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# Observable features and survival

## Strand

Life and Living

## Key concept

The characteristics of an organism and its functioning are interrelated.

## Purpose

Activities in this module are designed to help students understand that there are different kinds of living things; that interactions occur within environments; and that characteristics of living things are adaptations to different environments. Students have opportunities to:

- collect information about the external features, behaviour and environments of animals and plants;
- analyse similarities and differences in the features and behaviour of a variety of animals and plants;
- infer that the features and behaviour of an animal or plant are most useful in the environment in which it lives;
- communicate their understandings of the relationship between features of living things and their environments.

## Overview of activities

The following table shows the activities in this module and the way in which these are organised in **introductory**, **developmental** and **culminating** phases.

### Introductory ►

Observable features  
Similarities and differences  
Being sensitive

### Developmental ►

Plants and places  
Environmental factors  
Body coverings  
Animal behaviour  
Pupil size  
Hear! Hear!  
Smell and taste

### Culminating

Adaptations



## Core learning outcomes

This module focuses on the following core learning outcomes from the Years 1–10 Science Syllabus:

### Life and Living

2.1 Students look for patterns and relationships between the features of different living things and how those living things meet their needs.

**3.1 Students draw conclusions about the relationship between features of living things and the environments in which they live.**

## Core content

This module incorporates the following core content from the syllabus:

### Life and Living

- observable features of plants and animals — external;
- adaptations — structural.

## Assessment strategy

Suggestions for gathering information about student learning are provided in each of the activities in this module. Once sufficient information has been collected, judgments can be made about students' demonstrations of outcomes. Typical demonstrations of this module's intended outcomes are provided here to indicate the pattern of behaviour to look for when making judgments.

### Life and Living

**2.1 Students look for patterns and relationships between the features of different living things and how those living things meet their needs.**

Students may:

- relate the observable features and behaviour of living things to the needs of those things — for example, an animal's senses help it to find food; sprouting seeds bend towards the light source;
- relate observable changes in the functioning/behaviour/responses of living things to changes in the environment — for example, change in pupil size due to changes in light conditions;
- conclude that living things with different features have different needs, or that living things with similar features have similar needs.

### Life and Living

**3.1 Students draw conclusions about the relationship between features of living things and the environments in which they live.**

Students may:

- conclude that living things with different features live in different environments, or that living things with similar features live in similar environments;
- account for similarities and differences in the observable features and behaviour of living things, using information about the environments in which they live;

- justify why the features and behaviour of living things may have changed as their environments have changed;
- explain why a living thing may not survive if its environment changes, using information about features and needs.

## Background information

### Current scientific conceptions

All living things have a common set of characteristics: they grow, move, reproduce, respire, excrete, require nutrition, and are sensitive and responsive to their environments. The display of any one of these characteristics, by itself, does not provide sufficient evidence of life; rather, it is a combination of most or all of these characteristics that indicates something is alive. Students can be given repeated opportunities to refine and extend their understanding of what it means for an organism to be 'alive'.

There is a strong relationship between the observable features and behaviour of living things, their environments and their ability to obtain their needs. Particular living things have similar or different features and behaviours depending on similarities and differences in their environments and needs. For example, many animals in aquatic environments have fins, which help them to move in water, whereas many terrestrial animals have limbs, which enable them to move on land.

The features and behaviour of an animal or plant that enable it to survive in the environment in which it lives are referred to as 'adaptations'. A living thing's adaptations are most effective in its own environment. If its environment changes, these adaptations may no longer be effective and the living thing may have difficulty meeting its needs.

### Students' prior understandings

Students' prior understandings may differ from current scientific conceptions in a range of ways.

#### Living things/non-living things

Some students may think that:

- non-living things, such as the sun, are actually alive because of everyday metaphorical use of language that implies such things are capable of purposeful movement;
- plants are not alive unless they are seen to 'do' something associated with movement or action — for example, grow fruit.

Teachers can help students build and expand their concepts of 'life', 'animal' and 'plant' by asking them to observe living things and to identify characteristics these things have in common.

### Concept of 'animal'

Once students begin learning about specific biological groups, they are less likely to view animals as a 'collective group' and more likely to see them in terms of spiders, insects, snakes etc. For example, they may think that the term 'animal' refers only to mammals.

Teachers can enhance students' understandings by highlighting ways in which all animals are similar, even though they may differ markedly in appearance.

### Adaptation

Some students may have difficulties seeing the features of living things in terms of adaptation. They may think that:

- the features of a living thing are the result of its wishes or wants;
- the features of a living thing occur for a particular purpose.

It is likely that students will have had some prior experience in making links between the **features** of living things and the **needs** of those things — for example, they may relate the shape of a bird's beak to the food it eats, or the type of limb an animal has to the way it moves. Teachers can help students build on this prior experience and knowledge to develop a broader understanding of the relationship between living things' **features**, **needs** and **environments**.

## Terminology

Terms associated with the external features of animals and plants and the functions these perform are essential to the activities in this module — for example:

adaptation	feature	pupil	survival
animal	iris	response	tastebud
body covering	plant	sense	vibration
environment			

Students may already be aware of some of this terminology. If so, the activities provide opportunities for them to evaluate current usage.

## School authority policies

Teachers need to be aware of and observe school authority policies that may be relevant to this module.

Safety policies are of particular relevance to the activities that follow. It is essential that demonstrations and student activities are conducted according to procedures developed through appropriate risk assessments at the school.

In this module, teachers need to consider safety issues relating to:

- handling biological material, including live animals and plants;
- keeping, and caring for, live animals in the classroom;
- conducting excursions to field study sites.

Teachers also need to consider policies relating to the ethical use of animals in the learning environment.

## Support materials and references

Education Queensland 1997, *The Care and Use of Animals in Schools: Policy and Guidelines*, Brisbane.

Ingham, D. & Smythe, K. 1994, *Sensational Senses: Science Alive*, Mimosa Publications, Hawthorn, Vic.

Parker, S. 1994, *How the Body Works*, Dorling Kindersley Ltd, London.

Queensland Department of Education 1996, *Aspects of Science Management: A Reference Manual for Schools*, Brisbane.

Queensland Department of Education 1982, *Primary Science Sourcebook: Activities for Teaching Science in Year 4*, Brisbane.

Queensland Department of Education 1982, *Primary Science Sourcebook: Activities for Teaching Science in Year 5*, Brisbane.

Skamp, K. (ed.) 1998, *Teaching Primary Science Constructively*, Harcourt Brace & Co. Australia Pty Ltd, Marrickville, NSW.

VanCleave, J. 1996, *202 Oozing, Bubbling, Dripping and Bouncing Experiments*, John Wiley & Sons Inc., New York.

### Organisations

Queensland Museum Education Resource Service  
75 Grey St, Southbank  
South Brisbane Q 4101  
Tel: (07) 3840 7606  
Fax: (07) 3840 7610

## ACTIVITY

## Observable features

## Introductory

**Focus**

This activity provides opportunities for students to observe a variety of animals and plants and to reflect on their understanding of the relationship between external features and needs.

**Materials**

- animal and plant specimens
- a selection of pictures, texts and electronic resources featuring animals and plants in their natural habitats
- disposable gloves (for all students)

**Teaching considerations****Resources**

Provide opportunities for students to handle as many live specimens as possible. The following notes and suggestions may be helpful when gathering specimens and organising observation:

- Insects, spiders, lizards and toads can be kept in ventilated jars for short periods of time. (Include items from the natural environments of these animals.)
- Fish aquariums, including aquatic plants, can be maintained for extended periods.
- Students may be willing to bring pet animals from home. (Ensure that animals are housed appropriately at all times — for example, in cages.)
- It may be possible to keep a class pet. Students would need to provide a suitable environment for their pet and share responsibility for its care.
- Terrariums and pot plants are easy to keep, and care for, in the classroom.
- Arrange for students to observe animals and plants in and around the school grounds.

Animal specimens are available from the Queensland Museum (see 'Support materials and references', p. 5).

Create a class display of posters, brochures, books and other materials featuring animals and plants in their natural habitats. If time allows, show students videos such as the *Nature of Australia* series, *Babe*, *The Lion King* and *Jungle Book*.

**Safety**

Certain precautions must be taken when handling living things — for example:

- Identify animals that may bite and plants that may be poisonous. Also identify animals and plants that may cause allergic reactions.
- Make sure that students wear gloves when handling specimens.
- Emphasise that students must touch animals in a safe, gentle and non-threatening way.



## Working scientifically

Time: 60 minutes

Accessing resources  
Making observations  
Suggesting  
Describing

- Students observe animal and plant specimens and collect information about features and/or behaviours. Directions and questions to guide observation include:
- Describe the observable features of the animal/plant:
    - for animals:** features such as size, body covering, beak, wings, teeth, ears;
    - for plants:** features such as size; shape; leaf shape, size, smell and texture; roots; flowers; fruit.
  - How do you think the animal moves? What features help you to make this suggestion?
  - How do you think the animal eats? What features help you to make this suggestion?
  - Where does the animal/plant live?
  - What features help the animal/plant to survive in this environment?
- In the class group, students discuss their observations and make suggestions about the uses and benefits of features identified. Retrieval charts like the following could be used to record and collate information. The completed charts can be displayed in the classroom to provide a reference for talking and writing about observable features of animals and plants.

Animal	Features/ behaviour	How it moves	What it eats	Where it lives	How features help the animal survive
Duck	Oily feathers; sharp, flat bill; wings; webbed feet	Flies: has wings. Swims: has webbed feet.	Water plants Has a sharp bill for slicing off bits of plants.	Ponds, lakes, swamps	Feathers keep in warmth and keep its skin from getting wet. Webbed feet help the duck to swim and to walk in mud.

Plant	Features				Where it lives	How features help the plant survive
	Size/ shape	Leaves	Roots	Other		
Gum tree	Tall; high branches	Long, thin Waxy, tough Leaves smell when crushed.	Large, spreading root system	Thick bark; gumnuts	Australian bush; dry areas	Thick, waxy leaves help reduce loss of water in dry areas. Gumnuts contain seeds to produce new plants. Thick bark protects the tree from fire.

- Students draw concept maps or word wheels (see the initial in-service materials, Module 5) based on two or more specimens of their own choice (animal and plant). The maps should show what the features of these living things are and how these features help them meet their needs.



## Gathering information about student learning

Sources of information could include:

- retrieval charts of students' observations and suggestions;
- students' concept maps or word wheels showing connections between the features and needs of living things.

## ACTIVITY

## Similarities and differences

Introductory

**Focus**

This activity provides opportunities for students to develop an understanding of what is involved in comparing things.

**Materials**

- a mixed set of 10 objects per pair/group (e.g. marbles, leaves, coins)
- animal and plant specimens
- information gathered during the previous activity (e.g. retrieval chart)

**Teaching considerations**

This activity is intended to be used in conjunction with the previous activity 'Observable features'. It could be extended to provide opportunities for students to refine their understanding of the concepts of 'animal' and 'plant'.

**Working scientifically**

Time: 30 minutes

Looking for patterns  
Making comparisons  
Selecting and justifying  
Summarising and reporting

- The teacher demonstrates sorting based on similarities and differences — for example, by dividing a group of students into two separate groups according to hair/eye colour or height. Students suggest what criteria may have been used for the groupings. Questions to guide thinking could include:
- Why have these groups of students been separated?
  - Why have the students in each group been put together?

Students could be regrouped several times according to different criteria.

► In pairs or small groups, students identify similarities and differences in their allocated set of objects and use this information to sort the objects into two or more groups, to try alternative ways of grouping, and to explain why they have grouped things in certain ways. In the class group, students discuss how grouping things according to similarities and differences can be useful.

► Students group the living things observed and discussed in the previous activity according to similarities and differences. They could also prepare and present reports, charts or posters on these similarities and differences.

**Additional learning**

► When grouping living things, students could focus on identifying the common features that all animals have and then determine which of these features plants do not have — or vice versa.

**Gathering information about student learning**

Sources of information could include:

- anecdotal notes about students' explanations for grouping objects and living things in certain ways;
- students' reports, charts or posters on similarities and differences between living things.



**ACTIVITY****Being sensitive***Introductory***Focus**

This activity provides opportunities for students to reflect on their current understanding of the relationship between senses and needs.

**Materials**

- photographs/posters/drawings of environmental settings (e.g. the beach, a park, a kitchen, a forest)

**Teaching considerations**

This activity could be extended to provide opportunities for students to refine their understanding of what it means to be 'alive'. Students could do this by observing and identifying common features of a variety of living things. They could consider how animals and plants are similar in terms of being able to sense and respond to things in their environments.

**Working scientifically**

Time: 45 minutes

**Making links****Discussing thinking**

► Students brainstorm a list of everyday activities (for example, eating dinner, playing basketball) and identify the different senses used in each experience.

► Students look at photographs, posters or drawings of some environmental settings and, in pairs, discuss how they would know where they were and what was happening in these environments. Discussion questions could include:

- If you were in this setting, what would you expect to see?
- If you were blindfolded, how would you be able to work out where you were and what was happening?
- How are we able to find out things about our environment?

Students draw pictures of one of the settings, showing what they might see, hear, smell, touch or taste in this environment and add labels to indicate which sense(s) would be used in each case.

► With teacher guidance, students identify the role the senses play in enabling living things to meet their needs. Discussion questions could include:

- With what observable features are the senses associated? For example, how do we see?
- Do all animals have senses? In what ways do animals use their senses?
- What are some examples of unique features associated with senses which help animals to live in their environments?
- Are plants also sensitive to things in their environment? How can you tell?

A retrieval chart like the one on the following page could be used to record and collate points made during the discussion.

Sense	Sight	Smell	Hearing	Touch	Taste
Feature	Eyes				
How senses are used by animals	To find food To see things that might be dangerous				
Examples of unique features	A possum has big eyes to help it see in the dark.				
Signs that plants are sensitive to their environment	A plant growing inside may bend towards a window where there is more light. Plants wilt if they don't have enough water. Sunflowers follow the sun. Some flowers close at night.				

### Additional learning

► Students may currently use criteria such as movement, breathing and growth to judge whether things are living or non-living. To expand this range of criteria, students could investigate how the ability of things to sense light, sound and touch is another criterion of 'life'. For example, they could investigate how sprouting seeds grow towards light, or what happens when you gently touch a snail on its head.



### Gathering information about student learning

Sources of information could include:

- students' labelled illustrations that show how the senses are used;
- retrieval charts of students' responses.

## ACTIVITY

## Plants and places

Developmental

**Focus**

This activity provides opportunities for students to develop an understanding that particular living things are found in particular environments, and that the features of living things are suited to these environments.

Students survey plant life and physical conditions in two different areas.

**Materials**

For each group of students:

- tape measure, metre ruler or trundle wheel
- 4 markers similar to those used for sport
- equipment for investigations as required (e.g. magnifying glasses, thermometers, humidity meters)
- drawing materials
- art paper and large sheets of chart paper

**Teaching considerations****Choosing environments**

Two different kinds of environments should be chosen for the surveys — for example, a rainforest, a vacant block, a roadside, a football field, a playground, a park, a pond, a swamp, a seaside area.

If visiting an area outside the school, ensure that all school excursion policies are followed. Choose areas close to the school so that frequent visits can be made. If such visits are not practicable, set up micro-habitats in tubs or troughs — for example, an aquarium of pond water, or a miniature desert or rainforest.

**Safety**

Inspect sites beforehand and warn students of potential hazards and how to avoid them — for example, plants and animals that are poisonous or that may cause allergic reactions.

When working outdoors students should wear suitable footwear, protective clothing, hats and sunscreen.

**Working scientifically**

Time: 60 minutes

Designing and  
performing  
investigations

Making and judging  
observations

Seeking reasons

Inferring from data

Discussing thinking

► The teacher explains to students that they are going to survey two different environments and record information about physical conditions and plant life. Guided by the teacher, students then decide how to conduct their investigations. Discussion questions could include:



- Why is it important to ensure that you investigate the same things in the same ways at each site? How are you going to make sure that your investigations are similar?
- What kind of information are you going to collect?
- What would be the best way to determine what the conditions are like in the different environments? Why?
- How will you record the information you collect?

► Working in groups, students begin their investigations at each site by pegging out an area 3 metres square in which to work. Questions to help students structure their investigations might include:

- What is the terrain like — for example, are there puddles, slopes, paths, worn grass?
- What are the environmental conditions like — for example, is the area damp/dry, sunny/shady, warm/cool? (Students may be able to measure some of these conditions using appropriate equipment such as thermometers and humidity meters.)
- Is there water present? What are conditions in the water like — for example, turbidity, flow rate? (Again students may be able to measure some of these conditions.)
- What are the plants like? What special features do the plants have — for example, tendrils, thorns?
- How many different types of plants can be found?
- Are there any types of plants that were more common than others?

► Students measure the height of plants, and describe leaf shapes and colours. If there are any flowers, students can record their shape, size and colour. Similarly, if there are any fruit or seeds, students can record their shape, size and colour. They may be able to count or estimate the number of seeds per flower or fruit.

► Students record their observations of the plants in each area in a data table similar to the one below. In the 'Name' column, they can record the common names of the plants, or drawings of the plants. They may choose to use a table to document the physical conditions in the area, or simply record their observations in point form.

Plants in ... (name of environment)						
Name	Height	Leaves	Flowers	Fruit	Seeds	Special features
dandelion	15 cm		yellow	—		

► Students compare observations within their group and then with other groups. Within groups, students then debate and agree upon a common set of responses to questions such as:

- How are the areas the same?
- How are the areas different?
- Do the areas contain similar plants?
- Are there plants in one area that are not found at all in the other area?
- What can you infer from your data? (Why might some plants be found in one area, but not in another? How are the features of the plants related to their environments?)
- If the plants found only in one area were moved to the other area, what might happen to them? Why?

► As a concluding task, the class can create a mural illustrating each environmental site investigated. The work could be divided between individual students and groups in various ways. For example, parts of the mural could be allocated to groups and each group member could contribute an illustration of a plant or a feature of the site. Groups can then compile their illustrations, paste them onto large sheets of paper and annotate them with the inferences they discussed and agreed on earlier — for example: ‘This gum tree lives in this open, dry, sunny area, but not in the other area because that is too wet and shady’; ‘This gum tree can live in this open, dry, sunny area and not in the wet, shady area because it has tough leaves that help keep water inside the plant’; or ‘If this gum tree was moved to the shady area, it might die because it won’t get enough light to grow’.

### Additional learning

► Students could conduct further investigations to explore the unique features of Australian plants — for example, comparing the amount of water lost from equal amounts of eucalypt and fern leaves in sealed plastic bags that are left in the sun for half a day. Students can explain what they observe, in terms of the relationship between the plants and their environments.



### Gathering information about student learning

Sources of information could include:

- anecdotal notes about students’ contributions to discussions;
- anecdotal notes made during interviews with students as they work in groups;
- students’ data tables, which provide information on their ability to collect relevant and comprehensive data;
- the class mural with annotated inferences.

**ACTIVITY****Environmental factors***Developmental***Focus**

This activity provides opportunities for students to develop an understanding of how different plants respond to various environmental conditions and how these responses help the plants to survive in their environments.

Students investigate the effects of different environmental conditions on seed germination or on plant growth.

**Materials**

- seeds (alfalfa, bean, wheat, or seeds collected from research sites)
- seedlings (native plants, tomatoes, beans)
- small pots
- flat dishes with cotton wool (for germinating seeds)
- different types of soil (e.g. potting mix, clay, sand)
- planning and reporting worksheets (see the sourcebook guidelines, Appendix 3)
- Resource Sheet 1, 'The effect of shade on stem growth in plants'
- Resource Sheet 2, 'The effect of temperature on seed germination'
- Resource Sheet 3, 'The effect of light on plant growth'

Other materials may be needed, depending on the investigations conducted.

**Teaching considerations****Obtaining seeds or seedlings**

Students could use seeds collected from the environmental sites studied in the previous activity 'Plants and places'. (Be aware that collecting seeds from national parks and other protected areas is prohibited.) However, many native seeds are difficult to germinate because the specific conditions they require are difficult to provide. Bean, wheat or alfalfa seeds germinate more readily.

If using seedlings, it may be possible to obtain, from a nursery, seedlings of plants that grow at the research sites. They could then be potted in soil from the sites. (Be aware that soil must not be taken without permission — and not at all from a national park.) If this is not feasible, bean or tomato seedlings are a suitable alternative.

**Research method**

When students are planning and discussing how to conduct their investigations, they may need assistance with the following:

- taking into account all the variables involved;
- working out which variables are being tested and which need to be kept constant;
- working out how to use controls in their investigations.

The planning and reporting worksheets in the sourcebook guidelines provide questions which may help students plan and structure their investigations.

When students are setting up their experiments, ensure that they label all their pots. The experiments will need to run over a number of weeks to enable changes in plant growth to be detected. Students will need to keep an ongoing record of changes in the growth of the plants by drawing diagrams and/or taking measurements at regular intervals. They should also record the time intervals between measurements.



## Working scientifically

Time: 60 minutes, plus 10 minutes per recording session at regular intervals

Identifying and  
controlling variables  
Making plans  
Predicting  
Drawing conclusions  
Interpreting data

► The teacher and students review the observations and inferences made in the previous activity 'Plants and places', and revisit the question 'If the plants found only in one area were moved to the other area, what might happen to them?' Students predict what might happen if:

- the plants grow in different types of soil;
- the plants do not have any water;
- the plants have salt water instead of fresh water;
- the plants are exposed to different amounts of light.

► Students suggest ways they might test some of their predictions and then discuss, in groups, how to plan their investigations. Discussion questions could include:

- Which predictions are we going to be able to test in the classroom?
- How will we set up an investigation to test the predicted effects of changing an environmental factor?
- Which environmental factor will we investigate?
- Which factor(s) will we want to change? Why?
- Which factor(s) will we want to keep the same? Why?
- How will we ensure our investigation compares the effects of changing an environmental factor with the effects of not changing that factor?

► Students then select an environmental factor to investigate and plan their investigations. The following suggestions outline some possible investigations and the relevant experimental design:

### 1. The effect of different water conditions

- Pot 1: soil and fresh water (control)
- Pot 2: soil and salt water (to see what might happen if water salinity increases)
- Pot 3: soil and no water (to see what might happen if there is a drought)

### 2. The effect of different amounts of water on different plants — for example, on seedlings of native plants and tomato seedlings

- Pot 1: eucalypt seedling watered every day
- Pot 2: eucalypt seedling watered every 3 days
- Pot 3: eucalypt seedling watered once a week
- Pot 4: tomato seedling watered every day
- Pot 5: tomato seedling watered every 3 days
- Pot 6: tomato seedling watered once a week

### 3. The effect of different soil conditions on plant growth, using seedlings of one type of plant found at one of the research sites

- Pot 1: soil from site (control)
- Pot 2: sand
- Pot 3: clay
- Pot 4: potting mix

## **R** Resource Sheets 1, 2, 3

4. The effect of shade on stem growth in plants (Resource Sheet 1)
5. The effect of temperature on seed germination (Resource Sheet 2)
6. The effect of light on plant growth (Resource Sheet 3)
  - ▶ Students record data over a number of weeks by:
    - describing any changes;
    - measuring the height of the plants or the number of germinated seeds.
  - ▶ On completing their investigations, students discuss whether their results support their predictions, and how they might revise their predictions in light of the collected data. They can then use their data to draw conclusions about the ways plants are affected by different environmental conditions. They should explain these effects by considering the features of the plants and how these relate to the plants' natural environments.

### **Additional learning**

- ▶ Students could think about and discuss some of the ways in which humans have changed, and are changing, the environment, and how these changes might affect living things in different environments.



### **Gathering information about student learning**

Sources of information could include:

- students' records of their initial predictions, their investigation plans, their data, and the conclusions they drew from their data;
- anecdotal notes made during discussion and interviews with students while they plan and conduct their investigations, and evaluate their predictions.



**ACTIVITY****Body coverings***Developmental***Focus**

This activity provides opportunities for students to develop an understanding of how an animal's body covering helps it to meet its needs in the environment in which it lives.

**Materials**

- specimens of animals with different body coverings (e.g. fur, feathers, shell) including live specimens wherever possible (e.g. toad, skink, beetle, grasshopper, crab, spider, goldfish, budgerigar, mouse, guinea pig, snail)
- a selection of pictures, texts and electronic resources featuring the above animals in their natural habitats
- disposable gloves (for all students)

**Teaching considerations**

This activity focuses on body covering. However, it could be adapted to focus on other external features of animals, such as limbs, feet and beaks, thus providing students with further opportunities to look for relationships between animals' external features and their environments.

**Safety**

Certain precautions must be taken when handling living things — for example:

- Identify animals that may bite or cause allergic reactions.
- Make sure that students wear gloves when handling specimens.
- Emphasise that students must touch animals in a safe, gentle and non-threatening way.

**Working scientifically**

Time: 45 minutes

**Accessing resources**  
**Looking for patterns and meanings**  
**Justifying**  
**Summarising and reporting**

► Students observe the specimens and suggest how these may be grouped according to their type of body covering. The whole class could do this activity, with students volunteering to physically group the specimens. Students discuss their suggested groupings and justify them by pointing out the similarities in the body coverings of the animals within each group. When the class has agreed on the groupings the different sets of animals could be displayed around the room, together with relevant pictures and other information resources.

► The following strategy could be used to help students collect and share information from the resources (including specimens) provided:

- The class divides into 'home groups' and each group member selects a different set of animals to research. They then leave their home groups and combine with students from the other home groups who have also selected that particular set of animals.
- These groups examine the specimens, and research and record information about the environment and habits of each animal in their set. They should also note any differences in body covering — for example, one animal might have very long fur, whereas another might have short fur.

- Students return to their home groups to report their findings. They discuss the information shared and identify relationships between body covering and environment. Questions that may help students analyse the information include:
  - What differences are there between the different animals?
  - How does the type of body covering relate to an animal's environment and/or habits? Give examples to support your answers.
  - How would the survival of a particular animal be affected if its environment changed? Explain your predictions.
- Students can summarise the understandings they have gained by drawing concept maps (see the initial in-service materials, Module 5) showing the relationship between body covering and environment.

### Additional learning

- Students could investigate other similarities and differences within and between the major animal groups.



### Gathering information about student learning

Sources of information could include:

- peer assessment of students' contribution to the discussion;
- anecdotal notes about students' participation in the 'home groups' activity (for example, from interviews with students and from listening to group discussion);
- students' concept maps showing the relationship between body covering and environment.

**ACTIVITY****Animal behaviour***Developmental***Focus**

This activity provides opportunities for students to understand that, when conditions in an animal's environment change, the behaviour of an animal can help it to cope with these changes.

Students investigate and compare the responses of three different animals to a variety of stimuli.

**Materials**

- Resource Sheet 4, 'Starting points for investigations'
- Resource Sheet 5, 'Ideas for experimental designs'
- disposable gloves (for all students)

**Animal 1: aquarium or large jar containing fish**

- pebbles
- paperclip attached to about 30 cm of string
- fish food
- a plastic bag filled with ice
- a plastic bag filled with hot water
- black paper (to cover half the aquarium)
- torch
- 10 × 10 cm squares of different coloured paper (red, yellow, brown, green)

**Animals 2 and 3: mealworms (or earthworms) and slaters**

- 2 cups each of gravel, sand and humus
- cotton wool balls
- strong-smelling liquids (e.g. oil of cloves, peppermint essence)
- squares of coloured paper
- other materials indicated in diagrams on Resource Sheet 5

**Keeping mealworms (or earthworms) and slaters in the classroom**

## Teaching considerations

### Classroom organisation

Have at least two or three specimens of each animal. Set up workstations with one specimen at each workstation. Students can then easily work in small groups in one of two ways:

- either to observe one animal and then share information with the two groups that studied the other two animals;
- or to observe each of the animals.

### Humane treatment of animals

- Touching fish or tapping the sides of aquariums is distressing for the fish and should be avoided.
- Animals should be fed regularly and their containers should be kept clean and well ventilated.
- Any animals taken from the natural environment should be returned to the place where they were originally found.



### Safety

Certain precautions must be taken when handling living things — for example:

- Make sure that students wear gloves when handling specimens.
- Emphasise that students must touch animals in a safe, gentle and non-threatening way.

### Resources

Mealworms can be obtained from local pet shops, fish-bait suppliers, biological supply companies, or science centres. They can be kept in bran in any size container (see diagram, p. 19).

Earthworms can be used instead of mealworms. They can be kept in glass jars filled with moistened soil, and fed on leaves and soft cereal (see diagram, p. 19).

Slaters, or woodlice, may be found in and around the school grounds under any object which has damp soil under it. They may be difficult to find in dry weather.



## Working scientifically

Time: 60 minutes

► Students prepare for their investigations by:

- **formulating questions;**  
For example:
  - How might the animals respond to unfamiliar objects in their environments? To food? To light/darkness? To heat/cold? To different colours?
  - Do they prefer certain conditions? Do their preferences alter when they are exposed to any one condition for a longer period of time?
  - If a test is repeated a number of times, will the animal always respond in the same way? Why or why not?
- **predicting** what the animals' responses might be;
- **planning how to test their predictions.**

Some suggestions for investigations and experimental designs are provided on Resource Sheets 4 and 5. However, students should be encouraged to devise their own investigations wherever possible.

Performing experiments  
Formulating questions  
Predicting  
Making plans  
Inferring from data



Resource  
Sheets 4, 5

- ▶ Students discuss issues related to conducting their investigations — for example:
  - the role of making a prediction or formulating a question to be answered by the investigation;
  - why they might repeat the same test a number of times;
  - the importance of making and recording observations;
  - how to keep a record of their experiments and observations;
  - how to design their experiments to avoid harming the animals.
- ▶ Students construct a data table like the one below and work in groups on their investigations.

Fish/mealworms/earthworms/slaters		
What we did	Observations	Inferences

- ▶ Students use their observations to make inferences about what stimuli the animals respond to, and how these responses help the animals meet their needs. Groups can share and discuss data and inferences.
- ▶ Students then use their data to compare the behaviour of the animals. They should make notes about similarities and differences in behaviour and suggest explanations for these.

### Additional learning

- ▶ Students could visit a zoo and observe similarities and differences in the behaviours of different animals. The behaviours are responses to what is happening in the animals' environment. Students illustrate what the animals are responding to and how their responses help them meet their needs in their environments. Students may need assistance in recognising that the behaviour they observe in domestic pets or zoo animals may be modified from the animals' natural behaviour in the wild.



### Gathering information about student learning

Sources of information could include:

- anecdotal notes about students' responses during the initial discussion and the experiments, which will indicate their understanding of the nature of investigation;
- peer assessment (during group discussion) of the accuracy of observations, and justification of inferences;
- students' records of experimental procedures and the information they have collected;
- students' notes on similar and different behaviours, and suggested reasons for these.

## ACTIVITY

## Pupil size

Developmental

**Focus**

This activity provides opportunities for students to develop an understanding of how the sense of sight helps different animals to meet their needs in their environments.

Students examine the eyes of different animals and investigate the effects of varying amounts of light on pupil size.

**Materials**

- a selection of pictures, texts and electronic resources featuring the eyes of different animals
- curtains (or other similar materials) to create a darkened area in the classroom
- small torches
- soft measuring tapes
- Resource Sheet 6, 'Investigating the relationship between pupil size and light intensity'

**Teaching considerations****Light and sight**

The eye is the sense organ that responds to light. Light reflects off the surface of objects and enters the eye through the pupil. Different animals obtain their food in environments with different light conditions. Differences and similarities in the structure and function of eyes are linked to the ways in which animals interact with different light conditions. The ways animals interact with different light conditions are, in turn, linked to how effectively they are able to meet their particular needs.

**Device for looking at changes in pupil size**

Students could work in groups to construct the device suggested in Resource Sheet 6 before, or as part of, this activity.

**Safety**

If students are constructing the device, they may need assistance with (and practice at) using craft knives. They should cut on cutting mats or thick wads of newspaper, and must be supervised closely.

If torches are used during the investigation, students must not shine the light directly into each other's eyes.

When measuring pupil size, students should keep the measuring device at a safe distance from the eyes. Soft measuring tapes are safer to use than rulers.

**Working scientifically**

Time: 45 minutes

Exploring phenomena  
Formulating and elaborating ideas  
Inferring from data  
Discussing thinking

► The teacher and students discuss features of the eye — for example, shape, colour, pupil size, pupil shape. Students then observe the eyes of their classmates, and draw diagrams of eyes. They could also draw or collect pictures of eyes from a variety of other animals. Students should look for similarities and differences in the eyes they observe and highlight these on their diagrams and pictures.


**Resource  
Sheet 6**

► Once students have familiarised themselves with the external appearance of a range of different kinds of eyes, they can investigate the effect of varying the amount of light shining into their own eyes. The device suggested on Resource Sheet 6 could be used for this investigation. Alternatively, students could look at a darkened part of the room and then at a source of light — for example, out of the window or towards a shining torch. Students record their observations. (They may be able to quantify their observations by taking measurements of pupil size.)

► Students share their observations and determine the relationship between the size of the pupil and the amount of light in the environment. Discussion questions could include:

- Under what circumstances might your pupils be least open?
- How might this small pupil size be useful?
- Can the pupil of one eye be large while the other is small?
- What can you infer from the answers to these last two questions?

► Students consider the eyes of nocturnal animals by looking at pictures. Discussion questions could include:

- How are the eyes of nocturnal animals similar to or different from human eyes?
- How are these similarities and differences related to the environments and habits of these animals?

► As a follow-up activity, students record their understandings and conclusions about the relationships identified during discussion. They may also be able to suggest other ways in which animals cope with low levels of light in their environments — for example, bats use sound to ‘see’ in the dark.


**Gathering information about student learning**

Sources of information could include:

- students’ observations about similarities and differences between the eyes of different animals;
- students’ records of observations and inferences about the relationship between animals’ eye structure, environments and habits.

## ACTIVITY

**Hear! Hear!***Developmental***Focus**

This activity provides opportunities for students to develop an understanding of how the sense of hearing helps animals to meet their needs in their environments.

Students experiment with different ways of generating sound, investigate the role ears play in judging the direction of sound, and explore the relationship between ear size and hearing.

**Materials**

- a wind chime made of tubes of varying lengths
- tuning forks of varying lengths
- electric bell/heavy metal bell/alarm clock with bell
- plastic rulers
- guitar
- stereo system
- drum
- blindfold
- a selection of pictures, texts and electronic resources featuring the ears of different animals

**Teaching considerations*****Hearing and ear structure***

Our ears enable us to detect the loudness, pitch and direction of sounds, helping us to collect information about our surroundings and to respond appropriately. For some animals, hearing is the sense that they depend on most. The importance of hearing to an animal is reflected in its ear structure.

***The nature of sound***

Students may not have had the opportunity to develop an understanding of the nature of sound energy and how it is transferred. They should be encouraged to connect the vibration of objects with the production of sound.

The time gap between soundwaves reaching one ear, then the other, is less than one-thousandth of a second. But the ears and brain can detect this time difference, enabling us to know the direction the sound is coming from.

**Safety**

Warn students against creating loud noises very close to other students' ears.





## Working scientifically

Time: 45 minutes

Collecting  
information  
Handling  
materials  
Exploring  
phenomena  
Constructing  
meaning  
Relating

► Students close their eyes and keep very quiet for one minute, taking note of any sounds they hear. They could draw a sound map — for example, use symbols of their own choice to represent different sounds and mark the positions of the sources of the sounds. (Drawing sound maps is best done outdoors.)

► Students then discuss the sounds they heard, and the information that can be inferred from these and other sounds. The discussion could include grouping types of sounds into categories — for example, sounds that alert us; loud/soft sounds; annoying/pleasant sounds. A class retrieval chart could be compiled.

► Students explore and observe some different ways in which sounds are generated, and note down any common element(s) in these methods of generation. Where appropriate, they could suggest how sound generation may be prevented. They could also explore and identify some of the properties of sounds that our ears are able to detect — for example, pitch (high/low), loudness. Some suggestions for generating and experiencing sound are:

- striking the tubes of a wind chime;
- striking a tuning fork;
- ringing an electric bell or a heavy metal bell;
- holding a plastic ruler over the edge of a desk, and flicking it;
- making a sound with the voice while holding two fingers over the voice box;
- plucking the strings of a guitar;
- playing a recording or listening to the radio on a stereo system and feeling a speaker with the volume turned up;
- beating a drum.

► In groups, students investigate the role our ears play in judging the direction of sound. Group members arrange themselves in a circle around someone who is blindfolded. In a random order, each student in the circle makes a sound and the blindfolded person indicates where the sound is coming from. Students record (for example, on a tally chart on butcher's paper) how accurately the direction of the sound is pinpointed. Students then suggest reasons why the degree of accuracy in pinpointing the direction of sound might vary around the circle. They could devise additional tests to check their explanations in a future lesson.

► In pairs, students investigate the relationship between ear size and hearing in the following ways:

1. Students make a paper cone and take turns to hold it to their ears while their partner taps two coins together. They determine whether:
  - they can hear the sound more loudly and clearly with or without the paper cone;
  - the direction in which the paper cone is pointing makes any difference to how well they can hear.

2. Students construct two 'rabbit ears' and take turns to hold these to their own ears while their partner makes a soft sound. They determine whether:

- they can hear the sound more loudly and clearly with or without the paper ears;
- they can hear the sound as well when the paper ears are turned away from the sound.

► Students interpret this information and make generalisations about the benefits of having big ears, as rabbits and some other animals do. Students may need assistance to recognise that big ears also play a role in regulating body temperature in some animals living in hot climates — for example, elephants and some desert mammals.

► Students collect pictures and other information from a variety of sources to compare the ears of different animals. They should apply the understanding gained from the previous activities to describe how similarities and differences between ears may be related to animals' environments, and how the structure of ears helps animals to survive in their environments.

Discussion questions could include:

- Some animals have big ears while others have small ears. What connection is there between the size of their ears and how they survive in their environments? (For example, wombats have small external ears that do not obstruct the animal when it is underground.)
- What animals might rely on hearing as the most effective way to collect information about their environments? What observations about their ears might lead you to draw this conclusion?
- What animals have no need for a sense of hearing? Why? How else do these animals collect information about their environments?
- What animals use their ears for things other than hearing? How are these uses of ears related to the animals' environments?

► As a concluding activity, students prepare a presentation outlining some of the conclusions and inferences they have drawn from their investigations.



### Gathering information about student learning

Sources of information could include:

- self-assessment during group and investigative work;
- students' records of information collected during activities;
- anecdotal records and/or peer assessment during group discussion;
- students' presentations about the relationship between animals' ear structures and environments.

**ACTIVITY****Smell and taste***Developmental***Focus**

This activity provides opportunities for students to develop an understanding of how the sense of smell and/or taste helps animals meet their needs in their environments. It also helps students to become aware that senses usually function together to enable a full interaction with the environment.

Students try to identify a range of different things by smell and/or taste. They also look at the structure of noses and tongues, and how animals use these organs.

**Materials**

For investigating smell:

- blindfold
- saucers
- everyday substances with different odours (e.g. candle wax, lemon, chocolate, soap, apple, potato)
- a selection of pictures, texts and electronic resources featuring the noses and tongues of different animals

For investigating taste:

- foods cut into equal-sized cubes (e.g. apple, potato, lemon, onion, cheese, chocolate)
- toothpicks (for cubes of food)
- drinking water to wash out mouths
- nose clips

**Teaching considerations****Practical points: smell**

Ensure that the substances are freshly cut, so that they give off a strong odour. Put each substance on a saucer and keep covered so that the odours do not form a confusing mixture in the air. Point this out to the students as well.

Ensure that the blindfolded students have not seen the substances beforehand. If all students in the class are participating, have two different sets of substances prepared.

**Practical points: taste**

Ensure that any foods for tasting are cut into equal-sized cubes to remove other identifying clues, such as their shape or skin texture. Tell students that they will need to wash out their mouths with water in between tasting the different foods so that the tastes are not confused.

**Safety**

If students are investigating the sense of taste, remind them about safety issues associated with eating unknown substances.

Inform students about which substances are safe to taste.

Explain that tasting substances is not normally part of an experiment.



## Working scientifically

Time: 45 minutes

**Collecting  
information**  
**Formulating and  
elaborating ideas**  
**Illustrating**

► Students identify what information different smells can give us about our surroundings. They then identify the kind of information different smells can give other animals about their surroundings — for example, some animals use their sense of smell to find food, to find a mate, or to sense danger.

► In pairs, with one person blindfolded, students try to identify the substances provided, using only their sense of smell. They record how many substances they identify correctly, and what these substances are.

► Students collect information from a variety of sources about similarities and differences in animal noses. They discuss how animals use their noses — for example:

- dogs have a keen sense of smell that they use to find food;
- elephants can use their noses to pick up things;
- pigs can use their noses for turning up soil.

Students then draw and annotate diagrams to summarise the information collected and discussed.

► In pairs, with one person blindfolded, students try to identify the foods provided using only their sense of taste. To eliminate smell, they need to wear a nose clip. They then repeat the tasting without the nose clip and note any difference in their ability to identify the foods.

► The teacher introduces the term ‘tastebud’ and discusses with students the relationship between tastebuds and the sense of taste. Students collect information from a variety of sources about similarities and differences in animal tongues and discuss how animals use their tongues — for example:

- a butterfly’s tongue is a long tube that is used to suck up nectar;
- a frog’s tongue is long and sticky and used to catch insects.

Students then draw and annotate diagrams to summarise the information collected and discussed.

► Discussion after the experiments could include the following questions:

- Were some substances easier to identify than others? Suggest why this may be so.
- What does this investigation suggest about the ways in which we ‘sense’ our environment?
- What animals might rely mainly on smell and/or taste to meet their needs?
- What observations (for example, of differences in features) did you use to answer the above question?



## Gathering information about student learning

Sources of information could include:

- students’ records of their investigations into smell and taste;
- anecdotal notes about students’ contributions to discussion;
- students’ annotated diagrams comparing animals’ noses (and/or tongues).

## ACTIVITY

## Adaptations

Culminating

**Focus**

This activity provides opportunities for students to demonstrate their understanding of how observable similarities and differences in external features enable living things to meet their needs in the environments in which they live.

**Materials**

- animal and plant specimens (see 'Observable features', suggested list, p. 6)
- a selection of pictures, texts and electronic resources featuring animals and plants in their natural habitats

**Teaching considerations****Safety**

Certain precautions must be taken when handling living things — for example:

- Identify animals that may bite and plants that may be poisonous. Also identify animals and plants that may cause allergic reactions.
- Make sure that students wear gloves when handling specimens.
- Emphasise that students must touch animals in a safe, gentle and non-threatening way.

**Working scientifically**

Time: 60 minutes

**Hypothesising**  
**Applying ideas and concepts**  
**Drawing conclusions**  
**Selecting and justifying**  
**Synthesising**  
**Creating presentations**

► The teacher and students discuss the value of identifying similarities and differences between living things — for example:

- identifying similarities and differences helps us to recognise patterns in the living world and how humans fit into these patterns;
- identifying relationships between living things and their environments helps us to understand how we interact with and affect other living things, and makes us aware of the effects of changing the environment;
- identifying relationships between living things, their needs and their environments helps us to communicate about and care for living things;
- understanding the effects of changing the environment helps us to understand how we can best use and protect the living resources of the Earth.

► The teacher introduces the term 'adaptation' and demonstrates its use with reference to activities during the module. Referring to their records, students find their own examples of adaptations and give reasons for their choices.

► Students draw a concept map (see the initial in-service materials, Module 5) to demonstrate their understanding of adaptation. They can compare this map with the one drawn in the introductory activity 'Observable features' and explain how their thinking may have altered during the course of the module.

► Students create a presentation about three or four animals and/or plants they have observed in previous activities. The focus of their presentations should be the relationship between the features of living things and their environments. Below are some guiding points that could be useful:

- What features do these animals and/or plants have?
- How are these features similar/different?
- What are the relationships between the features and the needs of these living things?
- What are the relationships between the features and the environments of these living things?
- Taking one animal or plant as an example, would its features help it to survive in a different environment? Why/why not?
- Imagine a 'new' environment — for example, the moon, a rainforest, a desert. Draw a poster illustrating this environment and the living things that might be found in it. Illustrate and label the features of these living things.
- What are your reasons for giving these living things these particular features?



### Gathering information about student learning

Sources of information could include:

- anecdotal notes about students' discussion of adaptations;
- students' concept maps and their explanations of how their thinking might have changed;
- students' presentations showing their understanding of the task and the relevance of information collected, and the relationship between features of living things and their environments.

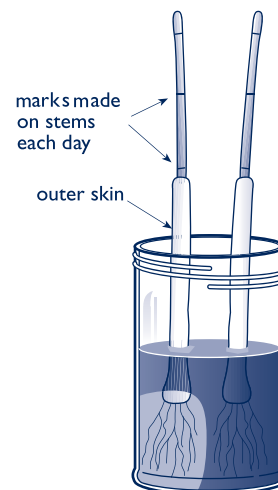
# The effect of shade on stem growth in plants

## Resource Sheet 1

You will need:

- ruler
- 4 spring onions (eschalots)
- scissors
- 2 clear, wide-mouthed jars
- potting mix
- tap-water
- pencil

1. Measure about 15 cm up the stem from the root of each spring onion and cut off the stem at this point.
2. Fill the jars with moist potting mix.
3. In the potting mix in each jar, use the pencil to make 2 holes about 5 cm deep near the side of the jar.
4. Plant a spring onion in each hole.
5. Place one jar near a window so that it receives sunlight and place the other jar in a darker area of the room.



**Note:** All other conditions should be as similar as possible. For example, the 'dark area' plant should not be placed in a cupboard if the temperature within is significantly different from that in the area where the other plant is.

6. Each day for 14 days, mark each stem just above the outer skin covering, as shown in the diagram.

Source: VanCleave, J. 1996, *202 Oozing, Bubbling, Dripping and Bouncing Experiments*, John Wiley & Sons Inc., New York, p. 40.

## The effect of temperature on seed germination

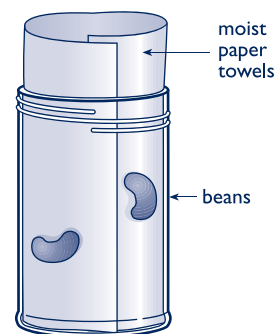
**R2****Resource Sheet 2**

You will need:

- 2 clear, wide-mouthed jars
- paper towels
- 8 bean seeds (e.g. pinto beans, broad beans)
- tap-water

1. Prepare both jars as follows:

- (a) Fold a paper towel and line the inside of the jar with it.
- (b) Wad several paper towels and stuff them into the jar to hold the paper lining against the glass.
- (c) Place 4 beans between the glass and the paper towel lining as shown in the diagram, spacing the beans evenly around the jar.



2. Moisten the paper towels in the jars, but not so much that they become dripping wet.
3. Place one jar in the refrigerator and keep the other at normal room temperature.
4. Keep the paper in both jars moist and observe for 7 days or more.

Source: VanCleave, J. 1996, *202 Oozing, Bubbling, Dripping and Bouncing Experiments*, John Wiley & Sons Inc., New York, p. 41.



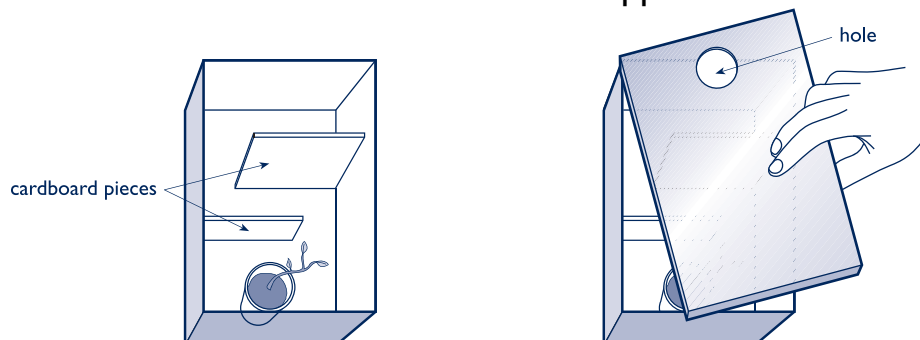
# The effect of light on plant growth

## Resource Sheet 3

You will need:

- paper cup
- 3 bean seeds (e.g. pinto beans, broad beans)
- potting mix
- tap-water
- scissors
- cardboard
- shoe box with a lid
- masking tape

1. Fill the cup with potting mix and plant the beans in it.
2. Moisten the potting mix and allow the beans to sprout (this will take about 5–7 days).
3. Cut 2 cardboard pieces to fit inside the shoe box.
4. Secure the cardboard with tape to form a maze as shown in the diagram below.
5. Cut a hole at one end of the lid.
6. Place one bean plant inside the shoe box at one end. (You could set up more than one plant if you wish.)
7. Secure the box lid with the hole at the opposite end from the plant.



8. For 2–3 weeks, open the lid daily to observe the growth of the plants. Water the plants when necessary.

Source: VanCleave, J. 1996, *202 Oozing, Bubbling, Dripping and Bouncing Experiments*, John Wiley & Sons Inc., New York, p. 40.

# Starting points for investigations

**R4**  
Resource Sheet 4

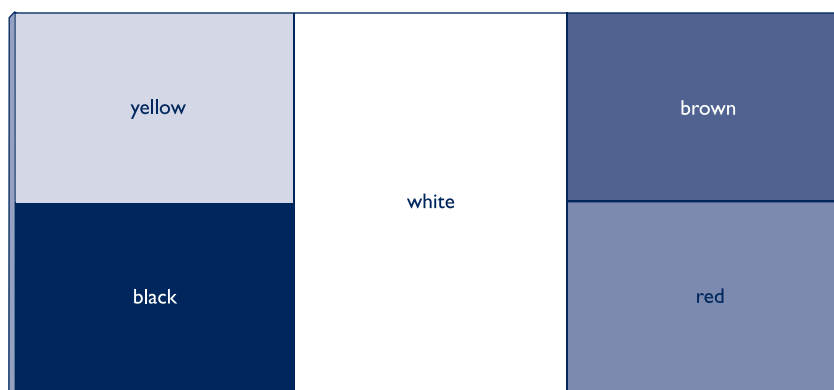
The following questions provide some starting points for students to investigate how fish, mealworms/earthworms and slaters respond to various stimuli.

## Fish

- How does the fish respond when:
  - a pebble is dropped into the aquarium?
  - a paperclip attached to a piece of string is lowered into the aquarium?
  - fish food is sprinkled on the water?
  - a plastic bag full of ice is lowered into the aquarium for 10 minutes?
  - a plastic bag full of hot water is lowered into the aquarium for 10 minutes?
  - half the aquarium is covered with black paper and a torch shone into the other half for 10 minutes?
  - squares of coloured paper are stuck on the sides of the aquarium?
- How does the position of an object lowered into the aquarium alter the response of the fish?

## Mealworms/earthworms, slaters

- What materials do the animals prefer to move around in? (Place the animals on each of the three materials — gravel, humus and sand — and leave for 10 minutes. To see if they prefer moist or dry materials, carry out the same investigation using one dry and one moist sample of each of the three materials.)
- How do the animals respond to different smells? (Hold cotton balls soaked in different strong-smelling liquids near the animals.)
- How do the animals respond to different colours? (Place the animals on the white section of the card as shown in the following diagram, and leave for 10 minutes.)



Source: Queensland Department of Education 1982, *Primary Science Sourcebook: Activities for Teaching Science in Year 5*, pp. 5–12.

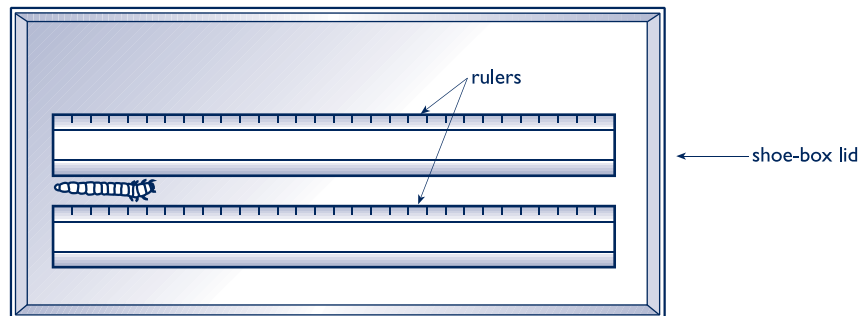
# Ideas for experimental designs

## Resource Sheet 5

The following experimental designs provide ideas for students' investigations. Discuss with students how these may be used to test the responses of mealworms/earthworms/slaters to different stimuli. Suggested questions accompany each design.

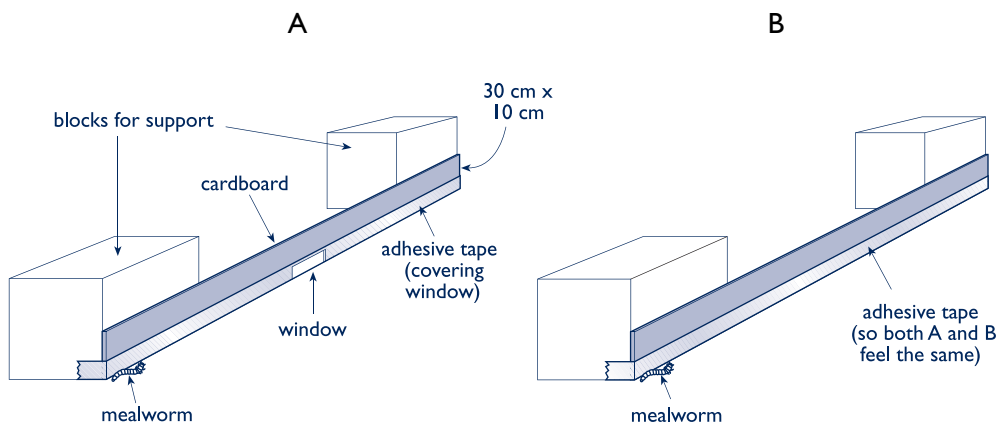
### Experiment 1: Can mealworms/earthworms/slaters see?

1. Place the animal beside a ruler. What does it do? When it gets to the end, which way does it turn?
2. Place a ruler on each side of the animal, as shown. What does it do when it gets to the end this time?



- Does the animal feel its way along, or can it see?

3. Set up a piece of cardboard with a window, and a piece without, as shown below.



- If the animal can see, how might its response to the card with the window differ from its response to the card without the window?
- If there is no observable difference in the responses, what might this imply?

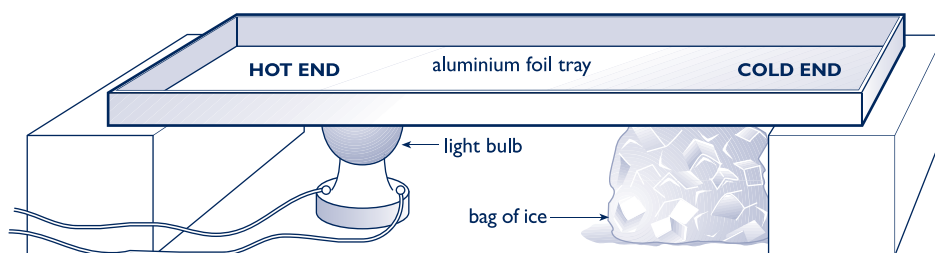
(continued)

Source: Queensland Department of Education 1982, *Primary Science Sourcebook: Activities for Teaching Science in Year 5*, Brisbane, pp. 8–12.

## Ideas for experimental designs (*continued*)

### Experiment 2: Do mealworms/earthworms/slaters prefer hot or cold?

1. Set up the equipment as shown in the following diagram.



2. Place the animal in the tray, and leave it for 10 minutes.
  - Which end of the tray does the animal seem to prefer?

### Experiment 3: Do mealworms/earthworms/slaters prefer light or dark?

1. Set up the equipment as shown in the following diagram.



2. Place the animal in the middle of the aluminium foil tray and cover it with the black paper tray. Leave it for 10 minutes.
  - Which end of the tray does the animal seem to prefer?

Source: Queensland Department of Education 1982, *Primary Science Sourcebook: Activities for Teaching Science in Year 5*, Brisbane, pp. 8–12.

# Investigating the relationship between pupil size and light intensity



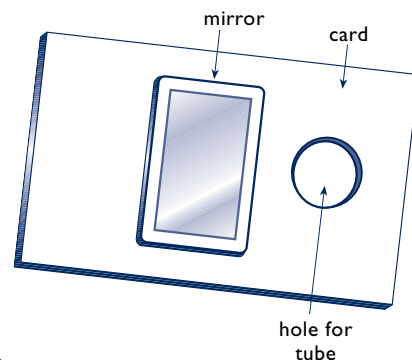
Resource Sheet 6

OBSERVABLE FEATURES AND SURVIVAL • MIDDLE PRIMARY

You will need:

- cutting mat (or thick wad of newspaper)
- sheet of thick card (20 cm x 15 cm)
- cardboard tube (e.g. paper-towel roll)
- pencil
- small plastic-edged mirror
- double-sided adhesive tape
- craft knife
- scissors

1. Place the end of the tube on the card near a short edge and draw around it.
2. Using the craft knife carefully, cut out the circle you have drawn so that the tube slides snugly through the hole.
3. Tape the mirror onto the card opposite the hole, about 2 cm from the hole.



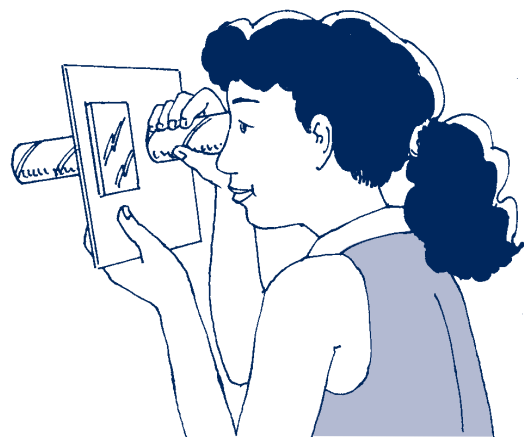
## Instructions for user

Push the tube through the hole and hold it up to one eye so that you can see the other eye in the mirror.

With both eyes open, look at a bright window, then a dark corner. Observe what happens to the pupil.

Put your hand over the end of the tube and look towards the window. Observe what happens to the pupil.

Suggest explanations for your observations.



Source: Ideas taken from *How the Body Works* by Steve Parker, p. 141, © 1994 Dorling Kindersley Ltd, London.  
Text © 1994 Steve Parker.

## Acknowledgments

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Grateful acknowledgment is made to the following organisations and people for granting permission to use copyright material:

Material from *202 Oozing, Bubbling, Dripping and Bouncing Experiments* by J. VanCleave, reprinted by permission of John Wiley & Sons Inc.;

Queensland Department of Education, PO Box 33, Brisbane Albert Street 4002, for material from *Primary Science Sourcebook: Activities for Teaching Science in Year 5*;

Dorling Kindersley Ltd, London, and Steve Parker for material from *How the Body Works*.

**This sourcebook module should be read in conjunction with the following Queensland School Curriculum Council materials:**

*Years 1 to 10 Science Syllabus*  
*Years 1 to 10 Science Sourcebook: Guidelines*  
*Science Initial In-service Materials*

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