PrimaryConnections®
Linking science with literacy

Fully aligned with the Australian Curriculum

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

Water works

Year 2

Earth and space 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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Water works

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Water is essential to life. As humans, we not only drink water, we also use it for cooking, hygiene, recreation and agriculture. Australia is a dry continent with an expanding population, and how we use water has become increasingly important. Water is a precious resource.

The *Water works* unit is an ideal way to link science with literacy in the classroom. This unit provides opportunities for students to develop an understanding of, and appreciation for, a precious natural resource. Through investigations, students explore how water is used, where water comes from and how to use it responsibly.

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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. 'PrimaryConnections: 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 PrimaryConnections 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 doable and sustainable. PrimaryConnections 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. PrimaryConnections 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 PrimaryConnections 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 PrimaryConnections prepares students well to participate in evidence-based discussions of these and other issues.

PrimaryConnections has been developed with the financial support of the Australian Government and has been endorsed by education authorities across the country. The Steering Committee, comprised of 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 science teacher background information on science is reviewed by a Fellow of the Academy of Science. 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 PrimaryConnections 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, 2009).

Linking science with literacy

Primary**Connections** 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.

Primary**Connections** develops the literacies of science that students need to learn and to represent their understanding of science concepts, processes and skills. Representations in Primary**Connections** 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 Primary**Connections** units. Assessment is linked to the development of literacy practices and products. Relevant understandings and skills for each lesson 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 of 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.

References

Australian Curriculum Assessment and Reporting Authority (ACARA). (2010). *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 — *Water works*

Phase	Lesson	At a glance
ENGAGE	**Lesson 1** Wondering about water	To capture students' interest and find out what they think they know about water (one of Earth's resources) and how it is used in a variety of ways To elicit students' questions about water, where it comes from and how to use it responsibly
EXPLORE	**Lesson 2** Water walk	To provide students with hands-on, shared experiences of water use at school
	Lesson 3 Rain, rain ***Session 1*** It's raining ***Session 2*** Ground water	To provide students with hands-on, shared experiences of what happens to rain falling on different surfaces
	Lesson 4 Go with the flow	To provide students with hands-on, shared experiences of exploring the movement of water across the landscape
EXPLAIN	**Lesson 5** My water story	To support students to represent and explain their understanding of sources of water and how it is collected, transported, accessed and used, and to introduce current scientific views
ELABORATE	**Lesson 6** Investigating water use at home ***Session 1*** Water detectives ***Session 2*** Graph it!	To support students to plan and conduct an investigation of water usage at home
	Lesson 7 Community water use ***Session 1*** Interview planning ***Session 2*** Guest speaker	To support students to plan and conduct an investigation of other people's use and management of water
EVALUATE	**Lesson 8** Informative interviews	To provide opportunities for students to represent what they know about water (one of Earth's resources) and how it is used in a variety of ways, and to reflect on their learning during the unit

A unit overview can be found in Appendix 5, page 69.

Alignment with the Australian Curriculum: Science

This *Water works* unit embeds all three strands of the Australian Curriculum: Science. The table below lists sub-strands and their content for Year 2. This unit is designed to be taught in conjunction with other Year 2 units to cover the full range of the Australian Curriculum: Science content for Year 2.

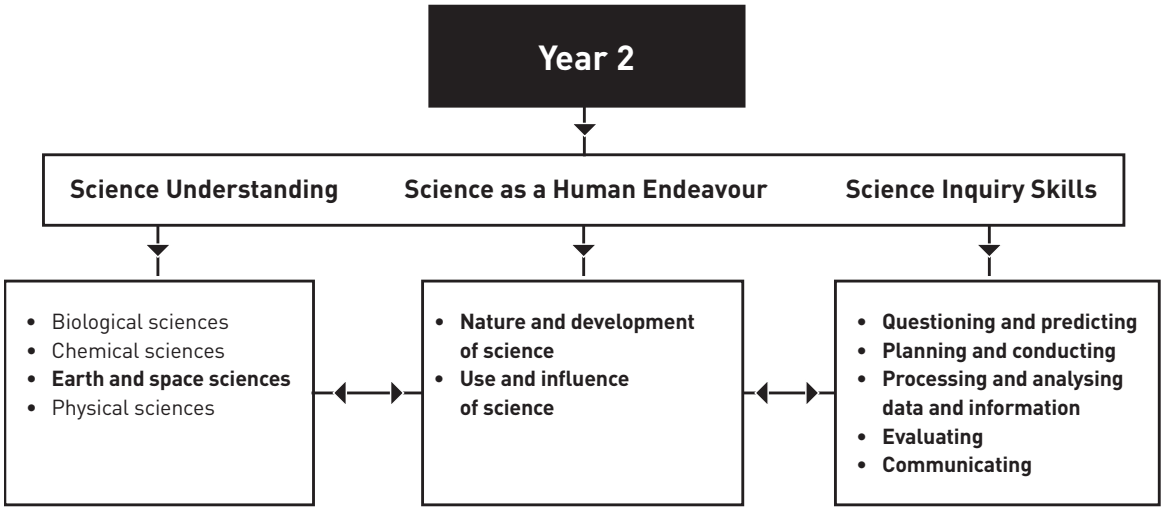
For ease of assessment the table below outlines the sub-strands and their aligned lessons.

Strand	Sub-strand	Code	Year 2 content descriptions	Lessons
Science Understanding (SU)	**Earth and space sciences**	ACSSU032	Earth's resources, including water, are used in a variety of ways	1–8
Science as a Human Endeavour (SHE)	**Nature and development of science**	ACSHE034	Science involves asking questions about, and describing changes in, objects and events	1, 3, 4, 5, 6
	Use and influence of science	ASCHE035	People use science in their daily lives, including when caring for their environment and living things	7, 8
Science Inquiry Skills (SIS)	**Questioning and predicting**	ACSIS037	Respond to and pose questions, and make predictions about familiar objects and events	1–6
	Planning and conducting	ACSIS038	Participate in different types of guided investigations to explore and answer questions, such as manipulating materials, testing ideas, and accessing information sources	1, 3, 4, 6
		ACSIS039	Use informal measurements in the collection and recording of observations, with the assistance of digital technologies as appropriate	6
	Processing and analysing data and information	ACSIS040	Use a range of methods to sort information, including drawings and provided tables	3, 6
		ACSIS214	Through discussion, compare observations with predictions	2, 3
	Evaluating	ACSIS041	Compare observations with those of others	3, 4, 6, 8
	Communicating	ACSIS042	Represent and communicate observations and ideas in a variety of ways such as oral and written language, drawing and role play	1–8

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 *Water works*, these overarching ideas are represented by:

Overarching idea	Incorporation in *Water works*
Patterns, order and organisation	Students observe and describe responsible use of water. They identify patterns of similarity and difference in how water is used at school, at home and in the community.
Form and function	Students observe some physical properties of water that determine its use. They explore how water is used at school, at home and in the community.
Stability and change	Students observe that rain falls periodically but is relatively stable over a yearly cycle. They explore how it collects in creeks, rivers, lakes, dams and as ground water, and that people can transfer it from a source to a point of use.
Scale and measurement	Students compare observations of water use at home. They collect data (using a survey), represent the activity categories (using a graph) and then analyse the data.
Matter and energy	Students model how water moves across the landscape and how it can be contained. They explore the piped delivery of water from storage to the tap.
Systems	Students explore natural and man-made systems associated with water. They explore the behaviour of rainwater on different surfaces and they investigate systems of water collection, transportation, access and use.

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 *Water works*
Awareness of self and the local world	Students explore how they and others use water. They investigate where it comes from, how it is collected, transported and accessed at school, at home and in the community and how to use it responsibly. They observe, investigate and gather information to describe how water is an essential resource for life.

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 2 achievement standard. Rubrics to help teachers make these judgments will be 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.

Water works—Australian Curriculum general capabilities

General capabilities	Australian Curriculum description	*Water works* 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 *Water works* the literacy focuses are: • science journals • word walls • maps • labelled diagrams • role-plays • storyboards • factual texts (optional) • graphs • interviews • factual recounts.
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, represent and interpret data from investigations
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 interactive resource technology to view, record and analyse information • use ICT to create presentations to communicate ideas, including digital animation.
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: • use reasoning to develop questions for inquiry • formulate, pose and respond to questions • predict how and where and what might happen • consider different ways of thinking about water use.
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: • ask questions of others, respecting each other's point of view.
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 effectively in collaborative learning teams • take turns and role-play effectively • use appropriate oral communication skills.
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 PrimaryConnections 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

Water works focuses on the Western science way of exploring their environment systematically. Students are introduced to investigation methods including surveys and to making claims based on evidence about how water is used.

Aboriginal and Torres Strait Islander Peoples traditionally have different patterns of water use in their lives, as well as different distribution and management systems.

PrimaryConnections 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 PrimaryConnections website.

Sustainability

The *Water works* unit provides opportunities for students to develop an understanding and appreciation of water as a precious resource that is essential to their lives. This can assist them to develop knowledge, skills and values to act in ways that contribute to more sustainable living. Students also explore methods of water distribution and patterns of use. This can assist them in making decisions about individual and community actions that contribute to sustainable patterns of use of the Earth's natural resources such as water.

Alignment with the Australian Curriculum: English and Mathematics

Strand	Sub-strand	Code	Year 2 content descriptions	Lessons
English–Language	**Language for interaction**	ACELA1461	Understand that language varies when people take on different roles in social and classroom interactions and how the use of key interpersonal language resources varies depending on the context	1–8
	Expressing and developing ideas	ACELA1467	Understand that simple connections can be made between ideas by using a compound sentence with two or more clauses usually linked by a coordinating conjunction	2
		ACELA1470	Understand the use of vocabulary about familiar and new topics and experiment with and begin to make conscious choices of vocabulary to suit audience and purpose	1–8
English–Literacy	**Interacting with others**	ACELY1666	Listen for specific purposes and information, including instructions, and extend students' own and others' ideas in discussions	1–8
		ACELY1789	Use interactive skills including initiating topics, making positive statements and voicing disagreement in an appropriate manner, speaking clearly and varying tone, volume and pace appropriately	1–8
		ACELY1667	Rehearse and deliver short presentations on familiar and new topics	5, 8
	Creating texts	ACELY1671	Create short imaginative, informative and persuasive texts using growing knowledge of text structures and language features for familiar and some less familiar audiences, selecting print and multimodal elements appropriate to the audience and purpose	5, 8
Mathematics–Measurement and Geometry	**Location and transformation**	ACMMG044	Interpret simple maps of familiar locations and identify the relative positions of key features	2
Mathematics–Statistics and Probability	**Data representation and interpretation**	ACMSP050	Create displays of data using lists, table and picture graphs and interpret them	3, 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 water

Water is a natural resource of Earth. Chemically, it is a molecule made up of two atoms of hydrogen and one atom of oxygen, represented by the chemical formula H_2O. It is one of the few materials that can naturally be found as a solid, liquid and gas in the temperature range usually found on the Earth's surface.

Earth is the only planet in our Solar System known to have surface water. The distance between the Sun and Earth ensures a temperature range that allows water to exist in liquid form, which makes Earth uniquely able to support plant and animal life. Scientists have found evidence that Mars once had surface liquid water but the current temperatures on Mars are too low and its atmosphere is too thin for surface water to exist.

Water is abundant on our planet; about three-quarters of the Earth's surface is covered by water. It is found in oceans, lakes, rivers and dams. Ice, snow and clouds are forms of water.

Ninety-seven per cent of the water on the Earth's surface is found as salt water in oceans, which teem with marine life. The remaining 3 per cent is fresh water, but two-thirds of this is found as ice and snow at the poles. This means that of all the water on Earth about only 1 per cent of it is useable fresh water. We therefore need to be responsible in how we use and manage water resources.

Water is essential for living things. Without it there would be no life as we know it. Water:

- helps living cells keep their shape
- moves dissolved substances around our bodies in our blood
- is used in many important biochemical reactions
- is necessary for plants to grow.

Animals and plants consist mostly of water. The human body is about 70 per cent water. Without water, people become thirsty and plants wilt. To remain healthy, we need to drink water every day to replace the water that is lost from our bodies through respiration, perspiration and urination. Apart from being essential to life, water is used by humans for activities, such as cooking, washing, cooling, heating, recreation, growing crops, transportation and for power generation.

For information about water recycling see the Australian Academy of Science's Nova: *Science in the news* topic 'Making every drop count' (www.science.org.au/nova/095/095key.htm).

Students' conceptions

Taking account of students' existing ideas is important in planning effective teaching approaches which 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.

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

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

Lesson 1 Wondering about water

AT A GLANCE

To capture students' interest and find out what they think they know about water (one of Earth's resources) and how it is used in a variety of ways.

To elicit students' questions about water, where it comes from and how to use it responsibly.

Students:

- use their senses to describe water
- record and share their ideas about water
- discuss their ideas and questions for the class 'Wondering about water' wall.

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:

- how water, one of Earth's resources, is used in a variety of ways and how people use science ideas in their daily lives to help them answer questions about water. 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:

- observe and describe water
- identify uses of water
- identify a source of water
- describe ways to use water responsibly.

Literacy

Students will be able to:

- use talk to report on observations and reflect on their experience of water
- record their personal experience of water.

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

Teacher background information

It is hard to think about a world without water. Water is used for many activities including cooking, washing, farming and horticulture, recreation, manufacturing, transport and power generation. All these uses are possible because of the specific properties of water. Water is:

- tasteless, odourless and colourless. Impurities or additives, for example, chlorine can give water a distinctive taste, smell or colour.
- a liquid, but, depending on the temperature, it can also be found as a solid (ice) or a gas (water vapour).
- a solvent. It can dissolve many substances. This means water can move dissolved chemicals and nutrients as it flows from one place to another, such as through the bloodstream or along a river.

Equipment

FOR THE CLASS

- class science journal
- word wall
- 'Wondering about water' wall (see 'Preparation')
- containers (eg, jugs or bottles) filled with water
- 1 enlarged copy of 'Wonderful water' (Resource sheet 1)

FOR EACH STUDENT

- science journal
- 1 small container (eg, a clear plastic cup)
- 1 copy of 'Wonderful water' (Resource sheet 1)

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 title 'Using our five senses' and the subtitles 'Sight', 'Touch', 'Taste', 'Smell' and 'Hearing'.
- Prepare an area for a continuing class 'Wondering about water' wall, such as a wall display space or a series of charts. Write headings, such as 'Where does water come from?', 'What do we use water for?', 'Who or what uses water?' and 'How can we use water responsibly?'. Include a heading 'What do we want to know about water?'.
- *Optional:* Display 'Wonderful water' (Resource sheet 1), the 'Wondering about water' wall, the class science journal and the word wall on an interactive whiteboard. Check the Primary**Connections** website to see if an accompanying interactive resource has been developed (www.primaryconnections.org.au).

Lesson steps

1 Introduce one of the water-filled containers to the class. Explain that students will use their five senses to explore what water looks like, feels like, tastes like, smells like and sounds like.

2 Distribute small containers and allocate water to students.

3 Ask students to observe the water in their small containers and describe what it looks like. Record their ideas under the 'sight' subtitle on the 'Using our five senses' page in the class science journal.

Discuss the purposes 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.

Optional: Students record descriptions of water in individual science journals.

4 As descriptions are shared, survey the class to identify students with similar responses, for example, 'Jack said the water looks runny. Who else thought the water looks runny?'. Record the number of responses against each description in the class science journal.

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 Ask students to smell the water and describe the smell. Record their ideas under the 'smell' subtitle.

Remind students that not all clear, colourless liquids are water. Explain to students that they should never taste or drink a liquid that looks like water unless they know that it is water.

Tell students where you collected the water in their small containers.

6 Ask students to taste the water and describe the taste. Add students' descriptions of what water tastes like under the 'taste' subtitle.

7 Ask students to feel the water in their small containers with their fingertips and describe what it feels like. Encourage students to carefully dip their fingers into the water and rub it between their fingertips to feel what water is like to touch. Record their ideas under the 'touch' subtitle.

8 Ask students to put aside their water containers and close their eyes and visualise water moving down a river or over a waterfall, crashing against a shoreline or pouring out of a tap. Ask students to describe how water sounds and record under the 'sound' subtitle.

9 Introduce an enlarged copy of 'Wonderful water' (Resource sheet 1). Discuss the questions 'Where does water come from?', 'What is water used for?', 'Who or what uses water?' and 'How can I use water responsibly?'.

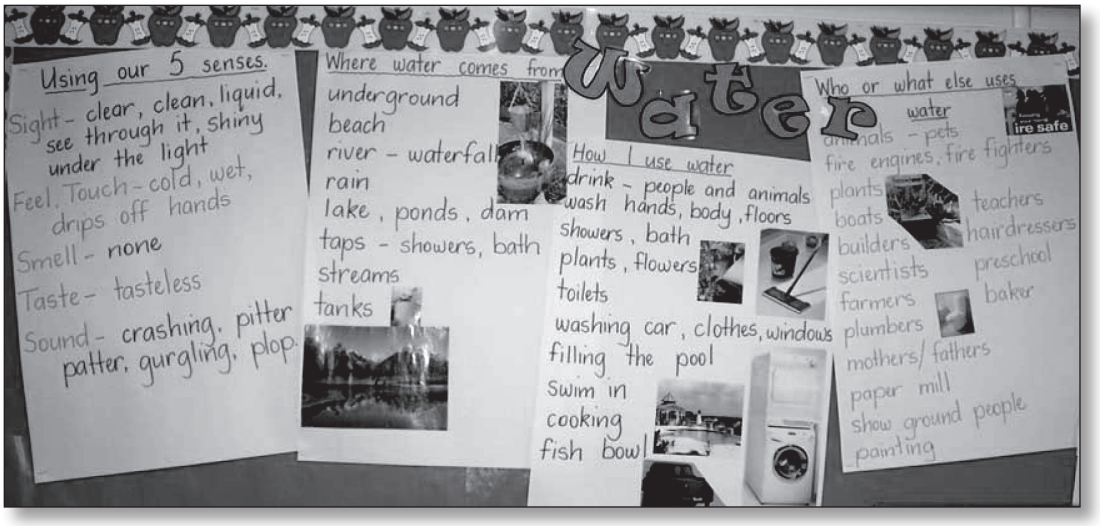
Distribute copies of 'Wonderful water' (Resource sheet 1) and ask students to record their ideas using drawing and/or writing.

Note: Do not correct answers at this stage as this activity is used to find out what students already know about water.

10 Introduce the class 'Wondering about water' wall (see 'Preparation') and invite students to make contributions to each of the questions, using their 'Wonderful water' (Resource sheet 1) ideas for support.

11 Introduce the 'What do we want to know about water?' section of the 'Wondering about water' wall and ask students to suggest questions they have about water. For example, students might ask:

- What is water made of?
- Where does water come from?
- Where does water go?
- Why do we need water?



'Wondering about water' wall

12 Begin a word wall with vocabulary about water. 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 spelled.

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.

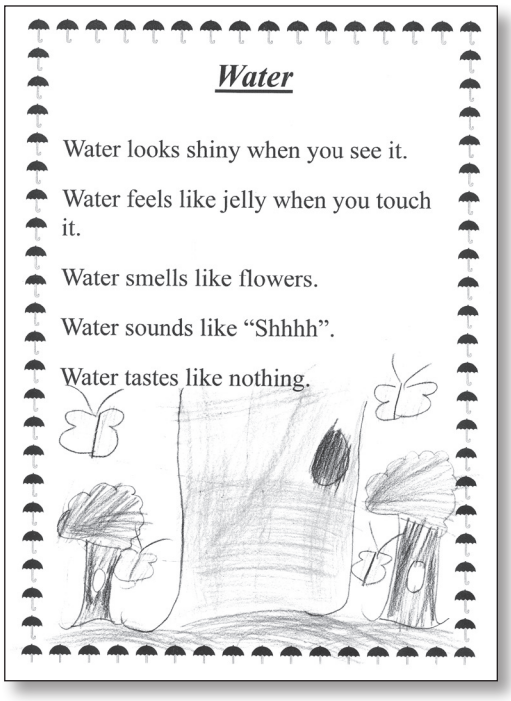
13 *Optional:* Students add pictures and information, such as brochures, newspaper clippings, to the 'Wondering about water' wall during the course of the unit.

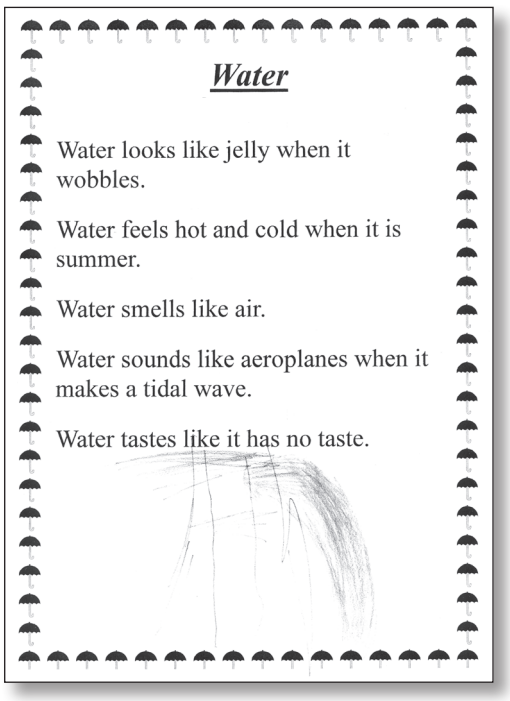
Optional: Discuss how students could dispose of the remaining water in their small containers responsibly, such as provide water for a pet, water the grass or clean paint brushes.

Curriculum links

English

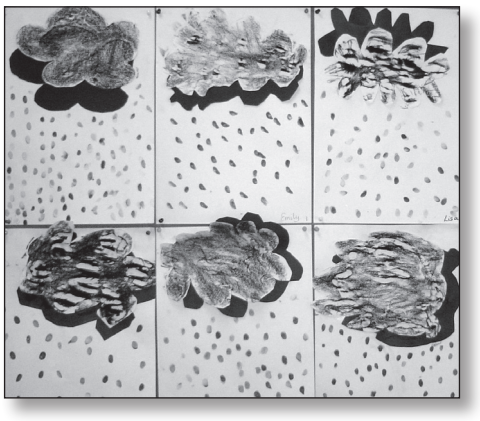
- Read and write poetry about water. Students write an acrostic, haiku or senses poem based on their observations about water.





The Arts

- Listen to and sing songs about water.
- Create water scene or water landscape artworks, such as underwater worlds, river, ocean, beach or swimming pool scenes.
- Use dye and water to create watery wash effects over crayon drawings.
- Use dye and water in a spray bottle and spray onto paper or cloth.
- Use dye and water with a short straw to make bubble or blow prints.



Rainy weather artworks

Ocean scene artworks

Indigenous perspectives

For traditional Indigenous people life is often nomadic and based on the availability of both water and food. Knowing the locality and reliability of different sources of water in the arid landscape is a vital part of Indigenous knowledge. This includes knowing the location of underground water and how to obtain water from the roots of particular trees and plants.

- View www.australianscreen.com.au/titles/5-seasons/clip3 and discuss the problems caused in the town by the excess water. Ask students questions, such as:
  - Have you experienced weather like this?
  - What problems do you think too much rain could cause?
  - What are the good things about the rain coming?
- 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).

Wonderful water

Name: _____ **Date:** _____

Where does water come from?

What is water used for?

Who or what uses water?

How can I use water responsibly?

 ISBN 978 0 85847 312 6

Lesson 2 Water walk

EXPLORE

AT A GLANCE

To provide students with hands-on, shared experiences of water use at school.

Students:

- explore the school to find evidence of water use
- record their observations
- share their 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, for example, 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 variety of ways water is used, and how science involves asking questions about and describing changes in water use. You will also monitor their developing science inquiry skills (see page 2).

Key lesson outcomes

Science

Students will be able to:

- make predictions about where water is used and accessed at school
- observe and describe water uses and water access points around the school
- identify examples of water being used responsibly or irresponsibly.

Literacy

Students will be able to:

- contribute to discussions about water use at school
- use oral, written and visual language to record and report observations of water use at school.

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

Teacher background information

Common uses for water inside and outside school buildings include:

Inside uses:

- drinking
- washing hands and equipment
- toilets
- cleaning
- dishwasher, eg, in the staffroom or canteen
- heating and cooling
- watering indoor plants
- water for school pets.

Outside uses:

- drinking, eg, bubblers
- watering lawns, gardens, trees
- water for school pets
- watering school farm plots
- recreation, eg, swimming pools or ornamental ponds
- fish ponds
- cleaning the pavement and buildings.

Water is used at school in essential and non-essential ways. School pets need clean and sufficient drinking water. Plants require water for growth. Staff and students use water for drinking, to flush toilets and to wash hands to stay healthy. These are examples of essential ways water is used at school. Washing driveways and using the toilet to get rid of litter are examples of non-essential uses for water.

Equipment

FOR THE CLASS

- class science journal
- word wall
- 'Wondering about water' wall
- *optional:* digital camera

FOR EACH STUDENT

- science journal

Preparation

- Consider how you will organise the use of the 'map' literacy focus in Lesson step 2 to provide necessary scaffolding for your class. To support students to interact with and familiarise themselves with the map of the school, label key features, for example, buildings or rooms, to orient students to the map.
- *Optional:* Arrange for a parent helper, teacher's assistant or buddy class to assist with the walk around the school grounds.

Lesson steps

1 Explain that students are going to investigate water use around the school. Ask students to predict how and where they might see water being used around the school. Discuss possible water access points, such as a tap or hose. Record students' predictions in the class science journal.

2 *Optional:* Introduce a simple map of the school on which the places and ways water is used or accessed can be recorded while the class is outside. The route taken during the walk could also be recorded on return to the classroom. Discuss the purpose and features of a map.

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?

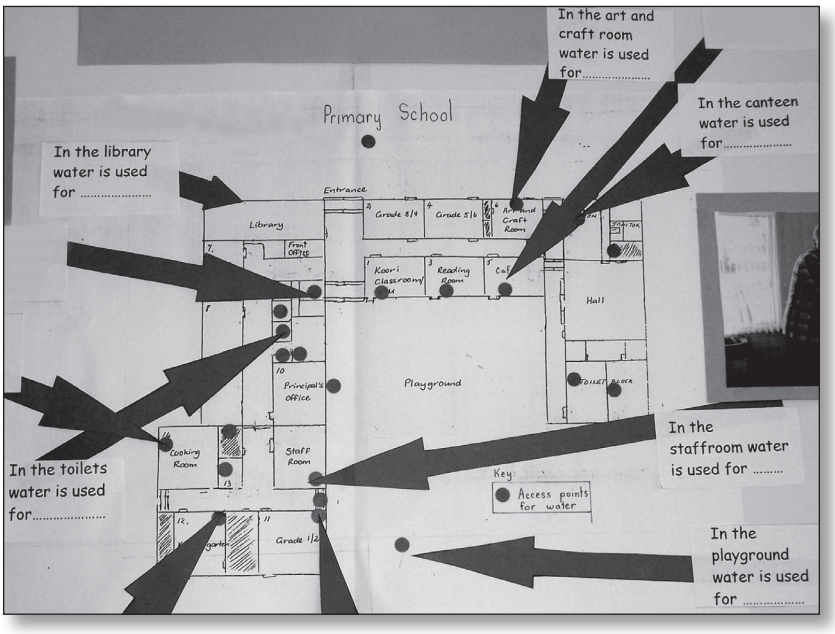
A **map** includes a title, labels, symbols and a key to explain the symbols. It might include arrows to show a path and scale to show distances.

3 Go for a walk around the school grounds and buildings to look for examples of how water is used, such as for water features, watering plants and animals, and swimming pools; and how it is accessed by implements, such as bubblers, hose, sprinkler and taps.

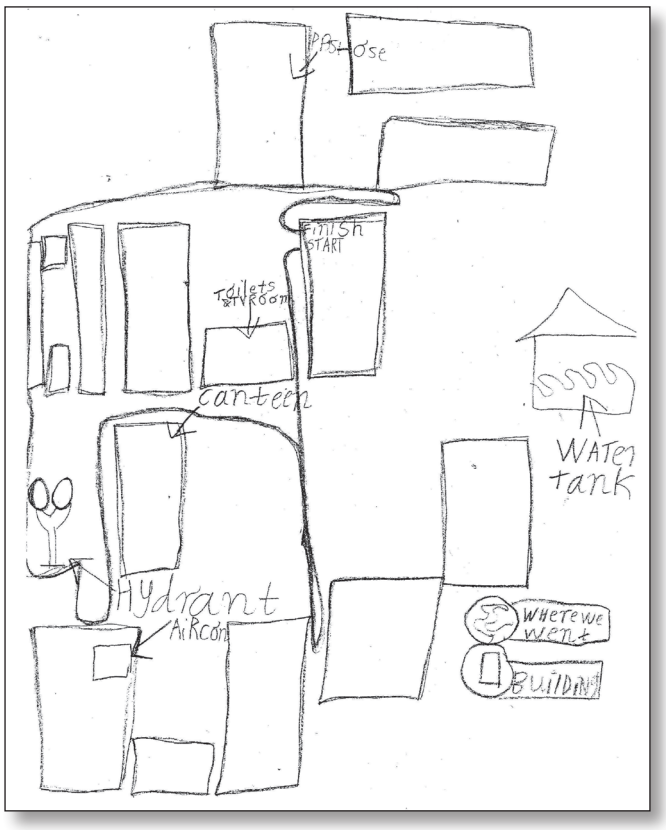
Optional: Take photographs of water uses and water access points observed by students for the 'Wondering about water' wall, and class or individual science journals.

Optional: Locate and show students the school water meter.

Optional: Students record individual maps showing the way water is used and accessed around the school.



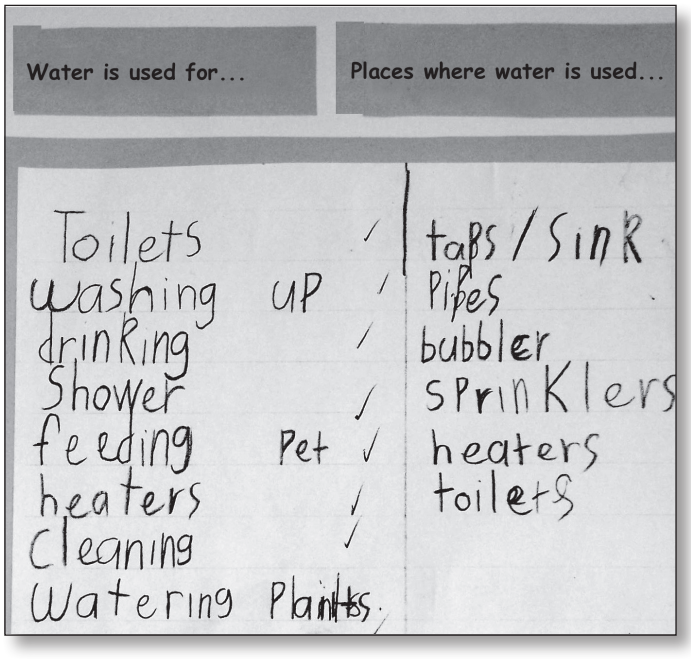
Class map showing the ways water is used and accessed around a school



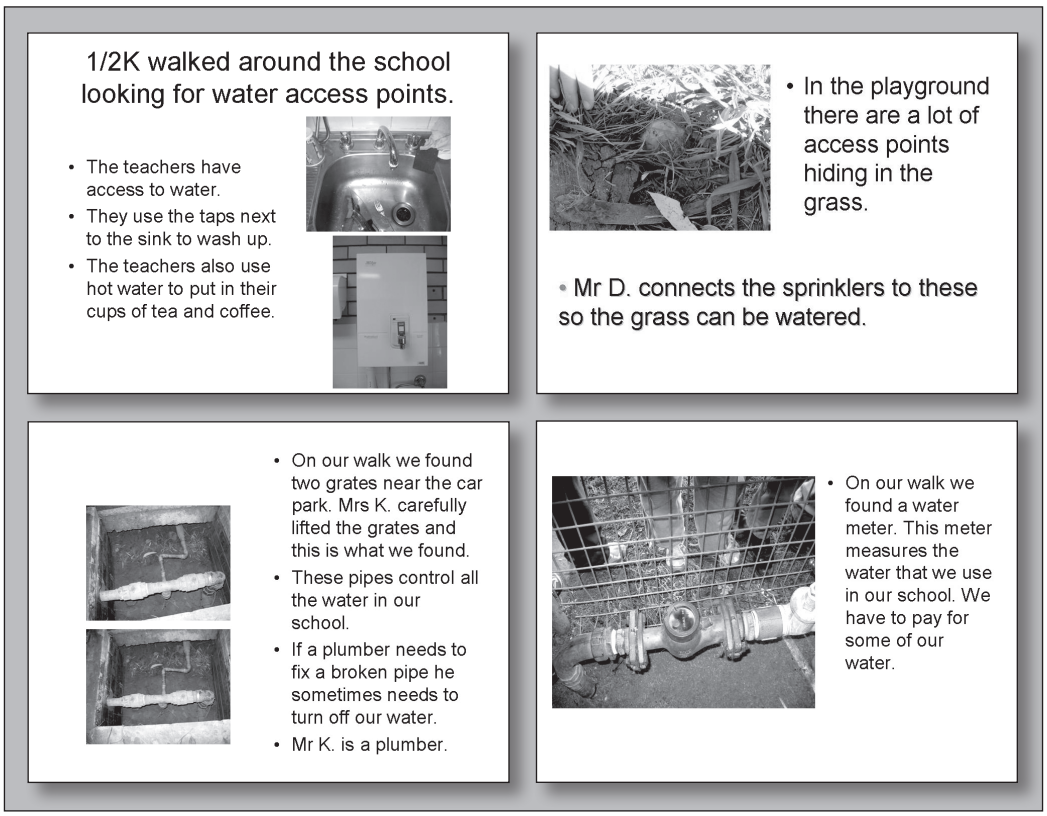
Student work sample showing ways water is used and accessed around a school

4 After returning to the classroom, ask students to record their observations from the water walk in their science journals. You might like to provide students with prompts, such as:

- Water is used for…
- Places where water is used…
- Water access points at school are…



Student record of the ways and places water is used



Sample slides from a PowerPoint presentation about a class water walk

5 Ask students to describe what they learned about water on their water walk. Add their responses to the 'Wondering about water' wall.

6 Discuss examples of the ways students observed water being used responsibly or irresponsibly and being wasted.

7 Update the word wall and the 'Wondering about water' wall with words and images.

Curriculum links

Science

- Consider how your class and school could become more environmentally sustainable by accessing the Department of the Environment, Water, Heritage and Art's *Educating for a Sustainable Future: A National Environmental Education Statement for Australian Schools* (www.environment.gov.au/education) and information about the *Australian Sustainable Schools Initiative* (http://www.environment.gov.au/education/aussi/index.html)

The Arts

- Water coming out of a tap sounds different to water in a flushing toilet. Record the water sounds that can be found or made and use them to create a sound-scape, or a story, about water in the school, home or local environment.

Indigenous perspectives

- Indigenous stories involve water, with people often gathering food or fishing.
- Contact the local Indigenous Land Council or cultural heritage centre to make contact with local Indigenous community members and invite them to speak with the students about Indigenous peoples' knowledge of water.
- 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 3 Rain, rain

EXPLORE

AT A GLANCE

To provide students with hands-on, shared experiences of what happens to rain falling on different surfaces.

Session 1 It's raining

Students:

- model what happens when it rains
- investigate rain falling on a variety of surfaces
- record and discuss observations.

Session 2 Ground water

Students:

- observe a ground water model.

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, for example, 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:

- how and where rainwater goes upon contact with the Earth's surface, asking and responding to questions, and describing the results of rainfall on different surfaces. You will also monitor their developing science inquiry skills (see page 2).

Key lesson outcomes

Science

Students will be able to:

- observe what happens to rain falling on different surfaces
- observe rain soaking into and running off different surfaces
- record and share observations.

Literacy

Students will be able to:

- use language to reflect on experiences of rain
- follow instructions to complete an investigation about the effect of rain on different surfaces
- use language to record and report on observations of rain falling on different surfaces.

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

Teacher background information

Water is found nearly everywhere on Earth. Salt water covers about three-quarters of the Earth's surface and accounts for 97 per cent of all its water. Water containing only a small amount of dissolved materials, such as salt and minerals, is called fresh water. Fresh water is found underground and in rivers, lakes, dams and streams. Glaciers and the polar ice caps contain frozen fresh water. Rain and snow are also examples of fresh water.

Fresh water is formed from water that has evaporated from the oceans, rivers, lakes, wet soil and vegetation on the Earth's surface. When salt water evaporates, the salt is left behind and pure water vapour rises into the air, forming clouds. The water vapour in clouds condenses around dust particles, forming larger and larger droplets of water. When these drops become big enough and heavy enough, they fall out of the air as rain. If the temperature is cold enough, the droplets will become snow or hail. Fresh water eventually makes its way back to the ocean, mixes with the salt water there and the water cycle begins again.

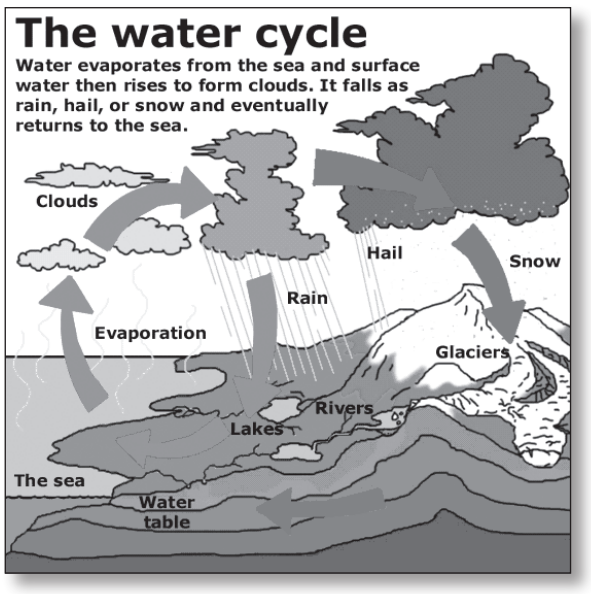


Image from the Primary**Connections Science Background CD**
(courtesy of Victorian Department of Education and Early Childhood Development)

Some of the rain runs across the Earth's surface into creeks and rivers and from there into lakes and dams. This water is called surface water. Some of the water soaks into the ground and collects in the cracks and crevices there. This water is called ground water. Ground water feeds underground streams and aquifers. It is often pumped back up to the surface through bores and is an important source of water for industry, agriculture and domestic homes and gardens. Surface water and ground water are the two main sources of water for use in Australian homes and schools.

Note: It is not intended that students develop an understanding of the water cycle at this stage of learning. Research shows that the concepts of evaporation and condensation are not well understood by students at this stage.

Session 1 It's raining

Equipment

FOR THE CLASS

- class science journal
- word wall
- team roles chart
- team skills chart
- 'Wondering about water' wall
- 1 enlarged copy of 'Rain, rain' (Resource sheet 2)
- water
- *optional:* digital camera

FOR EACH TEAM

- role wristbands or badges for Manager and Speaker
- each team member's science journal
- 1 copy of 'Rain, rain' (Resource sheet 2) for each team member
- 1 cup (eg, paper, plastic or polystyrene) with small holes in the bottom (see 'Preparation')

  Note: This cup will also be used in Lesson 4.
- 1 bottle of water (eg, 500 mL–1 L)

Preparation

- 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.
- Punch small holes with a tool, for example, a skewer, in the bottom of paper or polystyrene cups.
- Look for a range of surfaces in the playground, such as paved areas or areas covered with sand, soil, tanbark, grass or moss. Look for sloping areas or areas that are near a drain.

Lesson steps

1 Discuss students' experiences with rain, such as walking or driving in the rain, splashing in puddles, wearing a raincoat or using an umbrella or living in a drought. Introduce pictures or photographs, or share stories, that feature rainy settings.

2 Explain that students are going to work in collaborative learning teams to investigate what happens to rain falling on different surfaces.

If students are using these 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 badges to help them (and you) know which role each team member has.

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

3 Introduce an enlarged copy of 'Rain, rain' (Resource sheet 2) and read it through with the class. Explain that students will record their observations when they return to the classroom after their investigation.

4 Ask students to predict what might happen to water when it falls on different surfaces, such as:

- paving/bitumen
- sand
- soil
- tanbark
- grass
- sloping areas

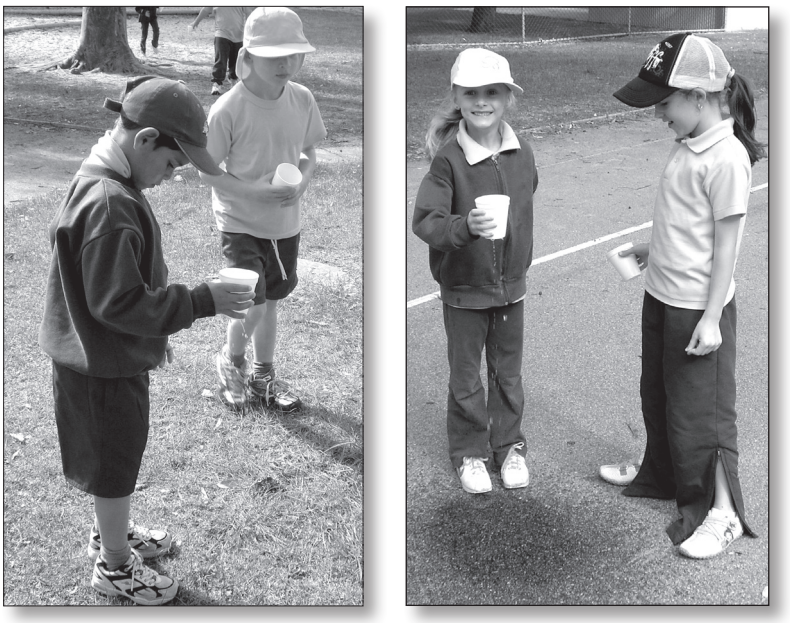
Record students' predictions in the class science journal.

Optional: Students record their predictions in their individual science journals.

5 Explain that teams are going to take turns to pour water from their bottle into their cup and observe what happens to the water when it falls on different surfaces. Discuss how they will take turns.

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

7 Go for a walk outside the classroom and allow teams time to investigate what happens when water falls on different surfaces.



Students investigating water falling on different surfaces

EXPLORE

8 Return to the classroom and allow time for earns to record their observations using 'Rain, rain' (Resource sheet 2).

9 Ask teams to share their observations and compare them with the predictions in the class science journal.

Use questioning and discussion to support students to analyse and interpret their observations, with questions, such as:

- What happened to the water that fell on the…(for example, grass, paving)?
- What happened to the water that fell on the sloped area?
- On which surfaces did the water…(for example, soak in, pool, run off, dry up)?

10 Discuss how the activity simulates what happens when it rains, for example, it soaks in or runs off, by using questions, such as:

- **Soak in:** 'What do you think happens to the rain that soaks into the ground? Where does it go? Do you think we could collect this water and use it?'
- **Run off:** 'What do you think happens to rain that runs off? Where does it go? Do you think we could collect and use this water again?'

11 Update the word wall and the 'Wondering about water' wall with words and images.

Rain, rain

Name: _____ **Date:** _____

What happens when water falls on different surfaces? Investigate and record your observations.

Surface tested	What happened?

 ISBN 978 0 85847 312 6

Session 2 Ground water

Equipment

FOR THE CLASS

- class science journal
- word wall
- 'Wondering about water' wall
- transparent container (eg, clear 2 L plastic bottle with neck cut off)
- 1 cup washed coarse gravel (eg, 1–2 cm diameter pieces)
- food colouring
- container (eg, jug, bottle or watering can) filled with coloured water
- long eye-dropper or plastic syringe

EXPLORE

Preparation

- Put washed gravel into the transparent container.
- Add food colouring to a container filled with water.

Lesson steps

1 Review the previous lesson and students' observations of what happened when water fell on different surfaces. Explain that in this lesson students are going to observe what happens to water that has soaked into the ground.

2 Slowly pour coloured water over the gravel in the transparent container. Ask students to observe where the water goes, for example, 'To the bottom of the container'.

3 Discuss how the activity models the formation of ground water. Ask students, 'How is this like rain that falls to the ground and soaks in?'

Ask students how water could be retrieved from under the ground, such as dig a well and use buckets to pull the water up, use a bore to pump the water up.

4 Demonstrate how the water can be retrieved using a long eye-dropper or plastic syringe.

5 Discuss how using an eye-dropper or syringe to collect ground water simulates processes that happen in real life. Discuss terms such as 'ground-water pump' and 'bore' or 'well'.

6 Update the word wall and the 'Wondering about water' wall with words and images.

Curriculum links

Science

- Investigate the ability of different soil types to retain water, for example, plan and conduct a fair test: 'Which type of soil holds the most water?'

Mathematics

- Study measurement of liquids, such as volume and capacity. Explore conservation of liquid, for example, using different-sized and different-shaped containers.

The Arts

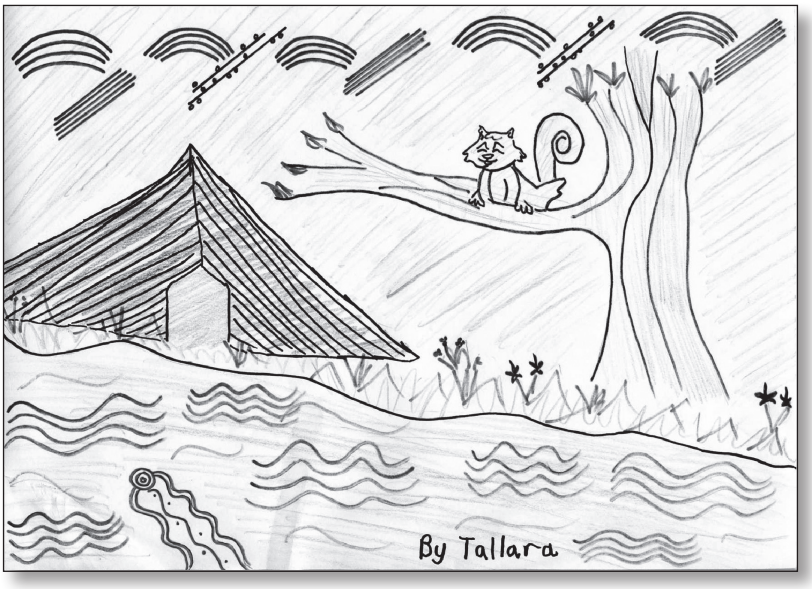
- Create mobiles using rainy-day shapes, such as rain drops, clouds, umbrellas.
- Create rainy weather scene artworks, such as drawings, paintings or collages.

Indigenous perspectives

Read stories about different people and their reactions and preparations when rains come, for example, the Indigenous story *Big Rain Coming*. (Germein, K. (1999). *Big Rain Coming*. New York: Clarion Books.)

- Explore symbols used to represent water and water sources, for example, in Indigenous art. Create a picture using some of the symbols.

  See: www.aboriginalartstore.com.au/aboriginal-art-culture/aboriginal-symbols-glossary



Work sample using indigenous art symbols

- 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 Go with the flow

EXPLORE

AT A GLANCE

To provide students with hands-on, shared experiences of exploring the movement of water across the landscape.

Students:

- discuss the movement of water
- use a model to represent the movement of water across the landscape
- discuss how water moves across the landscape and can be contained in a dam.

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, for example, 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:

- how water is transferred and stored, and using science ideas when making decisions about caring for the environment, such as using dams to prevent flooding. You will also monitor their developing science inquiry skills (see page 2).

Key lesson outcomes

Science

Students will be able to:

- follow directions to conduct an investigation
- make and share observations about the movement of water
- identify rivers, dams and reservoirs as places where rainwater collects.

Literacy

Students will be able to:

- follow instructions to make a model
- use language to report observations of the movement of water across the landscape
- create a labelled diagram to represent a model.

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

Teacher background information

An area of land that collects rainwater and run-off is called a catchment. The rain that falls in a catchment runs off into creek and river systems. If a barrier such as a dam is put across a river, water pools behind it to form a reservoir. This becomes the water that people drink and use in their homes, schools and workplaces. Water for towns and cities can also be taken directly from rivers.

Water naturally flows downhill. Reservoirs that store water for towns and cities are placed on high ground so that gravity pulls the water down through the pipes. Water that leaves the reservoir is piped to a water treatment plant where it is purified, filtered and disinfected, so it is safe to drink. The amount of water treatment needed can differ between areas and depends on factors such as the condition of the catchment and the levels of bacteria and other micro-organisms in the water.

After treatment, the water is piped into large storage tanks. From these tanks, it is pumped through underground pipes called water mains to homes, schools and businesses. Pipes also transport water to taps in different areas of a building, such as the bathroom, kitchen or laundry and to outside areas, such as gardens, pools or fish ponds.

In some places, people collect rain directly off their roofs and store it in rainwater tanks. Pipes are used to bring the water from tanks to taps inside the house and also to taps in the garden. In other places, people pump ground water into storage tanks and then use pipes to bring the water to their homes.

Equipment

FOR THE CLASS

- class science journal
- word wall
- team roles chart
- team skills chart
- 'Wondering about water' wall
- bucket filled with water
- sand or sandpit
- food colouring (eg, dark colour)
- *optional:* digital camera

FOR EACH TEAM

- role wristbands or badges for Manager and Speaker
- each team member's science journal
- access to sand/sandpit
- 1 cup or bottle (eg, 500 mL) of dark-coloured water
- 1 cup (eg, paper, plastic or polystyrene) with small holes in the bottom (from Lesson 3)
- *optional:* 1 rectangular container (eg, 1–2 L capacity) to build model in
- *optional:* 8 toothpicks and small pieces of paper

Preparation

- *Optional:* Practise making a model out of sand and spooning the coloured water onto the surface.
- Add dark food colouring to a bucket of water.

Lesson steps

1 Review the previous lesson using the class science journal and the 'Wondering about water' wall.

2 Brainstorm the places students think rainwater goes after it falls to the ground. Accept all answers and record students' ideas in the class science journal.

3 Explain that students will be working in collaborative learning teams to make a model landscape. Model using a spoon to create a hill out of sand, for example, in a corner of the container or sandpit. Model using the remaining sand to cover the base of the container.

Explain that teams are going to take turns to tip water over their hill, for example, using the cups with holes they used in Lesson 3, and observe what happens to the water.

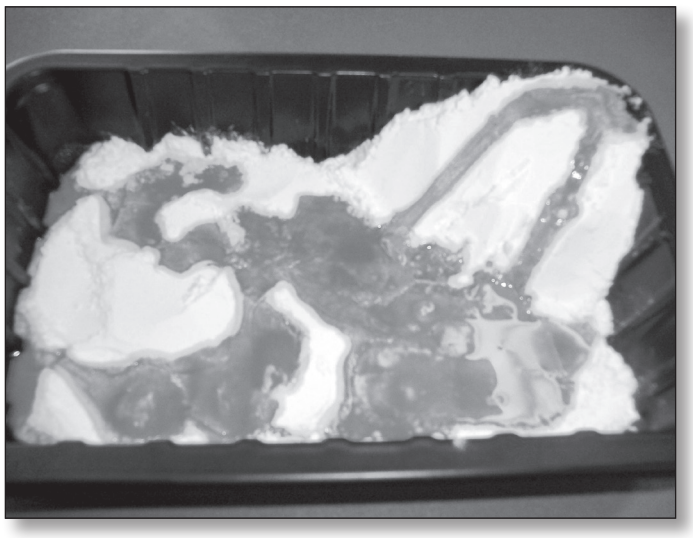
4 Form teams and allocate roles. Ask Managers to collect team equipment.

5 After teams have prepared their landscape, direct students to take turns to slowly pour the coloured water into the cup with holes and let it fall onto the top of the hill, like gently falling rain.

Student pouring water onto model landscape

6 Make the link between the materials used in the model and the phenomena or landforms that they represent, for example, 'The sand is like the land surface. It represents the hills, ridges, gullies, valleys and plateaus in the landscape. The coloured water represents rain. Rainwater soaks in, dries up or runs off and becomes the water that makes channels, rivers, streams, pools, swamps and lakes.'

Ask teams to describe the landforms in their model and the processes that are occurring.



Model representing the movement of water across the landscape

7 Ask teams to look at their model and consider what would happen if there was a barrier built across one of the rivers to hold back water. Assist students to develop their understanding of a dam as an artificial barrier used to protect areas from flooding or to store water.

Ask students where they would build a dam to collect water, for example, at the bottom of slopes, in a valley where water runs down and can be contained. 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.

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

Optional: Students create labels for their models using toothpicks and paper. Photograph the labelled models for inclusion in individual science journals.

8 Demonstrate drawing a labelled diagram of the processes depicted in the model, such as rainfall, run-off, channel, river and dam formation. Ask students to suggest names and labels for the parts.

9 Update the word wall and the 'Wondering about water' wall with words and images.

Curriculum links

Science

- Display and discuss images of water as it is found in different locations and as part of different environments, such as in lakes, in icebergs and in rivers.
- Research and read about the role of water in various environments, such as the river, the ocean, the desert.

'Water is found in many places' classroom display

Indigenous perspectives

- PrimaryConnections 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 PrimaryConnections website (www.primaryconnections.org.au).

Lesson 5 My water story

AT A GLANCE

To support students to represent and explain their understanding of sources of water and how it is collected, transported, accessed and used, and to introduce current scientific views.

Students:

- role-play the journey of water from a source to a point of use
- create a storyboard that represents the journey of water.

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:

- how water is collected, how it is transferred from its source to its point of use, how it is used and sourced, and how science involves asking questions. You will also monitor their developing science inquiry skills (see page 2).

Key lesson outcomes

Science

Students will be able to:

- represent stages in the journey of water from a source to a point of use.

Literacy

Students will be able to:

- use language and gestures to model the water supply system
- organise and annotate images to represent the water supply system
- 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).

Equipment

FOR THE CLASS

- class science journal
- word wall
- 'Wondering about water' wall
- 1 enlarged copy of 'My water story' (Resource sheet 3)
- *optional:* CD player and 'watery music' CD

FOR EACH STUDENT

- science journal
- 1 copy of 'My water story' (Resource sheet 3)
- *optional:* access 'My water story' images from the *Water works* unit section of the PrimaryConnections website at: www.primaryconnections.org.au

EXPLAIN

Preparation

- Prepare an enlarged copy of 'My water story' (Resource sheet 3).
- *Optional:* Display 'My water story' (Resource sheet 3) on an interactive whiteboard. Check the PrimaryConnections website to see if an accompanying interactive resource has been developed (www.primaryconnections.org.au).

Lesson steps

1 Review the class science journal entry from Lesson 2, including photographs taken during the water walk recording the different ways water is used and accessed at school.

Discuss students' experiences in the previous lesson of creating a model of what happens when it rains.

Discuss how water flowing from the taps at school once fell as rain.

2 Brainstorm the stages that the water might have gone through on its journey to the tap and record students' ideas in the class science journal. Distinguish between surface water and ground water sources of water. For example, surface water falls as rain, flows over land into creeks and rivers, is stored in a dam, passes through a treatment plant, travels down a series of pipes and comes out of a tap. Ground water falls as rain, soaks into the ground, is pumped from under the ground, passes through a treatment plant, travels down a series of pipes and comes out of a tap.

3 Ask a group of volunteers to role-play the different stages in the water supply system for surface water, and a second group to role-play the system for ground water. Discuss the purposes 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 As a class, role-play the water supply system using sounds and movements to represent the different stages discussed in Lesson step 2.

Optional: Use a 'watery music' CD to provide a background for students.

Optional: Perform the role-play for an audience.

5 Explain to students that they are going to represent their ideas about the stages in the water supply system by arranging pictures to create a storyboard in their science journal.

6 Introduce an enlarged copy of 'My water story' (Resource sheet 3). Discuss the purpose and features of a storyboard.

Literacy focus

Why do we use a storyboard?

We use a **storyboard** to show the important steps of a process in the order that they happen.

What does a storyboard include?

A **storyboard** includes a title and a series of drawings. Each step in the storyboard is numbered and includes a caption describing the step.

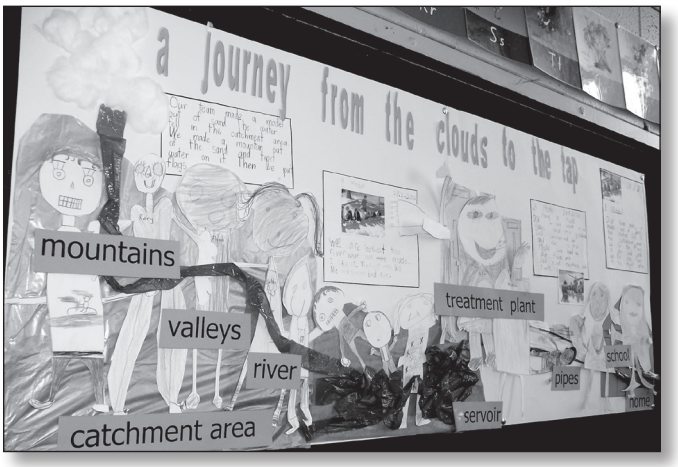
7 Provide each student with a copy of 'My water story' (Resource sheet 3) or access to the images electronically (see 'Equipment').

8 Ask students to order their storyboard before adding notes to describe what is happening in each picture. Encourage students to look at the word wall, the 'Wondering about water' wall and their science journals for support.

Organise for students to share their completed storyboards, for example, as an oral presentation to a small group or the whole class.

'My water story' storyboards presented as a flowchart

Optional: Students use their storyboards to create a presentation about the water supply system using computer and/or video technologies, for example, filming a news story.



'A journey from the clouds to the tap' classroom display

9 *Optional:* As students represent their ideas about the stages of the water supply system and features, such as rivers, lakes and dams, you might like to use simple factual texts to support them. Discuss the purpose and features of a factual text.

EXPLAIN

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.

Curriculum links

Information and Communication Technology (ICT)

Explore water pipes [includes spoken instructions], L18 (www.scootle.edu.au)

Explore water pipes [no spoken instructions], L202 (www.scootle.edu.au)

Students help Gecko to trace a city's water supply and disposal. They collect and test water samples from six locations: a dam, a water treatment plant, a pumping station, a house, a sewage treatment plant and a creek outfall. They then compare the water clarity and purity, matching the samples with their original locations.

Where does tap water come from? [includes spoken instructions], L19 (www.scootle.edu.au)

Where does tap water come from? [no spoken instructions], L203 (www.scootle.edu.au)

Students complete a click-and-drag jigsaw puzzle, which enables them to understand the water use cycle from the perspective of a household user in the country or in a city.

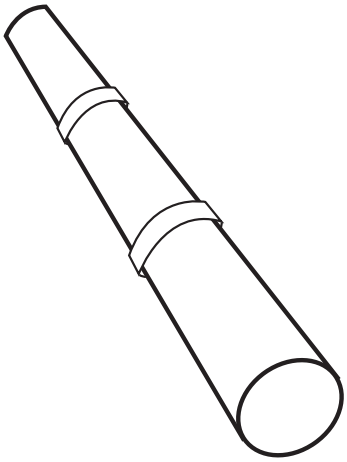
Indigenous perspectives

Invite local Indigenous community members to share their knowledge with students about local water sources. With permission, take photographs to add to the class science journal.

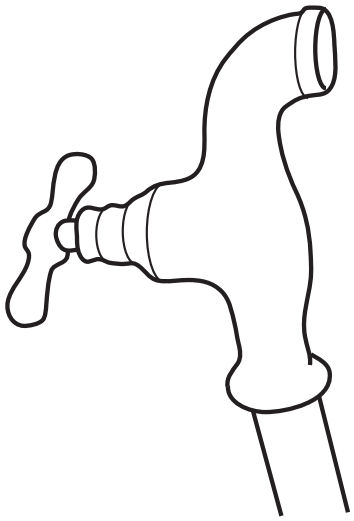
- Primary**Connections** recommends working with Aboriginal and Torres Strait Islander community members to access local and relevant cultural perspectives. Protocols for engaging with Aboriginal and Torres Strait Islander community members are provided in state and territory education guidelines. Links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

My water story

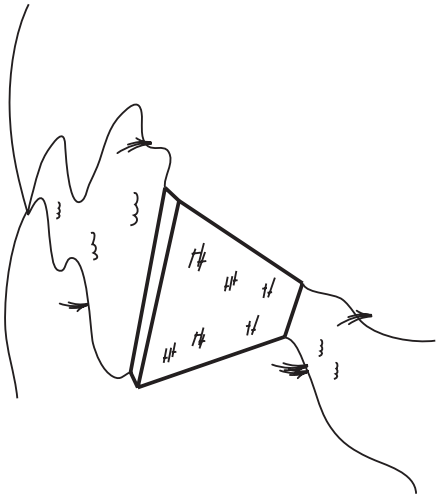
Name: _____ **Date:** _____



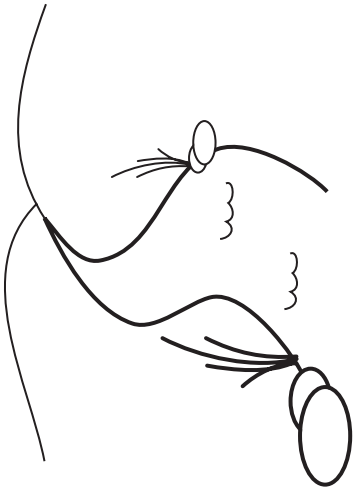
Pipes



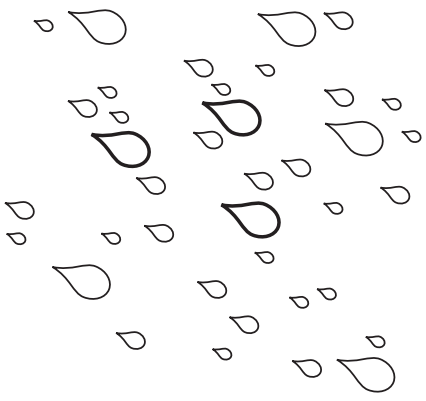
Tap



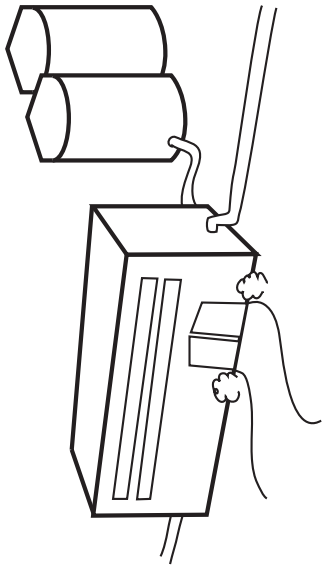
Dam



River



Rain



Water treatment plant

 ISBN 978 0 85847 312 6

Lesson 6 Investigating water use at home

AT A GLANCE

To support students to plan and conduct an investigation of water usage at home.

Session 1 Water detectives

Students:

- predict how water is used at home
- survey the patterns of water use at home
- record their observations.

Session 2 Graph it!

Students:

- share their observations
- create a class graph showing patterns of water use at home
- discuss and interpret their 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.

You are looking for evidence that the students understand:

- that water, one of Earth's resources, is used in a variety of ways in the home.

Key lesson outcomes

Science

Students will be able to:

- observe water uses at home
- record their observations about water uses
- share observations and contribute to the construction of a class graph
- identify patterns in a column graph to compare the frequency with which water is used for different purposes.

Literacy

Students will be able to:

- use oral, written and visual language to report observations and reflect on experiences of water use at home
- contribute to discussion to develop a class graph
- retrieve information from a graph.

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

Teacher background information

Uses of water at home include drinking, cooking, washing, cleaning, watering the garden and growing food.

Ways to use water responsibly in the home include:

- check and fix leaking taps and toilets
- turn off the tap while brushing teeth
- use water-efficient taps and shower heads and dual-flush toilets
- take shorter showers or shallower baths
- wait until the washing machine or dishwasher is full before using it
- keep a container of water in the refrigerator for drinking instead of running the tap until the water gets cool
- rinse fruit and vegetables in a half-full sink or a basin instead of under a running tap
- use a washing-up bowl and tip the water onto plants in the garden when you are finished.

Ways to use water responsibly in the garden include:

- check for leaking taps and hoses
- use tap timers to avoid over-watering
- water gardens in the cool of the morning or evening to reduce water loss through evaporation
- wash the car on the lawn using a bucket of water
- use a swimming pool cover to minimise water loss through evaporation
- use mulch and compost around plants to reduce evaporation and add nutrients to the soil
- use a broom, rake or blower to clean paths, patios and driveways
- select plants that are water-wise
- weed the lawn and garden beds regularly.

There are a range of science investigations with different structures and approaches to data collection. Each type of investigation provides opportunities to practise different approaches to the collection and analysis of data. In this unit, students have the opportunity to collect data using a survey and to represent and analyse data using a graph.

Session 1 Water detectives

Equipment

FOR THE CLASS

- class science journal
- 1 enlarged copy of 'Home water detectives' (Resource sheet 4)

FOR EACH STUDENT

- 1 copy of 'Home water detectives' (Resource sheet 4)

Preparation

- Prepare an enlarged copy of 'Home water detectives' (Resource sheet 4).
- *Optional:* Display 'Home water detectives' (Resource sheet 4) on an interactive whiteboard. Check the Primary**Connections** website to see if an accompanying interactive resource has been developed (www.primaryconnections.org.au).

Lesson steps

1 Review the class science journal entry from Lesson 2, including photographs taken during the water walk recording the different ways water is used around the school.

Explain that students are going to investigate how water is used at home.

2 Introduce an enlarged copy of 'Water detectives' (Resource sheet 4). Ask students to predict which of the school's water uses they think they will find in their own home.

Record their ideas in the class science journal.

3 Ask students to predict other uses for water that they might find at home. Record students' predictions in the class science journal.

4 Model how to complete 'Water detectives' (Resource sheet 4) using your home as a model, for example, 'My cat drinks water from her bowl in the laundry. Daniel washes the dishes in the kitchen sink. I wash the car on the grass in the front yard. We wash our hands in the bathroom.'

5 Explain to students that they will survey four places around the home. Explain that the information will be used to complete a class investigation about where water is used at home and how it is used.

SAFETY

Discuss the need for students to be careful while they are investigating, for example, avoid hot water, chemical containers, tools or appliances.

ELABORATE

6 Distribute 'Water detectives' (Resource sheet 4). Explain to the students that they can write and/or draw to record their findings.

7 *Optional:* Students create a simple map of their home and garden to record where water is used.

8 Inform students when the 'Water detectives' (Resource sheet 4) survey needs to be returned and ask them to record this date in the space provided.

Water detectives

Name: _____ **Date:** _____

In our science classes we have been investigating water, including how it is used. We are going to investigate four places at home and record examples of water use that we can find.

In each space, write or draw what the water is being used for and who uses it.

This resource sheet needs to be back at school on_____.

Initials

Place:

Initials

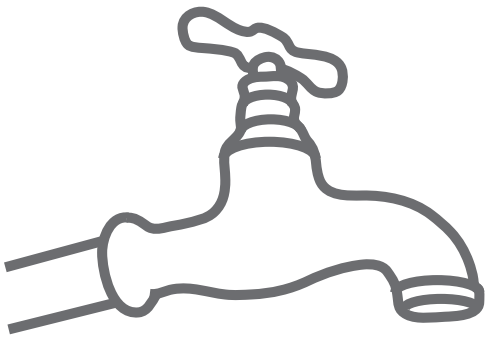
Place:

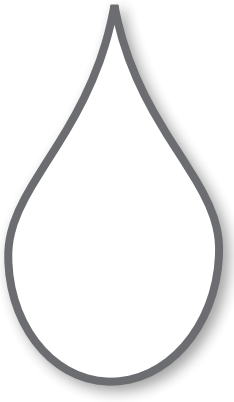
Initials

Place:

Initials

Place:





 ISBN 978 0 85847 312 6

Session 2 Water detectives

Equipment

FOR THE CLASS

- class science journal
- word wall
- 'Wondering about water' wall
- poster paper or cardboard to create a class graph

FOR EACH STUDENT

- completed 'Home water detectives' (Resource sheet 4)
- science journal

Lesson steps

1 Ask students to share the results of their 'Water detectives' (Resource sheet 4) survey with a partner. Ask students to discuss what findings they have in common, for example, 'We both have aquariums'.

2 Ask students to write their initials in each of the boxes on their completed 'Water detectives' (Resource sheet 4) survey, and cut along the dotted lines.

3 Explain that, as a class, students are going to organise their information in a graph.

Ask students to suggest how they can group their information as a class, according to activity categories, which you will decide on together. For example:

- cleaning, such as looking after people, animals, things
- cooking
- drinking
- gardening
- recreation.

4 Organise students to arrange information in columns on the poster paper or cardboard.

Note: The vertical axis is used to plot the units of measurement while the horizontal axis is used to plot the categories of information.

Discuss the purpose and features of a graph.

Literacy focus

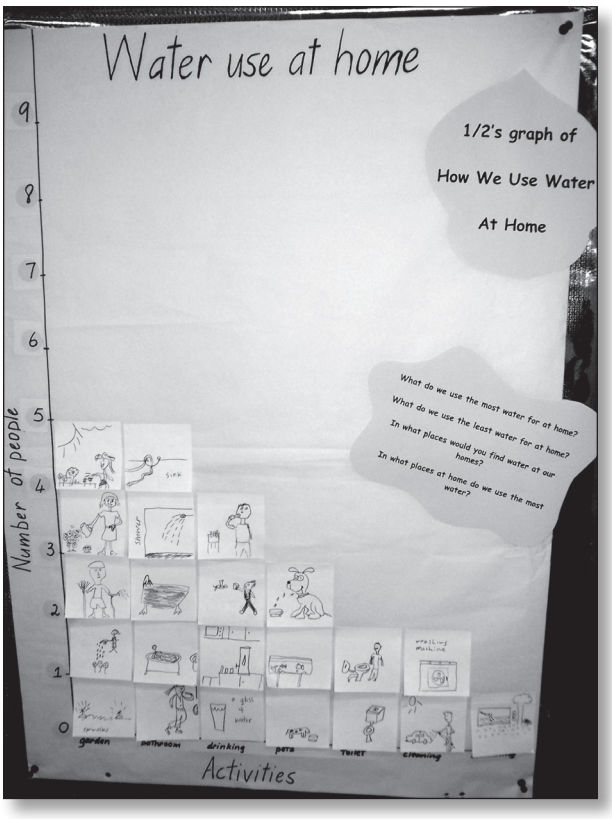
Why do we use a graph?

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.

ELABORATE



Sample graph of water use around the home

5 Model labelling the vertical axis of the graph with numbers, for example, from zero to the number of items in the tallest column. Count and record the number of responses in each group.

6 Discuss and record a name for the graph. Discuss and record titles for each axis, for example, 'Activities', 'Number of people'.

Note: The vertical axis (y axis) usually represents the thing (variable) we are measuring. The horizontal axis (x axis) usually represents the thing (variable) we change.

7 Use questioning and discussion to support students to analyse and interpret the information graphed with questions, such as:

- How many different ways did we use water as a class?
- How many homes use water to wash clothes? How many water plants? How many use water for drinking?
- Are there other ways that you use water at home that aren't on this graph?

8 Discuss examples of the ways students observed water being used responsibly or irresponsibly and being wasted.

9 Ask students to record statements in their science journals based on the discussion of the graphed data. This is an opportunity for students to compare their own and others' uses of water and identify actions that can be taken to conserve water. For example:

- Some of the ways we used water…
- We used most water to…
- Water can be saved by….

10 Update the word wall and the 'Wondering about water' wall with words and images.

ELABORATE

Curriculum links

Science

- Contact your local Water watch group (www.waterwatch.org.au) and ask for information about how students and their families can become involved.
- Research and read about water use and access in other parts of the world, such as Africa or India.

Intercultural understanding

- Research and read about the role and significance of water in the traditional and contemporary lifestyles of different people, including Indigenous peoples of Australia.

Lesson 7 Community water use

AT A GLANCE

To support students to plan and conduct an investigation of other people's use and management of water.

Session 1 Interview planning

Students:

- brainstorm questions and plan an interview with a guest speaker.

Session 2 Guest speaker

Students:

- interview a guest speaker
- recount events in their science journals.

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. Rubrics will be available on the website to help you monitor students' inquiry skills.

You are looking for evidence that the students understand:

- that water, one of Earth's resources, is used in a variety of ways, that people use water in their daily lives, and how it can be used responsibly by individuals, industries and organisations in the community.

Key lesson outcomes

Science

Students will be able to:

- describe how water is used by other people
- describe ways water is used responsibly by other people, industries or organisations in the community.

Literacy

Students will be able to:

- use oral language to inquire and clarify understanding through preparing and asking questions
- speak and listen in ways that enhance communication with others
- recount key ideas heard in an oral presentation.

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

Teacher background information

Water is essential for many industries and occupations. People who depend on water for their work use water meters, water quality monitoring, timers on hoses and sprinklers, strict pollution control measures, schemes for recycling water and regular checks for leaks or other damage to water infrastructure to manage water responsibly.

Industries that rely on water include:

- agriculture
- horticulture
- fishing
- mining
- manufacturing, including beverage production.

Other people whose jobs rely on water include:

- plumbers
- natural resource managers
- water treatment workers
- hydro-electricity workers
- tourism operators
- firefighters
- landscape gardeners.

Session 1 Interview planning

Equipment

FOR THE CLASS

- class science journal

FOR EACH STUDENT

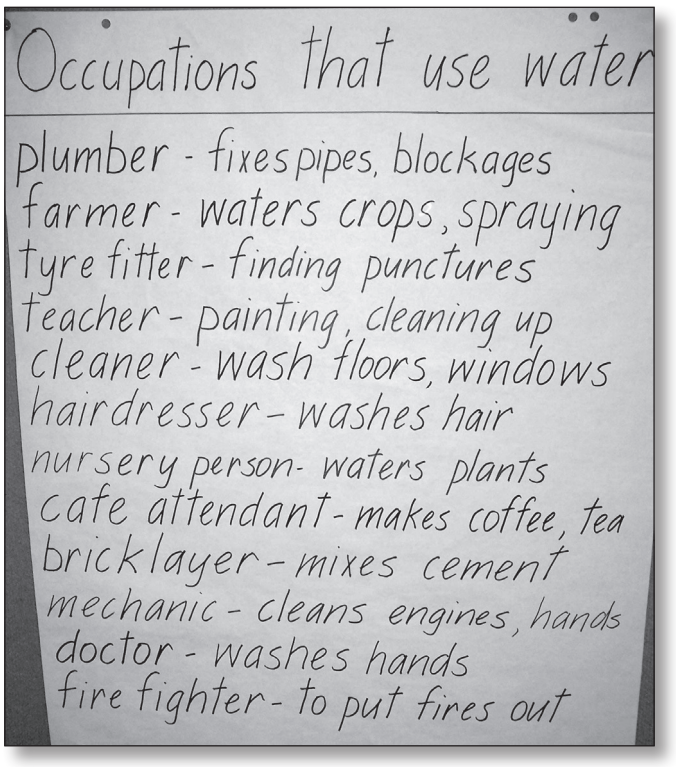
- paper to record questions

Preparation

- Organise a guest speaker to visit the class to be interviewed by the students. Ask them to prepare a brief presentation about their work and how they use and manage water responsibly.
- *Optional:* Organise an excursion to the workplace of a guest speaker.

Lesson steps

1 Ask how the class could find out more about ways to use and manage water. Brainstorm parents' occupations that involve using water.



Class brainstorm about the ways parents use water in their work

2 Discuss different forms of communication, such as writing a letter, sending an email, using the telephone or conducting a personal interview, to collect information about how water is used and managed in the community.

3 Invite a visitor, such as a plumber, farmer, gardener or representative from the local council or water board, to be interviewed by the class about how they use and manage water.

4 Discuss the purpose and features of an interview.

Literacy focus

Why do we use an interview?

We use an **interview** to collect information and opinions from someone.

What does an interview include?

An **interview** includes one or more people asking questions and one or more people answering them. It might take place face-to-face or over distance, such as by telephone or video link.

Brainstorm questions that students would like to ask the guest speaker about their use and management of water. Encourage students to ask a variety of open questions that avoid closed 'yes' or 'no' answers.

Record students' questions in the class science journal. Possible questions include:

- What is your job?
- How much water do you use?
- What do you use water for at work?
- Do you have to do anything special to the water that you use?
- Could you do your job without water?
- How do you use water responsibly?

5 Organise for students to record a question that they would like to ask the guest speaker. They can use this as a prompt during the interview. Provide students with time to practise asking their question, for example, with a partner.

Student with prepared interview question

6 Before the interview, model and practise appropriate oral communication skills, such as looking at the person you are speaking to and using appropriate voice volume and pace.

ELABORATE

Session 2 Guest speaker

Equipment

FOR THE CLASS

- class science journal
- word wall
- 'Wondering about water' wall
- *optional:* digital camera
- *optional:* video camera

FOR EACH STUDENT

- science journal
- prepared question from Session 1

Lesson steps

1 Introduce the guest speaker and support students to conduct the interview as planned by the class. Look for opportunities to model asking the guest follow-up and clarifying questions, for example, about technical language.

2 Organise students to thank the community member for their time.

3 *Optional:* Take photographs of the guest speaker's visit to assist students to recount the interview.

Demonstration of water use by a visiting hairdresser

4 Ask students to write and draw a factual recount about the guest speaker's visit, including new ideas that they learned from the interview. Discuss the purpose and features of a factual recount.

Literacy focus

Why do we use a factual recount?

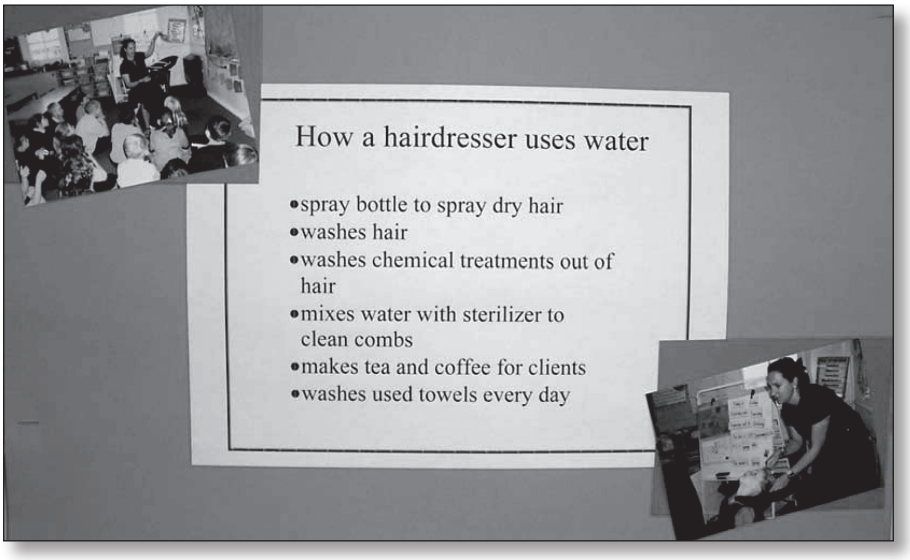
We create a **factual recount** to describe things that have happened to us. We can read a factual recount to find out about things that have happened to someone else.

What does a factual recount include?

A **factual recount** might include descriptions of how the writer felt and other people who were part of the events. It is often written in past tense.

This is an opportunity for students to compare their own and others' uses of water and identify actions that can be taken to conserve water. For example:

- One new/interesting thing I learned is…
- I use water for…and a (hairdresser) uses it for...
- A (hairdresser) can save water by…



Summary of the way a hairdresser uses water

5 Update the word wall and the 'Wondering about water' wall with words and images.

ELABORATE

Curriculum links

Science

- Organise an excursion to a local farm, dam, reservoir or water treatment plant.

  Note: Some states have age restrictions for visiting industrial sites such as water treatment plants.

History

- Discuss and research how people accessed and used water in the past, for example, houses have not always had bathrooms, washing machines and town/city water supplies. Interview older people to find out how they accessed and used water in the past.

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 8 Informative interviews

AT A GLANCE

To provide opportunities for students to represent what they know about water (one of Earth's resources) and how it is used in a variety of ways, and to reflect on their learning during the unit.

Students:

- review the unit by using the class science journal, word wall, 'Wondering about water' wall and other resources developed during the unit
- record and share their ideas about water in an interview
- 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:

- how water is used in a variety of ways, and how humans manage and protect water resources.

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:

- describe ways they and others use water
- identify the source of their water and how it is transported
- identify ways to use water responsibly.

Literacy

Students will be able to:

- use language to clarify their understanding and reflect on their experiences
- use language and visual representations to communicate their ideas
- speak and listen in ways that enhance communication with others.

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
- team roles chart
- team skills chart
- 'Wondering about water' wall
- *optional:* digital camera

FOR EACH TEAM

- role wristbands or badges for Manager and Speaker
- each team member's science journal
- each team member's copy of 'Wonderful water' (Resource sheet 1) from Lesson 1
- *optional:* 1 new copy of 'Wonderful water' (Resource sheet 1) per team member
- *optional:* cardboard for posters

Preparation

- Consider how you will organise this activity with your class, for example, roster three or four teams daily to practise and present their water interviews. You might consider conducting the interviews outside near a school water feature or place where water is used, for example, drink bubblers.
- *Optional:* View television talk-show style interviews, for example, from the ABC's *Behind the News*.

Lesson steps

1. Review the class science journal, the word wall, the 'Wondering about water' wall and the class graph.
2. Remind students of the interview they participated in during Lesson 7 and explain that students are going to work in collaborative learning teams to role-play an interview to show how much they know and have learned about water. Explain that both team members will have a turn to be the interviewer and the interviewee.

3 Explain that students will collaboratively write questions and answers, and practise the presentation before they present their interviews to the class, for example, in a talk-show format. Explain that students might participate in the interview as themselves or they might take on the identity of another water user, for example, the guest speaker from Lesson 7 or another water user they know.

4 Discuss the type of information that teams might include as part of their interview, such as:

- Where does water come from?
- What is water used for?
- Who or what uses water?
- How do you use water responsibly?

Optional: Provide students with a new copy of 'Wonderful water' (Resource sheet 1) to record their answers. Students could cut the sheet into four prompt cards for their interview presentation.

Optional: Students create posters, for example, about the responsible use of water, and use their journals and other resources from the unit as a backdrop to set the scene for the interview presentations.

5 Review and practise oral communication skills, such as looking at the person you are speaking to and using appropriate voice, volume and pace.

6 Form teams and allocate roles. Arrange for students to prepare, practise and present their interviews.

Optional: Record interviews using computer and/or video technologies, such as photograph or film the interviews.

7 Remind students of the 'Wonderful water' (Resource sheet 1) activity that they did at the beginning of the unit. Explain that they are going to review or repeat the activity to see how their ideas have changed and developed during the course of the unit.

Explain that it is an opportunity for students to show you and themselves how much they have learned about water.

8 Return students' initial 'Wonderful water' (Resource sheet 1) resource sheets to annotate (in a different colour) to show their new or changed ideas, or provide them with a new copy of the resource sheet, which they can complete and then compare with their initial ideas.

9 Ask students to use their science journals, their interview plans and their 'Wonderful water' (Resource sheet 1) to reflect on the most interesting or important things they have learned about water during the unit.

Review students' experiences of working in a collaborative learning team and performing in roles.

Use questions to help students summarise and clarify their ideas, such as:

- What new things have you learned about water?
- What ideas have you changed?
- What ideas do you know more about?
- What activities helped you to change your ideas?
- What activities helped you to learn new things?

10 Record students' ideas in the class science journal.

EVALUATE

Appendix 1
How to organise collaborative learning teams (Foundation–Year 2)

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.

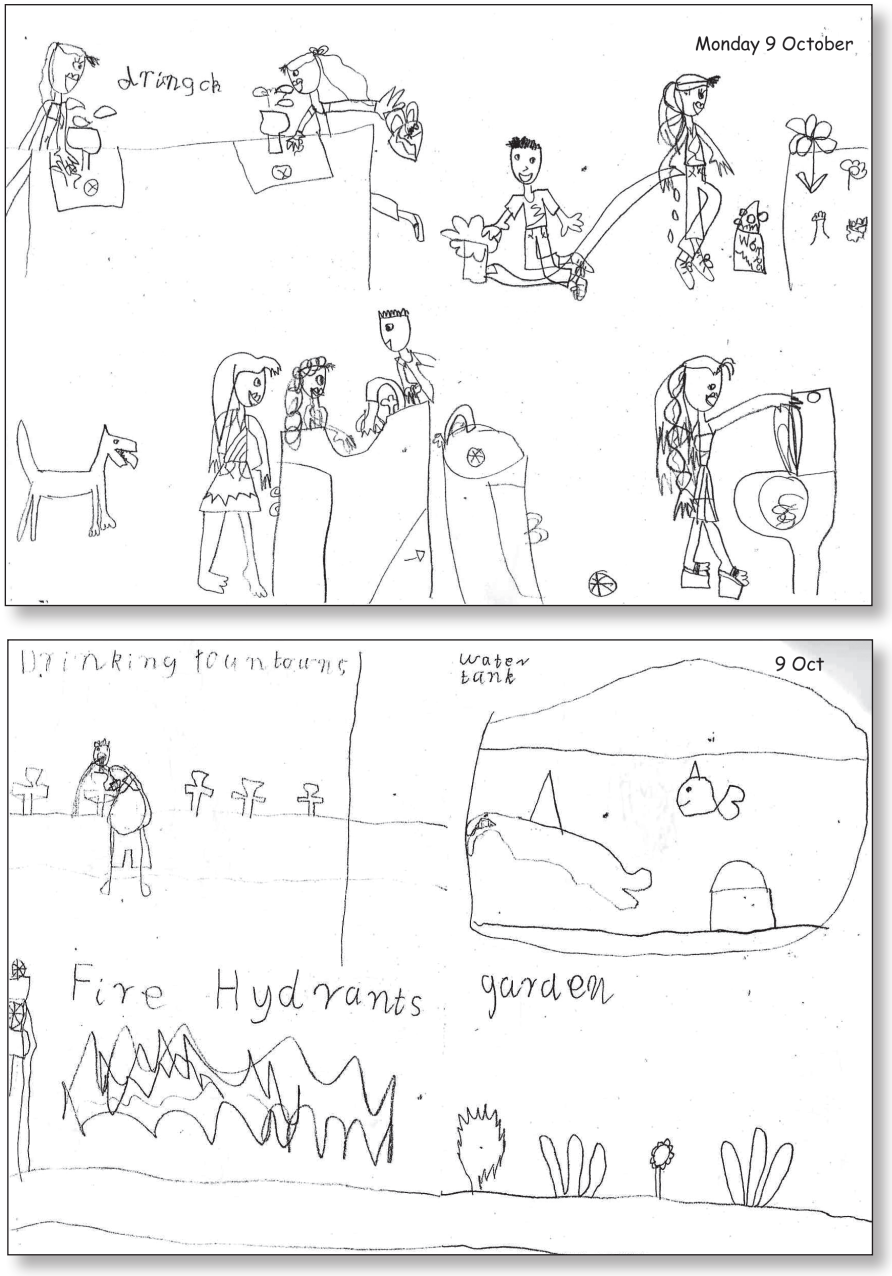
Using a science journal

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 year levels 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.



***Water works* science journal**

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.

Creating a class word wall, including words from different dialects and languages, aligns to descriptions in the Australian Curriculum: English. See page 7.

Goals in using a word wall

A word wall can be used to:

- support science and literacy experiences of reading, viewing, writing and speaking
- 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.

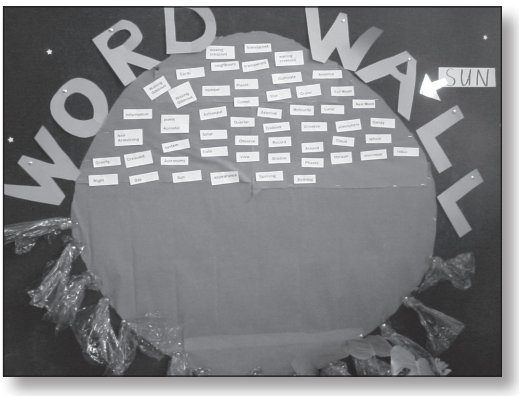
Choose robust material for the word cards. Write or type words on cardboard and perhaps laminate them. Consider covering the wall with felt-type material and backing each word card with a self-adhesive dot to make it easy for students to remove and replace word cards.

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.

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 *Water* works unit might be organised under headings, such as ‘Uses of water’ and ‘Sources of water’

Invite students to contribute words from different languages to the word wall. Group words about the same thing, for example, for the same surface type, 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.

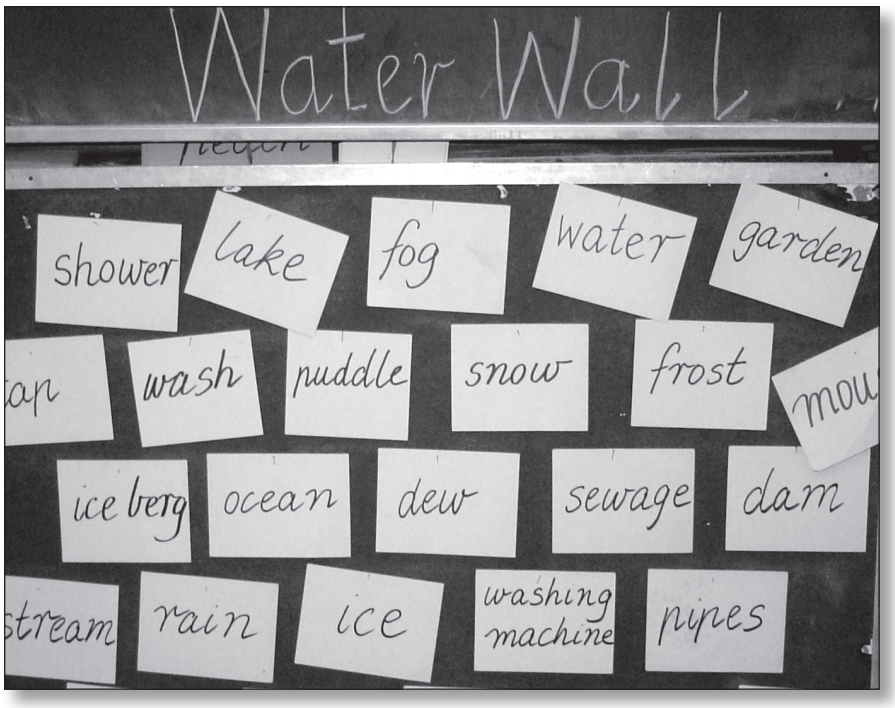
***Schoolyard safari* word wall**



***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.



***Water works* word wall**

Appendix 4
Water works equipment list

EQUIPMENT ITEM	QUANTITIES	LESSON	1	2	3	3	4	5	6	6	7	7	8
		SESSION			1	2			1	2	1	2	
Equipment and materials													
bucket, filled with water	1 per class						●						
containers and cups													
– container (eg, jug, bottle or watering can) filled with coloured water	1 per class					●							
– container, rectangular (eg, 1–2 L capacity) *optional*	1 per team						●						
– container, transparent (eg, 2 L plastic bottle with neck cut off)	1 per class					●							
– containers (eg, jugs, bottles) filled with water	sufficient quantity per class		●										
– container, small (eg, clear plastic cup)	1 per student		●										
– cup (eg, paper, plastic or polystyrene) with small holes in the bottom	1 per team				●		●						
eye-dropper or plastic syringe	1 per class					●							
food colouring (eg, dark colour)	1 per class					●	●						
gravel, coarse and washed (eg, 1–2 cm diameter pieces)	1 cup per class					●							
paper													
– poster paper or cardboard	sufficient quantity for class graph or poster									●			●
– paper, small pieces optional	8 per team						●						
– paper, to record questions	1 per student										●		
sand or sandpit	for demonstration						●						
toothpicks *optional*	8 per team						●						
water	1 per team												
– water	sufficient quantity per class				●								
– water, bottle (eg, 500 mL–1 L)	1 per team				●								
– water, dark-coloured	1 cup or bottle per team						●						

EQUIPMENT ITEM	QUANTITIES	LESSON	1	2	3	3	4	5	6	6	7	7	8
		SESSION			1	2			1	2	1	2	
Resource sheets													
'Wonderful water' (RS1)	1 per student		●										●
'Wonderful water' (RS1), enlarged	1 per class		●										
'Rain, rain' (RS2)	1 per student				●								
'Rain, rain' (RS2), enlarged	1 per class				●								
'My water story' (RS3)	1 per student							●					
'My water story' (RS3), enlarged	1 per class							●					
'Home water detectives' (RS4)	1 per student								●	●			
'Home water detectives' (RS4), enlarged	1 per class								●				
Teaching tools													
class science journal	1 per class		●	●	●	●	●	●	●	●	●	●	●
role wristbands or badges for Manager and Speaker	1 set per team				●		●						●
team roles chart	1 per class				●		●						●
team skills chart	1 per class				●		●						●
student science journal	1 per student		●	●	●		●	●		●		●	●
'Wondering about water' wall	1 per class		●	●	●	●	●	●		●		●	●
word wall	1 per class		●	●	●	●	●	●		●		●	●
Multimedia													
CD of 'watery' music *optional*	1 per class							●					
CD player *optional*	1 per class							●					
digital camera *optional*	1 per class			●	●		●					●	●
internet access *optional*	1 per class							●					
video camera *optional*	1 per class											●	

Appendix 5
Water works unit overview

		SCIENCE OUTCOMES*	LITERACY 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** Wondering about water	• observe and describe water • identify uses of water • identify a source of water • describe ways to use water responsibly.	• use talk to report on observations and reflect on their experience of water • record their personal experience of water.	• use their senses to describe water • record and share their ideas about water • discuss their ideas and questions for the class 'Wondering about water' wall.	**Diagnostic assessment** • Science journal entries • Class discussions • 'Wondering about water' wall contributions • Word wall contributions • 'Wonderful water' (Resource sheet 1)

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

		SCIENCE OUTCOMES*	LITERACY OUTCOMES*	LESSON SUMMARY	ASSESSMENT OPPORTUNITIES
		Students will be able to:	Students will be able to:	Students:	
EXPLORE	**Lesson 2** Water walk	• make predictions about where water is used and accessed at school • observe and describe water uses and water access points around the school • identify examples of water being used responsibly or irresponsibly.	• contribute to discussions about water use at school • use oral, written and visual language to record and report observations of water use at school.	• explore the school to find evidence of water use • record their observations • share their observations.	**Formative assessment** • Science journal entries • Class discussions • 'Wondering about water' wall contributions • Word wall contributions • 'Water walk' observation record
EXPLORE	**Lesson 3** Rain, rain ***Session 1*** It's raining ***Session 2*** Ground water	• observe what happens to rain falling on different surfaces • observe rain soaking into and running off different surfaces • record and share observations.	• use language to reflect on experiences of rain • follow instructions to complete an investigation about the effect of rain on different surfaces • use language to record and report on observations of rain falling on different surfaces.	***Session 1*** **It's raining** • model what happens when it rains • investigate rain falling on a variety of surfaces • record and discuss observations. ***Session 2*** **Ground water** observe a ground water model.	**Formative assessment** • Science journal entries • Class discussions • 'Wondering about water' wall contributions • Word wall contributions • 'Rain, rain' (Resource sheet 2)

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

		SCIENCE OUTCOMES*	LITERACY OUTCOMES*	LESSON SUMMARY	ASSESSMENT OPPORTUNITIES
		Students will be able to:	Students will be able to:	Students:	
EXPLORE	**Lesson 4** Go with the flow	• follow directions to conduct an investigation • make and share observations about the movement of water • identify rivers, dams and reservoirs as places where rainwater collects.	• follow instructions to make a model • use language to report observations of the movement of water across the landscape • create a labelled diagram to represent a model.	• discuss the movement of water • use a model to represent the movement of water across the landscape • discuss how water moves across the landscape and can be contained in a dam.	**Formative assessment** • Science journal entries • Class discussions • 'Wondering about water' wall contributions • Word wall contributions • Labelled diagram
EXPLAIN	**Lesson 5** My water story	• represent stages in the journey of water from a source to a point of use.	• use language and gestures to model the water supply system • organise and annotate images to represent the water supply system • use scientific vocabulary appropriately in their writing and talking.	• role-play the journey of water from a source to a point of use • create a storyboard that represents the journey of water.	**Formative assessment** • Science journal entries • Class discussions • 'Wondering about water' wall contributions • Word wall contributions • 'My water story' storyboard • 'My water story' (Resource sheet 3). • Participation in role-play

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

		SCIENCE OUTCOMES*	LITERACY OUTCOMES*	LESSON SUMMARY	ASSESSMENT OPPORTUNITIES
		Students will be able to:	Students will be able to:	Students:	
ELABORATE	**Lesson 6** Investigating water use at home ***Session 1*** Water detectives ***Session 2*** Graph it!	• observe water uses at home • record their observations about water uses • share observations and contribute to the construction of a class graph • identify patterns in a column graph to compare the frequency with which water is used for different purposes.	• use oral, written and visual language to report observations and reflect on experiences of water use at home • contribute to discussion to develop a class graph • retrieve information from a graph.	***Session 1*** **Water detectives** • predict how water is used at home • survey the patterns of water use at home • record their observations. ***Session 2*** **Graph it!** • share their observations • create a class graph showing patterns of water use at home • discuss and interpret their observations.	**Summative assessment** of Science Inquiry Skills • Science journal entries • Class discussions • 'Wondering about water' wall contributions • Word wall contributions • 'Home water detectives' (Resource sheet 4)
ELABORATE	**Lesson 7** Community water use ***Session 1*** Interview planning ***Session 2*** Guest speaker	• describe how water is used by other people • describe ways water is used responsibly by other people, industries or organisations in the community.	• use oral language to inquire and clarify understanding through preparing and asking questions • speak and listen in ways that enhance communication with others • recount key ideas heard in an oral presentation.	***Session 1*** **Interview planning** • brainstorm questions and plan an interview with a guest speaker. ***Session 2*** **Guest speaker** • interview a guest speaker • recount events in their science journals.	**Summative assessment** of Science Inquiry Skills • Science journal entries • Class discussions • 'Wondering about water' wall contributions • Factual recount

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

		SCIENCE OUTCOMES*	LITERACY OUTCOMES*	LESSON SUMMARY	ASSESSMENT OPPORTUNITIES
		Students will be able to:	Students will be able to:	Students:	
EVALUATE	**Lesson 8** Informative interviews	• describe ways they and others use water • identify the source of their water and how it is transported • identify ways to use water responsibly.	• use language to clarify their understanding and reflect on their experiences • use language and visual representations to communicate their ideas • speak and listen in ways that enhance communication with others.	• review the unit by using the class science journal, word wall, 'Wondering about water' wall and other resources developed during the unit • record and share their ideas about water in an interview • reflect on their learning during the unit.	**Summative assessment** of Science Understanding • Science journal entries • Class discussions • 'Wondering about water' wall contributions • Word wall contributions • Role-play interview • 'Wonderful water' (Resource sheet 1)

* These lesson outcomes are aligned 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*
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