PrimaryConnections®
Linking science with literacy

Fully aligned with the Australian Curriculum

The PrimaryConnections program is supported by astronomer, Professor Brian Schmidt, Nobel Laureate

Schoolyard safari

Year 1

Biological sciences

Primary**Connections project**

Professional learning program

Primary**Connections** comprises a professional learning program supported with exemplary curriculum resources to enhance teaching and learning in science and literacy. Research shows that this combination is more effective than using each in isolation.

Professional Learning Facilitators are available throughout Australia to conduct workshops on the underpinning principles of the program: the Primary**Connections** 5Es teaching and learning model, linking science with literacy, investigating, embedded assessment and collaborative learning.

The Primary**Connections** website has contact details for state and territory Professional Learning Coordinators, as well as additional resources for this unit. Visit the website at:
www.primaryconnections.org.au

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Schoolyard safari

Year 1

Biological sciences



The world is teeming with animal life. Even the most unexpected places can host a diverse range of creatures. As humans, we share our wonderful planet with many other animals. Taking the time to really look at another species can provide a window into the similarities and differences among living beings, and can help us to appreciate how we are all part of a single, gloriously complex ecological system.

The *Schoolyard safari* unit is an ideal way to link science with literacy in the classroom. By observing the features and behaviour of small animals, students glimpse the diversity of animal life. Students observe the external features of small animals leading to a better understanding of how their features help them survive in their habitats. Through investigations, students learn how animals move, feed and protect themselves. They explore and compare the habitats of different animals.

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Contents

Foreword

The Australian Academy of Science is proud of its long tradition of supporting and informing science education in Australia. 'Primary**Connections:** linking science with literacy' is its flagship primary school science program, and it is making a real difference to the teaching and learning of science in Australian schools.

The Primary**Connections** approach has been embraced by schools since its inception in 2004, and there is substantial evidence of its effectiveness in helping teachers transform their practice. It builds teacher confidence and competence in this important area, and helps teachers use their professional skills to incorporate elements of the approach into other areas of the curriculum. Beginning and pre-service teachers find the approach do-able and sustainable. Primary**Connections** students enjoy science more than in comparison classes, and Indigenous students, in particular, show significant increases in learning using the approach.

The project has several components: professional learning, curriculum resources, research and evaluation, and Indigenous perspectives. With the development of an Australian curriculum in the sciences by ACARA in December 2010, it is an exciting time for schools to engage with science, and to raise the profile of primary science education.

Students are naturally curious. Primary**Connections** provides an inquiry-based approach that helps students develop deep learning, and guides them to find scientific ways to answer their questions. The lessons include key science background information, and further science information is included on the Primary**Connections** website (www.primaryconnections.org.au).

Science education provides a foundation for a scientifically literate society, which is so important for engagement in key community debates, such as climate change, carbon emissions, and immunisation, as well as for personal decisions about health and well-being. The inquiry approach in Primary**Connections** prepares students well to participate in evidence-based discussions of these and other issues.

Primary**Connections** has been developed with the financial support of the Australian Government and has been endorsed by education authorities across the country. The Steering Committee, comprising the Department of Education, Employment and Workplace Relations and Academy representatives, and the Reference Group, which includes representatives from all stakeholder bodies including states and territories, have provided invaluable guidance and support. Before publication, the teacher background information on science is reviewed by a Fellow of the Academy. All these inputs have ensured an award-winning, quality program.

The Fellows of the Academy are committed to ongoing support for teachers of science at all levels. I commend Primary**Connections** to you and wish you well in your teaching.

Professor Suzanne Cory, AC PresAA FRS
President (2010–2013)
Australian Academy of Science

The Primary**Connections program**

Primary**Connections** is an innovative program that links the teaching of science and literacy in the primary years of schooling. It is an exciting and rewarding approach for teachers and students, with a professional learning program and supporting curriculum resources. Further information about professional learning and other curriculum support can be found on the Primary**Connections** website: (www.primaryconnections.org.au)

The Primary**Connections teaching and learning model**

This unit is one of a series designed to exemplify the Primary**Connections** teaching and learning approach, which embeds inquiry-based learning into a modified 5Es instructional model with the five phases: *Engage, Explore, Explain, Elaborate* and *Evaluate* (Bybee, 1997). The relationship between the 5Es phases, investigations, literacy products and assessment is illustrated below:

Primary**Connections 5Es teaching and learning model**

Phase	Focus	Assessment focus
ENGAGE	Engage students and elicit prior knowledge	**Diagnostic assessment**
EXPLORE	Provide hands-on experience of the phenomenon	**Formative assessment**
EXPLAIN	Develop scientific explanations for observations and represent developing conceptual understanding Consider current scientific explanations	**Formative assessment**
ELABORATE	Extend understanding to a new context or make connections to additional concepts through a student-planned investigation	**Summative assessment** of the Science Inquiry Skills
EVALUATE	Students re-represent their understanding and reflect on their learning journey, and teachers collect evidence about the achievement of outcomes	**Summative assessment** of the Science Understanding

More information on Primary**Connections** 5Es teaching and learning model can be found at: www.primaryconnections.org.au

Developing students' scientific literacy

The learning outcomes in Primary**Connections** contribute to developing students' scientific literacy. Scientific literacy is considered the main purpose of school science education and has been described as an individual's:

- scientific knowledge and use of that knowledge to identify questions, acquire new knowledge, explain scientific phenomena and draw evidence-based conclusions about science-related issues
- understanding of the characteristic features of science as a form of human knowledge and enquiry
- awareness of how science and technology shape our material, intellectual and cultural environments
- willingness to engage in science-related issues, and with the ideas of science, as a reflective citizen (Programme for International Student Assessment & Organisation for Economic Co-operation and Development [PISA & OECD], 2009).

Linking science with literacy

PrimaryConnections has an explicit focus on developing students' knowledge, skills, understanding and capacities in science and literacy. Units employ a range of strategies to encourage students to think about and to represent science.

PrimaryConnections develops the literacies of science that students need to learn and to represent their understanding of science concepts, processes and skills. Representations in PrimaryConnections are multi-modal and include text, tables, graphs, models, drawings and embodied forms, such as gesture and role-play. Students use their everyday literacies to learn the new literacies of science. Science provides authentic contexts and meaningful purposes for literacy learning, and also provides opportunities to develop a wider range of literacies. Teaching science with literacy improves learning outcomes in both areas.

Assessment

Assessment against the year level achievement standards of the Australian Curriculum: Science (ACARA, 2014) is ongoing and embedded in PrimaryConnections units. Assessment is linked to the development of literacy practices and products. Relevant understandings and skills are highlighted at the beginning of each lesson. Different types of assessment are emphasised in different phases:

Diagnostic assessment occurs in the *Engage* phase. This assessment is to elicit students' prior knowledge so that the teacher can take account of this when planning how the *Explore* and *Explain* lessons will be implemented.

Formative assessment occurs in the *Explore and Explain* phases. This enables the teacher to monitor students' developing understanding and provide feedback that can extend and deepen students' learning.

Summative assessment of the students' achievement developed throughout the unit occurs in the *Elaborate* phase for the Science Inquiry Skills, and in the *Evaluate* phase for the Science Understanding.

Alignment with the Australian Curriculum: Science

The Australian Curriculum: Science has three interrelated strands—Science Understanding, Science as a Human Endeavour and Science Inquiry Skills—that together 'provide students with understanding, knowledge and skills through which they can develop a scientific view of the world' (ACARA, 2014).

The content of these strands is described by the Australian Curriculum as:

Science Understanding	
Biological sciences	Understanding living things
Chemical sciences	Understanding the composition and behaviour of substances
Earth and space sciences	Understanding Earth's dynamic structure and its place in the cosmos
Physical sciences	Understanding the nature of forces and motion, and matter and energy
Science as a Human Endeavour	
Nature and development of science	An appreciation of the unique nature of science and scientific knowledge.
Use and influence of science	How science knowledge and applications affect people's lives and how science is influenced by society and can be used to inform decisions and actions
Science Inquiry Skills	
Questioning and predicting	Identifying and constructing questions, proposing hypotheses and suggesting possible outcomes
Planning and conducting	Making decisions regarding how to investigate or solve a problem and carrying out an investigation, including the collection of data
Processing and analysing data and information	Representing data in meaningful and useful ways; identifying trends, patterns and relationships in data, and using evidence to justify conclusions
Evaluating	Considering the quality of available evidence and the merit or significance of a claim, proposition or conclusion with reference to that evidence
Communicating	Conveying information or ideas to others through appropriate representations, text types and modes

AC All the material in this table is sourced from the Australian Curriculum.

There will be a minimum of four Primary**Connections** units for each year of primary school from Foundation to Year 6—at least one for each Science Understanding sub-strand of the Australian Curriculum. Each unit contains detailed information about its alignment with all aspects of the Australian Curriculum: Science and its links to the Australian Curriculum: English and Mathematics.

Safety

Learning to use materials and equipment safely is central to working scientifically. It is important, however, for teachers to review each lesson before teaching to identify and manage safety issues specific to a group of students. A safety icon 

is included in lessons where there is a need to pay particular attention to potential safety hazards. The following guidelines will help minimise risks:

- Be aware of the school's policy on safety in the classroom and for excursions.
- Check students' health records for allergies or other health issues.
- Be aware of potential dangers by trying out activities before students do them.
- Caution students about potential dangers before they begin an activity.
- Clean up spills immediately as slippery floors are dangerous.
- Instruct students never to taste, smell or eat anything unless they are given permission.
- Discuss and display a list of safe practices for science activities.

Gloves

Many of the lessons in *Schoolyard safari* require handling of biological material and the use of gloves is recommended. Cotton, disposable or rubber gloves can be used, or obtain a class set of children's gardening gloves that can be washed and dried and reused.

References

Australian Curriculum Assessment and Reporting Authority (ACARA). (2012). *Australian Curriculum: Science.* www.australiancurriculum.edu.au

Bybee, R.W. (1997). *Achieving scientific literacy: from purposes to practical action.* Portsmouth, NH: Heinemann.

Programme for International Student Assessment & Organisation for Economic Co-operation and Development. (2009). *PISA 2009 assessment framework: key competencies in reading, mathematics and science.* Paris: OECD Publishing.

Unit at a glance *Schoolyard safari*

Phase	Lesson	At a glance
ENGAGE	**Lesson 1** In the yard ***Session 1*** Curious creatures ***Session 2*** In my schoolyard ***Session 3*** In my own backyard *(Optional)*	To capture students' interest and find out what they think they know about how living things, such as small animals, have a variety of external features and live in different places where their needs are met To elicit students' questions about small animals
EXPLORE	**Lesson 2** Wiggly worms ***Session 1*** Watching earthworms ***Session 2*** Earthworm viewer *(Optional)*	To provide students with hands-on, shared experiences of the features, behaviour and habitat of earthworms
	Lesson 3 Slimy snails ***Session 1*** Snail surprises ***Session 2*** Snail shack *(Optional)*	To provide students with hands-on, shared experiences of the features, behaviour and habitat of snails
	Lesson 4 Ant antics	To provide students with hands-on, shared experiences of the features, behaviour and habitat of ants
EXPLAIN	**Lesson 5** Same or different? ***Session 1*** Comparing creatures ***Session 2*** Animated animals *(Optional)*	To support students to represent and explain their understanding and observations about the similarities and differences between small animals To introduce current scientific views about how living things, such as small animals, have a variety of external features and live in different places where their needs are met
ELABORATE	**Lesson 6** Habitat detectives	To support students to plan and conduct an investigation to compare different types of animal habitats, and the type and number of animals found
EVALUATE	**Lesson 7** Hidden in their habitat	To provide opportunities for students to represent what they know about how living things, such as small animals, have a variety of external features and live in different places where their needs are met, and to reflect on their learning during the unit

A unit overview can be found in Appendix 6, page 85.

Alignment with the Australian Curriculum: Science

This *Schoolyard safari* unit embeds all three strands of the Australian Curriculum: Science. The table below lists sub-strands and their content for Year 1. This unit is designed to be taught in conjunction with other Year 1 units to cover the full range of the Australian Curriculum: Science content for Year 1.

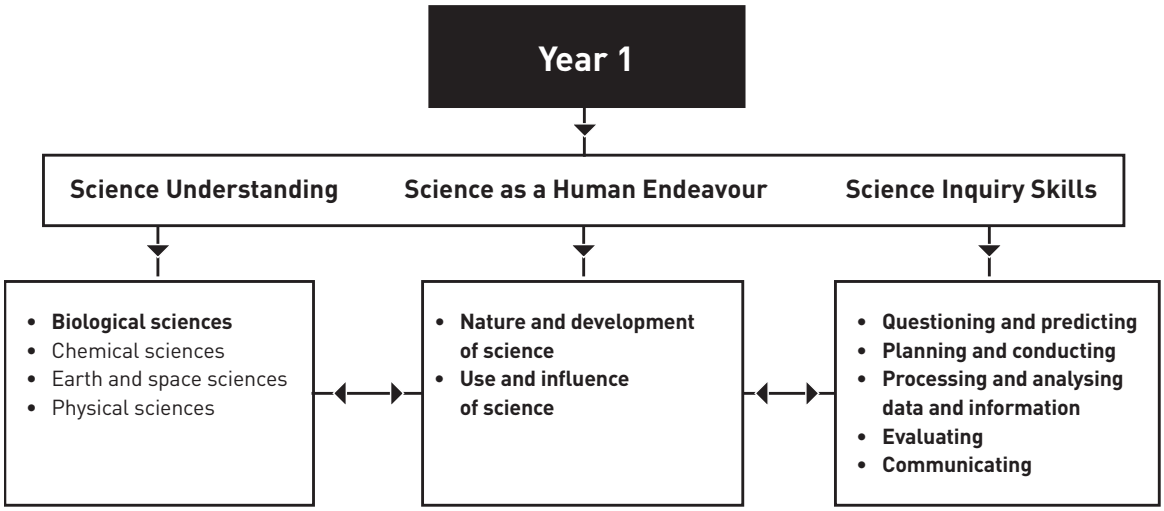
For ease of assessment the table below outlines the sub-strands and their aligned lessons.

Strand	Sub-strand	Code	Year 1 content descriptions	Lessons
Science Understanding (SU)	**Biological sciences**	ACSSU017	Living things have a variety of external features	1–7
		ACSSU211	Living things live in different places where their needs are met	1–7
Science as a Human Endeavour (SHE)	**Nature and development of science**	ACSHE021	Science involves asking questions about, and describing changes in, objects and events	1–7
	Use and influence of science	ACSHE022	People use science in their daily lives, including when caring for their environment and living things	1–7
Science Inquiry Skills (SIS)	**Questioning and predicting**	ACSIS024	Respond to and pose questions, and make predictions about familiar objects and events	1–7
	Planning and conducting	ACSIS025	Participate in different types of guided investigations to explore and answer questions, such as manipulating materials, testing ideas, and accessing information sources	5, 6
		ACSIS026	Use informal measurements in the collection and recording of observations, with the assistance of digital technologies as appropriate	2–7
	Processing and analysing data and information	ACSIS027	Use a range of methods to sort information, including drawings and provided tables	2, 3, 4
		ACSIS212	Through discussion, compare observations with predictions	1–4, 6
	Evaluating	ACSIS213	Compare observations with those of others	1–4, 6
	Communicating	ACSIS029	Represent and communicate observations and ideas in a variety of ways such as oral and written language, drawing and role play	1–7

AC All the material in the first four columns of this table is sourced from the Australian Curriculum.

Interrelationship of the science strands

The interrelationship between the three strands—Science Understanding, Science as a Human Endeavour and Science Inquiry Skills—and their sub-strands is shown below. Sub-strands covered in this unit are in bold.



AC All the terms in this diagram are sourced from the Australian Curriculum.

Relationship to overarching ideas

In the Australian Curriculum: Science, six overarching ideas support the coherence and developmental sequence of science knowledge within and across year levels. In *Schoolyard safari* these overarching ideas are represented by:

Overarching idea	Incorporation in *Schoolyard safari*
Patterns, order and organisation	Students compare the similarities and differences between the external features of small animals. Students disrupt ant trails to examine how ants move and regroup
Form and function	Students draw detailed observations of small animals to describe their physical characteristics and their related functions
Stability and change	Students draw conclusions about the quantity and diversity of small animals found in the schoolyard
Scale and measurement	Students compare the shapes and sizes of small animals found in the schoolyard
Matter and energy	Students discuss relationship between the habitat and the feeding needs of small animals
Systems	Students make links between the physical features of living things and their habitats

Curriculum focus

The Australian Curriculum: Science is described by year level, but provides advice across four year groupings on the nature of learners. Each year grouping has a relevant curriculum focus.

Curriculum focus Foundation–Year 2	Incorporation in *Schoolyard safari*
Awareness of self and the local world	Through investigating the external features of small animals and how they move, feed and protect themselves, students learn about the needs of living things and the biodiversity of the schoolyard.

Achievement standards

The achievement standards of the Australian Curriculum: Science indicate the quality of learning that students typically demonstrate by a particular point in their schooling, for example, at the end of a year level. These standards will be reviewed regularly by ACARA and are available from the ACARA website.

By the end of this unit, teachers will be able to make evidence-based judgments on whether the students are achieving below, at or above the Australian Curriculum: Science Year 1 achievement standard. Rubrics to help teachers make these judgements are available on the website (www.primaryconnections.org.au)

General capabilities

The skills, behaviours and attributes that students need to succeed in life and work in the 21st century have been identified in the Australian Curriculum as general capabilities. There are seven general capabilities and they are embedded throughout the units. For further information see: www.australiancurriculum.edu.au

For examples of our unit-specific general capabilities information see the next page.

Schoolyard safari—Australian Curriculum general capabilities

General capabilities	Australian Curriculum description	*Schoolyard safari* examples
Literacy	Literacy knowledge specific to the study of science develops along with scientific understanding and skills. Primary**Connections** learning activities explicitly introduce literacy focuses and provide students with the opportunity to use them as they think about, reason and represent their understanding of science.	In *Schoolyard safari* the literacy focuses are: • science journals • role-plays • word walls • maps • tables • ideas maps • labelled diagrams • factual texts • graphs
 **Numeracy**	Elements of numeracy are particularly evident in Science Inquiry Skills. These include practical measurement and the collection, representation and interpretation of data.	Students: • collect, interpret and represent data through tables • create and interpret picture graphs.
Information and communication technology (ICT) competence	ICT competence is particularly evident in Science Inquiry Skills. Students use digital technologies to investigate, create, communicate, and share ideas and results.	Students are given optional opportunities to: • use a digital camera to take photographs of small animals • view video of societies of ants—real and fictional • create 'Blabberize' animations about small animals.
 **Critical and creative thinking**	Students develop critical and creative thinking as they speculate and solve problems through investigations, make evidence-based decisions, and analyse and evaluate information sources to draw conclusions. They develop creative questions and suggest novel solutions.	Students: • ask and answer questions, describe and explain their ideas, make suggestions and join in discussions • make comparisons between habitats and between the physical features of living things • explain their reasoning.
Ethical behaviour	Students develop ethical behaviour as they explore principles and guidelines in gathering evidence and consider the implications of their investigations on others and the environment.	Students: • use a 'Code for Caring' when collecting and observing animal specimens.
 **Personal and social competence**	Students develop personal and social competence as they learn to work effectively in teams, develop collaborative methods of inquiry, work safely, and use their scientific knowledge to make informed choices.	Students: • work collaboratively in teams • follow instructions to collect data.
 **Intercultural understanding**	Intercultural understanding is particularly evident in Science as a Human Endeavour. Students learn about the influence of people from a variety of cultures on the development of scientific understanding.	• 'Cultural perspectives' opportunities are highlighted where relevant. • Important contributions made to science by people from a range of cultures are highlighted where relevant.

AC All the material in the first two columns of this table is sourced from the Australian Curriculum.

Cross-curriculum priorities

There are three cross-curriculum priorities identified by the Australian Curriculum:

- Aboriginal and Torres Strait Islander histories and cultures
- Asia and Australia's engagement with Asia
- Sustainability.

For further information see: www.australiancurriculum.edu.au

Aboriginal and Torres Strait Islander histories and cultures

The Primary**Connections** Indigenous perspectives framework supports teachers' implementation of Aboriginal and Torres Strait Islander histories and cultures in science. The framework can be accessed at: www.primaryconnections.org.au

Schoolyard safari focuses on the Western science way of making evidence-based claims about how living things, such as small animals, have a variety of external features and live in different places where their needs are met.

Aboriginal and Torres Strait Islander Peoples might have other explanations for the external features of small animals and the places where they live.

Primary**Connections** recommends working with Aboriginal and Torres Strait Islander community members to access local and relevant cultural perspectives. Protocols for engaging with Aboriginal and Torres Strait Islander community members are provided in state and territory education guidelines. Links to these are provided on the Primary**Connections** website.

Sustainability

The *Schoolyard safari* unit provides opportunities for students to develop an understanding of how the different places where small animals live can be affected by environmental conditions, including changes due to human activities. This unit helps them to develop an understanding of the fragility of the environment and living things. This can assist them to develop knowledge, skills and values for making decisions about individual and community actions that contribute to sustainable patterns of use of the Earth's natural resources.

Alignment with the Australian Curriculum: English and Mathematics

Strand	Sub-strand	Code	Year 1 content descriptions	Lessons
English–Language	**Text structure and organisation**	ACELA1447	Understand that the purposes texts serve shape their structure in predictable ways	5, 7
English–Literacy	**Interacting with others**	ACELY1656	Engage in conversations and discussions, using active listening behaviours, showing interest, and contributing ideas, information and questions	2, 4, 6, 7
		ACELY1788	Use interaction skills including turn-taking, recognising the contributions of others, speaking clearly and using appropriate volume and pace	1, 2, 3, 4, 5, 6
		ACELY1657	Make short presentations using some introduced text structures and language, for example opening statements	7 (optional)
	Interpreting, analysing, evaluating	ACELY1658	Describe some differences between imaginative informative and persuasive texts	5 (optional)
		ACELY1660	Use comprehension strategies to build literal and inferred meaning about key events, ideas and information in texts that they listen to, view and read by drawing on growing knowledge of context, text structures and language features	5
	Creating texts	ACELY1661	Create short imaginative and informative texts that show emerging use of appropriate text structure, sentence-level grammar, word choice, spelling, punctuation and appropriate multimodal elements, for example illustrations and diagrams	1–7
Mathematics–Measurement and Geometry	**Location and transformation**	ACMMG023	Give and follow directions to familiar locations	1, 6
	Using units of measurement	ACMMG019	Measure and compare the lengths and capacities of pairs of objects using uniform informal units	4
Mathematics–Statistics and Probability	**Data representation and interpretation**	ACMSP263	Represent data using objects and drawings where one object or drawing represents one data value. Describe the displays	6

AC All the material in the first four columns of this table is sourced from the Australian Curriculum.

Other links are highlighted at the end of lessons where possible. These links will be revised and updated on the website (www.primaryconnections.org.au).

Teacher background information

Introduction to small animals

Many small animals can be found in the schoolyard environment. Animals are capable of actively moving from place to place at some stage in their life cycle, and they feed by consuming other living things—or parts of them. Most plants are fixed to one place and make their own food by photosynthesis, using energy from sunlight.

The schoolyard might have animals with a backbone (vertebrates) such as birds, lizards and some mammals such as cats and dogs. Many animals in the schoolyard are, however, likely to be very small and without a backbone (invertebrates) such as earthworms, snails, ants, ant lions, slaters, beetles and spiders.

Schoolyard safari explores some common invertebrates with land habitats. Students will investigate the parts of the animals that enable them to move, feed and protect themselves and will consider how their habitats provide for their needs such as food, water and shelter.

Invertebrates are a vital part of ecosystems because of their number, variety and their influence on larger animals and plants and even entire ecosystems. They play an important part in ecosystems by:

- helping to break down waste and recycle nutrients in the soil
- dispersing seeds of plants and
- assisting with pollination.

Some invertebrates (and vertebrates) have a negative effect on other living things by transmitting diseases—for example, mosquitoes—or multiplying excessively and consuming the food of other animals, for example, locust swarms.

In this unit students will have the opportunity to investigate three types of invertebrate animals:

- Annelids ('ringed'): animals with no limbs and with bodies divided by rings into repeated segments, such as, earthworms and leeches.
- Molluscs: soft-bodied animals usually covered with a hard, outside shell that provides protection, such as, snails and oysters.
- Arthropods: animals with a hard, external covering (exoskeleton) and jointed limbs. The exoskeleton provides protection and a framework to which muscles are attached and which allows them to move. The arthropods include:
  - crustaceans, such as, slaters and crabs.
  - arachnids, which are animals with eight legs, a head and abdomen, such as, spiders and ticks.
  - myriapods have many legs, such as, centipedes and millipedes.
  - insects, the largest groups of arthropods, have a head, thorax and abdomen, six legs and antennae, such as, ants and bees.

Scientists have developed different classification systems for animals based on the features and/or the origin of species. These are being revised constantly as new knowledge emerges.

Students' conceptions

Taking account of students' existing ideas is important in planning effective teaching approaches that help students learn science. Students develop their own ideas during their experiences in everyday life and might hold more than one idea about an event or phenomenon. Many students have non-scientific ideas about what an animal is. Many students' concept of an animal is limited to common mammals such as cats, dogs and cows, and does not include humans or insects.

Students commonly hold anthropomorphic views of animals—that is, they attribute human motivation, features or behaviour to animals. These views are often perpetuated in storybooks and films.

The skill of observing

From an early age, students use their senses to explore the diverse nature of the world around them. They do so mainly through observation, a skill that is fundamental to science and technology. Observation involves the use of the five senses: touch, taste, hearing, sight and smell. Each sense provides different information about what we are observing.

Learning to observe involves learning to communicate observations to others, by representation or description. This is an important skill so others can replicate an investigation or identify a described species.

Students might need practice and assistance through questioning to distinguish between observations and assumptions or inferences about the animal's intent (anthropomorphic views). For example, 'The ant is burrowing in the corner' or 'The ant is digging a tunnel near the wall of the jar' are observations whereas 'The ant is trying to escape' or 'The ant is looking at us' are inferences.

Animal ethics

This unit describes investigations of invertebrate animals. Each Australian state and territory has animal ethics requirements for school investigations involving vertebrate animals (those with a backbone such as birds or guinea pigs). You would need to comply with any requirements of the relevant *Animal Welfare Act* if you chose to investigate vertebrate animals. Each school might also have policies in place addressing animal welfare in classroom settings.

Insects and crustaceans are invertebrate animals and are not covered by the Animal Welfare Act but still require care and consideration.

Snails

A variety of snails, slugs and planarians are suitable intermediate hosts of the rat lungworm, *Angiostrongylus cantonensis*. Human infection occurs following ingestion of raw snails, slugs or planarians, something young toddlers particularly are prone to do. Another possible source of human infection is through ingestion of improperly washed vegetables such as lettuce.

It is recommended that the following safety procedures be followed during *Schoolyard safari:*

- wear gloves when handling any biological material
- always wash hands with soap and water after handling any biological material (particularly snails, slugs or their slime, and any vegetation such as vegetables or leaf litter), even after wearing gloves
- when handling snails or slugs, keep hands away from the mouth, and clarify with students that they should never encourage, or dare anyone to eat raw snails or slugs.

To access more in-depth science information in the form of text, diagrams and animations, refer to the Primary**Connections** Science Background Resource which has now been loaded on the Primary**Connections** website: www.primaryconnections.org.au/science-background-resource/.

Note: This background information is intended for the teacher only.

Lesson 1 In the yard

AT A GLANCE

To capture students' interest and find out what they think they know about how living things, such as small animals, have a variety of external features and live in different places where their needs are met.

To elicit students' questions about small animals.

Session 1 Curious creatures

Students:

- predict which animals they think will be found in their schoolyard environment
- participate in a role-play to show what they think they know about the features and behaviour of small animals.

Session 2 In my schoolyard

Students:

- explore the schoolyard for evidence of small animals
- write about and draw their observations.

Session 3 In my own backyard *(optional)*

Students:

- observe, record and report on small animals found in their own backyard.

Lesson focus

The focus of the *Engage* phase is to spark students' interest, stimulate their curiosity, raise questions for inquiry and elicit their existing beliefs about the topic. These existing ideas can then be taken account of in future lessons.

Assessment focus

Diagnostic assessment is an important aspect of the *Engage* phase. In this lesson you will elicit what students already know and understand about:

- the external features of small animals and the habitats that meet their needs, and how to care for living things and their environment. You will also monitor their developing science inquiry skills (see page 2).

Key lesson outcomes

Science

Students will be able to represent their current understanding as they:

- explain their existing ideas about the features and behaviour of small animals
- follow directions to conduct an exploration of the 'Schoolyard safari' area
- use their senses to observe and identify small animals in their habitats.

Literacy

Students will be able to:

- describe the purpose and features of a role-play
- use oral language and role-play to represent what they think they know about the features and behaviour of small animals
- describe the purpose and features of a map
- use oral, written and visual representation to report observations of animals in their habitats and compare them with their predictions
- ask questions about small animals.

This lesson also provides opportunities to monitor the development of students' general capabilities (highlighted through icons, see page 5).

Teacher background information

Small animals likely to be found in the schoolyard environment

snails	spiders	moths
slugs	cockroaches	wasps
earthworms	grasshoppers	mosquitoes
ants	crickets	silverfish
slaters	cicadas	beetles
millipedes	flies	birds
centipedes	bees	lizards
aphids	ladybirds	
dragonflies	butterflies	

For further information about identification and naming of invertebrates see the Primary**Connections** website (www.primaryconnections.org.au).

How to collect, observe and care for small animals:

- Search carefully, disturbing the surroundings as little as possible.
- Replace stones and logs after searching underneath them.
- Do not remove plants.
- Do not collect known dangerous small animals.
- Wear gloves when searching. Small animals can be aggressive (such as, bite or sting) when their habitat is disturbed.
- Handle small animals carefully. Use spoons and damp brushes, not fingers, as animals could be crushed accidentally.
- Place small animals in small, sealable plastic containers with air holes.
- Label containers with the area collected so the small animals can be returned (the labels can also provide information such as date collected).
- When collecting, keep different types of small animals in separate containers, so they don't injure or attack each other.
- After a short time, return the small animals to where they were found or make suitable classroom homes for them.

The small animals selected in the unit have been chosen because they are found in most schoolyards and are relatively easy to find and observe.

Note: This unit is focused on small animals found in a land habitat. Other habitats—such as a freshwater pond, seashore or compost—could be explored using the lesson structure modelled in this unit.

Note: If vertebrate animals (such as birds, guinea pigs or lizards) are investigated, you will need to comply with your state's animal ethics requirements, Animal Welfare Act and your school's policy on the use of animals in classroom settings.

Read the safety information on page 9 about handling snails.

Session 1 Curious creatures

ENGAGE

Equipment

FOR THE CLASS

- class science journal
- word wall

Preparation

- Read 'How to use a science journal' (Appendix 2).
- Read 'How to use a word wall' (Appendix 3).
- Prepare a page in the class science journal with the heading 'Animals in our schoolyard'.

Lesson steps

1 Write 'safari' on the board and briefly discuss its meaning, focusing on the idea of a safari being an expedition to look for and learn about a variety of animals. Add 'schoolyard' to 'safari' and ask students to think about what the title means and what animals might be found in their schoolyard.

2 Record students' predictions about what animals they think they might find in the schoolyard under the 'Animals in our schoolyard' heading in the class science journal. Focus students' thinking on small invertebrates for example, insects.

Discuss the purpose and features of a science journal.

Literacy focus

Why do we use a science journal?
We use a **science journal** to record what we see, hear, feel and think so that we can look at it later.
What does a science journal include?
A **science journal** includes dates and times. It might include written text, drawings, measurements, labelled diagrams, photographs, tables and graphs.

3 Organise the class to role-play some of the small animals on their list, including ants, earthworms and snails. Discuss the purpose and features of a role-play.

Literacy focus

Why do we use a role-play?
We use a **role-play** to show how something works by acting it out.
What does a role-play include?
A **role-play** might include speech, actions and props.

4 Draw students' attention to the way the features and behaviour of an animal are demonstrated in their role-play. For example, if a student is role-playing an earthworm, ask questions such as:

- Why are you moving along the floor?
- Why have you pulled your arms close to your body?
- Why do you have your eyes shut?
- Why are you wriggling along headfirst?

Note: In the *Engage* phase, do not provide any formal definitions or correct students' answers as the purpose is to elicit students' prior knowledge.

5 Discuss the small animals enacted, asking questions such as:

- How does the animal move?
- Which parts of the animal help it to move?
- How does the animal see?
- How does the animal eat?
- What does the animal eat?
- How does the animal protect itself?
- What kind of place does the animal live in? Why does it live there?

Record in the class science journal ideas about the small animals.

6 Explain that during the unit the class will find out more about small animals and where they live. Record students' questions about small animals in the class science journal.

7 Begin a word wall with vocabulary about small animals. Discuss the purpose and features of a word wall.

Literacy focus

Why do we use a word wall?
We use a **word wall** to record words we know or learn about a topic. We display the **word wall** in the classroom so that we can look up words we are learning about and see how they are spelt.
What does a word wall include?
A **word wall** includes a topic title or picture and words that we have seen or heard about the topic.

Session 2 In my schoolyard

Equipment

FOR THE CLASS

- class science journal
- word wall
- team roles chart
- team skills chart
- 'Schoolyard safari' map (see 'Preparation')
- 'Code for caring' poster (see 'Preparation')

FOR EACH TEAM

- role wristbands or badges for Manager and Speaker
- each team member's science journal
- 1 blank sheet of A4 paper
- *optional:* 1 clipboard to hold blank sheet
- gloves for each team member
- 1 large hoop or skipping rope
- self-adhesive notes

Preparation

SAFETY

- Be aware of allergies that students might have, for example, plant allergies. Students might also suffer from allergies to different substances and detergents as well as the latex used in disposable gloves.
- Read 'How to organise collaborative learning teams' (Appendix 1). Display an enlarged copy of the team skills chart and the team roles chart in the classroom. Prepare role wristbands or badges and the equipment table.
- Identify an area of the schoolyard that would be suitable for small animal observation. It would be helpful for the area to have a range of habitats that could include light and shade, trees and shrubs, long grass, asphalt, logs, wet and dry areas, flowers and weeds.
- Make a large 'Schoolyard safari' map, including familiar landmarks for students. Divide the area into sections and allocate a particular area to one or two teams.
- *Optional:* It could be helpful for students to mark off each section physically to create boundaries for their observation. This could be done using string and four chairs or witch's hats as corners for the area.
- *Optional:* Add a key to indicate different aspects of the habitat so that students can make inferences about the habitat from the colouring (such as, brown = dirt, dark green = lush grass, light green = sparse grass).
- Prepare a blank poster with the title 'Code for caring' (see Lesson step 3).
- Check your state and territory guidelines for keeping and handling animals in classrooms and schools.

SAFETY

- Read the safety information on page 9 about handling snails.

Lesson steps

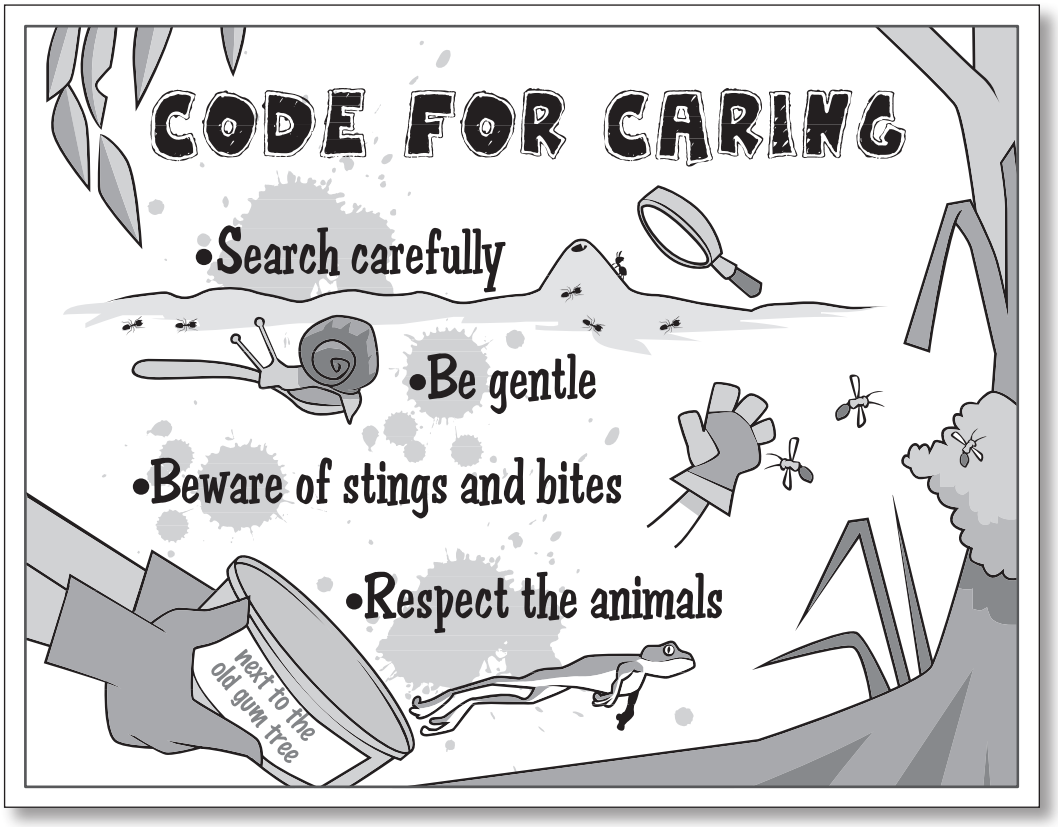
1 Review the previous session, referring to the class science journal and students' predictions of what they might find in their schoolyard.

2 Explain that students will be working in collaborative learning teams to look for small animals that might be found in the 'Schoolyard safari' area.

If students are using collaborative learning teams for the first time, introduce and explain the team skills chart and the team roles chart. Explain that students will wear role wristbands or Manager and Speaker badges to help them (and you) know which role each team member should be doing.

Draw students' attention to the equipment table and discuss its use. Explain that this is where Managers will collect and return equipment.

3 Introduce the blank poster with the title 'Code for caring'. Discuss what a code is. Negotiate and record on the poster ways for students to care for small animals (see 'Teacher background information').



Sample 'Code for caring' poster

4 Introduce students to the 'Schoolyard safari' map and ask if they recognise its location in the schoolyard and any landmarks and areas that are familiar to the students. Discuss the purpose and features of a map.

ENGAGE

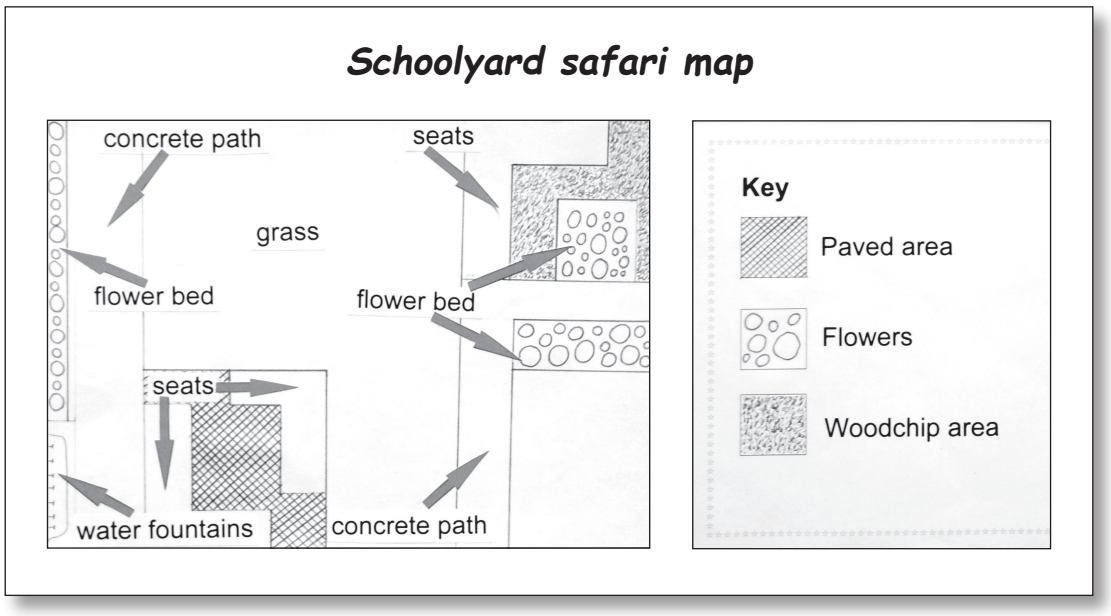
Literacy focus

Why do we use a map?

We use a **map** to show where things are, how far apart they are and how to get between them.

What does a map include?

A **map** includes a title, labels, symbols and a key to explain the symbols. It might include arrows to show a path and scale to show distances.



Sample 'Schoolyard safari' map

5 Draw attention to the designated areas for the teams and model how teams will use a large hoop or a skipping rope forming a circle on the ground to help them focus on their observation area.

6 Explain that the Manager will wear gloves to protect their hands as their role is to pick up rocks and move leaves and logs so the team can observe the small animals underneath. Other team members are not touching animals, they are just observing.

7 In the class science journal model how the Speaker will record the name or draw small animals observed on a blank A4 sheet and count the number found in their area.

8 Form teams and allocate roles.

9 Ask Managers to collect team equipment, and walk with their team to the 'Schoolyard safari' area, place their hoop on the ground and record the small animals inside it. Once placed, it is not to be moved so the observations are restricted to one area.

10 Allow students time to explore and observe the area.

Note: If students do not find animals in the viewing area of their hoop, ask them to explore another area.

On return to the classroom, review the students' experience by asking questions such as:

- How many different kinds of small animals did you find?
- Which animals did you see lots of?
- What were the animals doing as you watched them?
- Were any animals difficult to see?
- Did any team find dead animals or parts of an animal?
- Did any team find an animal that other teams didn't?

11 Review the students' predictions from Session 1 in the class science journal. Using a different coloured pen, tick confirmed predictions and record the names of other small animals observed.

12 Record, on the 'Schoolyard safari' map, the number and type of animals found in each area using information recorded on each team's A4 sheet.

13 Review students' questions to see if any have been answered. Update the word wall with words and images.

Session 3 In my own backyard *(optional)*

Equipment

FOR THE CLASS

- class science journal
- word wall
- 'Code for caring' poster (see Session 2)

FOR EACH STUDENT

- 'In my own backyard' folder or journal (eg, manila folder, book)
- 'Information note for families' (Resource sheet 1)
- 'Backyard safari search' (Resource sheet 2)

Preparation

- Make an 'In my own backyard' folder or journal for each student, including 'Information note for families' (Resource sheet 1) and 'Backyard safari search' (Resource sheet 2).
- Decide when the students will present the information collected (see Lesson step 7) and write this information on 'Information note for families' (Resource sheet 1).

Lesson steps

1. Using the 'Schoolyard safari' map, review the small animals that were found in the schoolyard in the previous lesson.
2. Ask students what types of animals they might find in their own backyard. Record the predictions in the class science journal.
3. Review the 'Code for caring' poster and discuss how students could make observations of small animals in their own backyard (or the backyard of someone they know).

   Remind students not to pick up small animals using their fingers as some of them can bite or sting.
4. Introduce the 'In my own backyard' folder or journal prepared for each student. Discuss how students will use their 'In my own backyard' journal to record information.
5. Use the classroom journal to model entries, such as:
   - where the observation took place, the date and time
   - draw or take a photograph of the small animals and where they were found

   Optional: ask students to include a key to indicate different aspects of the habitat so that other students can make inferences about the habitat from the colouring, such as, brown = dirt, dark green = lush grass, light green = sparse grass.
6. Introduce the 'Information note for families' (Resource sheet 1) and discuss.
7. Explain that students will give presentations of what they find in their backyard either as the unit progresses or at the end of the unit.

Curriculum links

Mathematics

- Develop understanding of the vocabulary of position and mapping. For example, construct a 3 x 3 grid using rulers on the floor or in a sandpit and add a few plastic animals to the grid. Have students draw this grid and describe the location of the animals, for example, the beetle is in A2.

The Arts

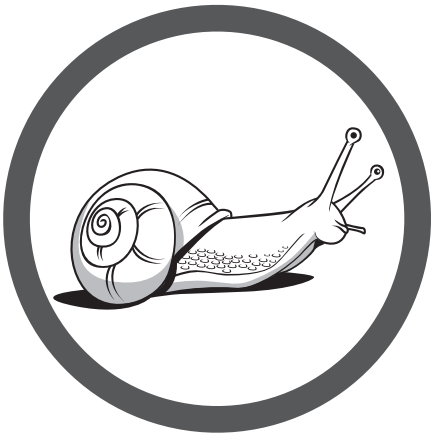
- Create an undergrowth environment in the classroom, for example, cover the windows with green cellophane. Make 2-D and 3-D models of objects that are found in the undergrowth.

Indigenous perspectives

- Insects have played an important part in the culture of Indigenous people for many thousands of years. Extensively used for their food, medicine and as part of their cultural beliefs, these insects include the Bogong moth, witjuti (witchetty) grub, honeypot ant and native bee for its sugarbag (honey).
- Display pictures or drawings of some of the insects that are a part of Indigenous culture. Discuss and group according to the students' ideas.
- For images see Australian National Insect Collection: www.csiro.au/places/ANIC.html
- For further information see www.insects.org/ced1/aust_abor.html
- Primary**Connections** recommends working with Aboriginal and Torres Strait Islander community members to access local and relevant cultural perspectives. Protocols for engaging with Aboriginal and Torres Strait Islander community members are provided in state and territory education guidelines. Links to these are provided on the Primary**Connections** website (www.primaryconnections.org.au).

Information note for families

Name: _____ **Date:** _____



Introducing 'In my own backyard' project

This term, our class will explore small animals and their habitat in the science unit, *Schoolyard safari*. As part of this unit, we would like to learn about the small animals that might be found in the homes and gardens of students in our class.

Tasks to do

Each student will have an 'In my own backyard' folder or journal to record information. This will include a 'Backyard safari search' sheet for drawing and writing about the animals found. Students are encouraged to take photographs if possible.

Students will be asked to share their observations with their classmates on_____.

Code for caring

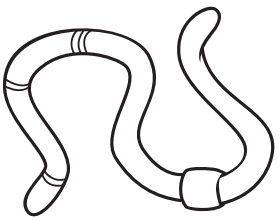
The class has established a 'Code for caring' to help students search carefully without disturbing the search area. This includes:

- Replace stones and logs after searching under them.
- Leave all plants and gardens undisturbed.
- Leave all dangerous small animals alone.
- Wear gloves to avoid bites and stings.
- Use spoons and damp brushes to avoid crushing small animals.
- When observing animals, keep them in a labelled container that has air holes and after a short time return the animal to where it was found.

SAFETY

Note: Students are not collecting the animals, they are observing them. Children should be supervised while observing snails. If students handle snails, slugs or their slime, ensure they keep their hands away from their mouths and wash their hands with soap afterwards.

Class Teacher



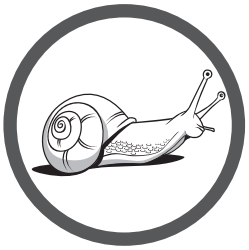
For further information about small animals see the CSIRO website.
www.csiro.au/resources/pfhc.html

 ISBN 978 0 85847 319 5

Backyard safari search

Name: _____ **Date:** _____

In my own backyard



Search around your home for small animals such as:

slugs, snails, earthworms, ants, slaters, millipedes, centipedes, aphids, spiders, earwigs, cockroaches, grasshoppers, beetles, cicadas, flies, bees, ladybirds, dragonflies, butterflies, moths, wasps, mosquitoes, silverfish, crickets, lizards or birds.

Name of animal _____ I found it _____	Name of animal _____ I found it _____
Name of animal _____ I found it _____	Name of animal _____ I found it _____

 ISBN 978 0 85847 319 5

Lesson 2 Wiggly worms

EXPLORE

AT A GLANCE

To provide students with hands-on, shared experiences of the features, behaviour and habitat of earthworms.

Session 1 Watching earthworms

Students:

- record what they think they know about earthworms
- observe, discuss and draw earthworms
- record what they find out about earthworms.

Session 2 Earthworm viewer *(optional)*

Students:

- observe a class earthworm viewer
- record observations.

Lesson focus

The *Explore* phase is designed to provide students with hands-on experiences of the science phenomenon. Students explore ideas, collect evidence, discuss their observations and keep records such as science journal entries. The *Explore* phase ensures all students have a shared experience that can be discussed and explained in the *Explain* phase.

Assessment focus

Formative assessment is an ongoing aspect of the *Explore* phase. It involves monitoring students' developing understanding and giving feedback that extends their learning. In this lesson you will monitor students' developing understanding of:

- the external features of an earthworm, how an underground habitat meets their needs and how science involves asking questions. You will also monitor their developing understanding of science inquiry skills (see page 2).

Key lesson outcomes

Science

Students will be able to:

- observe and draw the features of an earthworm
- observe and describe earthworm movement
- identify features of earthworms that allow them to breathe, feed, move and protect themselves underground
- *optional:* construct an earthworm habitat.

Literacy

Students will be able to:

- use oral, written and visual language to report observations of the features, behaviour and habitat of the earthworm
- describe the purpose and features of a table
- draw a detailed drawing after careful observation
- record ideas in a science journal
- answer questions about earthworms.

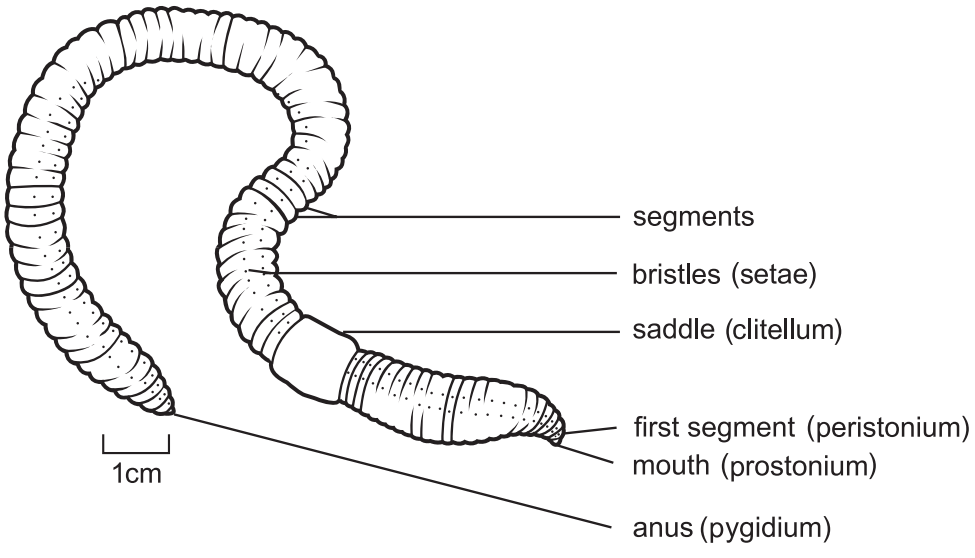
This lesson also provides opportunities to monitor the development of students' general capabilities (highlighted through icons, see page 5).

Teacher background information

About earthworms

Earthworms are annelids, which means 'ringed' animal. They are cylindrical animals without a backbone (invertebrate). They are divided into segments. While they don't have lungs, they have very thin skin through which they absorb oxygen and expel carbon dioxide. As their skin is permeable, they can lose water by evaporation and it is important that they do not dry out or they will not be able to 'breathe'. Earthworms have primitive

Labelled diagram of an earthworm



Note: This diagram is not intended for student use.

eyes, which allow them to avoid sunlight and therefore avoid the surface of the Earth, where they could be eaten by birds. They are one of a host of organisms that processes the world's organic matter and helps maintain ecosystems.

There are two main types of earthworms: earthworkers and composting earthworms. Earthworkers are earthworms that live in the soil, creating burrows. These burrows allow air and water to circulate in the soil and make it easier for plant roots to penetrate. Compost worms do not live in soil; they live in organic matter (anything that was once living), in compost bins or the top layer of soil rich in organic matter, eating it and leaving castings (manure) that fertilise the ground.

The average adult earthworm is about 10 centimetres long. The Victorian Gippsland giant is the largest in Australia; a mature adult can stretch to two metres long when relaxed.

The earthworm's body is divided into ring-like segments. Each segment has eight tiny bristles, called setae, which enable the earthworm to 'grip' the soil and move along. Adult earthworms have a clitellum near the head end of the body, which is part of the reproductive system. It is often called a saddle because it is a thickened, usually paler-coloured, saddle-shaped area.

How they move

Earthworms have two sets of muscles. They have circular muscles around each segment, which the earthworm tightens to stretch out, becoming long and thin. They also have a longitudinal set of muscles running along the length of their bodies. These compress the earthworm, making it shorter and fatter. Earthworms move by using their bristles (setae) to anchor themselves and push through the soil. If they can squeeze into small cracks they force their way through; otherwise they eat their way through.

How they eat

The mouth of an earthworm is folded in on itself. When earthworms eat, they fold out this front section and pull the soil or organic material back into the top of their digestive tract. The digested remains are deposited as manure or castings, which make the ground more fertile.

How to get a supply of earthworms

Earthworms can be found in a garden. Water an area of the garden and place a damp, dark cloth over it. Earthworms will rise to the surface as their burrows fill up, thinking that they are safe from predators as it seems to be night. Walk lightly and use a torch covered with red cellophane as they are not sensitive to red light. These earthworms are earthworker worms, or agricultural worms. They are slow to reproduce and grow. They also require a lot of space in which to live and breed.

It is possible that not enough earthworms will be found using this method. The alternative is to buy commercial, composting earthworms from earthworm farms, nurseries, the gardening section of larger department stores or bait shops. These earthworms can live in dense communities, growing and reproducing at a fast rate. Earthworms can be recycled into the school garden at the end of the unit.

How to house earthworms

1 Punch narrow holes in the bottom of a polystyrene box to allow water to drain through.

2 Place the polystyrene box inside another box without holes to catch the liquid. It will also catch earthworms that fall out through the holes. Place something like a brick in the bottom of the lower box to give the earthworms something to climb onto so they don't drown.

3 Put several layers of wet newspaper in the bottom of your container and cover with layers of soil, sheep manure, tea leaves, shredded paper etc., dampening each layer as you go. A layer of soil over the top is also a good idea.

4 Add the earthworms. They will multiply rapidly providing they are kept fed, watered and in the dark.

5 Put organic (anything that was once living) kitchen waste on top of the bedding regularly but in small amounts. As the population increases, so will the amount of food required.

For further information about how to house earthworms see the Primary**Connections** website (www.primaryconnections.org.au).

Earthworms like	Earthworms don't like
Fruit and vegetable scraps	Hard pits and seeds, avocado skins
Cereals, grains, bread, rice, pasta	Meat, fatty food, dairy products
Coffee and tea. These can become acidic, so are best mixed with crushed egg shell or wood ash	Food that stings your eye (eg, acidic or spicy food such as lemons, onions, chillies, raw potato, garlic, orange and grapefruit)
Garden waste. (Avoid diseased or infected plants.)	Really salty foods

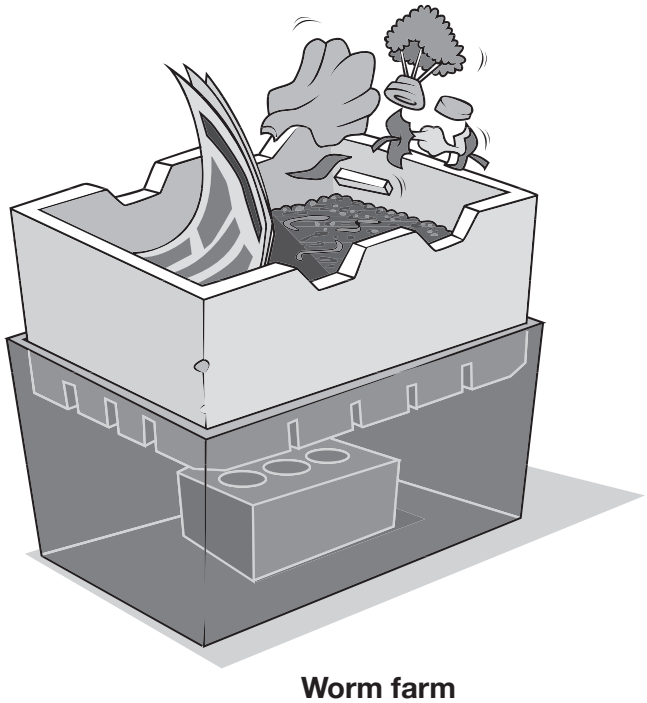
Note: Do not feed earthworms citrus, garlic, meat scraps or dairy products; they become sick if they ingest them.

6 Cover the food waste with damp newspaper, hessian or carpet underlay. A cover needs to allow air circulation, retain moisture and provide a dark environment. It is convenient for observation as earthworms will tend to congregate under the cover.

7 Add water to the soil whenever it begins to dry. It should be the consistency of a lightly squeezed sponge; if it is too wet the earthworms will die. A spray bottle is useful.

SAFETY

Avoid contact with bacteria and fungal spores in soil.



Worm farm

EXPLORE

Session 1 Watching earthworms

Equipment

FOR THE CLASS

- class science journal
- word wall
- team roles chart
- team skills chart
- 'Schoolyard safari' map (see Lesson 1)
- 'Code for caring' poster (see Lesson 1)
- 'Watching earthworms' table
- 1 spray bottle of water

FOR EACH TEAM

- role wristbands or badges for Manager and Speaker
- each team member's science journal
- 1 small clear plastic container
- 1 magnifying glass
- 1 soft-haired paint brush
- 1 plastic spoon
- composting earthworm
- gloves for each team member
- *optional*: each student's 'In my own backyard' journal (see Lesson 1)

Preparation

- Obtain a supply of earthworms (see 'Teacher background information').
- Prepare a 'Watching earthworms' table in the class science journal, for example:

Watching earthworms

Before a close look	After a close look

Lesson steps

1. Review the previous lesson using the class science journal and the students' pictures of small animals found in the 'Schoolyard safari' area.
2. Ask if anyone observed earthworms in the 'Schoolyard safari' area and mark the location on the 'Schoolyard safari' map.
3. *Optional:* Ask students to report what they have identified in their garden recently using their 'In my own backyard' journal.
4. Explain that students will be working in collaborative learning teams to look closely at an earthworm. Discuss the purpose and features of a table.

   Record what students know about earthworms in the 'Before a close look' column of the 'Watching earthworms' table (see 'Preparation').

Literacy focus

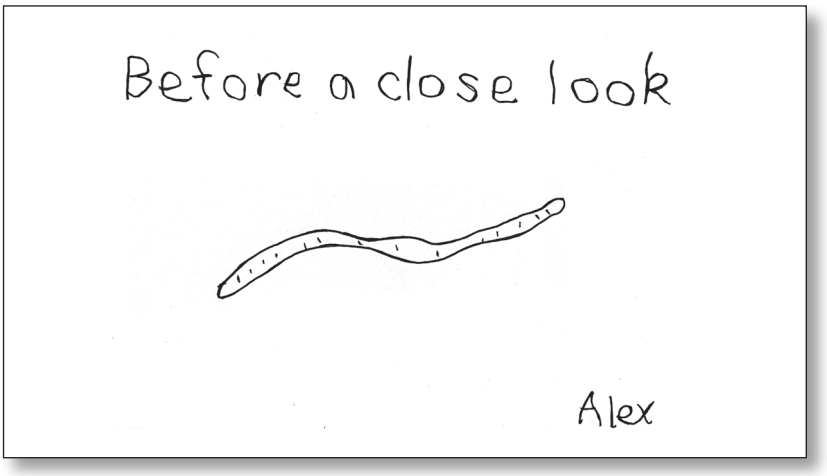
Why do we use a table?

We use a **table** to organise information so we can understand it more easily.

What does a table include?

A **table** includes a title, columns with headings and information organised under each heading.

5 Ask students to draw, in their science journals, an earthworm under the title 'Before a close look'.



Student work sample of a 'Before a close look' drawing

6 Show the earthworms to the class. Discuss what students might observe, such as:

- the colour and texture of the earthworm's skin
- the shape and size of the earthworm
- how the earthworm moves
- whether the topside of the earthworm is different from the underside.

SAFETY

Refer to the 'Code for caring' poster created in Lesson 1. Instruct the students to wear gloves when handling earthworms and remind them of safety precautions such as not touching their eyes or mouth during the activity.

7 Demonstrate how to use the magnifying glass to assist their observations. Explain to the students that you might need to spray the earthworm gently with water to keep it moist.

8 Model how to observe the underside of an earthworm that is inside a small, clear plastic container.

9 Form teams and allocate roles. Ask Managers to collect team equipment.

SAFETY

10 Once teams have observed their earthworm, ask them to wash their hands and then share their observations with each other.

11 Ask Speakers to share their team's findings. Record findings in the 'After a close look' column of the 'Watching earthworms' table in the class science journal.

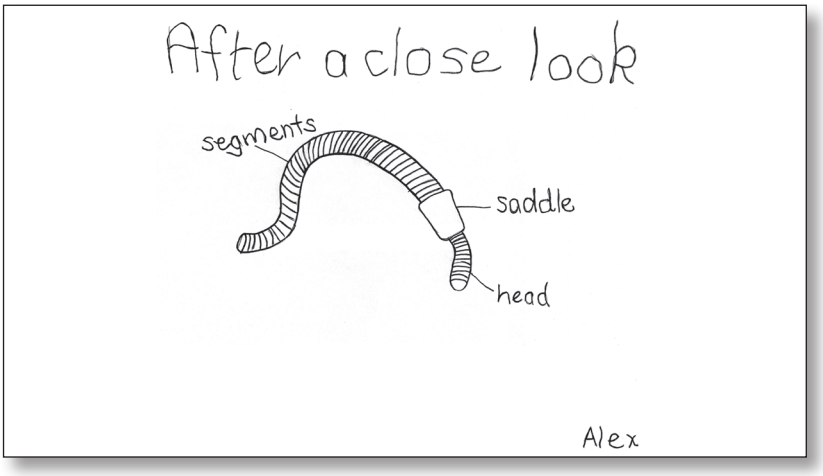
EXPLORE

12 Review and discuss the drawings students made of an earthworm before the close observations. Ask them to discuss their 'Before a close look' drawings and suggest improvements based on their observations. Model drawing an earthworm on the board, taking students through the following steps:

- look closely at the earthworm
- draw the shape of the earthworm
- count and draw the segments
- add any details.

13 Provide students with the opportunity to look again at their earthworm and make a second drawing in their science journal with the title 'After a close look'. The drawings should represent the shapes, quantity and location of the parts of the animal.

14 Discuss the importance of having a close look to gather detailed information and why scientists might find this useful.



Student work sample of an 'After a close look' drawing

15 Discuss the observations that students have made of the earthworm, and ask for suggestions about how the parts of the animal help it move, feed and protect itself in its habitat. Ask questions such as:

- How do earthworms see?
- How do earthworms breathe?
- How do earthworms eat?
- Where do earthworms usually live (their habitat)?
- How do the parts of the earthworm help it live in its habitat?
- How do earthworms find food and water in their habitat?
- How do earthworms protect themselves from drying out?
- How do earthworms protect themselves from being eaten by birds?

16 Review students' questions to see if any have been answered. Update the word wall with words and images.

Session 2 Earthworm viewer *(optional)*

Equipment

FOR THE CLASS

- class science journal
- word wall
- 'Code for caring' poster (see Lesson 1)
- 1 earthworm viewer (see 'How to make an earthworm viewer', Resource sheet 3)
- composting earthworms
- gloves

FOR EACH STUDENT

- science journal

Preparation

- Obtain a supply of earthworms (see 'Teacher background information').
- Prepare an earthworm viewer (see 'How to make an earthworm viewer', Resource sheet 3).

Lesson steps

1. Review the previous lesson and discuss the features and behaviour of the earthworm.
2. Draw students' attention to the habitat of the earthworm. Ask them where they think earthworms live and what conditions earthworms might need to survive.
3. Show students the earthworm viewer you have made and discuss its features. Ask students questions such as:
   - Why is the soil moist?
   - Why does the bottle have holes in the bottom?
   - Why have grass clippings been put on top of the soil?
   - Why will we wrap the bottle in black plastic?
4. Draw a diagram of the earthworm viewer in the class science journal.
5. Wear gloves to add the earthworms to the top layer of grass and leaves. Watch the earthworms burrow into the soil.
6. Cover the earthworm viewer with the black plastic bin liner and place it in a cool dark place.
7. Organise for students to observe the earthworm viewer every few days and compare what is seen with the drawing in the class science journal. Keep the top layer moist as necessary.

8 *Optional:* Make a second earthworm viewer with no earthworms in it to allow students to compare the two viewers to see the difference that earthworms made.

9 Ask students to record, using drawings and text, their claims and evidence about earthworm behaviour and habitat in their science journal. To assist students with their thinking, ask questions such as:

- Is there any evidence of the earthworms' burrowing? How do you know?
- Has anything happened to the soil layers? What do you think has happened?
- Has anything happened to the grass clippings or leaves? What do you think has happened?

10 Review students' questions to see if any have been answered. Update the word wall with words and images.

Curriculum links

English

- Read information and fiction books about earthworms. Students identify key words and complete a short report on earthworms.

Mathematics

- Find ways to measure and compare the lengths of the earthworms.
- Create a jumbled sequence of photos to show the transformation of a plastic drink bottle into an earthworm viewer; ask students to reorder them.

Technology

- Design an effective worm farm.

Studies of society and environment

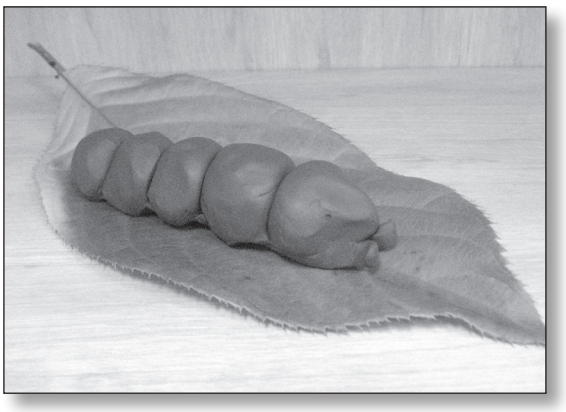
- Discuss sustainability programs and the possible role of earthworm farms in the school environment.

Indigenous perspectives

The witjuti (witchetty) grub is the larvae of cossid moths and is found in the roots of several desert plants. The grub is a food source (bush tucker) for some Indigenous people. The grubs are collected by digging up the roots of the acacia bush and cracking them open to locate the grubs within, and can be eaten raw or roasted.

For further information see
www.museum.wa.gov.au/collections/natscience/invertebrates/documents/Giantmoths.pdf
www.rumbalara-e.schools.nsw.edu.au/bushtucker/Xyleutes_sp.htm

- Watch the videoclip, *Witchetty grubs are healthy.* See www.australianscreen.com.au/titles/cool-drink-and-culture/clip2
- Find images of witjuti grubs and carefully observe the body structure, including the different sections of the grub. Use modelling clay or plasticine to make a model of a witjuti grub. Make a home for the grub using natural materials—inside a piece of root or bark, or on a leaf.



Work sample of a plasticine witjuti grub

- Primary**Connections** recommends working with Aboriginal and Torres Strait Islander community members to access local and relevant cultural perspectives. Protocols for engaging with Aboriginal and Torres Strait Islander community members are provided in state and territory education guidelines. Links to these are provided on the Primary**Connections** website (www.primaryconnections.org.au).

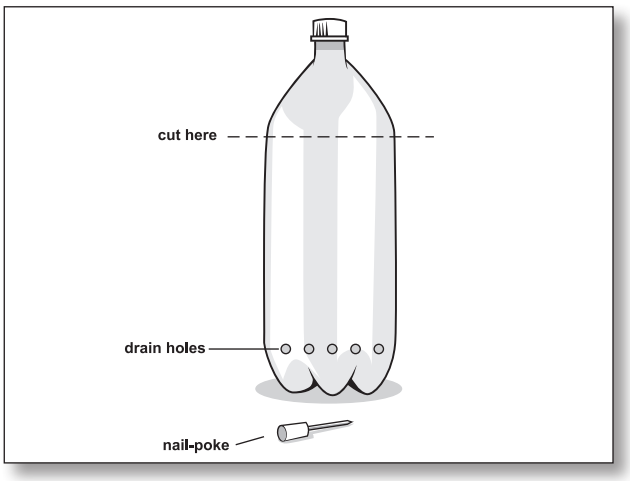
How to make an earthworm viewer

Equipment

- 1 empty 2 L clear plastic drink bottle
- 1 empty 500 mL plastic drink bottle
- 1 saucer
- scissors
- 1 marking pen
- 1 nail and cork for nail-poke
- candle and matches
- water
- gravel
- soil
- sand
- grass clippings or dead leaves
- 12–15 earthworms
- 1 black plastic bin liner
- spray bottle with water

Steps to make an earthworm viewer

1. To make a nail-poke, push the head of a nail into a cork.
2. To use the nail-poke, heat the point of the nail over the candle flame. Push the hot poke into the plastic bottle to make drainage holes.
3. Cut the top 10 cm off the 2 L plastic bottle and poke a ring of drainage holes about 2 cm from the bottom. Place on tray or saucer to catch drained liquid.
4. Half fill the 500 mL plastic bottle with water and stand it inside the 2 L bottle.
5. Put a layer of gravel into the space between the two bottles up to the drainage holes.
6. Arrange the soil and sand in 2 cm layers until the bottle is almost full, starting and finishing with a soil layer. Moisten each layer with water from the spray bottle.
7. On the outside of the bottle, mark the layers with a marking pen.
8. Add a layer of grass clippings and chopped up dead leaves. Moisten the layer with the spray bottle.



Where to poke holes in the earthworm viewer

Completed earthworm viewer

 ISBN 978 0 85847 319 5

Lesson 3 Slimy snails

AT A GLANCE

To provide students with hands-on, shared experiences of the features, behaviour and habitat of snails.

Session 1 Snail surprises

Students:

- use an ideas map to show what they think they know about snails
- work in teams to observe and draw snails
- observe and record how snails move and eat.

Session 2 Snail shack *(optional)*

Students:

- construct a snail habitat
- keep observation records about snails and their habitat.

Lesson focus

The *Explore* phase is designed to provide students with hands-on experiences of the science phenomenon. Students explore ideas, collect evidence, discuss their observations and keep records such as science journal entries. The *Explore* phase ensures all students have a shared experience that can be discussed and explained in the *Explain* phase.

Assessment focus

Formative assessment is an ongoing aspect of the *Explore* phase. It involves monitoring students' developing understanding and giving feedback that extends their learning. In this lesson you will monitor students' developing understanding of:

- the external features of a snail and how a snail's habitat meets its needs, and how science involves asking questions. You will also monitor their developing understanding of science inquiry skills (see page 2).

Key lesson outcomes

Science

Students will be able to:

- observe and draw details of a snail's external structure
- observe and describe the movement and feeding of a snail
- identify features of snails that allow them to breathe, feed, move and protect themselves in the yard
- *optional*: construct a snail habitat.

Literacy

Students will be able to:

- use oral, written and visual language to report observations of the features, function and habitat of a snail
- identify the purpose and features of an ideas map
- identify the purpose and features of a labelled diagram
- record information as a labelled diagram
- answer questions about snails.

This lesson also provides opportunities to monitor the development of students' general capabilities (highlighted through icons, see page 5).

Teacher background information

About snails

Snails are gastropods (a specific type of mollusc), which means literally 'belly-footed animal'. Snails have a large foot and a spiral shell, which protects and camouflages them. There are different types of snails: some live in water (marine and freshwater) and some live on land. In this unit, we are focusing on land snails. Land snails have a breathing hole near the base of their shell, which allows air to enter their lungs.

Land snails have two sets of tentacles on their head. The longer ones have black spots on the ends (their 'eyes'). These are light sensitive but a snail's eyesight is very poor so they rely on touch and smell to find food. The short tentacles are sensitive to vibrations.

Land snails are nocturnal animals. In summer, they hide and close up the entrance to their shell with a lid of slime, which dries into a hard skin that keeps predators out and keeps moisture in. This lid of slime has a small hole in it to let in air so that the snail can continue to breathe. They estivate (a period of dormancy like the hibernation of animals in northern hemisphere winters) until the weather becomes more clement.

How they move

Snails use the muscles in their foot to move. These muscles contract in a ripple movement, lifting the snail slightly off the surface it is on and pushing it forward. The push causes the snail's foot to slide over the ground. To reduce friction, the snail creates a thick layer of slime to glide forward over. The slime is slippery but also sticky, allowing the snail to climb almost any surface. The production of slime requires a lot of water, which is why land snails are more active when it has just rained. This slime is visible when dry on some surfaces, showing a 'snail track'.

How they eat

Most snails are herbivores: they eat plants. They can also eat bits of rock such as limestone, which contains chalk, which they need for making their shells. Instead of teeth, they have a tongue with rough edges called a radula. The uneven edges work like a file to rip food into pieces, carrying the shreds into the snail's mouth.

How to get a supply of snails

Snails are best collected when they are abundant. They can be stored safely for long periods. Land snails placed in a clean, dry, covered container, for example, a shoebox, will estivate. It is important to keep the humidity low, or they will become active and die. Containers with plastic or metal lids with holes poked in them will be too humid.

To bring snails out of estivation and prepare them for study, gently detach them, dip in water and place on a damp surface. (It can take up to eight hours for the snail to emerge, depending on how long it has been without food and water.) If they are reluctant, they might need to be dipped again. Sometimes leaving damp lettuce or other food and water in the box overnight can coax snails to emerge.

Snails that retreat into their shells during a class lesson can generally be coaxed out again by a brief dip in water.

How to house snails

Active snails can be kept for classroom viewing in a terrarium made from an aquarium, a large, wide-mouthed jar, or a fish bowl. The top should be covered securely with screen or part of a nylon stocking. Lids that have holes punched in them do not allow adequate ventilation and the sharp edges on the interior are a safety risk. Snails 'chew' their way out of containers covered with paper. The contents of the terrarium can be an elaborate recreation of a garden environment, or something as sparse as only food and water.

Water can be supplied in a shallow plastic lid, in a deeper dish that contains a water-soaked sponge, or by generously sprinkling lettuce or other fresh leafy food with water. Food can also be put into a shallow plastic lid. Snails are vegetarians and eat many kinds of plant material. Cornmeal, oatmeal and fresh green leaves are all appropriate foods. Chalk, egg shells or snail shells should be powdered and added to the food to provide the calcium necessary for healthy shells.

Cleaning should be done on a regular basis to remove mouldy food, the build-up of mucus and droppings. Overcrowding should be avoided. Too many snails in too small a space or inadequate ventilation can cause the humidity to rise to unacceptable levels and the snails will die.

For further information about how to house snails see the Primary**Connections** website (www.primaryconnections.org.au).

Read the safety information on page 9 about handling snails.

Session 1 Snail surprises

Equipment

FOR THE CLASS

- class science journal
- word wall
- team roles chart
- team skills chart
- 'Schoolyard safari' map (see Lesson 1)
- 'Code for caring' poster (see Lesson 1)
- ideas map (see 'Preparation')
- 2 different coloured marking pens
- *optional*: 1 lettuce head
- active snails
- 1 shallow container of water in which to dip reluctant snails

FOR EACH TEAM

- role wristbands or badges for Manager and Speaker
- each team member's science journal
- 1 snail in a small, clear plastic container
- 1 lettuce leaf
- oatmeal mix (see 'Preparation')
- 1 plastic spoon
- 1 magnifying glass
- gloves
- *optional*: each student's 'In my own backyard' journal (see Lesson 1)

Preparation

- Collect snails well before you want to use them. Read 'Teacher background information' on collecting and keeping snails.

SAFETY

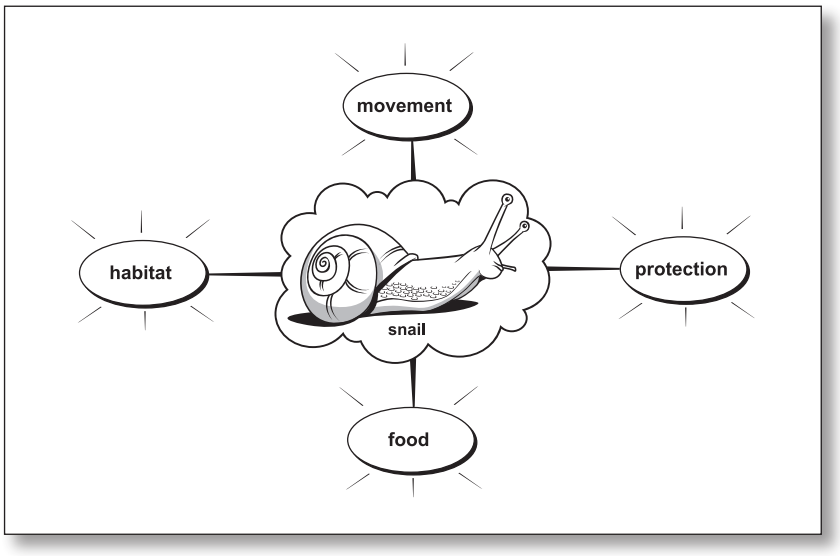
- Read the safety information on page 9 about handling snails.
- Make up some oatmeal mix (two parts oatmeal to one part water).
- Draw an ideas map in the class science journal or on a large sheet of paper (see Lesson step 4).

Lesson steps

1. Review the features, behaviour and habitat of the small animal explored in the previous lesson.
2. Ask if anyone observed snails in the 'Schoolyard safari' area and mark the location on the 'Schoolyard safari' map.

Literacy focus

Why do we use an ideas map?
We use an **ideas map** to show our thoughts about a topic.
What does an ideas map include?
An **ideas map** includes a title in the centre. Ideas are written around it and arrows are drawn between similar ideas. An **ideas map** might include pictures and symbols.



Beginning of an ideas map on snails

3 *Optional:* Ask students to report what they have identified in their garden recently using their 'In my own backyard' journal.

4 Introduce the class ideas map (see 'Preparation'). Discuss the purpose and features of an ideas map.

5 Use guided questioning to find out what students think they know about snails, such as:

- discuss the meaning of the term 'protection'
- ask students what they think they know about how snails protect themselves
- ask students what snails need to be protected from.

Record students' ideas on the ideas map using one of the coloured marking pens.

6 Explain that students will be working in collaborative learning teams to closely observe and draw a snail. Explain that students will examine the shell and body of their snail with their eyes before they use the magnifying glasses to look for more detail.

7 Remind students of how they drew their earthworm in the previous lesson. Assist students to focus on the parts of the snail, by asking questions such as:

- What shape is the snail's body? What shape is the snail's shell?
- How many different parts can you see?
- Can you describe the different parts of the snail?

SAFETY

8 Review the 'Code for caring' poster created in Lesson 1. Focus students' attention on ways to care for small animals. Impress upon students the importance of safety when working with snails and any vegetation they have left a trail on. Gloves must be used, all hands must be washed thoroughly afterwards and the lettuce must not be eaten.

9 Form teams and allocate roles. Ask Managers to collect team equipment.

Optional: Present snails on a head of lettuce. Invite teams to choose a snail.

10 After students have made and recorded their observations in their science journal, spread some oatmeal mix on the plastic container and watch through a magnifying glass as the snails eat the oatmeal.

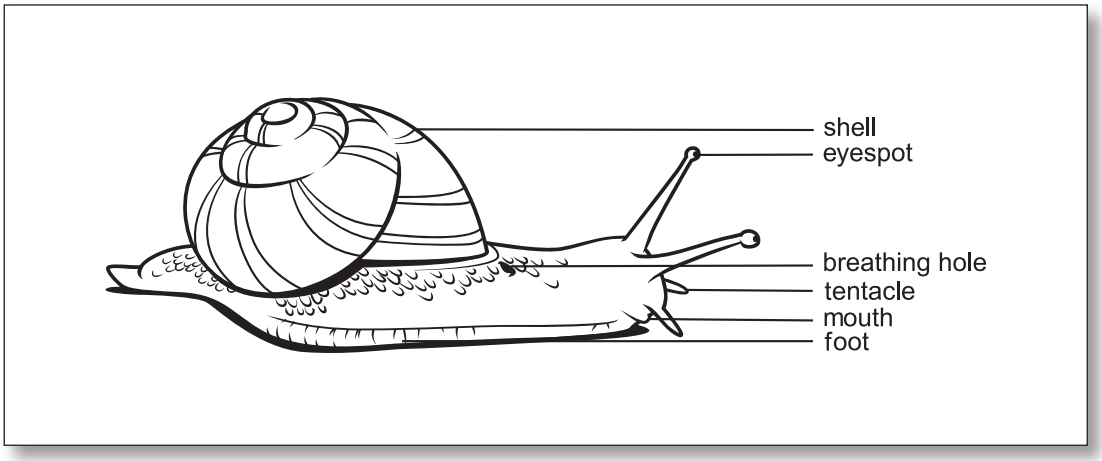
11 Discuss the observations that students have made about the parts of a snail, and ask for suggestions about how the parts of the animal help it move, feed and protect itself in its habitat. Ask questions such as:

- How do snails see?
- How do snails breathe?
- How do snails eat?
- Where do snails usually live (their habitat)?
- How do the parts of the snail help it live in its habitat?
- How do snails find food and water in their habitat?
- How do snails protect themselves from drying out?
- How do snails protect themselves from being eaten?

12 Draw a diagram in the class science journal of a snail and model how to label it. Discuss the purpose and features of a labelled diagram.

Literacy focus

Why do we use a labelled diagram?
We use a **labelled diagram** to show the shape, size and features of an object.
What does a labelled diagram include?
A **labelled diagram** might include a title, a drawing, a scale to show the object's size and labels showing the main features. A line or arrow connects the label to the feature.



Labelled diagram of a snail

Ask students to review their own drawings.

13 Review students' questions to see if any have been answered.

14 Update the ideas map using the second coloured marking pen. Update the word wall with words and images.

Session 2 Snail shack *(optional)*

Equipment

FOR THE CLASS

- class science journal
- word wall
- 'Code for caring' poster (see Lesson 1)
- 1 large transparent container with screen lid
- gravel
- 1 shallow plastic container for water
- 1 shallow plastic container for food
- 1 piece of cuttlefish (from pet food shop)
- pieces of plant material
- rocks or pieces of terracotta pot
- dark-coloured cloth to cover the container

FOR EACH STUDENT

- science journal

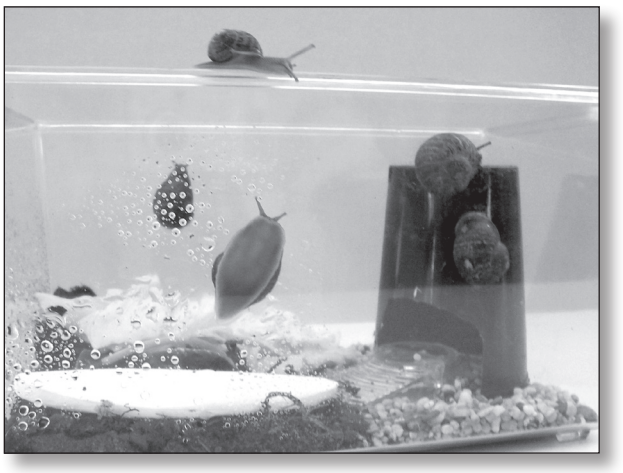
Preparation

- Read 'How to house snails' in 'Teacher background information'.

Lesson steps

1. Review the information about snails from the previous session.
2. Introduce the 'Snail shack' container and ask students what they think is needed to make a good home for snails. Record their ideas in the class science journal.

3. With student help, organise the equipment in the 'Snail shack'. Add water to the water tray and plant material to the food tray. Wear gloves when placing snails in the container. Remind students of safety precautions when working with snails.
4. Organise a roster of teams to clean the 'Snail shack' and care for the snails. Remind students about the 'Code for caring' poster created in Lesson 1.
5. *Optional:* Students track the snails' movement over time by describing their location at particular times of the day. Tape can be placed on the 'Snail shack' to mark top/bottom and left/right to make the description easier.
6. *Optional:* Organise students into collaborative learning teams and provide teams with the equipment to make a 'Snail shack' for their snails.
7. Review students' questions to see if any have been answered. Update the word wall with words and images.



Snail shack without a lid

Curriculum links

Mathematics

- Students create a 3-D model of an animal in plasticine from a drawing. Discuss the correspondence between the shapes, quantities and locations of parts of the animal on the drawing and on the model.
- Students make a series of action drawings and place them in sequence to show how the snail moves.

Indigenous perspectives

- Primary**Connections** recommends working with Aboriginal and Torres Strait Islander community members to access local and relevant cultural perspectives. Protocols for engaging with Aboriginal and Torres Strait Islander community members are provided in state and territory education guidelines. Links to these are provided on the Primary**Connections** website (www.primaryconnections.org.au).

Lesson 4 Ant antics

AT A GLANCE

To provide students with hands-on, shared experiences of the features, behaviour and habitat of ants.

Students:

- record what they think they know about ants
- observe and draw ants
- track the movement of ants in an ant farm
- observe and record information about ants.

Lesson focus

The *Explore* phase is designed to provide students with hands-on experiences of the science phenomenon. Students explore ideas, collect evidence, discuss their observations and keep records such as science journal entries. The *Explore* phase ensures all students have a shared experience that can be discussed and explained in the *Explain* phase.

Assessment focus

Formative assessment is an ongoing aspect of the *Explore* phase. It involves monitoring students' developing understanding and giving feedback that extends their learning. In this lesson you will monitor students' developing understanding of:

- the external features of ants, how ant farms meet the needs of ants and how science involves asking questions. You will also monitor their developing understanding of science inquiry skills (see page 2).

Key lesson outcomes

Science

Students will be able to:

- observe and draw details of an ant's external features
- observe and describe ant
- movement and communication
- make observations about how ants carry food
- identify features of ants that allow them to breathe, feed, move and protect themselves.

Literacy

Students will be able to:

- use oral, written and visual language to report observations of the features, function and habitat of an ant
- contribute to discussions about ant behaviour
- record observations as a labelled diagram
- answer questions about ants.

This lesson also provides opportunities to monitor the development of students' general capabilities (highlighted through icons, see page 5).

Teacher background information

About ants

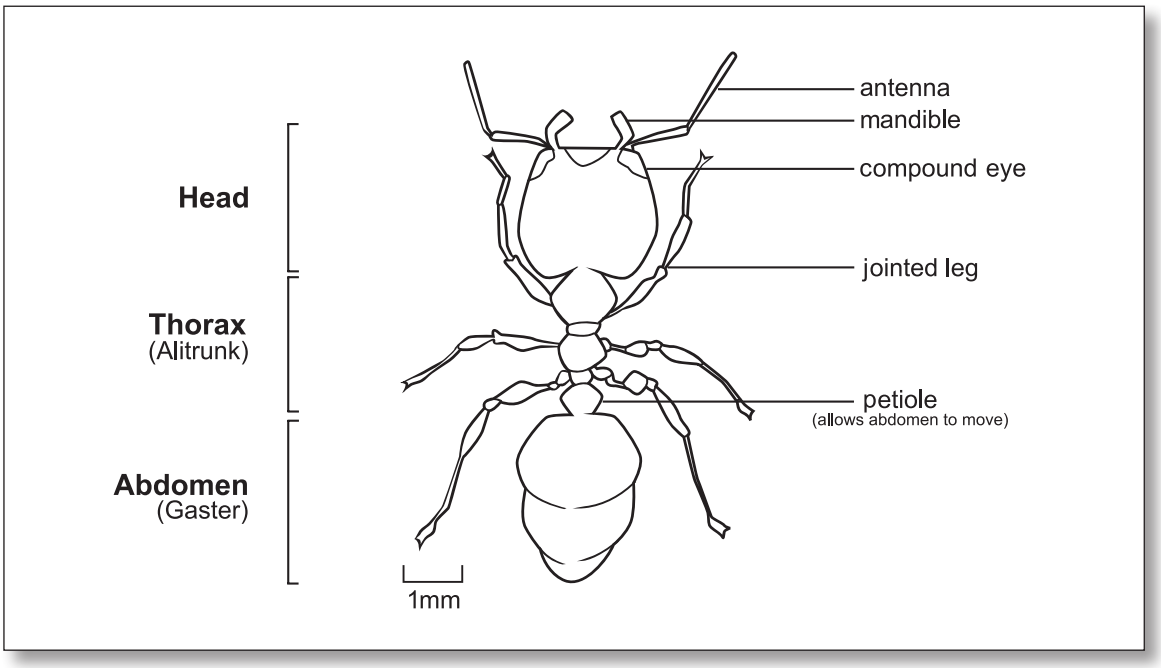
Ants are arthropods. They live in nests or colonies, with different ants having different roles (castes). Some species have little coordination between their members, whereas others have highly coordinated colonies with all groups working towards the same goal. This social interaction is possible because ants are able to communicate with each other, using their antennae and chemical signals they produce. For example, they can identify intruders.

The worker ants perform all of the work for the colony, including searching for food, nursing the young, constructing the nest and defending the colony. Worker ants are sterile females—generally all sisters.

The males play no role in the colony apart from mating with the future queens. They have wings and copulate with the future queens while flying (the mating flight). They die soon after.

The queen is larger than the worker ants and much larger than the males. She lays all the eggs for the colony. She can lay unfertilised eggs (which develop into males) or fertilised eggs (which develop into females). The fertilised eggs that are fed an average amount of food develop into sterile female workers. Those that are well nourished develop into fertile females.

The fertile females have wings, ready to take flight. They mate with the winged males during a mating flight and acquire a stock of sperm. They then establish a colony as a new queen and lose their wings.



Labelled diagram of an ant

Note: This diagram is not intended for student use.

How they move

Adult ants have their skeleton on the 'outside'—a hard exoskeleton that gives shape to their soft body and provides a structure for their muscles to pull against. They walk on all six legs. They use parts of their jaw—the mandibles—to carry things. The mandibles have many different, specialised shapes depending on the type of ant and its caste. Mandibles can be used to transport food (and sometimes even drops of water), to construct things and to defend the colony.

How they eat

Forager ants are the worker ants that look for food. They use their compound eyes (eyes made of hundreds of light-sensitive compartments) to look for food. The most important organs for perception—for the senses of touch and smell—are the antennae. When you observe an active ant, its antennae are in almost constant motion: tapping the ground, vegetation, other ants and food sources or 'smelling' the air.

Ants can collect food by:

- foraging for plant material
- feeding on dead animals
- hunting insects
- 'farming' aphids and other animals that produce honeydew
- cultivating mushrooms by feeding them leaf litter.

Most ants eat a wide variety of plant material, including leaves and seeds, and animal life. Like most animals, they need a balance of carbohydrates and protein.

Ant trails

Ants find their way to sources of food by laying down chemicals called pheromones on the ground. Ants use their antennae to follow the scent trail. The pheromones are more concentrated the closer the trail gets to the nest, so the ants know if they are heading towards the food or away from it. The pheromones disappear gradually when the trail is no longer used.

For further information about ant trails see the Primary**Connections** website. www.primaryconnections.org.au

How to get a supply of ants

The simplest way to collect ants is by hand. Observe an area and, if there are foraging ants, simply follow them back to their colony. Care is needed when collecting ants, for example, by gently using the moistened tip of a paintbrush.

Bait can help attract ants if they are scarce. Try crumbled biscuits, tuna, peanut butter, honey or jam. There are as many types of baits as there are species of ants.

Note: Ensure the ants are sourced from only one colony; otherwise they could attack and injure each other.

Equipment

FOR THE CLASS

- class science journal
- word wall
- team roles chart
- team skills chart
- 'Schoolyard safari' map (see Lesson 1)
- 'Code for caring' poster (see Lesson 1)
- ants
- honey
- 1 flat ring of cardboard—about 20 cm in diameter and 5–6 cm wide (see Lesson step 7)
- *optional:* digital or video camera
- *optional:* ant farm

FOR EACH TEAM

- role wristbands or badges for Manager and Speaker
- each team member's science journal
- 1 ant in a clear plastic container
- 1 magnifying glass
- cake crumbs
- gloves for each team member
- *optional:* each student's 'In my own backyard' journal (see Lesson 1)

Preparation

- Locate an ant colony where students can observe the comings and goings of ants.
- Collect enough ants for each team to have one ant for observation (see 'Teacher background information' for strategies to collect ants). Place one ant in each clear plastic container.

  Optional: Students collect their own ant in teams.

Lesson steps

1 Review the features, behaviour and habitat of the small animals explored in the previous lessons.

2 Ask if anyone observed ants in the 'Schoolyard safari' area and mark the location on the 'Schoolyard safari' map.

Optional: Ask students to report what they have identified in their garden recently using their 'In my own backyard' journal.

3 Ask students what they think they know about ants and record their answers in the class science journal.

4 Explain that students will observe ants in the playground to learn about their features and behaviour. Remind students about the 'Code for caring' poster (see Lesson 1).

SAFETY

Warn students that ants can bite and sting so they must wear gloves.

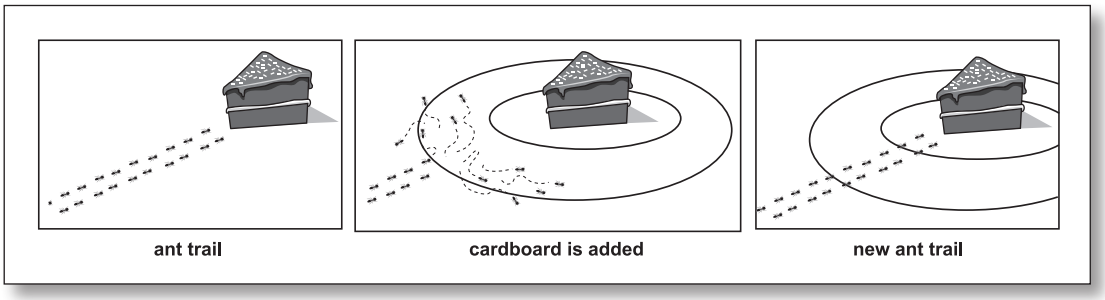
5 Organise students so that they can observe an ant trail. Ask questions such as:

- In which direction are the ants walking?
- What happens when ants meet?
- Can you see an ant carrying anything?
- What happens when an ant comes to a large object?

If there is no ant trail, place honey on the ground about a metre away from the colony and wait. Ants are most active during the hottest part of the day.

6 Ask students to predict what would happen if the ant trail was disrupted, and explain why. Place the ring of cardboard around the source of food the ants are carrying back to the nest (or around the nest). Be careful not to squash the ants. Ask students to observe what happens.

Note: The ants will initially walk in all directions instead of heading for the food because the cardboard has disrupted their scent trail.



Disruption of an ant trail with a cardboard circle

7 Return to the classroom and record students' observations in the class science journal. Ask students why the ants behaved the way they did when they came to the cardboard.

8 Explain that students will be working in collaborative learning teams to closely observe and draw an ant. Review students' detailed and labelled drawings of other small animals and the purpose and features of a labelled diagram.

EXPLORE

9 Form teams and allocate roles. Ask Managers to collect team equipment.

10 Assist students to make accurate observations, asking questions such as:

- How many body parts does the ant have?
- How many legs?
- Where are the legs attached?
- How long are its antennae compared to its body?

11 Add a few cake crumbs to the students' containers and ask questions such as:

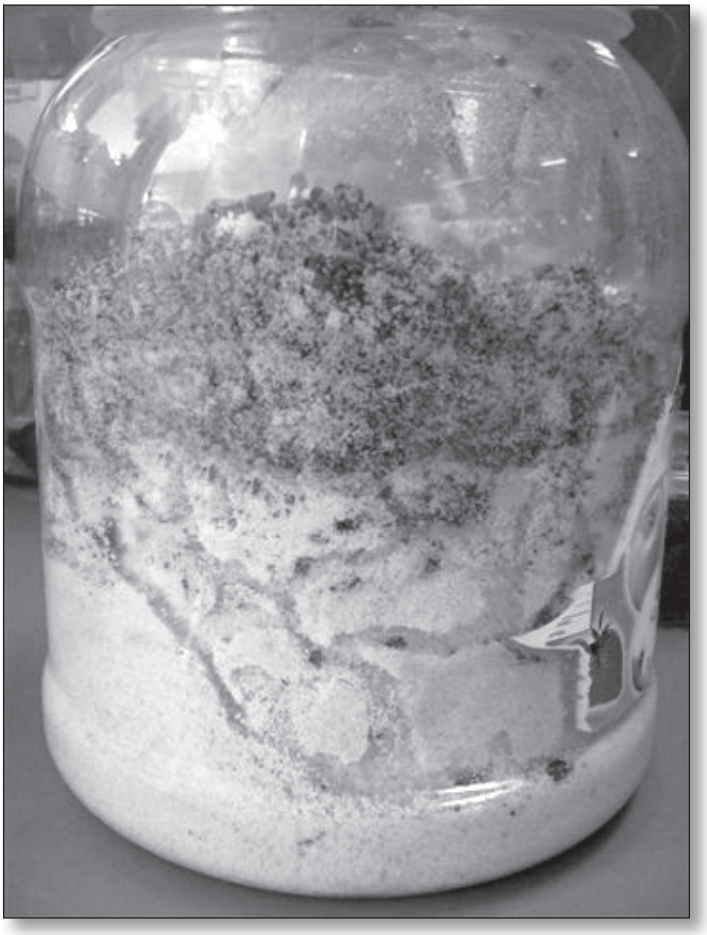
- What did the ants do with the crumbs?
- What body parts do they use to carry or eat crumbs?
- What did you observe about the size of the crumbs compared with the size of the ant?

12 Ask students to draw a labelled diagram of their ant in their science journal.

Optional: Assist students with their observations using photographs taken with the digital camera.

13 Update what students know about ants in the class science journal.

Optional: Bring the class together and show them the ant farm. Ask students what they think will happen if they put their ants in the ant farm. Put each team's ants into the ant farm.



Ant farm with ants' tunnels in the sand

14 Discuss the observations that students have made about the parts of an ant, and ask for suggestions about how the parts of the animal help it move, feed and protect itself in its habitat. Ask questions such as:

- What do ants use their antennae for?
- How do ants eat?
- How do ants carry their food?
- Where do ants usually live (their habitat)?
- How do the parts of the ant help it live in its habitat?
- How do ants find food and water in their habitat?
- How do ants protect themselves from drying out?
- How do ants protect themselves from being eaten?

15 Review students' questions to see if any have been answered. Update the word wall with words and images.

Curriculum links

Mathematics

- Students work in pairs to make and record their own tracks in sand or soil. One student makes tracks and one student records. Ask them to compare physically how tracks look when someone changes direction or travels more quickly.

Studies of society and environment

- Students find out about the social structure of an ant colony and compare it with honey bees.

Indigenous perspectives

Various kinds of ants are used by some Indigenous people either as bush tucker or bush medicine. The honeypot ant *(Melophoris inflatus)* is found in Central Australia and stores honey in its stomach. Digging sticks are used to dig the ant from deep within the ground. The swollen honey-filled stomach of the ant is regarded as a delicacy.

- Watch the videoclip, Honey Ant. See www.australianscreen.com.au/titles/livingcountry/clip3
- Find images of a honeypot ant and create an annotated drawing using Indigenous symbols. See www.aboriginalartstore.com.au/aboriginal-art-culture/aboriginalsymbols-glossary

  Green tree ants *(Oecophylla smaragdina)* are found throughout northern Australia and are used as bush medicine.
- In consultation with local Indigenous community members and/or Indigenous educations officers, discuss Indigenous people's use of green ants for medicinal purposes.
- Primary**Connections** recommends working with Aboriginal and Torres Strait Islander community members to access local and relevant cultural perspectives. Protocols for engaging with Aboriginal and Torres Strait Islander community members are provided in state and territory education guidelines. Links to these are provided on the Primary**Connections** website (www.primaryconnections.org.au).

Lesson 5 Same or different?

EXPLAIN

AT A GLANCE

To support students to represent and explain their understanding and observations about the similarities and differences between small animals.

To introduce current scientific views about how living things, such as small animals, have a variety of external features and live in different places where their needs are met.

Session 1 Comparing creatures

Students:

- work in teams to compare two small animals
- as a class, develop a table that summarises information
- read factual texts about small animals.

Session 2 Animated animals *(optional)*

Students:

- view an animated film about ants
- consider how small animals are represented in animated films
- compare their understanding of small animals with those in the film.

Lesson focus

In the *Explain* phase students develop a literacy product to represent their developing understanding. They discuss and identify patterns and relationships within their observations. Students consider the current views of scientists and deepen their own understanding.

Assessment focus

Formative assessment is an ongoing aspect of the *Explain* phase. It involves monitoring students' developing understanding and giving feedback that extends their learning. In this lesson you will monitor students' developing understanding of:

- the external features of two small animals, how animals live in places where their needs are met, and how science involves asking questions. You will also monitor their developing understanding of science inquiry skills (see page 2).

You are also able to look for evidence of students' use of appropriate ways to represent what they know and understand about the external features of small animals and how they live in places that meet their needs, and give them feedback on their representations.

Key lesson outcomes

Science

Students will be able to:

- describe the features and behaviour of a small animal
- compare two small animals and make conclusions about similarities and differences.

Literacy

Students will be able to:

- use a variety of resources to find current scientific information about a small animal
- record information in a table
- use drawings and language to compare two small animals
- use scientific vocabulary appropriately in their writing and talking.

This lesson also provides opportunities to monitor the development of students' general capabilities (highlighted through icons, see page 5).

Session 1 Comparing creatures

Equipment

FOR THE CLASS

- class science journal
- word wall
- team roles chart
- team skills chart
- 1 enlarged copy of 'Small animal description' (Resource sheet 4)
- multi-modal factual texts about the animals used in the *Explore* phase (see Primary**Connections** website for suggestions)
- *optional: Life in the Undergrowth* Episode 1, 'Invasion of the Land', and Episode 5, 'Supersocieties' (David Attenborough, 2006, BBC Worldwide Ltd)

FOR EACH TEAM

- role wristbands or badges for Manager and Speaker
- each team member's science journal
- 2 copies of 'Small animal description' (Resource sheet 4)
- each team member's science journal
- *optional:* each student's 'In my own backyard' journal (see Lesson 1)

EXPLAIN

Preparation

- **Note**: This lesson is about snails and ants. If you have not studied these animals, adjust the lesson to focus on the animals you have explored.
- *Optional:* View *Life in the Undergrowth* (David Attenborough, 2006, BBC Worldwide Ltd) to check that the language is appropriate for your class, and to familiarise yourself with its information.

  Episode 1, 'Invasion of the Land':

  – 0–1.11 min is an introductory piece on snails

  – 1.43–1.52 min and 2.16–2.43 min is footage of ants

  – 12.05–15.21 min is about snails

  – 31.05–32.11 min is about earthworms

  – 33.05–35.15 min is about the giant earthworms of Gippsland.

  Episode 5, 'Supersocieties':

  – 17.52–37.19 is about different ant societies in different environments.

Lesson steps

1 Review what students now know about earthworms, snails and ants.

2 *Optional:* Ask students to report on what they have identified in their garden recently using their 'In my own backyard' journal.

3 Explain that students will be working in collaborative learning teams to find out what is the same and what is different about snails and ants.

4 Explain that each student will research one animal using factual texts. Introduce the texts and discuss the purpose and features of such texts.

Literacy focus

Why do we use a factual text?
We use a **factual text** to inform, teach or persuade someone reading it. We can read a **factual text** to collect information.
What does a factual text include?
A **factual text** includes a title, text and pictures. It might include labels, diagrams, maps and photographs.

5 Introduce the enlarged copy of 'Small animal description' (Resource sheet 4). Explain that each team member will record information about the animal they are researching on their 'Small animal description' (Resource sheet 4).

6 Form teams and allocate roles. Ask Managers to collect the resource sheets.

7 Allow students time to read texts and gather information.

8 Ask students to share their 'Small animal description' (Resource sheet 4) in their teams, to find similarities and differences between the two animals. For example, students can record similarities and differences in their science journal.

9 Assist students to provide peer assessment of each others' representations.

10 Discuss the similarity and difference of the animals as a class, asking Speakers to share their team's conclusions. Record information in the class science journal.

11 *Optional:* View Life in the Undergrowth Episodes 1, 'Invasion of the Land', and 5, 'Supersocieties', pausing to discuss what students have seen (see 'Preparation').

12 Review students' questions to see if any have been answered. Update the word wall with words and images.

Small animal description

Name: _____ **Date:** _____

My animal is a

A labelled drawing of my animal:

It has _____ legs.

It moves by

It eats

It eats by

It lives

because

It protects itself by

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Session 2 Animated animals *(optional)*

Teacher background information

Students view many books, pictures, films and other literacy products in which animal characters take on the features of humans—such as speaking, walking upright, wearing clothes and showing emotion.

This can influence students' conceptual understanding of the features, behaviour and habitat of small animals. For example, the book *A worm's eye view … the history of the world* by Caren Trafford (2001, Etram, ISBN 0646415883) contains valuable information about earthworms, but the illustrations show earthworms with eyes, wearing hats and sitting on sofas. Such publications provide an opportunity for students to think critically about the text, audience and purpose by contrasting these anomalies with scientists' views about earthworms.

Viewing the following animated films about ants could provide an opportunity to develop visual and critical literacy as well as help develop conceptual understanding. It is also a tool for formative assessment as students express their conceptual understanding.

Each film is set in and around an ant colony, so students need to have completed Lesson 4: Ant antics.

- *The Ant Bully* (G rating)
- *A Bug's Life* (G rating)
- *ANTZ* (PG rating)

This lesson uses the film *A Bug's Life* as an example.

Equipment

FOR THE CLASS

- class science journal
- word wall
- *A Bug's Life* DVD or video
- DVD or video player with 'Pause' control

FOR EACH STUDENT

- science journal

Preparation

- Select and preview the literacy product. If selecting a film, consider showing a segment. For example, the opening scene of *A Bug's Life* includes a number of things consistent with the scientists' view:
  - an ant hill surrounded by soil that has been dug out of the colony
  - ants that are dwarfed by the surrounding undergrowth
  - ants carrying heavy loads

– an ant caring for an aphid.

It also includes things that are not consistent with the scientists' view:

– ants walking upright with two legs and two arms

– ants carrying food with arms or driving a machine.

Lesson steps

1 Review previous lessons and discuss what students know about the features, behaviour and habitat of ants.

2 Ask students if they have seen *A Bug's Life* or a similar film. Discuss animated films, drawing attention to the way characters are given human traits.

3 Explain that students will spot the similarities and differences between 'real ants' and 'film ants'.

4 Show the segment of the film without stopping it so that students have an overall understanding of the setting and characters. Ask questions such as:

- What is happening in the film?
- What have you seen so far?
- Where is the action taking place?
- Was there anything that puzzled you in the film?
- How is the film like the real world?

5 Show the segment of the film for a second time. Guide the viewing by pausing and discussing similarities and differences between 'real ants' and 'film ants', such as:

- The ants in the film are carrying food with their arms. Do real ants have arms? What do they carry food with?
- The ants in the film are talking to each other. Do real ants talk? How do they communicate with each other?

Write students' responses under the headings 'Same', 'Different' or 'Not sure' in the class science journal. Remind students to refer to information in their science journals when considering their responses.

6 Draw conclusions about the similarities and differences. Ask questions such as:

- How are cartoon ants and real ants the same and different?
- What have you learned about the features of real ants and cartoon ants?
- Does it matter if the ants in the film don't have the same features as real ants? Why do you think that?
- Why do you think the film-makers show ants like this?

7 Review students' questions to see if any have been answered. Update the word wall with words and images.

Curriculum links

Indigenous perspectives

- Contact the local Indigenous Land Council or cultural heritage centre to make contact with local Indigenous community members. Invite them to visit the class and talk about insects and their uses in the community. Include local Indigenous language for insects as well as English common names on the word wall.
- Primary**Connections** recommends working with Aboriginal and Torres Strait Islander community members to access local and relevant cultural perspectives. Protocols for engaging with Aboriginal and Torres Strait Islander community members are provided in state and territory education guidelines. Links to these are provided on the Primary**Connections** website (www.primaryconnections.org.au).

Lesson 6 Habitat detectives

AT A GLANCE

To support students to plan and conduct an investigation to compare different types of animal habitats, and the type and number of animals found.

Students:

- work in teams to look for evidence of small animals in a habitat
- compare the evidence found in different habitats
- record and discuss observations.

Lesson focus

In the *Elaborate* phase students plan and conduct an open investigation to apply and extend their new conceptual understanding in a new context. It is designed to challenge and extend students' science understanding and science inquiry skills.

Assessment focus

Summative assessment of the Science Inquiry Skills is an important focus of the *Elaborate* phase (see page 2). Rubrics will be available on the website to help you monitor students' inquiry skills.

ELABORATE

Key lesson outcomes

Science

Students will be able to:

- conduct an investigation of a habitat of the 'Schoolyard safari' area and make and record their observations
- compare the observations of two different habitats and identify similarities and differences
- identify links between animal features and their habitats.

Literacy

Students will be able to:

- ask questions and make predictions
- use oral, written and visual language to record and discuss the results of their investigation
- identify the purpose and features of a picture graph
- construct and retrieve information from a picture graph
- participate in discussion to generate explanations and compare ideas about small animals and their habitats.

This lesson also provides opportunities to monitor the development of students' general capabilities (highlighted through icons, see page 5).

Teacher background information

Comparative or descriptive studies typical of field biology

The number, diversity and behaviour of animals in a particular habitat all vary depending on the local conditions, time of day and season. Field biologists therefore make a wide range of observations and record this information carefully because observations made at a single moment in time cannot be replicated.

Geography, habitat and climate are important for understanding the distribution of species; therefore, field biologists record a wealth of information, such as:

- date (time of year) of sampling
- time of day sample was found
- temperature, humidity, barometer readings and wind direction
- exactly where an animal was found
- size and detailed description of animal
- identification of the animal if possible, and reasoning
- other things that could be relevant, such as the surroundings of the sample site (Next to a road? Next to a forest?), and important recent biological/natural changes (Invasion by a pest? Recent drought?).

Establishing the biodiversity of an area takes many repeated observations, at different times of day and year. By repeating observations, scientists can check the consistency of the results and can then make judgments about the trustworthiness of the findings.

When comparing sites, there are many different methods that are used. A common method when contrasting two environments is to examine several plots of the same size selected at random in each environment. The plots are examined using quadrants, which are square frames that define a set surface within the area. This allows the scientists to have an idea of the relative concentration of species.

Links between structure, function and habitat

Living things adapt to the constraints of the environment in which they live. The availability of resources such as water and food, and the presence of predators, affect an animal's chances of survival and reproduction. The structures of the animals are suited to the functions that have to be performed for survival in a particular habitat. For example, different appendages enable efficient movement through the habitat to obtain food and avoid predators.

Different animals have adapted in different ways to the same environments. For example, underground dwellers can live with little light in an environment that is difficult to move in. Some underground dwellers have claws for digging through the soil, others eat their way through, and others excavate it to form chambers. Those that live almost exclusively underground don't have good eyesight; those that foray out retain good eyesight.

Predators are part of the environment an animal adapts to. Different adaptations include:

- hiding, for example, earthworms burrow away from light
- protection, for example, snails have a hard shell
- defence, for example, ants can produce formic acid, and defend their colony aggressively.

Sometimes animals are found in habitats in which they did not evolve. For example, pigeons inhabit enclosed spaces such as railway stations. Animals that have changed habitats recently could retain adaptations from their old habitat, which might or might not help them to survive in the new habitat.

Equipment

FOR THE CLASS

- class science journal
- word wall
- team roles chart
- team skills chart
- class 'Schoolyard safari' map (see Lesson 1)
- 'Code for caring' poster (see Lesson 1)
- 1 enlarged copy of 'Investigation record' (Resource sheet 5)
- 1 sheet of butcher's paper with a horizontal axis labelled 'Type of small animal' and a vertical axis labelled 'Number of small animals'

FOR EACH TEAM

- role wristbands or badges for Manager and Speaker
- each team member's science journal
- 1 copy of 'Investigation record' (Resource sheet 5)
- gloves for each team member
- large hoops or skipping rope (see Lesson step 7)
- 1 magnifying glass
- 1 sheet of butcher's paper (as for class)
- small, same sized pieces of paper (see Lesson step 11)
- *optional:* 1 clipboard
- *optional:* each student's 'In my own backyard' journal (see Lesson 1, Session 2)

Preparation

SAFETY

- Be aware of allergies that students might have, for example, to plants. Students might also suffer from allergies to different substances and detergents as well as the latex used in disposable gloves.
- Read 'How to construct and use a graph' (Appendix 4).
- Identify a number of different habitats for investigation, such as: pond, oval, garden, compost heap or school vegetable patch.
- Decide on the size of the area that each collaborative team will analyse, for example, the size of two large hoops. The larger the area, the more chance of finding small animals but the longer it will take to investigate.
- Allocate collaborative learning teams to each of the areas. It might be necessary to allocate more than one team to each habitat.
- Organise an older class, or adults, to help groups investigate the different habitats.

- On the class and each group's piece of butcher's paper draw a horizontal axis labelled 'Type of small animals' and a vertical axis labelled 'Number of small animals'. Include the heading for each team's graph 'Number of small animals in [name of area] habitat'.

Lesson steps

1 Review the walk in Lesson 1, to the 'Schoolyard safari' area using the class 'Schoolyard safari' map and identify the areas the class observed and the number of animals recorded.

Optional: Ask students to report what they have identified in their garden recently using their 'In my own backyard' journal.

2 Indicate the asphalt and ask if you would find a fish there. Ask students to explain their answers, for example, 'I don't think you would find a fish there because fish die when they are out of water'. Explore the reasons why animals live in particular habitats by asking:

- Would you find a worm in the ground? Why do you think that?
- Would you find a snail in the ground? Why do you think that?
- What sort of animal might you find in water?
- What sort of animal might you find in the desert?

3 Explain that students will be working in collaborative learning teams to investigate the different types and number of small animals in different habitats in the 'Schoolyard safari' area.

4 Discuss the investigation and record in the class science journal student's responses to questions such as:

- How will the habitats be different?
- What differences might there be in the animals found in the different habitats?
- How can you make the comparison fair? (For example, use the hoops to make sure they observe the same amount of space at each site.)
- What if team A counted animals in one hoop and team B counted animals in four hoops?
- What if there are too many small animals to count (see Lesson step 6)?

5 Introduce the enlarged copy of 'Investigation record' (Resource sheet 5). Explain how students will complete the boxes using words and sketches to record their findings. Explain that they will count how many of each small animal they find, however, after a certain number (for example, 20) they should stop counting and write 'lots'. They can then concentrate on looking for evidence of other small animals.

Optional: If the habitats being investigated have mainly ants, you might like to encourage the students to look at the different kinds of ants.

6 Review the 'Code for caring' poster created in Lesson 1.

Remind students to wear gloves and not to pick up small animals with their fingers as some of them can sting and bite.

7 Form teams and allocate roles. Assign teams to habitats. Allocate an older helper to each team. Ask Managers to collect team equipment.

8 Allow teams time to investigate their designated habitat and make notes and sketches on their 'Investigation record' (Resource sheet 5).

9 On returning to the classroom, discuss the investigation using questions such as:

- Describe the habitat you studied. Did it have shade? Did it have water?
- Which small animals did you find lots of? Why were there so many?
- Did you find evidence of any other small animals?
- Did you find any tracks of small animals? Were they easy to follow?

10 Discuss how to organise information on a graph: the horizontal axis is used to plot the types of animals while the vertical axis is used to plot the number of animals. Discuss the purpose and features of a graph.

Literacy focus

Why do we use a graph?
We use a **graph** to organise information so we can look for patterns. We use different types of graphs, such as picture, column, or line graphs, for different purposes.
What does a graph include?
A **graph** includes a title, axes with labels and the units of measurement.

Model how to create a picture graph using small pieces of paper that are the same size. On each piece draw a picture of an animal that has been counted. Arrange the pictures in columns to match each animal.

11 Remind students that once they counted up to 20 animals they stopped counting and wrote 'lots'. Discuss how to represent that on the graph, such as, writing 'more than 20' as the last line of the vertical axis or writing 'more' or 'lots' above the column of pictures.

12 Allow time for each group to complete a graph of their information.

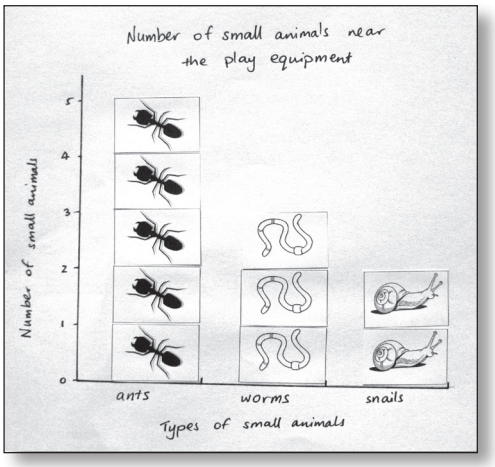
Optional: Suggest students write under the graph a description of the habitat they investigated.

Optional: Ask older helpers associated with each group to assist the students with the graphing process.

13 Display the graphs. Ask students to identify how the graphs are similar and how the graphs are different. Ask questions such as:

- How many ants were in the playground? Near the pond? In the garden? On the asphalt?
- Which habitat had the most snails?
- Why were there no worms on the asphalt?

14 Record observations in the class science journal, asking questions such as:



Sample of a picture graph

ELABORATE

- Are the small animals where we expected them to be? Why or why not?
- What features do the animals that live in the pond have in common?
- What type of animal did we find the most of in our 'Schoolyard safari' area? Why do you think that is the case?
- Why did we find lots of snails in this area but not that area?
- Why didn't we find ants in that area?

Encourage students to make links between the types of habitats and the features of the animals that are found there and how that contributes to meeting their needs.

15 Review students' questions to see if any have been answered. Update the word wall with words and images.

Curriculum links

Science

- Use fair testing to investigate which foods and habitats small animals prefer.
- Invite an entomologist or curator to talk to students about how researchers collect small animals including invertebrates.

Information and Communication Technology (ICT)

Garden detective: explore an Australian garden, L1118 (www.scootle.edu.au)

Students examine the Australian garden with the magnifying glass looking for different creatures. Once found, a description of the creature with some of its distinguishing characteristics is displayed. Students can then choose whether to include the creature in their collection or to move on to look for others. They print the collection and continue on to make several collections. There are 24 creatures hidden in the garden.

Garden detective: group Australian animals, L1119 (www.scootle.edu.au)

Students use the magnifying glass to find Australian creatures in the garden. In this learning object, students are challenged to find groups of animals with like characteristics. For example, students are asked to find three animals with wings.

Indigenous perspectives

- Ask a local Indigenous community member and/or Indigenous education officer with local knowledge to take students for a bush tucker walk. Observe insects and small animals that could be used as a food source.
- Primary**Connections** recommends working with Aboriginal and Torres Strait Islander community members to access local and relevant cultural perspectives. Protocols for engaging with Aboriginal and Torres Strait Islander community members are provided in state and territory education guidelines. Links to these are provided on the Primary**Connections** website (www.primaryconnections.org.au).

Investigation record

Name: _____ **Date:** _____

Observation place: _____	Observation time: _____
What does the habitat look like?	
How can you tell there are small animals in the habitat?	

Name of animal _____ How many I found _____	Name of animal _____ How many I found _____
Name of animal _____ How many I found _____	Name of animal _____ How many I found _____

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Lesson 7 Hidden in their habitat

AT A GLANCE

To provide opportunities for students to represent what they know about how living things, such as small animals, have a variety of external features and live in different places where their needs are met, and to reflect on their learning during the unit.

Students:

- construct a class 'What am I?' book of the small animals found in the 'Schoolyard safari' area
- participate in a role-play
- reflect on their learning during the unit.

Lesson focus

In the *Evaluate* phase students reflect on their learning journey and create a literacy product to re-represent their conceptual understanding.

Assessment focus

Summative assessment of the Science Understanding descriptions is an important aspect of the *Evaluate* phase. In this lesson you will be looking for evidence of the extent to which students understand that:

- living things, such as small animals, have a variety of external features and live in different places where their needs are met.

Literacy products in this lesson provide useful work samples for assessment using the rubrics provided on the Primary**Connections** website.

Key lesson outcomes

Science

Students will be able to:

- identify the features of small animals for feeding, movement and protection
- describe the habitat of small animals
- identify the ways small animals depend on their habitat for survival.

Literacy

Students will be able to:

- ask questions and make predictions
- use oral, written and visual language to record and discuss the results of their investigation
- identify the purpose and features of a picture graph
- construct and retrieve information from a picture graph
- participate in discussion to generate explanations and compare ideas about small animals and their habitats.

This lesson also provides opportunities to monitor the development of students' general capabilities (highlighted through icons, see page 5).

Equipment

FOR THE CLASS

- class science journal
- word wall
- class 'Schoolyard safari' map from Lesson 1
- class displays, charts and tables
- 1 book entitled 'What am I?' (see 'Preparation')
- *optional:* copy of *Leaf Litter* (Rachel Tonkin, 2006, Harper Collins) or similar book with lift-up flaps

FOR EACH STUDENT

- science journal
- 1 copy of 'What am I?' (Resource sheet 6)
- paper to make lift-up flaps
- paper strip with name of small animal
- *optional:* 'In my own backyard' journal (see Lesson 1)

EVALUATE

Preparation

- Prepare a blank, class 'What am I?' book for students to glue their 'What am I?' (Resource sheet 6) into.
- Write the names of small animals on paper strips. Include all animals that have been observed in the 'Schoolyard safari' area. Place in a container.
- Organise props for the role-play (see Lesson step 4).
- *Optional:* Organise the class into groups of four (combine two collaborative learning teams) for a role-play activity.
- Cut out shapes to act as flaps over the square drawing space of the copies of 'What am I?' (Resource sheet 6).

  Optional: Use A3 paper to prepare a large blank, class 'What am I?' book for students to glue their 'What am I?' (Resource sheet 6) into.

Lesson steps

1 Review literacy products from the unit such as the class science journal, the word wall, the class 'Schoolyard safari' map and tables.

Optional: Students make a final presentation on what they found in their backyard using their 'In my own backyard' journal. In a class discussion, compare this information with what they found in the schoolyard.

2 Remind students about the role-play they performed at the start of the unit.

3 Explain that each student will role-play a small animal. Ask each student to select the name of the animal they will role-play from a container (see 'Preparation'). The other students will try to guess which animal they are depicting and what they think the animal is doing.

Ask students to make a statement before they guess the name of the animal, such as:

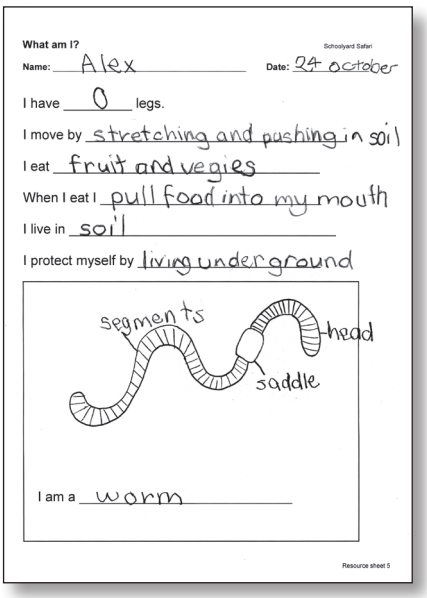
- You have protected your body with a box and are hiding under it. I think you are a snail protecting yourself with your shell.
- You have tied a cloth around your body and are sliding on the ground. I think you are an earthworm moving through the ground and the cloth is the saddle.

4 Explain that each student is going to make a page about a small animal of their choice for a class book called 'What am I?'.

Optional: Read from a text such as *Leaf Litter* and show how the author has used the lift-up flaps to hide the small animals in their habitat.

5 Introduce the enlarged copy of 'What am I?' (Resource sheet 6). Explain that students will fill in the sentences to give clues to the reader, and draw a labelled diagram of the small animal in the box. Model creating a flap that covers the picture. Ask students to represent the small animal's habitat on the outside of the flap.

6 Allow time for students to complete their copy of 'What am I?' (Resource sheet 6). Encourage students to use their science journals, their drawings and diagrams and their investigation record to provide accurate information.


What am I?

Schoolyard Safari

Name: Alex Date: 24 october

I have 0 legs.

I move by stretching and pushing in soil

I eat fruit and vegies

When I eat I pull food into my mouth

I live in soil

I protect myself by living underground

I am a worm

Resource sheet 5

Student work sample of 'What am I?' (Resource sheet 6)

7 Ask students to share their completed sheets with each other. Collect them for the class 'What am I?' book. Read the book as a class and add it to the class reading area.

Optional: Create a simple 'Blabberize' animation about a small creature studied as part of the unit. http://blabberize.com/

For example: 'Animal reports using Blabberize' at http://stasbookreviews.blogspot.com.au/

8 Ask students to reflect on what they have learned and what has helped them to learn during the unit. Ask questions such as:

- What new things have you learnt about small animals?
- Why do small animals live where they do?
- What features help them to survive?
- What are you still wondering about?
- What activities helped you learn new things?

Record the students' ideas in the class science journal.

9 Review students' experiences of working in a collaborative learning team and performing in role-plays in this unit.

10 *Optional:* Ask students to share their new knowledge with a wider audience, such as:

- send a letter or email to another class
- take digital photos for display
- invite parents to view students' work
- roster students to take the 'What am I?' book home
- invite a local newspaper to report on the unit.

EVALUATE

Curriculum links

Science

Students create an imaginary animal and consider its habitat. They consider movement, defence and environment and write a report to demonstrate how the animal's features assist it to live in its environment.

The Arts

Create a diorama of a landscape view of the 'Schoolyard safari' area. Students draw a small animal on the inside of a folded piece of paper and its habitat on the outside flap. Students place their drawing in the diorama.

Indigenous perspectives

- Primary**Connections** recommends working with Aboriginal and Torres Strait Islander community members to access local and relevant cultural perspectives. Protocols for engaging with Aboriginal and Torres Strait Islander community members are provided in state and territory education guidelines. Links to these are provided on the Primary**Connections** website (www.primaryconnections.org.au).

What am I?

Name: _____ **Date:** _____

I have _____ legs.

I move by _____

I eat _____

When I eat I _____

I live in _____

I protect myself by _____

Glue flap here

I am a _____

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Appendix 1
How to organise cooperative learning teams (Foundation–Year 1)

Introduction

Students working in collaborative teams is a key feature of the Primary**Connections** inquiry-based program. By working in collaborative teams students are able to:

- communicate and compare their ideas with one another
- build on one another's ideas
- discuss and debate these ideas
- revise and rethink their reasoning
- present their final team understanding through multi-modal representations.

Opportunities for working in collaborative learning teams are highlighted throughout the unit.

Students need to be taught how to work collaboratively. They need to work together regularly to develop effective group learning skills.

The development of these collaborative skills aligns to descriptions in the Australian Curriculum: English. See page 7.

Team structure

The first step towards teaching students to work collaboratively is to organise the team composition, roles and skills. Use the following ideas when planning collaborative learning with your class:

- Assign students to teams rather than allowing them to choose partners.
- Vary the composition of each team. Give students opportunities to work with others who might be of a different ability level, gender or cultural background.
- Keep teams together for two or more lessons so that students have enough time to learn to work together successfully.
- If you cannot divide the students in your class into teams of three, form two teams of two students rather than one team of four. It is difficult for students to work together effectively in larger groups.
- Keep a record of the students who have worked together as a team so that by the end of the year each student has worked with as many others as possible.

Team roles

Students are assigned roles within their team (see below). Each team member has a specific role but all members share leadership responsibilities. Each member is accountable for the performance of the team and should be able to explain how the team obtained its results. Students must therefore be concerned with the performance of all team members. It is important to rotate team jobs each time a team works together so that all students have an opportunity to perform different roles.

For Foundation—Year 2, teams consist of two students—Manager and Speaker. (For Year 3–Year 6, the teams consist of three students—Director, Manager and Speaker).

Each member of the team should wear something that identifies them as belonging to that role, such as a wristband, badge, or coloured clothes peg. This makes it easier for you to identify which role each student is doing and it is easier for the students to remember what they and their team mates should be doing.

Manager

The Manager is responsible for collecting and returning the team's equipment. The Manager also tells the teacher if any equipment is damaged or broken. All team members are responsible for clearing up after an activity and getting the equipment ready to return to the equipment table.

Speaker

The Speaker is responsible for asking the teacher or another team's Speaker for help. If the team cannot resolve a question or decide how to follow a procedure, the Speaker is the only person who may leave the team and seek help. The Speaker shares any information they obtain with team members. The teacher may speak to all team members, not just to the Speaker. The Speaker is not the only person who reports to the class; each team member should be able to report on the team's results.

Director

The Director is responsible for making sure that the team understands the team investigation and helps team members focus on each step. The Director is also responsible for offering encouragement and support. When the team has finished, the Director helps team members check that they have accomplished the investigation successfully. The Director provides guidance but is not the team leader.

Team skills

Primary**Connections** focuses on social skills that will help students work in collaborative teams and communicate more effectively.

Students will practise the following team skills throughout the year:

- Move into your teams quickly and quietly
- Stay with your team
- Take turns.

To help reinforce these skills, display enlarged copies of the team skills chart (see the end of this Appendix) in a prominent place in the classroom.

Supporting equity

In science lessons, there can be a tendency for boys to manipulate materials and girls to record results. Primary**Connections** tries to avoid traditional social stereotyping by encouraging all students, irrespective of their gender, to maximise their learning potential. Collaborative learning encourages each student to participate in all aspects of team activities, including handling the equipment and taking intellectual risks.

Observe students when they are working in their collaborative teams and ensure that both girls and boys are participating in the hands-on activities.

TEAM ROLES

Manager

Collects and returns all materials the team needs

Speaker

Asks the teacher and other team speakers for help

TEAM SKILLS

1 Move into your teams quickly and quietly

2 Stay with your team

3 Take turns

Appendix 2
How to use a science journal

Introduction

A science journal is a record of observations, experiences and reflections. It contains a series of dated, chronological entries. It can include written text, drawings, labelled diagrams, photographs, tables and graphs.

Using a science journal provides an opportunity for students to be engaged in a real science situation as they keep a record of their observations, ideas and thoughts about science activities. Students can use their science journals as a useful self-assessment tool as they reflect on their learning and how their ideas have changed and developed during a unit.

Monitoring students' journals allows you to identify students' alternative conceptions, find evidence of students' learning and plan future learning activities in science and literacy.

Maintaining a science journal aligns to descriptions in the Australian Curriculum: Science and English. See pages 2 and 7.

Using a science journal

1 At the start of the year, or before starting a science unit, provide each student with a notebook or exercise book for their science journal or use an electronic format. Tailor the type of journal to fit the needs of your classroom. Explain to students that they will use their journals to keep a record of their observations, ideas and thoughts about science activities. Emphasise the importance of including pictorial representations as well as written entries.

2 Use a large project book or A3 paper to make a class science journal. This can be used at all stages to model journal entries. With younger students, the class science journal can be used more frequently than individual journals and can take the place of individual journals.

3 Make time to use the science journal. Provide opportunities for students to plan procedures and record predictions, and their reasons for predictions, before an activity. Use the journal to record observations during an activity and reflect afterwards, including comparing ideas and findings with initial predictions and reasons. It is important to encourage students to provide evidence that supports their ideas, reasons and reflections.

4 Provide guidelines in the form of questions and headings and facilitate discussion about recording strategies, such as, note-making, lists, tables and concept maps. Use the class science journal to show students how they can modify and improve their recording strategies.

5 Science journal entries can include narrative, poetry and prose as students represent their ideas in a range of styles and forms.

6 In science journal work, you can refer students to display charts, pictures, diagrams, word walls and phrases about the topic displayed around the classroom. Revisit and revise this material during the unit. Explore the vocabulary, visual texts and ideas that have developed from the science unit, and encourage students to use them in their science journals.

7 Combine the use of resource sheets with journal entries. After students have pasted their completed resource sheets in their journal, they might like to add their own drawings and reflections.

8 Use the science journal to assess student learning in both science and literacy. For example, during the *Engage* phase, use journal entries for diagnostic assessment as you determine students' prior knowledge.

9 Discuss the importance of entries in the science journal during the *Explain* and *Evaluate* phases. Demonstrate how the information in the journal will help students develop literacy products, such as posters, brochures, letters and oral or written presentations.

***Schoolyard safari* science journal**

Ant Trail Observation:

What did you see?

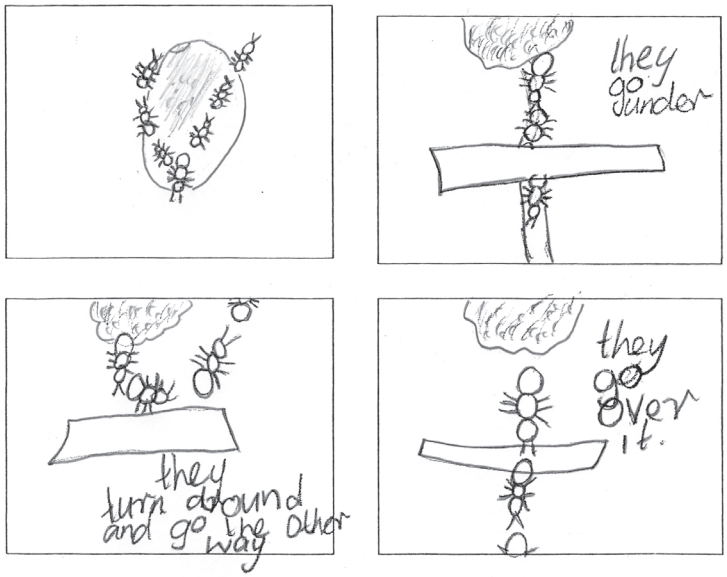
How do the ants walk?
firstly by using its senses.

What happens when the ants meet?
they smell each other with their feelers to communicate.

Did you see the ants carrying anything?
they were carrying some bark.

What happens when the ants get to a large object?
they go under it, go over it or turn around and go the other way

Disruption of an Ant Trail:
Draw what you see:



Appendix 3
How to use a word wall

Introduction

A word wall is an organised collection of words and images displayed in the classroom. It supports the development of vocabulary related to a particular topic and provides a reference for students. The content of the word wall can be words that students see, hear and use in their reading, writing, speaking, listening and viewing.

Goals in using a word wall

A word wall can be used to:

- support science and literacy experiences of reading, writing, speaking and viewing
- provide support for students during literacy activities across all key learning areas
- promote independence in students as they develop their literacy skills
- provide a visual representation to help students see patterns in words and decode them
- develop a growing bank of words that students can spell, read and/or use in writing tasks
- provide ongoing support for the various levels of academic ability in the class
- teach the strategy of using word sources as a real-life strategy.

Organisation

Position the word wall so that students have easy access to the words. They need to be able to see, remove and return word cards to the wall. A classroom could have one main word wall and two or three smaller ones, each with a different focus, for example, high-frequency words.

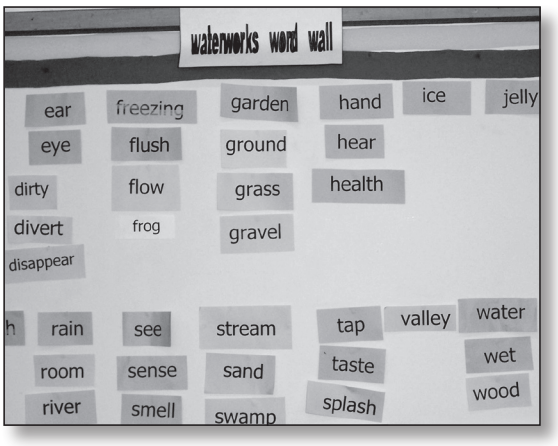
Choose robust material for the word cards. Write or type words on cardboard and perhaps laminate them. Consider covering the wall with felt-type material and backing each word card with a self-fastening dot to make it easy for students to remove and replace word cards.

Word walls do not need to be confined to a wall. Use a portable wall, display screen, shower curtain or window curtain. Consider a cardboard shape that fits with the unit, for example, an apple for a needs unit.

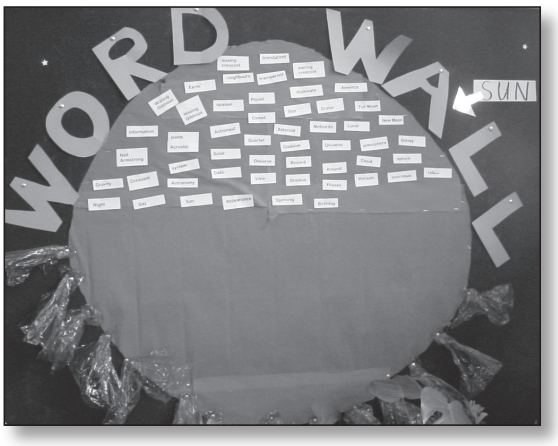
The purpose is for students to be exposed to a print-rich environment that supports their science and literacy experiences.

Organise the words on the wall in a variety of ways. Place them alphabetically, or put them in word groups or groups suggested by the unit topic, for example, words for a *Schoolyard safari* unit might be organised using headings, such as ‘Animal names’, How animals move’, ‘What they look like’ and ‘What they need’.

Invite students to contribute words from different languages to the word wall. Group words about the same thing, for example, different names of the same animal, on the word wall so that students can make the connections. Identify the different languages used, for example, by using different-coloured cards or pens to record the words.



***Water works* word wall**



***Spinning in space* word wall**

Using a word wall

1. Limit the number of words to those needed to support the science and literacy experiences in the classroom.
2. Add words gradually, and include images where possible, such as drawings, diagrams or photographs. Build up the number of words on the word wall as students are introduced to the scientific vocabulary of the unit.
3. Encourage students to interact with the word wall. Practise using the words with students by reading them and playing word games. Refer to the words during science and literacy experiences and direct students to the wall when they need a word for writing. Encourage students to use the word wall to spell words correctly.
4. Use the word wall with the whole class, small groups and individual students during literacy experiences. Organise multi-level activities to cater for the individual needs of students.

***Schoolyard safari* word wall**

Appendix 4
How to construct and use a graph

Introduction

A graph organises, represents and summarises information so that patterns and relationships can be identified. Understanding the conventions of constructing and using graphs is an important aspect of scientific literacy.

During a scientific investigation, observations and measurements are made and measurements are usually recorded in a table. Graphs can be used to organise the data to identify patterns, which help answer the research question and communicate findings from the investigation.

Once you have decided to construct a graph, two decisions need to be made:

- What type of graph? and
- Which variable goes on each axis of the graph?

What type of graph?

The Australian Curriculum: Mathematics describes data representation and interpretation for Year 1 as follows:

- Choose simple questions and gather responses.
- Represent data with objects and drawings where one object or drawing represents one data value. Describe the displays.

Picture graph

Picture graphs support students in the transition from using physical representations to representing information using symbols or pictures in columns. The symbols or pictures must be the same size.

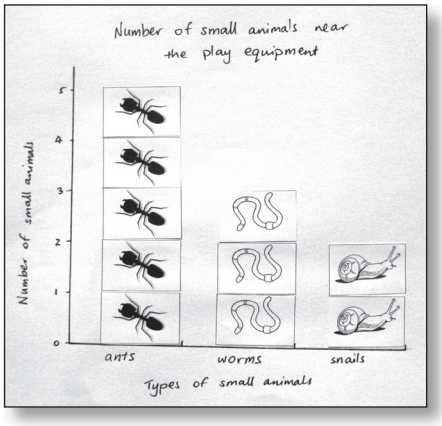
Table A shows the results recorded for an investigation of the types of small animals found in different environments. This information is represented in Graph A by using one small picture for each animal in Table A.

Table A:
Number of small animals near the play equipment

Types of small animals	Number of small animals
ant	5
worm	3
snail	2

In the graph to the right, each picture might also represent a number of animals, for example, 1 picture = 5 animals found

Graph A:
Number of small animals near the play equipment



Which variable goes on each axis?

It is conventional in science to plot the variable that has been changed on the horizontal axis (X axis) and the variable that has been measured/observed on the vertical axis (Y axis) of the graph.

Graph titles and labels

Graphs have titles and each variable is labelled on the graph axes, including the units of measurement. The title of the graph is usually in the form of 'The effect of one variable on the other variable'. For example, 'The effect of material on the amount of light that passes through.'

Steps in analysing and interpreting data

Step 1 Organise the data (for example, construct a graph) so you can see the pattern in data or the relationship between data for the variables (things that we change, measure/observe, or keep the same).

Step 2 Identify and describe the pattern or relationship in the data.

Step 3 Explain the pattern or relationship using science concepts.

Questioning for analysis

Teachers use effective questioning to assist students to develop skills in interrogating and analysing data represented in graphs. Such as:

- What is the story of your graph?
- Do the data in your graph reveal any patterns?
- Is this what you expected? Why?
- Can you explain the pattern? Why did this happen?
- How certain are you of your results?

Analysis

Analysis of Graph A shows that different numbers of small animals were found near the play equipment. Students could compare graphs of different environments to determine which environments suit which animals. For example, if lots of ants were found in the garden, near the play equipment and in the lunch area students might conclude that ants can live in lots of places in the schoolyard. If ants were only found in the garden, students might conclude that the ants prefer a garden habitat because they aren't found in other places.

Appendix 5 ***Schoolyard safari*** **equipment list**

EQUIPMENT ITEM	QUANTITIES	LESSON	1	1	1	2	2	3	3	4	5	5	6	7
		SESSION	1	2	3	1	2	1	2		1	2		
Equipment and materials														
animals														
– ants	1 per team									•				
– earthworms (composting)	1 per team					•	•							
– snails	12 to 15 per class							•	•					
– ant farm optional	1 per class									•				
bin liner, black plastic	1 per class						•							
cake crumbs	¼ cup per team									•				
candle	1 per class						•							
cardboard, ring, 20 cm diameter and 5–6 cm wide	1 per class									•				
clipboard optional	1 per team			•									•	
cloth, coloured, large, dark	1 per class								•					
containers and cups														
– container, shallow, for dipping reluctant snails	1 per class							•						
– drink bottle, 500 mL, empty	1 per class						•							
– drink bottle, 2 L, empty, clear plastic	1 per class						•							
– plastic container, clear (eg, a takeaway dish) for each team	1 per team					•		•						

EQUIPMENT ITEM	QUANTITIES	LESSON	1	1	1	2	2	3	3	4	5	5	6	7
		SESSION	1	2	3	1	2	1	2		1	2		
Equipment and materials (continued)														
– plastic container, clear with lid (eg, Petri dish) or clear plastic bottles	1 per team									●				
– plastic containers, shallow	2 per class								●					
– spray bottle of water	1 per class					●	●							
– transparent container, large with screen lid	1 per class								●					
cuttlefish, piece	1 per class								●					
'Earthworm viewer' (RS3) *optional*	1 per class						●							
factual texts about small animals	many in class										●			
gloves, small gardening or disposable cotton, rubber or vinyl	1 pair per student			●		●	●	●					●	
grass clippings or dead leaves	enough for 1 worm viewer						●							
gravel	enough for 1 snail shack								●					
gravel, soil, sand	enough for 1 worm viewer						●							
honey	1 tablespoon per class									●				
hoops (large) or skipping rope	1 per team			●									●	
Leaf Litter (Rachel Tonkin, Harper Colllins, 2006) or similar book *optional*	1 per class													●
lettuce head *optional*	1 per class							●						
lettuce leaf	1 per team							●						
magnifying glass	1 per team					●		●		●			●	
marking pens, 2 colours	2 per class						●	●						
matches, box of	1 per class						●							
nail and cork for nail-poke	1 per class						●							

EQUIPMENT ITEM	QUANTITIES	LESSON	1	1	1	2	2	3	3	4	5	5	6	7
		SESSION	1	2	3	1	2	1	2		1	2		
Equipment and materials (continued)														
oatmeal	¼ cup mix per team							•						
paint brush, soft-haired	1 per team					•								
paper														
– blank book, large titled 'What am I?'	1 per class													•
– blank paper for each team	1 per team			•										
– blank paper for making flaps	1 per student													•
– butcher's paper with vertical and horizontal axis drawn for class	for class and 1 sheet per team												•	
– small, same sized pieces	for class and each team												•	
– 'In my own backyard' folder or journal (eg, manilla folder, book) for each student optional	1 per student				•	•		•		•	•		•	•
– paper strips with name of small animals studied in unit	1 per student													•
– self-adhesive notes for class	several per team			•										
plant material, pieces of	some per class								•					
plastic sheet, clear	1 per class													
rocks or pieces of terracotta pot	some per class								•					
saucer	1 per class						•							
scissors	1 per class						•							
spoon, plastic	1 per team					•		•						
Resource sheets														
– 'Information note for families' (RS1)	1 per student				•									
– 'Backyard safari search' (RS2)	1 per student				•									
– 'Small animal description' (RS4)	2 per team										•			

EQUIPMENT ITEM	QUANTITIES	LESSON	1	1	1	2	2	3	3	4	5	5	6	7
		SESSION	1	2	3	1	2	1	2		1	2		
Resource sheets (continued)														
– 'Investigation record' (RS5)	1 per student												●	
– 'Investigation record' (RS5), enlarged	1 per class												●	
– 'What am I?' (RS6)	1 per student													●
Teaching Tools														
class science journal	1 per class		●	●	●	●	●	●	●	●	●	●	●	●
'Code for caring' poster	1 per class			●	●	●	●	●	●	●			●	●
collaborative learning role wristbands or badges	1 set per team			●		●		●		●	●		●	
collaborative learning team roles chart	1 per class			●		●		●		●	●		●	
collaborative learning teams skills chart	1 per class			●		●		●		●	●		●	
ideas map	1 per class							●						●
'Schoolyard safari' map	1 per class			●		●		●					●	●
student science journal	1 per student			●		●	●	●	●	●	●	●	●	●
'Watching earthworms' table	1 per class					●								●
word wall	1 per class		●	●	●	●	●	●	●	●	●	●	●	●
Multimedia														
digital camera *optional*	1 per class									●				
DVD or video of *Life in the Undergrowth* Episodes 1 'Invasion of the Land' and 5 'Supersocieties'. David Attenborough (2006) *optional*	1 per class										●			
DVD or video of *A Bug's Life* (Disney/PIXAR)	1 per class											●		
DVD or video player with 'pause' control	1 per class										●	●		

Appendix 6 ***Schoolyard safari*** **unit overview**

		SCIENCE OUTCOMES*	LESSON OUTCOMES*	LESSON SUMMARY	ASSESSMENT OPPORTUNITIES
		Students will be able to represent their current understandings as they:	Students will be able to:	Students:	
ENGAGE	**Lesson 1** In the yard ***Session 1*** Curious creatures ***Session 2*** In my schoolyard ***Session 3*** In my own backyard (optional)	• explain their existing ideas about the features and behaviour of small animals • follow directions to conduct an exploration of the 'Schoolyard safari' area • use their senses to observe and identify small animals in their habitats.	• understand the purpose and features of a role-play • use oral language and role-play to represent what they think they know about the features and behaviour of small animals • describe the purpose and features of a map • use oral, written and visual representation to report observations of animals in their habitats and compare them with their predictions • ask questions about small animals.	***Session 1*** Curious creatures • predict which animals they think will be found in their schoolyard environment • participate in a role-play to show what they think they know about the features and behaviour of small animals. ***Session 2*** In my schoolyard • explore the schoolyard for evidence of small animals • write about and draw their observations. ***Session 3*** In my own backyard (optional) • observe, record and report on small animals found in their own backyard.	**Diagnostic assessment** • Role-play and discussions • Predictions and questions • Science journal entries • Observation records

* These lesson outcomes are linked to relevant descriptions of the Australian Curriculum. See page 2 for Science and page 7 for English and Mathematics.

		SCIENCE OUTCOMES*	LESSON OUTCOMES*	LESSON SUMMARY	ASSESSMENT OPPORTUNITIES
		Students will be able to:	Students will be able to:	Students:	
EXPLORE	**Lesson 2** Wiggly worms ***Session 1*** Watching earthworms ***Session 2*** Earthworm viewer (optional)	• observe and draw the features of an earthworm • observe and describe earthworm movement • identify features of earthworms that allow them to breathe, feed, move and protect themselves underground • *optional* construct an earthworm habitat.	• use oral, written and visual language to report observations of the features, behaviour and habitat of the earthworm • describe the purpose and features of a table • draw a detailed drawing after careful observation • record ideas in a science journal • answer questions about earthworms.	***Session 1*** Watching earthworms • record what they think they know about earthworms • observe, discuss and draw earthworms • record what they find out about earthworms. ***Session 2*** Earthworm viewer (optional) • observe a class earthworm viewer • record observations	**Formative assessment** • Drawings • Discussions • 'Watching worms' table • Science journal entries

* These lesson outcomes are linked to relevant descriptions of the Australian Curriculum. See page 2 for Science and page 7 for English and Mathematics.

		SCIENCE OUTCOMES*	LESSON OUTCOMES*	LESSON SUMMARY	ASSESSMENT OPPORTUNITIES
		Students will be able to:	Students will be able to:	Students:	
EXPLORE	**Lesson 3** Slimy snails ***Session 1*** Snail surprises ***Session 2*** Snail shack (optional)	• observe and draw details of a snail's external structure • observe and describe the movement and feeding of a snail • identify features of snails that allow them to breathe, feed, move and protect themselves in the yard • *optional* construct a snail habitat.	• use oral, written and visual language to report observations of the features, function and habitat of a snail • identify the purpose and features of an ideas map • identify the purpose and features of a labelled diagram • record information as a labelled diagram • answer questions about snails.	***Session 1*** Snail surprises • use an ideas map to show what they think they know about snails • work in teams to observe and draw snails • observe and record how snails move and eat. ***Session 2*** Snail shack (optional) • construct a snail habitat • keep observation records about snails and their habitat.	**Formative assessment** • Ideas map • Labelled diagrams • Discussions • Science journal entries
	Lesson 4 Ant antics	• observe and draw details of an ant's external features • observe and describe ant movement and communication • make observations about how ants carry food • identify features of ants that allow them to breathe, feed, move and protect themselves.	• use oral, written and visual language to report observations of the features, function and habitat of an ant • contribute to discussions about ant behaviour • record observations as a labelled diagram • answer questions about ants.	• record what they think they know about ants • observe and draw ants • track the movement of ants in an ant farm • observe and record information about ants.	**Formative assessment** • Labelled diagrams • Discussions • Science journal entries

* These lesson outcomes are linked to relevant descriptions of the Australian Curriculum. See page 2 for Science and page 7 for English and Mathematics.

		SCIENCE OUTCOMES*	LESSON OUTCOMES*	LESSON SUMMARY	ASSESSMENT OPPORTUNITIES
		Students will be able to:	Students will be able to:	Students:	
EXPLAIN	**Lesson 5** Same or different? ***Session 1*** Comparing creatures ***Session 2*** Animated animals (optional)	• describe the features and behaviour of a small animal • compare two small animals and make conclusions about similarities and differences.	• use a variety of resources to find current scientific information about a small animal • record information in a table • use drawings and language to compare two small animals • use scientific vocabulary appropriately in their writing and talking.	***Session 1*** Comparing creatures • work in teams to compare two small animals • as a class, develop a table that summarises the information • read factual texts about small animals. ***Session 2*** Animated animals (optional) • view an animated film about ants • consider how small animals are represented in animated films • compare their understanding of small animals with those in the film.	**Formative assessment** • Science journal entries • 'Small animal description' (Resource sheet 4)

* These lesson outcomes are linked to relevant descriptions of the Australian Curriculum. See page 2 for Science and page 7 for English and Mathematics.

		SCIENCE OUTCOMES*	LESSON OUTCOMES*	LESSON SUMMARY	ASSESSMENT OPPORTUNITIES
		Students will be able to:	Students will be able to:	Students:	
ELABORATE	**Lesson 6** Habitat detectives	• conduct an investigation of a habitat of the 'Schoolyard safari' area and make and record their observations • compare the observations of two different habitats and identify similarities and differences • identify links between animal features and their habitats.	• ask questions and make predictions • use oral, written and visual language to record and discuss the results of their investigation • identify the purpose and features of a picture graph • construct and retrieve information from a picture graph • participate in discussion to generate explanation and compare ideas about small animals and their habitats.	• work in teams to look for evidence of small animals in a habitat • compare the evidence found in different habitats • record and discuss observations.	**Summative assessment** of Science Inquiry Skills • Science journal entries • 'Investigation record' (Resource sheet 5) • Graphs

* These lesson outcomes are linked to relevant descriptions of the Australian Curriculum. See page 2 for Science and page 7 for English and Mathematics.

		SCIENCE OUTCOMES*	LESSON OUTCOMES*	LESSON SUMMARY	ASSESSMENT OPPORTUNITIES
		Students will be able to:	Students will be able to:	Students:	
EVALUATE	**Lesson 7** Hidden in their habitat	• identify the features of small animals for feeding movement and protection • describe the habitat of small animals • identify the ways small animals depend on their habitat for survival.	• contribute to a discussion about the features, function and habitat of small animals • use oral, written and visual language to describe the habitat of small animals • use written descriptions and role-play to represent their understanding of small animals and their habitats • answer questions about small animals.	• construct a class 'What am I?' book of the small animals found in the 'Schoolyard safari' area • participate in a role-play • reflect on their learning during the unit.	**Summative assessment** of Science Understandings • Science journal entries • 'What am I?' (Resource sheet 6) • Role-plays • Discussions

* These lesson outcomes are linked to relevant descriptions of the Australian Curriculum. See page 2 for Science and page 7 for English and Mathematics.

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Year	Biological sciences	Chemical sciences	Earth and space sciences	Physical sciences
F	*Staying alive*	*What's it made of?*	*Weather in my world*	*On the move*
1	*Schoolyard safari*	*Spot the difference*	*Up, down and all around*	*Look! Listen!*
2	*Watch it grow!*	*All mixed up*	*Water works*	*Push pull*
3	*Feathers, fur or leaves?*	*Melting moments*	*Night and day*	*Heating up*
4	*Plants in action*	*Material world*	*Beneath our feet*	*Smooth moves*
	Friends and foes	*Package it better*		
5	*Desert survivors*	*What's the matter?*	*Earth's place in space*	*Light shows*
6	*Marvellous micro-organisms*	*Change detectives*	*Earthquake explorers*	*It's electrifying*
				Essential energy

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