James Webb Space Telescope
DEEP SPACE DIARY

ACTIVITY 1.2
THE SKY AT NIGHT

From Chapter One of the Deep Space Diary discoverydiaries.org/activities/the-sky-at-night/

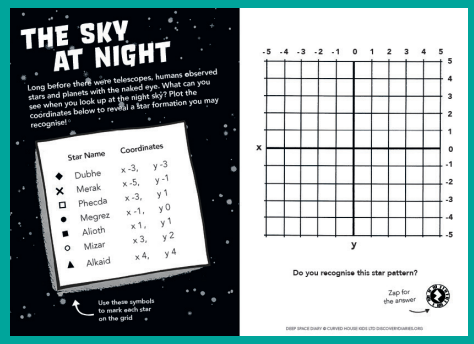
LEARNING LEVEL

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 plot a star pattern visible from Earth on a graph.

Resources Required

- Smartphone/device or computer to access Zap code (optional)
- World globe (optional)

Background to this Activity

Since ancient times, humans have used the celestial bodies (stars and planets) to monitor the passing of time, to navigate and for cultural and religious ceremonies. As early as the mid-seventeenth century BCE, humans were recording the movements of planets. This means they had recognised the difference between stars, which retain their configuration in the sky over time, and planets which change position in relation to these stars.

The 'Plough' is an asterism (a small pattern of stars) which is always visible in the Northern Hemisphere, regardless of the season. It consists of seven bright stars, four which form the 'body' or moldboard of the plough and three which create the 'handle'.

When we look at the Plough from Earth, its position in relation to where we are viewing it from will change according to the season and the time of night. Because the Earth spins on an axis, the Plough completes a rotation around the North Star every 24 hours.

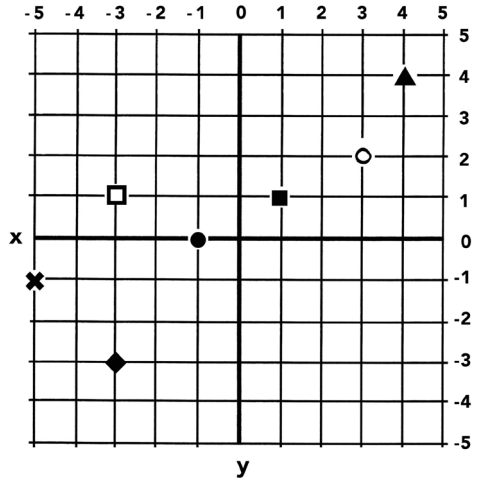
Running the Activity

Introduce the concept that humans have used stars for navigation and to monitor the passing of time for centuries. NB: If students are unaware of vocabulary, such as celestial bodies and constellations, go through this with the class at beginning of activity and refer to the glossary: discoverydiaries.org/toolkit/deep-space-glossary/. Ask students to think about why this might be. Using a globe, demonstrate how the Earth spins on an axis, creating day and night. The angle of Earth's axis can also help students understand why we see different stars in different hemispheres.

To explain why constellations (groups of stars which form recognisable patterns) appear to rotate during the night, ask students to stand below something that is fixed to the ceiling, such as a rectangular fluorescent light fitting. Tell the students to look up and slowly turn on the spot. As they move, the orientation of the light fitting will change from the child's point of view. The activity works even better if students can stand beneath a picture attached to the ceiling, which will appear upside-down to each student as they spin. As a group, discuss why the movement of constellations created by Earth's rotation would have been useful for humans before we had technology to measure time and identify our location on Earth.

Explain to the class that they will be plotting an asterism made of seven stars on the axis and that each star has a name. Students should work through the coordinates, plotting each star by using its symbol. Students can then draw a line from star to star to reveal the Plough's shape. Using the zap code, they can then identify the name of the asterism and confirm that their plotting is correct.

Solution to the Activity



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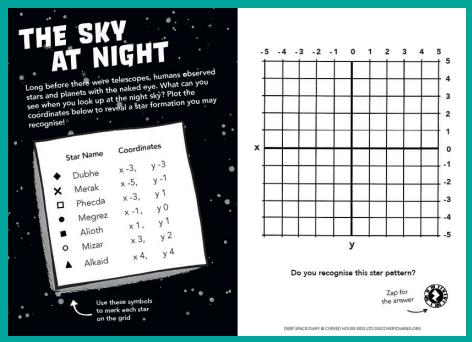

Questions for the Class

- What are some of the differences between stars and planets?
- Why do people in different hemispheres *(halves of the Earth – remember hemi = half, sphere is a shape. Two hemispheres make a sphere – the shape of the Earth)* see different constellations?
- Why do constellations appear to move during the night?
- Besides the movement of constellations, what are some other ways we can monitor the time of day, month or year, without using modern technology?

Additional Challenges / Extension Activities

The Plough is the name of this asterism in the UK, but other cultures have their own names for it. Ask students to research the various names of the Plough – in both contemporary and past cultures – identifying where each name is used both geographically and historically.

The Plough is an asterism – a small collection of stars which is part of a constellation. Ask students to research which constellation the Plough is in (Ursa Major), and ask them to learn about its name and the mythology/story behind it.

Identify other constellations which appear in the Northern Hemisphere and plot them on black cardboard using star stickers, to create a constellation gallery in the classroom.

Ideas for Differentiation

Support:

- Support younger students by working through the coordinates as a group. If you have an outdoor playground available, draw the graph in chalk and guide students in physically plotting coordinates by assigning seven students the role of 'star' and the rest of the class as 'astronomers'. Students can then work together to plot the asterism on their worksheets.

Challenge:

- Recreate the graph on an A3 piece of paper, extending both axes five times to 25. Ask students to plot the Plough, labelling each star with its name. Next, ask students to find the position of Polaris – the North Star – which is located by drawing an imaginary line from Merak to Dubhe, then extending it for five times the distance between these two stars. Students can then identify the coordinates of Polaris.

Useful Links

The Big Dipper Clock: https://starrynighteducation.com/images/free_resources/BigDipperActivity.pdf

Article about free stargazing apps: https://www.astronomytrek.com/top-10-free-smartphone-apps-for-stargazing/

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.

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