# *Space explorers* **Teacher background notes**

**In this investigation, students research, collect and use data about the planets in our solar system, in order to assess their suitability for human settlement.**

#### [**Australian Curriculum: Science links**](https://assist.asta.edu.au/resource/3972/space-explorers-cle-year-5)

## Learning intentions

Students will be able to:

* identify and describe the features of the planets in our solar system;
* understand that scientific knowledge is used to inform personal and community decisions;
* use data and evidence to develop explanations of events and phenomenon;
* pose questions to clarify practical problems;
* predict findings of an investigation;
* use tables to organise data; and
* identify patterns in their data and use this as evidence in developing explanations.

## Suggested time for this CLE

The time needed to complete the *Space explorers* CLE will depend on the depth of the prior knowledge of students, whether the optional investigation: ‘The Penguin Project’, Investigation 2: ‘What should a penguin ‘wear’ to keep warm?’ is done, the time required for researching information and deep discussion. Allow 6–7 hours.

## Prior conceptual knowledge

Science / Year 3 / Science Understanding / Earth and space sciences

Content description

*Earth’s rotation on its axis causes regular changes, including night and day*[*(ACSSU048)*](http://www.australiancurriculum.edu.au/curriculum/contentdescription/ACSSU048)

Science / Year 3 / Science Understanding / Physical Sciences

Content description

*Heat can be produced in many ways and can move from one object to another*[*(ACSSU049)*](http://www.australiancurriculum.edu.au/curriculum/contentdescription/ACSSU049)

Science / Year 5 / Science Understanding / Physical Sciences

Physical sciences

Content description

*Light from a source forms shadows and can be absorbed, reflected and refracted*[*(ACSSU080)*](http://www.australiancurriculum.edu.au/curriculum/contentdescription/ACSSU080)

## New concepts to be introduced

The concept of the components of the Solar System can be quite difficult for students, as often their conceptions of space are formed on frequently erroneous information presented in fictional texts. Furthermore, for many students, their familiarity with the night sky has been restricted by lifestyle factors; such as limited access to being in the outdoors at night time, daylight saving and light pollution. Many student questions about space relate to the features of the universe such as galaxies, black holes, and other solar systems, which are more advanced concepts addressed in depth in upper secondary, yet closer and more familiar features of our Solar System are often not well understood.

As much of the information we have about space has been developed by collecting and interpreting data, this topic affords an excellent opportunity for students to develop their inquiry skills; in particular, analysing and interpreting data, appreciating how science helps us to understand the world we cannot touch, and using reasoning to make appropriate decisions.

## Possible misconceptions

Students may hold a variety of misconceptions about the Solar System.

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| **STUDENTS MAY THINK…** | **INSTEAD OF THINKING…** |
| The planets are not very far away. | The furthest planet (Neptune) is over 4.3 billion kilometres from Earth. |
| All planets are made of rock. | Some planets can be largely composed of gas, others are largely rock. Variation in temperature can mean substances that are in gas or liquid form on Earth can be in a different state on another planet. (Methane is ice on Neptune.) |
| Planets all move at about the same speed. | The more distant the planet is from the Sun, the less gravitational force is exerted on it by the Sun. This means the planet’s orbital speed is slower the further the planet is from the Sun. Planets also rotate on their axis at different speeds. (See day/night cycles below). Venus and Uranus rotate anticlockwise. |
| Planets remain the same distance away from each other. | Planets orbit at different speeds and have different orbits, so their distance from each other depends on their position in orbit at any particular point in time. |
| Planets have similar day/night cycles. | The speed of rotation affects the length of day/night. Jupiter has the shortest day/night cycle (9.9 hours) Venus the longest (5832.5 hours). |
| Planets are aligned in a straight line from the sun. | Planets move on different orbits in a three-dimensional space, and will never be perfectly aligned. |
| Other planets in our solar system are likely to have alien life. | Other planets **in our solar system** are very unlikely to have life, although two moons (of Jupiter and Saturn) possibly have water, which is an essential prerequisite for life to exist. |
| Planets revolve around the Earth. | Planets revolve around a star. In our solar system this star is the Sun. |
| Pluto should be a planet. | The discovery of Eris caused scientists to develop the following criteria for classifying a planet.   * A planet is in orbit around the Sun. * A planet has sufficient mass to be spherical. * A planet has ‘cleared the neighbourhood’ around its orbit (which Pluto failed to do).   Pluto has therefore been reclassified as a minor planet. |
| Planets are colder the further they are from the Sun. | Other factors can affect the temperature of a planet. Atmospheric insulation (for example, the atmosphere around Venus) or heat generated from the planet’s core (for example, Neptune’s core) can also affect the average temperature. |

## Links to further information

Australian Academy of Science. 2012. *Earth’s place in space,* PrimaryConnections, *PrimaryConnections* website, <https://primaryconnections.org.au/products/2PC504-BK>

A digital version of this unit is available through Scootle: <http://www.scootle.edu.au/ec/viewing/S5683/index.html> (Login required)