

STARS RESOURCES

Teacher notes

Tracking the Moon

ACTIVITY

Observe the Moon's orbit across the sky to see how its position changes over time.

By the end of this activity students will:

- be familiar with collecting and accurately recording observational data
- be able to explain the positioning of the Earth, Moon and Sun relative to one another
- recognise that the Moon's orbit is cyclical and predictable.

Note: This activity takes about a month of data collection to complete. It can be done with or without a telescope, so could be done by the students in their own time, without teacher supervision.

BACKGROUND INFORMATION

Here are some suggested resources to familiarise yourself with the Moon and its motion around the Earth, and the Earth's motion around the Sun.

Read more about the ecliptic:

'Ecliptic Plane', Hyperphysics, Dept of Physics and Astronomy, Georgia State University website, <http://hyperphysics.phy-astr.gsu.edu/hbase/eclip.html>.

'Ecliptic is the sun's path in our sky', EarthSky website, <https://earthsky.org/astronomy-essentials/definition-ecliptic-what-is-the-ecliptic/> (25 July 2021).

Watch short videos about the ecliptic:

'The Ecliptic', Macmillan Learning (1:05 mins), <https://www.youtube.com/watch?v=EoFct5WwVys> (2019).

'What is the Ecliptic?', MOVA geography (1:18 mins), <https://www.movaglobes.com/blog/mova-geography-the-ecliptic/> (29 July 2021).

Read more about the Moon's position in the sky:

'Phases and orbits of the Moon', Institute of Physics, <https://www.iop.org/explore-physics/moon/phases-and-orbits-moon#gref>.

'How to Track the Moon's Path Across the Sky', Sciencing website, <https://sciencing.com/track-moons-path-across-sky-8622008.html> (24 April 2017).

All websites accessed 8/3/2022.

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PLAN AHEAD

It is suggested that you look up the Moon phases and start your observing during a new Moon (i.e. when there is no Moon in the sky). Use a website such as Time and Date, <https://timeanddate.com> to work this out.

Each night, observe the Moon at the same time. It is important that you go out roughly the same time every night. Moon rise or the 6.30 - 8pm window is optimal.

CURRICULUM LINKS

AUSTRALIAN CURRICULUM: YEAR 7 SCIENCE

Science Understanding

Predictable phenomena on Earth, including seasons and eclipses, are caused by the relative positions of the sun, Earth and the moon (ACSSU115)

Science as a Human Endeavour

Scientific knowledge has changed peoples' understanding of the world and is refined as new evidence becomes available (ACSHE119)

Science Inquiry Skills

Collaboratively and individually plan and conduct a range of investigation types, including fieldwork and experiments, ensuring safety and ethical guidelines are followed (AC SIS125)

Measure and control variables, select equipment appropriate to the task and collect data with accuracy (AC SIS126)

Construct and use a range of representations, including graphs, keys and models to represent and analyse patterns or relationships in data using digital technologies as appropriate (AC SIS129)

Summarise data, from students' own investigations and secondary sources, and use scientific understanding to identify relationships and draw conclusions based on evidence (AC SIS130)

Reflect on scientific investigations including evaluating the quality of the data collected, and identifying improvements (AC SIS131)

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RECOMMENDED PRE-LAB ACTIVITY

This entertaining video contains more information than the students may need, but clearly explains the ecliptic.

'Exciting Ecliptics Explained | Star Gazers', Florida Atlantic University, PBS website (2:55 mins), <https://www.youtube.com/watch?v=om8EbgKL0vM> (25 February 2020).

If you would like to also perform a physical demonstration, this one by the Institute of Physics uses simple materials. Although it is designed to show why solar eclipses happen, it encompasses an understanding of the ecliptic and the tilt of the Moon's orbital plane and so is useful for this Tracking the Moon activity, too.

'Solar Eclipses Demonstration', Institute of Physics website, <https://spark.iop.org/solar-eclipses-demonstration>

SUGGESTED ANSWERS

1. Describe the changes in the Moon's appearance over the course of your observations.

Expected answers should include descriptions of the shape of the Moon, the amount of shadow, and any extra features on the surface of the Moon that may be more or less prominent depending on the phase of the Moon.

2. Imagine that you are now standing on the Moon looking back at the Earth.

a) How would the Earth change over the course of 24 hours?

You would see the entire Earth complete a rotation on its axis and see night and day for a full hemisphere of the planet.

b) If you stayed on the Moon in the same spot for a week, would the Earth's position in the Moon's sky change?

The Earth would be perpetually in the same position in the Moon's sky.

EXTENSION QUESTIONS

1. How might your observations have been different if you had conducted this experiment further north, say at the equator, over the same dates?

The Moon would still follow the ecliptic, but the ecliptic would take it much higher in the sky.