Year 5

Conceptual narrative Science: Earth in space

In the Earth and space sciences sub-strand, there are two main conceptual threads being developed from Foundation through to Year 10, Earth in space and the Earth's surface.

Big ideas

The Earth is a body in space an part of a system of planets orbiting around the sun, which is a star.

What concepts do I want my students to understand?

- The key features of our solar system.
- Earth is one component within a solar system.
- Use models to investigate astronomical scales in the solar system

Appendix 1 shows how the three interwoven strands, Science Understanding, Science as a Human Endeavour and Science Inquiry Skills, work together to build the sophistication and complexity of the science concepts from Foundation to Year 10.

This conceptual narrative illustrates one of the nine science concepts from the Australian Curriculum: Science Content structure. It tells the story of the concept in isolation of the eight others. However, there are situations when it is advisable to teach both concepts (Earth in space and the Earth's surface) together, because they complement each other.

Note: Not all concepts are specifically addressed in each year level.

Introduction

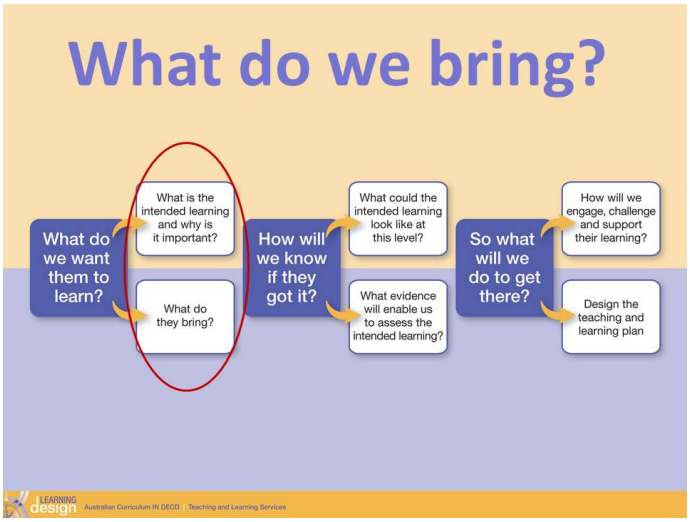
What might my students already know about this concept?

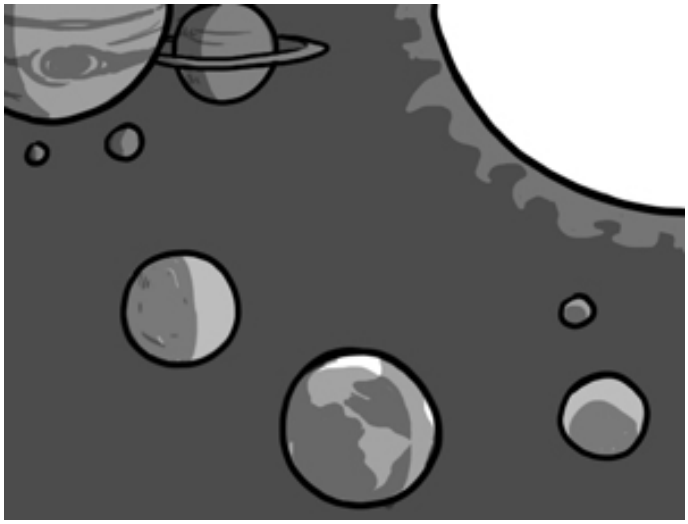
Students will be aware of changes in the appearance of the sun, moon and stars in the sky. Day and night are regular and predictable cycles. The Earth's rotation on its axis causes these regular cycles.

What content could I use to explore this concept?

We could investigate this concept in many ways, such as modelling distances in the solar system and comparing the sizes of planets, or comparing how long they take to orbit the sun.

Now to bring the essence of scientific understanding to life, let's think about this concept through the six questions from the Bringing it to Life tool (BitL).





In Year 5, students perspective of the Earth in space is broadened to include the Earth revolving around the sun as part of a system of planets, the solar system. Students might model and compare day and night on other planets.

Year 5 example

My students could use secondary sources, such as data from NASA, including scale diagrams, planet data tables or digital learning objects, such as virtual tours of the solar systems to make observations.

What do you notice?

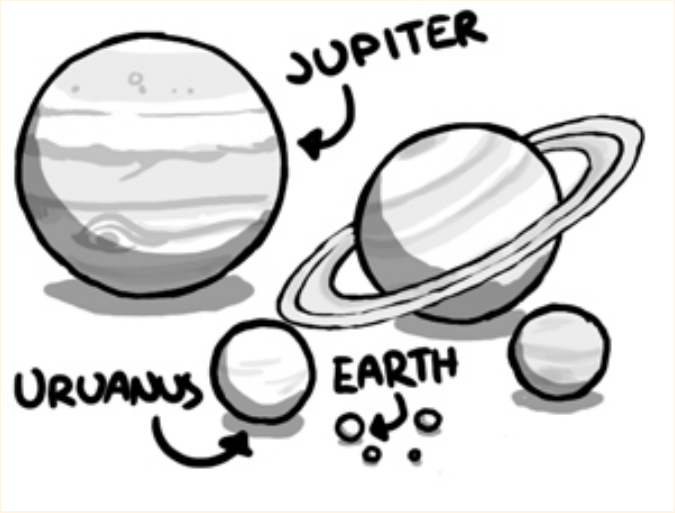
How can I help my students make observations?

Using the BitL questions, I could ask:

- *What do you notice?*

At Year 5, I want my students to observe similarities that change over time. Questions I would ask my students are:

- *What do you notice about the planets?*
- *How are the planets similar and how are they different?*



What patterns and relationships can you see?

How can I help students to see patterns and relationships? What questions might my students ask?
Student's curiosity leads them to ask questions. these questions help students to order their findings into a pattern to be able to make comparisons or find relationships. these questions support students to be more precise and foster analysis and classification of the observations.

Using the BitL questions, I could ask:

- *What patterns and relationships can you see?*

In Year 5, I want my students to notice patterns in the solar system. I want students to see the similarities between the planets. Questions I could ask:

- *What patterns can you see?*
- *Are there any exceptions?*
- *is there anything unusual?*

What do you predict?

How can I help students to identify and formulate investigable questions?

Students ask testable questions that help them to narrow the focus of the inquiry. These questions provide opportunities for students to make predictions.

Using the BitL questions, I could ask:

- *What do you predict...?*

At Year 5, I want my students to use their patterns to predict findings of an investigation. Questions that could prompt the students thinking are:

- *What do you predict a scale model of the solar system might look like if it was to fit inside your school oval?*
- *What do you think might happen if the Earth was moved?*

Scientists currently think the planets revolve around the sun.

- *How does that relate to your ideas?*
- *What happens to the length of a year/surface temperature if you go further from away from the sun?*

How can you test it?

These questions support students to develop science inquiry skills and problem solve.

Using the BitL questions, I could ask:

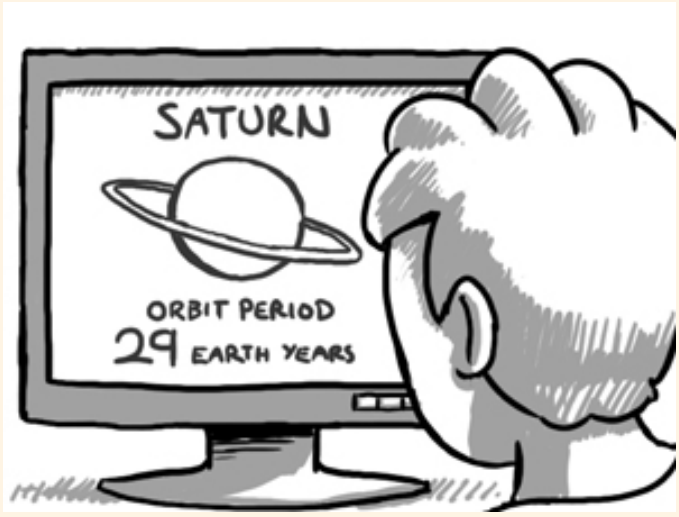
- *How can you test it?*

In Year 5, I want my students to investigate their questions. For example:

- *How might we investigate conditions on other planets?*

Questions I could ask my students are:

- *Compared to Earth, how long is a day?*
- *How old would you be in Saturn years?*
- *What, on Earth, is the same temperature as the surface of Venus?*
- *What would you weigh on Mars?*
- *What might a scientist do to find out about that?*



How can you review and communicate?

How can I help students share their observations and questions?

These questions stimulate student's reasoning and help them analyse, draw conclusions and make generalisations about the concepts.

Using the BitL questions, I could ask:

- *How can you review and communicate?*

In Year 5, I want my students to start using multimodal texts to communicate their findings. Questions I could use to prompt the students are:

- *How might lists, tables, graphs and diagrams be useful when communicating your findings?*
- *Would a model or digital technology help explain your ideas?*
- *How could you best represent your understanding of different features of the solar system?*
- *Did other people find something different to you? How?*
- *How might you improve your investigation?*

So what? What next?

How can I help students apply the concepts in a range of authentic contexts?

These questions support student's reasoning, to expand or change their ideas from their experience and evidence and generalise to new contexts.

Using the BitL questions, I could ask:

- *So what? What next?*

In Year 5, I want my students to identify how scientific discoveries are used to solve problems that directly affect people's lives. To do this, I could ask the students:

- *How has space exploration affected people's lives?*
- *What else could be investigated?*
- *Who might be interested in this information?*
- *Who decides what space investigations are valued?*

Concluding comments

What concepts might students develop through working with the BitL questions in this way?

By exploring this science understanding through these questions, we can help our students to be able to think, work and process scientifically. Students can connect science to their world and consider why they need to learn about the relative distances between the planets and their locations.

Appendix 1

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This conceptual narrative illustrates one of the nine science concepts from the Australian Curriculum: Science Content structure. These concepts develop in depth and breadth of understanding from Foundation to Year 10. This conceptual narrative tells the story of the concept in isolation of the eight others. However, there are situations when it is advisable to teach both concepts (Earth in space and the Earth's surface) together, because they complement each other.

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Earth and space sciences

In the Earth and space sciences sub-strand, there are two main conceptual threads being developed from Foundation through to Year 10. They are the concepts Earth in space and the Earth's surface. Let's look at the concept Earth in space.

Let's look at the Earth in space concept

Year 1

In Year 1, students notice observable changes in the sky. For example, students can see stars at night time.

Year 3

Year 3, students are introduced to the concept of the Earth as a body in space, where Earth's rotation on its axis is used to explain day and night.

Year 5

In Year 5, students build on their understanding of Earth as a body in space and see it is part of the solar system, which includes other planets also revolving around our star, the sun.

Year 7

At Year 7, we want students to understand that phenomena such as seasons and eclipses can be explained by how the moon moves around the Earth, and the Earth, on a titled axis, moves around the sun.

Year 10

In Year 10, students extend their perspective of the universe to include galaxies, stars and other solar systems, and can explain the origin of the universe using the Big Bang theory.

So, from Year 1 to Year 10, students develop their concept of Earth in space by using models and theories to explain their observations.