING LEVEL

KS2, P5-7, Y4-6

CURRICULUM LINKS & DIFFERENTIATION IDEAS

View detailed curriculum links for England, Scotland, Northern Ireland and Wales in the Teacher Toolkit, plus differentiation ideas for your region and year level.

discoverydiaries.org/resources/teacher-toolkit/



Learning Objective

To imagine what I want to discover in Deep Space.

Resources Required

- Smartphone/device or computer to access Zap code (optional)
- Art supplies

Background to this Activity

The development of technology has enabled us to learn more about our Solar System and explore the Universe we live in. For example, in 2005 the Hubble Space Telescope discovered two new moons in our Solar System, orbiting Pluto. Since 1990, Hubble has helped scientists study space. After its last service by astronauts in 2015, NASA decided it would not be repaired again. Now, a new era of space exploration is underway, led by the largest telescope humans have built to date – the James Webb Space Telescope.

Known as Webb, the James Webb Space Telescope has the potential to significantly advance our understanding of the Universe. Webb's huge primary mirror is more than twice the size of Hubble's, allowing it to collect vast amounts of light and detect light from fainter objects in space. This, along with its specialist instruments which are designed to detect infrared wavelengths, allows it to observe stars and planets forming and to see the light emitted by galaxies in the early Universe.

Webb has four key study goals:

- First Light: When did the first stars start to shine?
- Galaxy Building: How do galaxies like the Milky Way form?
- The Birth of Stars and Planets: What is happening within the clouds of gas and dust which form stars, and how do the 'leftovers' of this process evolve to become planets?
- Exoplanets and the Origins of Life: Scientists suspect that galaxies are teeming with planets. They would like to discover if any of those planets are similar to Earth.

Running the Activity

This activity is designed to promote imaginative and lateral thinking.

Begin by drawing on students' existing knowledge to create a mind-map of what they already know about Earth and space. This could be done as a class or in small groups. Before starting the main activity, access Tim Peake's message using a smartphone, device or through the web portal – discoverydiaries.org/activities/to-space-and-beyond/.

Using the concept of space as an endless frontier, ask students to generate ideas and questions about what humans might discover if they had the power to see more of the Universe than ever before, noting these on a whiteboard or whiteboard paper. If in small groups, students can take turns asking each other what they would like to discover most about our Universe. After their discussion, students should have an idea of a question or concept they would most like to explore. They can capture this through art, diagramming, writing or images on their activity sheet – this will become their mission goal.

Questions for the Class

- Where is Earth positioned in our Solar System?
- Which other celestial bodies are in our Solar System?
- Are there any other celestial bodies you know about? What are they?
- What is a star?
- Can stars have planets around them?
- What else might be in outer space that we don't know about yet?

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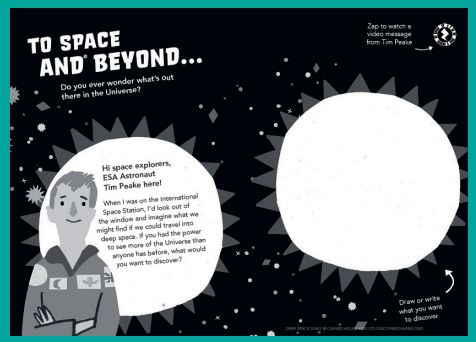

- What can stop us from seeing further into space?
- Other than planets and stars, what else can be found in space?

Additional Challenges / Extension Activities

Research our Galaxy – the Milky Way – and identify our Solar System's position in it. Other than our Solar System, what else might we find in the Milky Way?

Planning an enquiry: Now that students have their mission goal, can they break down the steps, or explain how they would go about finding out the answer to their question? Question them about evidence they may need to collect in order to support their idea or possible answer.

Non-chronological Report/Explanation text: Using their research into our Galaxy, can students communicate their findings scientifically?

Ideas for Differentiation

Support:

- Support students by working in small groups. Provide students with vocabulary and a suitable glossary for celestial bodies, such as planet, sun, moon, star, exoplanet, asteroid, comet, atmosphere, black hole, galaxy, dark matter. Understanding of these terms could be further supported by providing definitions and images of each word. See the Deep Space Glossary for terms and definitions: discoverydiaries.org/toolkit/deep-space-glossary/

Challenge:

- Linked to the planning an enquiry extension, ask students to write a Mission Request letter to Tim Peake, explaining what they want to discover, why they want to discover it and what they will need to complete their mission.

Useful Links

Information about our Universe: https://www.esa.int/kids/en/learn/Our_Universe/Story_of_the_Universe/The_Universe

Take a virtual (and imaginary!) trip to some exoplanets: https://exoplanets.nasa.gov/alien-worlds/exoplanet-travel-bureau/

This 14-minute clip about the James Webb Space Telescope's mission is an excellent way to familiarise yourself with the difference between Webb and Hubble's capacities and what we can potentially learn with Webb. It may be too technical for students, however the first four minutes contain wonderful images taken by Hubble and could be a useful in introducing students to Webb: https://webbtelescope.org/contents/media/videos/2013/03/1060-Video?page=5&filterUUID=21409408-9414-41eb-a027-a6b3abfe7af5

NOTE: This clip states an incorrect launch date of 2018.

ZAP! Students can independently access multimedia resources using the Zappar mobile/tablet app. See Zappar instructions at the link below and note that the mobile/tablet will need to be on a WIFI connection: https://discoverydiaries.org/toolkit/discovery-diaries-zappar-instructions/

If you don't have access to the internet in the classroom, all Zap code content is available to download on the activity's web page (see link to the left) as a PowerPoint presentation or as bundles of images.

zappar
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ZAP THE CODE
Download on the App Store
GET IT ON Google play

Find more great space-themed STEM resources at https://www.stem.org.uk/esero