Year 3

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 and the movement of the Earth causes day and night.

What concepts do I want my students to understand?

- Day and night are regular predictable cycles.
- The Earth's rotation on its axis causes these regular cycles.

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

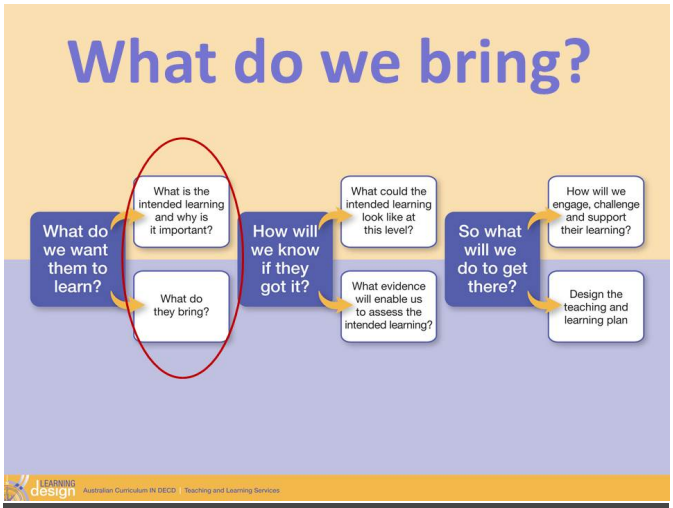
What might my students already know about this concept?

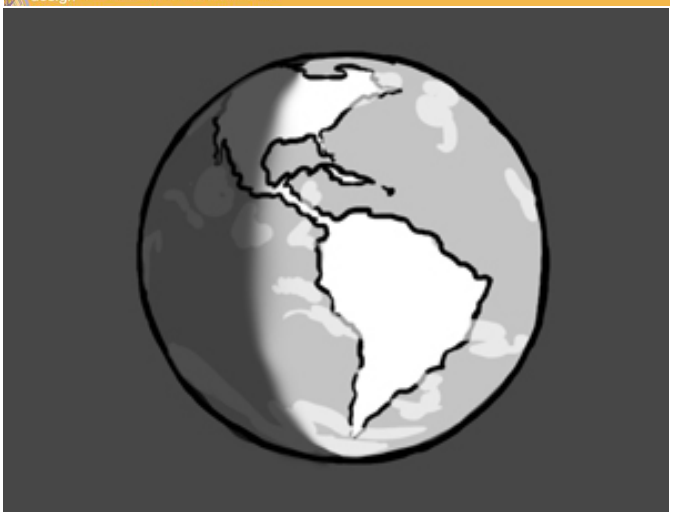
Students will be aware of the changes in the appearance of the sun, moon and stars in the sky.

What content could I use to explore this concept?

We could learn this concept through using models, interactive simulations, or through constructing and investigating how sundials works..

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 3, students are introduced to the concept of the Earth as a body in space, when day and night is explained by the rotation of the Earth as it receives light from the sun. This relatively abstract concept is combined with direct observation of shadows on the ground and the use of scale models, representing the sun and the Earth and the moon.

Year 3 example

In this example, students will observe shadows over a day.

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 3, I want my students to make observations in order to group similar things together. I would ask my students to make observations about the sun. Questions I could ask are:

- *What stays the same about shadows over the day?*
- *What changes?*
- *What do you notice about the sun?*
- *What is interesting?*

I would point out the safety aspect of never looking directly at the sun.

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?*

At Year 3, I want my students to use prior knowledge to describe the relationships between the sun and Earth. Focussing on the changes to shadows, I could ask my students:

- *How are they the same?*
- *How are they different?*
- *What causes shadows?*
- *Is there anything unusual?*
- *What questions do you have?*

What do you think if?

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

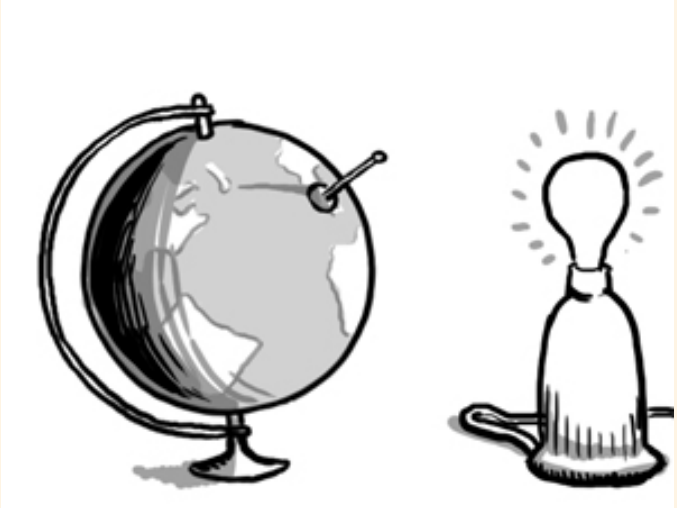
Students ask testable questions that help them to narrow the focus of the inquiry. These questions provide opportunities for students to make predictions.

Using the BitL questions, I could ask:

- *What do you think if?*

I want my students to predict how the relationships might change within a system. I would use a matchstick, stuck to Blu-Tack on a globe of the world, and a bright light as the sun, and ask my students to make predictions. I could ask:

- *What if we were to think of the Earth like this?*
- *How might we think about day and night and the changes in shadows?*
- *What would you think if there was no shadow?*



How can you explore?

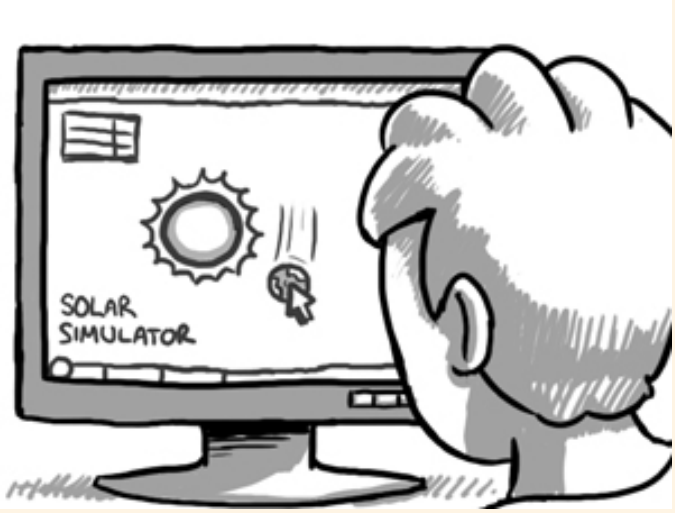
These questions support students to develop science inquiry skills and problem solve.

Using the BitL questions, I could ask:

- *How can you explore?*

At Year 3, I want my students to start planning and conducting investigations with guidance. Questions I could ask the students are:

- *What are your ideas?*
- *Which is your best idea?*
- *How could you test your idea?*
- *What will you record?*
- *How could you use models, digital learning objects or role play to explain changes in the sun or shadows over a day?*



How can you review and communicate?

How can I help students share their observations and questions?

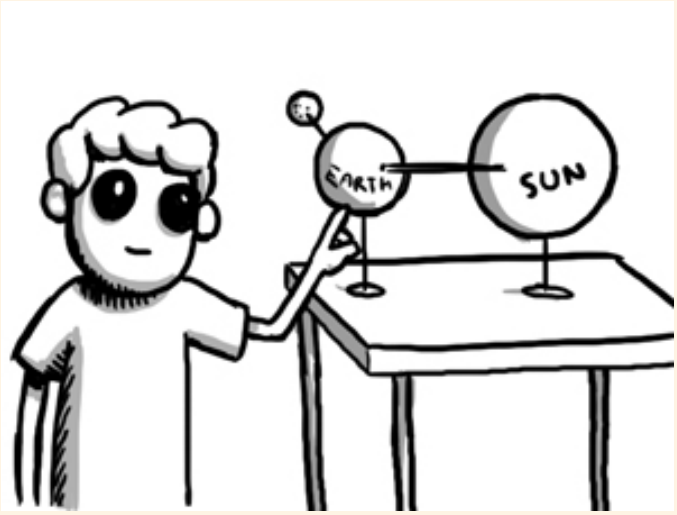
These questions stimulate student's reasoning and help them analyse, draw conclusions and make generalisations about the concepts.

Using the BitL questions, I could ask:

- *How can you review and communicate?*

I would provide the students with example of tables and simple graphs. Questions I could ask my students are:

- *What do you think is the best way to show the relationships you found between the sun and the Earth?*
- *How might you communicate your findings using diagrams or models?*
- *How could you show your thinking about how the Earth moves in space?*



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?*
- *How might shadows affect people?*
- *Who would need to predict where they might be?*
- *Who might be interested in knowing about shadows?*
- *What might a shadow tell us about the world around us?*
- *What else could you investigate about shadows?*

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 that the movement of shadows can be explained by the rotation of the Earth.

Appendix 1

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. 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.

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

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.