

# Conceptual narrative Science: Form and function

In the biological sciences sub-strand, there are three main conceptual threads being developed from Foundation through to year 10. They are the concepts of diversity and evolution, form and function and interdependence and ecosystems.

## Big ideas

Living things have similar basic needs.

### What concepts do I want my students to understand?

- People, plants and animals both at home or in nature need food, water and shelter to survive.

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, (properties of matter and changes of matter) together, because they complement each other.

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

## Introduction

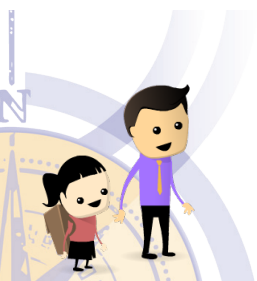
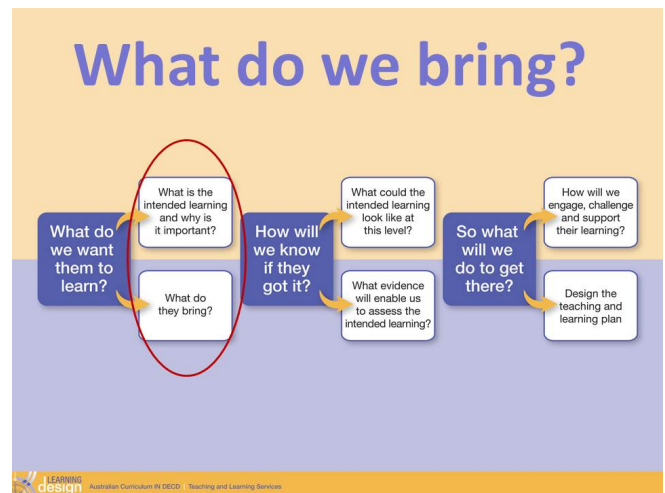
### What might my students already know about this concept?

Students will be aware they need water and shelter. Some may have experience of pets and plants.

### What content could I use to explore this concept?

There are many ways to investigate what animals and plants need to survive. We could observe snails, worms, crickets, grow wheat seeds or observe the class pet.

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 1, we want our students to understand the features of living things and what they do.

## Foundation Year example

For this example we are going to observe the class pet which is a guinea pig.

### What do you notice?

#### How can I help my students make observations?

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Using the BitL questions, I could ask:

- *What do you notice?*

In Foundation I want my students to make observations using their senses. I would ask my students

- *What do you see the guinea pig doing?*
  - *What do you see the guinea pig eating and drinking?*
  - *How does the guinea pig get its food and drink?*
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#### 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.

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Using the BitL questions, I could ask:

- *What do you think?*

I want my students to use their observations to discover similarities between the guinea pig, themselves and other animals. Questions I would ask my students are: :

- *What does the guinea pig need?*
  - *What do we need to give the guinea pig to keep it alive?*
  - *What else needs food and water?*
  - *How are you like a guinea pig?*
  - *What do you need to stay alive?*
  - *How different are you?*
  - *What questions do you have about looking after a guinea pig?*
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### 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.

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Using the BitL questions, I could ask:

- *What do you think if...?*

Some students at Foundation may be able to use these patterns to make predictions. I could ask my students: :

- *What do you think might happen if we forget to feed the guinea pig?*
  - *Would this be responsible?*
  - *What do you think would happen if we give the guinea pig our food?*
  - *How do you feel if you forget to eat? If someone gave you the wrong kind of food?*
  - *What do you think will happen if you forget to have a drink?*
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## How can you explore?

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

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Using the BitL questions, I could ask:

- *How can we explore?*

In Foundation I want my students to start exploring their questions and predictions. Questions I might ask my students are:

- *If we offer the guinea pig 3 bowls of food – carrots, lettuce and apples, which do you think it will eat? How will you find out?*
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## 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 share?*

In Foundation I want my students to represent their observations and findings through discussion, role plays and drawings. I could ask my students:

- *Can you draw a diagram to show what the guinea pig ate?*
- *Can you share with the class by making a reminder chart for the guinea pig's needs?*

## 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?*
- *How does knowing this help us? '*

It is important to connect the concept to their everyday life so they can see why it is important to know this. I could ask my students:

- *Why is it important to care for the guinea pig responsibly?*
- *Why is it important to understand the needs of other living things?*
- *Who might be interested in this? Why?*
- *Do all animals need food and water?*

## 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 think, work and process scientifically. Students can connect science to their world, and consider why they need to learn that objects might be grouped into living and non-living.

## Appendix 1

Appendix 1 shows how the Science as a Human Endeavour strand develops in sophistication and complexity across 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, (properties of matter and changes of matter) together, because they complement each other.

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

### Biological sciences

In the biological sciences sub-strand, there are three main conceptual threads being developed from Foundation to Year 10. They are the concepts of diversity and evolution, form and function and interdependence and ecosystems.

### Let's look at the form and function concept

#### Year 1

This starts in Year 1, when students explore the features of living things and link them with their function. They might look at familiar insects and identify that eyes are for seeing, wings are for flying and legs are for crawling.

#### Year 5

In Year 5, students look at how different body parts are adapted to particular environments, such as birds, which have different beaks depending on what they eat. Some, like parrots, are for cracking seeds while honeyeaters beaks are long and narrow to eat nectar from flowers. Another example is the covering of some animals which enables them to be camouflaged in their surroundings.

#### Year 8

The scale in Year 8, zooms in to the microscopic, where students learn about the form and function of cells as the basic unit of living things. They then zoom out, to examine how the structure of organs relates to the specialised function of the system it is part of. The students might start by looking at blood cells, and then zoom out to the heart, which is an organ that is part of the circulatory system.

#### Year 9

At Year 9, students start to think about form and function within systems, the focus is on how the internal systems work together to respond to changes in an organism's environment, such as the body's response to heat stress or infection.

#### Year 10

In Year 10, students learn about genetics, the role of genes and DNA, as a mechanism for passing on these adaptations of form and function, from one generation to the next.

So from Year 1 to Year 10, students develop their understanding from what they can see on familiar living things, to internal systems of living things, at both the macroscopic and microscopic scale. Along the way, they relate this to how they are related to functioning in their environment.