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Needs of living things

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 to understand that living things have needs. Students have opportunities to:

- clarify their ideas and concepts about living and non-living things;
- make observations about how living things are affected when their needs are not met;
- handle plants and animals.

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 ►

Living and non-living
Ways of grouping

Developmental ►

Animals around us
Potting plants
Needs of plants
Making a home for animals

Culminating

Plants — where they live
Animals — where they live



Core learning outcomes

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

Life and Living

1.1 Students discuss their thinking about needs of living things.

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

Activities in this module also provide opportunities for students to demonstrate a level of understanding before Level 1.

Core content

This module incorporates the following core content from the syllabus:

Life and Living

Needs of living things

- water, oxygen, nutrients, suitable temperature

Observable features of plants and animals

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 give teachers an indication of the pattern of behaviour to look for when making judgments.

Life and Living

Foundation Level

Students are developing an understanding that some things are living and some things are non-living, and can use observable features to communicate the difference.

Students may:

- sort things according to whether they are living, once living or non-living;
- describe the features of things;
- identify and label living and non-living things.

Life and Living

1.1 Students discuss their thinking about needs of living things.

Students may:

- make comparisons between living and non-living things;
- construct meaning for the terms 'living' and 'non-living';
- discuss their thinking about the needs of plants;
- discuss their thinking about the needs of animals;
- make observations about how living things are affected when their needs are not met.

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:

- identify differences between living things and relate these to the ways living things meet their needs.

Background information**Current scientific conceptions**

Most living things need water, oxygen, nutrients and a suitable temperature. Plants have the additional requirements of carbon dioxide and sunlight. Some animals need shelter. Specific needs in terms of nutrition and temperature vary according to species and locations.

Students' prior understandings

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

Some students may think that:

- the terms 'non-living' and 'dead' are synonymous;
- plants are not living things;
- only mammals are animals;
- small animals such as insects are pests and are not important.

Teachers can enhance students' understandings by providing opportunities for them to observe many different living things, to investigate their needs and to consider the ways these needs are met in a variety of environments.

Terminology

Terms associated with living things are essential to the activities in this module — for example:

air	fertiliser	moths	spiders
amphibians	fish	nutrients	stem
animals	flowers	oxygen	sun
ants	food	plants	sunlight
birds	grass	pupa	sunshine
butterflies	homes	reptiles	trees
carbon dioxide	insects	root	vines
caterpillars	leaves	seed	warmth
fern	mammals	shelter	water

Students may already be familiar with some of these terms and understand their meanings and use in scientific contexts. If so, the activities in this module will provide opportunities for them to evaluate current usage. If not, these activities will provide opportunities for students to develop their understandings.

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 live specimens;
- caring for live specimens;
- using potting mix.

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

Support materials and references

Queensland Department of Education 1981, Brisbane:

Primary Science Sourcebook: Activities for Teaching Science in Year 1

Primary Science Sourcebook: Activities for Teaching Science in Year 2

Ryan, M. & Brunke, R. 1990, *The Amazing Book of Insects*, Queensland Museum, Brisbane.

Organisations

Queensland Museum Education Resource Service

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ACTIVITY

Living and non-living

Introductory

Focus

This activity provides opportunities for students to explore differences between living and non-living things.

Materials

Two or three of each of the following:

- live worm and confectionery worm
- live snail and plastic snail
- real and artificial flowers
- real and artificial plants
- other specimens or pictures of plants and animals

Teaching considerations**Obtaining and handling specimens**

Snails and worms are the animal specimens suggested for this activity. If these are unobtainable, use other suitable animals from the local area. Various kinds of plastic animals are available from novelty shops. Confectionery snakes are easily obtainable and may be used to represent worms in this activity. However, ensure that students do not develop the idea that worms are snakes.

It is recommended that students sit in a circle on the floor for this activity and pass specimens and objects around for observation. Students who are unwilling to handle live worms and snails should not be required to do so.

Students should handle animals gently. Worms will die if they are handled too much. The heat of the human hand dries out their skins, and they are unable to take in oxygen. Plants can also be damaged if handled roughly.

**Safety**

Inform students about safe and hygienic practices for handling and investigating plants and animals in this activity — for example:

- Wash hands after handling animals and plants.
- Do not lick or taste animals or plants.

**Working scientifically**

Time: 30 minutes

Handling materials
Looking for patterns and meanings
Constructing meaning
Drawing conclusions
Making comparisons
Clarifying ideas and concepts
Discussing thinking

- ▶ Students discuss their ideas about the terms 'living' and 'non-living'.
- ▶ Students handle the live worms and observe:
 - texture of the skin;
 - features of the skin;
 - movements the worm makes;
 - what the worm feels like on their hands when it moves;
 - its shape;
 - its colour;
 - its size;
 - whether it has a smell.

- ▶ Students handle and observe the confectionery worms in the same way as for the live worm.
- ▶ Students discuss their observations and compare the live worm and the confectionery worm. The teacher records points of comparison. Students then observe and compare the other live and artificial specimens — snails, flowers and plants.
- ▶ Students consider the comparisons and identify characteristics that are common to all the real things and that differentiate them from the artificial things. They suggest a term that could be used to describe the real things ('living things').
- ▶ In small groups, students discuss their ideas about what makes something 'living'. They share ideas in the class group and compile a joint description. Students test the description by discussing whether it applies to other living things provided for observation (as specimens or in pictures). If necessary, students modify their description.



Gathering information about student learning

Sources of information could include:

- students' contributions to discussions;
- students' observations of living and non-living things.

ACTIVITY

Ways of grouping

Introductory

Focus

This activity provides opportunities for students to enhance their understanding of living things by investigating ways these things can be grouped.

Materials

- specimens, imitations or pictures of living and non-living things, including things that were once living (e.g. snakes, spiders, insects, birds, mammals, marine animals, trees, flowers, vines, grass, rocks, bones, plastic items, wooden items, glass items, sand)

For each student:

- Resource Sheet 1, 'Grouping things'

Teaching considerations**Specimens**

Where possible, provide real specimens for this activity rather than imitations or pictures. Animals specimens are available from the Queensland Museum (see 'Support materials and references', p. 4).

Observation

Observation means using all the senses. In this activity, encourage students to use the senses of touch and smell as well as sight.

Students with vision impairment

Some students with vision impairment may need assistance for this activity. Seek advice from their support teacher.

**Safety**

Inform students about safe practices for investigating and handling plants and animals — for example:

- Identify plants that may cause allergic reactions.
- Wear gloves at all times.
- Handle animals in a safe, gentle and non-threatening way.
- Do not lick or taste animals or plants.

**Working scientifically**

Time: 45 minutes

Looking for patterns
Generalising
Making comparisons
Selecting and justifying
Discussing thinking
Explaining ideas and decisions

- In small groups, students observe the specimens and/or pictures. They sort these into groups and describe and give reasons for their grouping. Students may find it difficult to group specimens such as wood or bones which come from living things but are no longer living. They may decide to create the category 'others' for these specimens — for example:
- living, non-living, others;
 - plants, animals, others;
 - things that move, things that do not, others.



- Students share their grouping with the class and discuss the various approaches taken. Questions to guide discussion could include:
- Which specimens did you find it easy to place into groups?
 - Did you find it easy to place all the items into groups? If not, why not?
 - Where did you decide to place bones and wood? In what ways are these different from plants or spiders?
- Each student cuts pictures from Resource Sheet 1 and pastes them in a table under the following headings:

Grouping things		
Living	Non-living	Once living



Gathering information about student learning

Sources of information could include:

- students' contributions to discussions;
- students' completed tables.

ACTIVITY

Animals around us

Developmental

Focus

This activity provides opportunities for students to expand their ideas about the characteristics of animals.

Materials

- butcher's paper
- art materials

Teaching considerations

Some students may have limited experience with animals and a very limited concept of what an animal is.

Videos, CD-ROMs, the Internet or real animals could be used to expand students' thinking about what is included in the group biologists refer to as 'animal'.

**Working scientifically**

Time: 45 minutes

Looking for patterns
Applying ideas
Generalising
Creating presentations
Discussing thinking
Exploring and elaborating ideas

- ▶ Students discuss pets (their own and other people's). They identify the kinds of animals that are kept as pets and the things that pets need to live.
- ▶ Students discuss their understanding of the word 'animal' and suggest characteristics that make something an animal. They then brainstorm a list of animals they know.
- ▶ Students discuss ways of grouping animals on the list — for example:
 - familiar, unfamiliar;
 - farm animals, zoo animals, household pets;
 - animals that live in the garden, home, bush;
 - animals that walk, fly, swim, live on land, live in the water;
 - animals that have scales, feathers, fur or hair, beaks (or other characteristics).
- ▶ Students group the animals according to their characteristics (the way they look and feel). These criteria and the related discussion should lead students to create groups such as 'fish', 'birds' and 'insects'.
- ▶ Students reconsider the previously identified characteristics of animals and modify these if their thinking has changed.
- ▶ Students each draw a picture of an animal for a wall mural. The mural could show animals in different locations in an environment (for example, hills, houses, river, sea) or in groups according to characteristics (for example, mammals, fish, birds). The mural could be displayed in the classroom or library.

**Gathering information about student learning**

Sources of information could include:

- students' contributions to discussions;
- students' grouping of animals;
- students' drawings of animals and contributions to the mural.

ACTIVITY

Potting plants

*Developmental***Focus**

This activity provides opportunities for students to develop their understandings about the needs of plants.

Materials

For each student:

- seedlings
- potting mix
- draining material (pebbles or coir)
- plant pots (or yoghurt containers with drainage holes in the base)
- labels

Teaching considerations**Suitable area**

This activity could be messy. Plan to do it outside in a shady area or use newspaper as a drop sheet.

Seedlings

Marigolds, impatiens or salvia are examples of plants suitable for this activity. If students maintain their interest and growing conditions are good, some of the plants may reach the flowering stage.

Students may have to be shown how to remove seedlings from the tray without damaging the roots. Alternatively, seedlings could be removed from the tray beforehand.

If seedlings are not available, use seeds instead. Packets of seed are available by mail order. For suppliers, look under 'Seedsmen' in the index of the Yellow Pages telephone directory.

Needs of plants

Students will probably identify water as a major need of plants. However, warn them not to overwater the plants, especially if this activity is undertaken in the cooler months.

Plants also need light, gases (oxygen and carbon dioxide) from the air and nutrients from the soil. The amount of light required depends on the type of plant selected. Labelling on the tray of seedlings or seed packets will state whether the seedlings require high or low levels of light. Initially, students are not likely to be aware that plants need nutrients and gases.

**Safety**

Inform students about safe practices for handling commercial potting mix — for example:

- Check warnings on the packaging.
- Avoid breathing in dust and spores.
- Wash hands after using the mix.



Working scientifically

Time: 60 minutes for initial discussion and planting; 5–10 minutes per observation session at regular intervals; 20 minutes for discussion of results

Handling materials
Making observations
Measuring
Making comparisons
Discussing thinking
Summarising and reporting

► Students brainstorm and discuss ideas in response to the question ‘What do plants need to grow?’. They then create a list of plants’ needs and suggest reasons for the inclusion of each item.

► Students form the groups they will be working in during this activity and discuss ways of providing for the needs of seedlings they are going to plant and study. They then share ideas in the class group.

► The teacher introduces the idea of a jobs chart. With assistance, students record the actions identified earlier for maintaining the plants. Students also decide and record times when tasks are to be done and each group member’s responsibilities.

► Students move to the planting area, and one member of each group collects materials for the activity. Each group member labels a pot with his or her name and the type of seedling. They then plant the seedlings following these directions:

- Place some draining material in the base of the pot and cover it with potting mix to a specified point. (The depth of the potting mix could be marked on the side of the pot or measured by finger width.)
- Pat down the potting mix and dig a small hole in it.
- Place the plant in the hole and pat down the potting mix around it.
- Water the plant and place it in an area with a suitable level of light.

► Students decide on the form of observation to be carried out during the following weeks — for example:

- observations to be made — for example, height of seedlings, number of leaves, development of flowers;
- methods of recording information — for example, in a diary in their notebooks, on a wall chart;
- frequency of observations;
- length of the observation period.

Students then record the date of planting and their observations of the plant at this time.

► At the end of the observation period, students discuss how well their plants grew and suggest reasons for any changes that occurred.



Gathering information about student learning

Sources of information could include:

- students’ contributions to discussions;
- students’ potting of plants;
- students’ observation records.

ACTIVITY

Needs of plants

*Developmental***Focus**

This activity provides opportunities for students to investigate how plants are affected when their needs are not met.

Materials

For each group:

- butcher's paper
- marking pens
- potted plants

Teaching considerations**Plants**

Plants from the previous activity could be used for this investigation if they are still healthy and have not flowered. If new seedlings are used, they need to be potted about a week before the investigation starts.

Assistance with investigations

Students may need help to design their investigations, to find a suitable place for the plants and to record results.

They may suggest that plants need water, sunlight, soil and food:

- **water:** Plants being deprived of water should be kept in pots in a sunny position.
- **sunlight:** Plants being deprived of sunlight could be kept in a cupboard. These plants will use less water than plants in the open sunlight so students need to be careful not to overwater them. Overwatering could cause the plants to rot.
- **soil:** Soil can be removed from the roots of plants by placing them under gently running water. The plants could then be placed in a jar of water. Placing black paper round the jar reduces algal growth in the water and provides better conditions for the growth of roots.
- **food:** There may need to be discussion about what students mean by plant food. At this stage, they may not know that plants need mineral nutrients from the soil. Plants could be deprived of mineral nutrients by placing them in washed sand or distilled water. If students are aware that plants use sunlight to make 'food', they will find that tests about the need for food and the need for sunlight are set up in the same way.

Two or three plants from each group should be kept as controls. Discuss the reason for the control with students. (Refer to the sourcebook guidelines, p. 35, for ideas to guide discussion about fair testing.)

Students with good writing skills could base their investigation on the planning and reporting worksheets (model 1) in appendix 3 of the sourcebook guidelines.



Working scientifically

Time: 40 minutes to set up the investigation; 10 minutes per observation session at regular intervals; 25 minutes for discussion of results

Designing and performing investigations
Exploring phenomena
Formulating questions
Handling materials
Analysing
Constructing meaning
Suggesting
Clarifying ideas
Discussing thinking

► Students discuss the needs of plants, compile a list of these and suggest what would happen if each of the needs were not met.

► Individually, students choose one of the needs for investigation and then form groups with others who have made similar choices. With teacher assistance, they discuss how to test their ideas and how to make the test fair. They then design their investigations. Questions to guide thinking include:

- What do I want to find out?
- What do I need?
- What do I think will happen?

► Questions could be written on butcher's paper and students' responses listed underneath — for example:

What do I want to find out?

I want to find out if a plant can live without soil.

What do I need?

I need a plant, and then I need to remove the soil from its roots. I also need to put the plant into a container so that it will have water.

What do I think will happen?

I think the plant will die.

► Students decide which information is to be collected and the recording methods to be used. They also identify tasks required to maintain the plants, and create a jobs chart showing each person's responsibilities.

► Students conduct their investigations and collect and record the results. To analyse the results, they ask the following questions:

- What happened?
- Why do we think that happened?

► In the class group, students discuss the results of the investigations. They then compare their understandings about what happens to plants if their needs are not met.

► Students discuss how the needs of plants are met in their natural environments.



Gathering information about student learning

Sources of information could include:

- students' contributions to discussions;
- students' designs for their investigations;
- students' collection and recording of information and their analysis of results.

ACTIVITY

Making a home for animals

Developmental

Focus

This activity provides opportunities for students to reflect on their understandings about the needs of animals.

Materials

Materials required for this activity will depend on the animals that students choose to keep in the classroom.

Teaching considerations**Animals for observation**

Animals that students may choose for this activity include mice, fish, worms, spiders and caterpillars.

Keeping mice in the classroom provides opportunities for discussing needs such as water, food and shelter. Maintaining an aquarium provides opportunities for observing fish behaviour and discussing how the needs of animals are met in an aquatic environment. Contact the local pet shop for advice about the number of fish that can be kept in aquariums of different sizes. If only small numbers of fish are to be kept, aeration and filtering equipment may not be needed.

Having a wormery in the classroom enables students to see how worms mix and aerate soil, and keeping spiders could provide opportunities for observing web construction. Information about setting up a wormery and making a home for a spider is provided in *Primary Science Sourcebook: Activities for Teaching Science in Year 2* (see 'Support materials and references', p. 4). Skinks can be kept for a short time in a home similar to that used for spiders.

Observing caterpillars (including silkworms) provides opportunities for observing animals' growth. Information about caring for silkworms is provided in *The Amazing Book of Insects* (see 'Support materials and references', p. 4).

Obtaining animals

Small animals could be collected from the local environment. They may be found under leaves, beneath rocks and logs and in crevices and holes (see safety notes below). The animals can be transferred to temporary homes in the classroom for the observation period and then returned to their natural environments.

Larger animals such as mice and fish are best purchased from a pet shop. Check with pet shop staff about appropriate methods of care.

Animal welfare

All animals should be treated with consideration for their health and wellbeing. Students should learn from an early age about the special place of all animals and living things in the world. Animals such as flies, cockroaches, spiders, frogs, snakes and mice all have important functions in the natural world. Animals must be observed and handled humanely.

Depending on their social and cultural backgrounds, students may differ in their understandings about the place of some animal groups in the natural world. Students' understandings must be treated sensitively.

**Safety**

Inform students about safe practices for collecting, investigating and handling animals:

- Approach all animals warily.
- Do not place hands under logs or in crevices, or poke fingers or sticks down holes.

- Identify animals that may be dangerous or cause allergic reactions.
- Wear gloves at all times.
- Use probes to move animals into sealable containers.
- Do not stand close to the edges of rivers or ponds.
- Use nets and buckets to collect pond animals.
- Handle animals in a safe, gentle and non-threatening way.



Working scientifically

Time: 60 minutes for collecting animals and setting up the animal homes;
5–10 minutes per observation session at regular intervals

**Collecting
information**

Handling materials

Making observations

Generalising

Discussing thinking

► Students discuss the animals they have helped to look after at school or at home. They identify what they had to provide for the animals and explain why these things were needed.

► Students suggest some animals they could keep in the classroom for a short time. They discuss where to obtain the animals and what would need to be provided for them — for example, food, water, shelter and air.

► Students decide which animals to keep. They then create a jobs chart listing tasks involved in caring for the animals and showing each person's responsibilities.

► Students observe the behaviour of the animals and any changes that occur in the animal homes during the following two or three weeks. They record their observations in a diary.

► Students share and discuss their observations. Questions to guide discussion could include:

- What did you have to provide for the various animals?
- Which needs did the animals have in common?
- How did the animals meet their needs in the environment created in the classroom?
- How might the animals meet their needs differently in their natural environments?



Gathering information about student learning

Sources of information could include:

- students' contributions to discussions;
- students' observations and records.

ACTIVITY**Plants — where they live***Culminating***Focus**

This activity provides opportunities for students to reflect on their understandings about the needs of plants and how these are met.

Materials

- pictures of different environments where plants are the major feature (e.g. rainforest, eucalypt forest, grassland)

Teaching considerations

Students may be able to find pictures for this activity.

Short video segments could be included in the resources for the activity or used instead of pictures. Another option is to make the activity part of an excursion.

Many students do not recognise differences in plants and may need guidance to see that different species of plants grow in different areas.

**Working scientifically**

Time: 30 minutes

Making observations**Applying ideas and concepts****Drawing conclusions****Making comparisons****Discussing thinking**

► Students examine the pictures and compile a class list of words to describe each environment.

► Students discuss how the environments vary. Questions to guide thinking could include:

- What do you think the temperature would be on the ground in each of these environments?
- How much water (moisture) do you think there is in each environment?
- How moist would the soil be?
- Where would there be a lot of sunlight in this environment?
- Where would there be a lot of shade in this environment?

► Students discuss the environmental differences in terms of the needs of plants. They look at the variety of plants shown in the pictures and discuss the question 'Do all plants need the same things in the same amounts?'. (Responses to the question should be supported with explanations and/or examples.)

**Gathering information about student learning**

Sources of information could include:

- students' contributions to the word lists;
- students' contributions to discussions;
- students' answers to the final question.

ACTIVITY**Animals — where they live****Culminating****Focus**

This activity provides opportunities for students to reflect on their understandings about the needs of animals and how these needs are met.

Materials

- pictures of animals in their natural environments

Teaching considerations

Pictures should show a variety of animals and environments. Make sure both vertebrates and invertebrates are included and aquatic environments as well as terrestrial. Also include a range of environments — for example, hot, cold, wet, dry, lush, arid with little vegetation.

Short video segments could be included in the resources for this activity or used instead of pictures.

It is suggested that students look at a minimum of three different animals. More animals could be studied over an extended period of time.

**Working scientifically**

Time: 30 minutes

Making observations**Applying ideas and concepts****Drawing conclusions****Making comparisons****Discussing thinking**

- ▶ Students examine each of the pictures. They list words to describe the environments and identify major differences.
- ▶ Students discuss the needs of animals and how they obtain these needs from their environments. They could discuss:
 - the type of food the animal eats and how it is obtained — for example, hunting, trapping, waiting for it to pass by;
 - whether the animal needs shelter and how it makes a home;
 - how the animal gets water;
 - how the animal gets air (if it lives underground or in water);
 - problems it may have and how these are overcome — for example:
 - hot, dry environment (the animal may be nocturnal);
 - cold environment (the animal may hibernate or grow thick fur);
 - predators (the animal may make use of camouflage or be able to run fast and/or climb trees).
- ▶ Students select one animal and draw it in its natural environment. They write two or three sentences (with assistance if necessary) describing how the animal's needs are met.

**Gathering information about student learning**

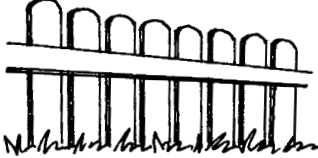
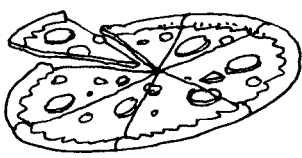

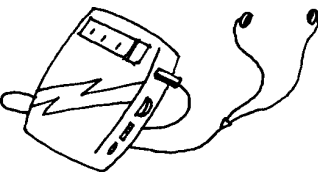
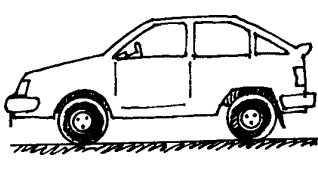


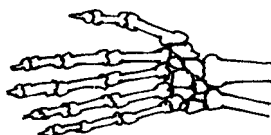
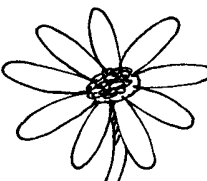
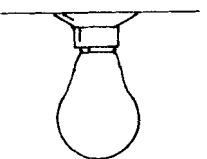
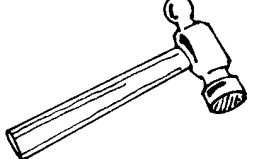
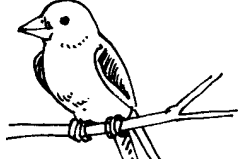
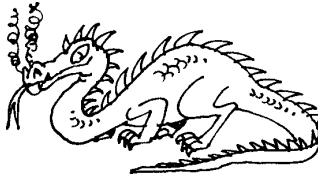
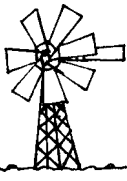
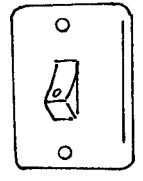
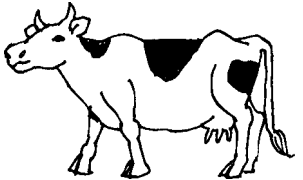
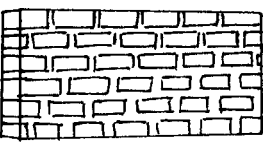
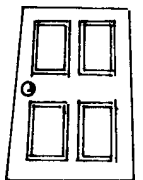
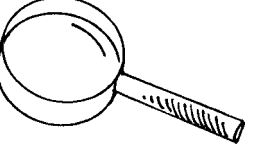





Sources of information could include:

- students' contributions to the word list;
- students' contributions to discussions;
- students' drawings and descriptive sentences.

Grouping things

R1

Resource Sheet 1

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

ISBN 0 7345 2070 0

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Illustrations by Stephen Francis

PIP 99136
