



year
2 Science
For the Australian
Curriculum

Water:
Learn it for life!

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Wonder of water

Introduction

Water plays an essential role in the daily life of living things. It can easily be taken for granted as a limitless resource by those who live with a plentiful supply. Years of water restrictions due to climate and weather factors have made us aware that water is a finite and precious resource.

In an Early Years context, the unit 'Wonder of water' allows students to use the inquiry process to explore the properties, uses and locations of water. They apply data from their observations and water audits to create posters to persuade others to use water wisely. Displaying these posters prominently in the school community and beyond will assist students and their communities to consider and understand reasons for reducing water usage.

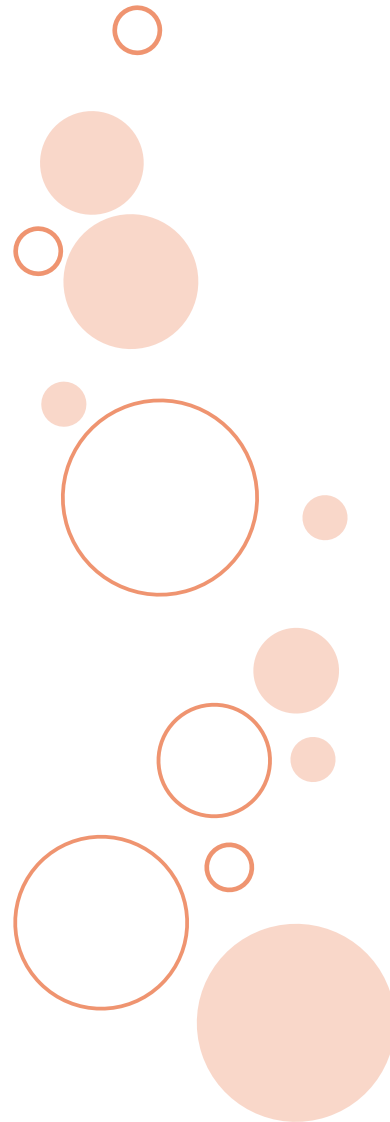
The unit title 'Wonder of water' is based on the definition of wonder as:

'The emotion aroused by something awe-inspiring, astounding, or marvelous'.

Source: <www.thefreedictionary.com/wonder>

The unit has been written to develop students' appreciation of water as an awe-inspiring and astounding resource and to help them understand that it is their scientific duty to promote its wise usage in their everyday lives.

If possible, organise to implement this unit in a term in which you are likely to receive rain.



Australian Curriculum links for this unit

This Year 2 unit aligns with the Australian Curriculum: Science which can be viewed at www.australiancurriculum.edu.au/Science/Curriculum/F-10.

❖ Science—Year 2

» Science Understanding

Earth and space sciences

- Earth's resources including water are used in a variety of ways (ACSSU032)

» Science as a Human Endeavour

Use and influence of science

- People use science in their daily lives, including when caring for their environment and living things (ACSHE035)

» Science Inquiry Skills

Questioning and predicting

- Respond to and pose questions, and make predictions about familiar objects and events (ACSI037)

Planning and conducting

- Participate in different types of guided investigations to explore and answer questions, such as manipulating materials, testing ideas and accessing information sources (ACSI038)
- Use informal measurements in the collection and recording of observations, with the assistance of digital technologies as appropriate (ACSI039)

General capabilities

- Literacy
- Numeracy
- Critical and creative thinking
- Ethical behaviour

Processing and analysing data and information

- Use a range of methods to sort information, including drawings and provided tables (ACSI040)
- Through discussion, compare observations with predictions (ACSI214)

Evaluating

- Compare observations with those of others (ACSI041)

Communicating

- Represent and communicate observations and ideas in a variety of ways, such as oral and written language, drawing and role play (ACSI042)

❖❖❖ Assessment

Assessment is an ongoing process throughout the unit. Diagnostic assessment occurs in the *Engage* phase as teachers assess students' prior knowledge and possible alternative conceptions. Formative assessment of students' ongoing development of understandings about water and their developing science inquiry skills occurs in the *Explore*, *Explain* and *Elaborate* phases. In the *Evaluate* phase, summative assessment occurs when students produce persuasive posters indicating their level of understanding of the need for wise water usage, and suggest viable ways of reducing water usage.

Opportunities for assessment in this unit include:

- participating in tasks
- contributing to word walls and TWLH charts
- collecting, organising and interpreting rainfall data
- creating a persuasive poster
- completing the Whizzy sorting task.

A TWLH chart has four columns: 'what we Think we know', 'what we Want to learn', 'what we Learned' and 'How we know'. It is used to:

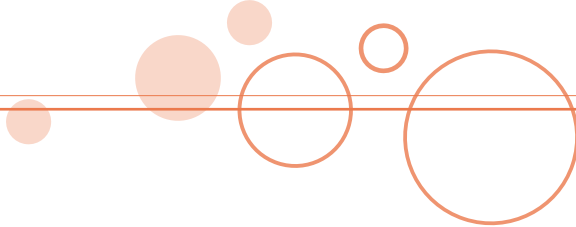
- elicit students' prior understanding
- identify questions students would like answered
- record learning as it occurs through the unit.

❖❖❖ Cross-curriculum priority: Sustainability

This unit provides a rich opportunity to discuss sustainable water management issues—particularly those related to students' local catchments. The issues relating to the organising ideas of Sustainability could include:

- properties of water
- uses of water
- how water can be recycled.

Awareness and understanding of sustainable water management issues encourage students to take action to address these issues. Enabling actions include the creation of persuasive posters with reasons for using water wisely.



❖ Cross-curriculum priority: Aboriginal and Torres Strait Islander histories and cultures

Aboriginal and Torres Strait Islander communities have a rich cultural connection to their waterways and seas. This sense of identity can be explored in this unit. Local community elders could be invited to share their stories—particularly those relating to water.

For ideas about how to develop partnerships with local Aboriginal and Torres Strait Islander communities go to the Department of Education and Training website <www.education.qld.gov.au>, select ‘Indigenous Education and Training’ and download the ‘Embedding Aboriginal and Torres Strait Islander Perspectives in Schools (EATSIPS)’ document. It includes information and additional links to assist with developing protocols for engaging Aboriginal and Torres Strait Islander community members.

The Queensland Studies Authority also provides useful support materials. Go to <www.qsa.qld.edu.au>, select ‘P-12 Approach’, ‘Indigenous perspectives’, ‘Support materials’, ‘Working with Aboriginal and Torres Strait Islander guest speakers’.

❖ Linking locally

Contact your local natural resource management specialists to gather locally relevant information about the ‘water story’ in your area. Invite them to speak to your class about their work. These experts could include:

- Council catchment or water resource management officers
- members of Landcare or catchment groups
- Department of Environment and Resource Management (DERM) or Regional Natural Resource Management (NRM) body staff
- parents and community members who rely on water in industry or commerce
- parents and community members involved in the provision of water-associated infrastructure, e.g. plumbers, the local water authority, and bore-drillers.

Unit overview

This unit is designed to address Australian Curriculum: Science descriptors for Year 2 for Earth and Space Sciences and takes approximately ten lessons to complete. It is designed using a 5 Es instructional framework (Bybee et al., 1989). Using the 5 Es instructional framework, learning is structured in five phases: *Engage*, *Explore*, *Explain*, *Elaborate* and *Evaluate*.

Engage

To capture students' interest and to discover their prior knowledge and understandings.

Lesson 1: Wondering about water

Students contribute their ideas and questions about water, and participate in a school-ground puzzle hunt to locate a special object related to water.

Explore

To participate in shared hands-on experiences that assist development of students' understanding about water.

Lesson 2: How much rain?

Students construct rain gauges and use them to measure rainfall.

Lesson 3: What can water do?

Students participate in tasks demonstrating the properties of water.

Lesson 4: Where is water used?

- Session 1—Water at school
Students observe and collect data about water points in the school.
- Session 2—Dripping taps
Students collect and measure the amount of water wasted by a dripping tap.

Lesson 5: Where does water come from?

Students explore and discuss a poster about the water cycle to develop understanding about water sources and water usage.

Explain

To develop explanations based on students' experiences in the Explore phase.

Lesson 6: Precious water

Students explore the Total Water Cycle Management poster and develop knowledge and scientific language about water and the water cycle.

Lesson 7: Water watchers

Students re-visit the school water audit and relate data from the audit to the possible implementation and consequences of water-saving and water-recycling strategies.

Elaborate

To consolidate and extend students' learning about water uses and the potential impact of a decrease in available water.

Lesson 8: Water users

- Session 1—Writing questions
Students prepare questions to ask when interviewing people whose work involves water use and management.
- Session 2—Our special visitor
Students interact with an invited guest by asking questions about water use.

Lesson 9: Water challenges

Students respond to hypothetical scenarios about the impact of reductions in the amount of available water.

Evaluate

To demonstrate what has been learnt and to review and reflect on students' learning

Lesson 10: Water carers

- Session 1—Persuasive posters
Students design and create persuasive posters to inform the school community about strategies for conserving water and reasons why water should be conserved.
- Session 2—What do we know?
Students complete a sorting task to demonstrate their knowledge about using water wisely.

❖ Bibliography

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Teaching and learning sequence

...❖ Engage

» Lesson 1: Wondering about water— A school-ground puzzle hunt

Lesson overview

In this lesson, students draw on their prior knowledge and then extend it to ‘wonder’ about water. They write questions about water and add them to their ‘wonder wall’. Students then participate in a puzzle hunt in the school grounds to find letter clues that lead to the location of a special gift related to water. After finding the gift that they will use during the unit, students return to the class and contribute water-related words when responding to questions about water.

A wonder wall is a dedicated wall space for students to post questions as they arise.

Lesson objectives

In this lesson students will:

- respond to and pose questions about water
- represent and communicate their ideas about water in a variety of ways, including oral and written language.

Equipment

For the class

- a commercial rain gauge wrapped as a gift
- other water-related objects such as a tap, water bottle, raincoat, picture of Whizzy the waterdrop, umbrella or piece of water pipe (optional)
- A3 map of the school grounds
- seven clue cards concealed at various water-related locations around the school
- seven A3 waterdrop shapes to use as part of a word wall—Resource 1
- TWLH chart

For each student

- post-it notes
- clipboard, paper and pencil

Preparation

Obtain a commercial rain gauge that students will use throughout the unit, and wrap the gauge as a gift.

Find other water-related objects or images to include with the rain gauge. Objects might include a tap, water bottle, raincoat, a picture of Whizzy the waterdrop, umbrella or piece of water pipe. Obtain or draw a map of the school grounds showing water-related places where the clues will be hidden. Places might include a water cooler, tree, hose, rainwater tank, sink, and water meter. Ensure that the final clue is a tree, because students won’t necessarily think of a tree as a water-related place unless they have additional clues.

Arrange to hide the clue cards and gift prior to the lesson and inform other staff members about the puzzle hunt so that clue cards remain in place until the activity is completed. Prepare clue cards that the class will follow to find the gift. Clue cards could include the number of paces between water points, landmarks close to the water point, description of features such as ‘the place where we get water to have a drink after sport’, ‘where teachers make a cup of coffee’, ‘the big shady tree where we shelter from the sun’ or ‘the hose in the school vegetable garden’. Each clue card needs a letter from the word ‘measure’ on the back of it. Prepare a clipboard for each student. Strong card could be used.

Enlarge the waterdrop shape (Resource 1) to A3 size to use in Lesson step 9, and prepare seven shapes with the following questions and headings:

- What do we use water for?
- Where do we use water?
- How can we use water wisely?
- Where does water come from?
- Where does rain come from?
- How can we save water?
- What else do we know about fresh water?

Decide whether step 9 will be done as a whole class or as a group activity and prepare accordingly.

The waterdrops with questions will be added to the 'wonder wall'.

Prepare a TWLH chart with the headings—'what we Think we know', 'what we Want to know', 'what we Learned', and 'How we know'.

Prepare a 'word wall' for new vocabulary and a 'wonder wall' for the students to display their questions about water—on the waterdrops—if relevant.

A TWLH chart is used to:

- **elicit students' prior understanding**
- **identify questions students would like answered**
- **record learning as it occurs through the unit.**

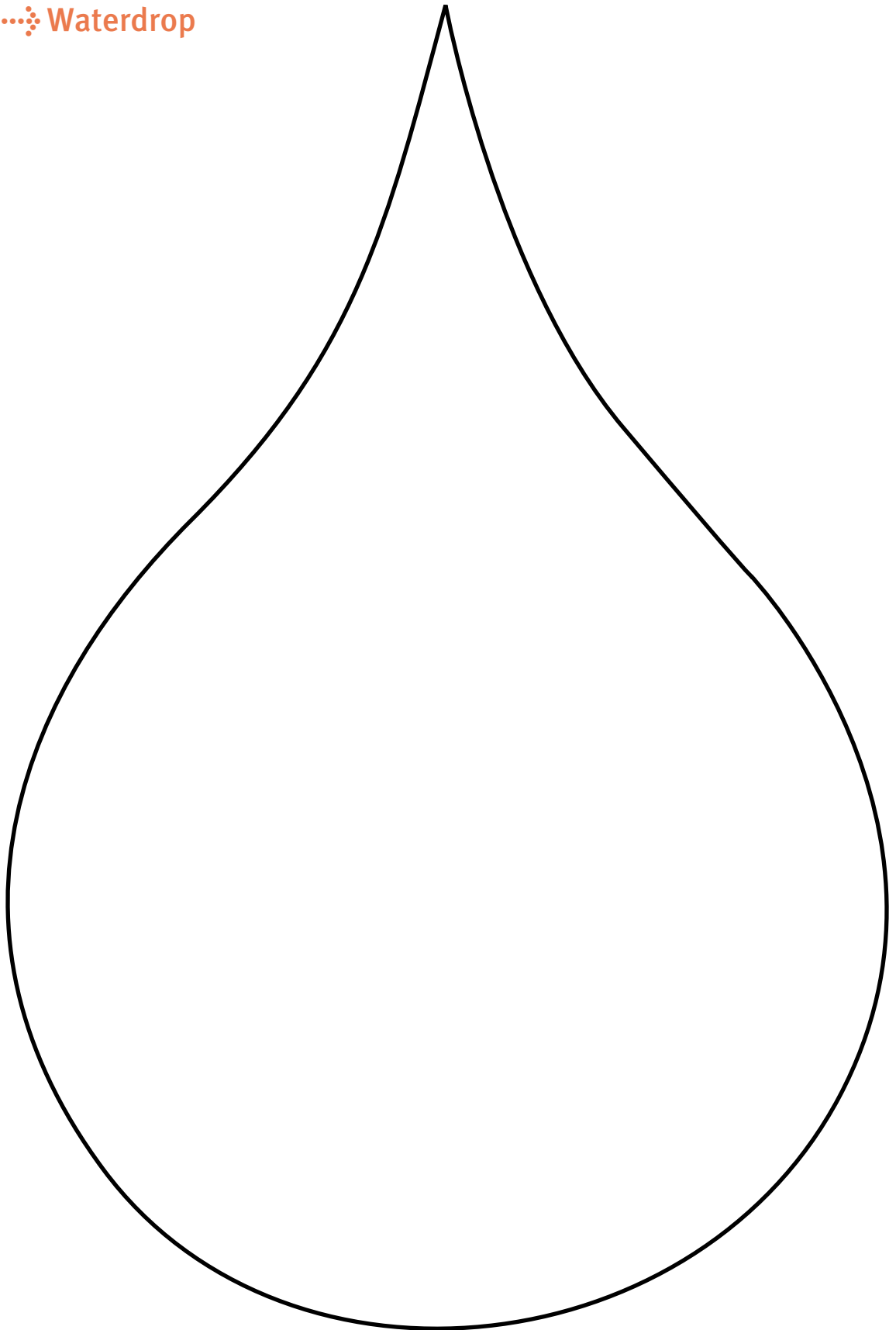
Lesson steps

1. Write the word 'vital' on the white-board and explain to the students that they will be learning about something vital—which means essential for life. At the end of the unit, they will tell other people about it by creating and displaying posters.
2. Brainstorm things that students think are vital—including food, air, shelter and water—and record students' responses. Depending on students' responses, it may be necessary to discuss things students suggest are vital but that they could survive without if they had to.
3. Explain to students that they will be learning about water. Give each student three post-it notes and ask students to write or draw an idea about water on each post-it note.
4. Ask students to share their ideas with the class and to place their post-it notes on the whiteboard. You might decide to group students' ideas according to the headings on the waterdrops that are introduced after the puzzle hunt, without explaining how you are grouping the ideas. Students could suggest how the words have been grouped to create an affinity diagram.
5. Show the students the map of the school and explain that they will be going on a puzzle hunt in the school grounds to find something special that they can use during the unit of work. Distribute the A3 map and clipboards to students.
6. Begin with the first clue. As students reach each clue, they mark it on the map so they can re-trace their journey. They can refer to the map throughout the unit. Ask students to write or draw the clue on their clipboard sheet and to think about why the clue has been included in the puzzle hunt. The final clue should be found near the tree. Collect the clue cards at each location to use in step 7.
7. When the gift—the water gauge—is discovered, take it to the classroom and discuss what it is and how it is used. Re-arrange the letters on the clue cards to make the word 'measure', and discuss the meaning of the word in the context of the rain gauge.
8. Display the map of the school grounds with the clues and route marked on it and ask students why they think each clue was included in the puzzle hunt. Add students' ideas to the post-it notes from steps 3 and 8 and display on the white-board.
9. Display the waterdrop shapes with questions on the wonder wall and ask students to help sort the post-it notes onto the waterdrops. Ask students to explain how they decided which post-it note belongs on a waterdrop.
10. Explain the TWLH chart and discuss and record what students think they know about water and what they would like to find out during the unit of work.

An affinity diagram is a very useful tool for organising student ideas after brainstorming.

Resource 1

❖ Waterdrop



❖ Explore

» Lesson 2: How much rain?

Lesson overview

In the previous lesson, students discussed what they think is vital for survival, then participated in a puzzle hunt to find a rain gauge. In this lesson, students devise reasons for and ways of measuring and recording rainfall, including using commercial rain gauges. Students work in groups to construct rain gauges from plastic bottles. They use their rain gauges and a commercial rain gauge to measure and record rainfall in the school grounds.

Lesson objectives

In this lesson students will:

- respond to and pose questions, and make predictions about familiar objects and events
- use informal measurements in the collection and recording of observations
- use a range of methods including graphs to sort and display information
- develop an understanding that people use science in their daily lives.

Equipment

For the class

- commercial rain gauge
- rainfall figures for a particular location for a twenty-four hour period
- permanent marker
- bottle rain gauge—500 mL
- 30 cm ruler
- clear adhesive tape

For each group

- plastic bottle, about 500 mL, with flat base if possible
- ‘Making a rain gauge’ resource sheet (Resource 2)
- 30 cm ruler or ‘Rainfall measuring strip’ (Resource 3)
- ‘Rainfall recording sheet’ (Resource 4)
- one permanent marker
- piece of modelling clay
- clear adhesive tape
- insulation tape to cover cut edges of bottles

Preparation

Cut plastic bottles at the place where the top begins to taper so that the top can be inverted like a funnel into the bottle. A variety of bottles could be used as rain gauges to emphasise the necessity of using a standard means of measuring the amount of rain collected, so that data are accurate and can be compared fairly. Alternatively, if resources and time are limited, construct one bottle gauge for the class. Place tape on cut sections to protect students from sharp edges.

If you can’t source a flat-bottomed plastic bottle, pour about two or three centimetres of sand or small pebbles into the bottle. Pour in enough water so that the water level is just above the level of the sand. (You may need to alter the instructions in Resource 2.)

Decide how you will stabilise the bottle. Decide on an open, convenient and safe location to place the rain gauges.

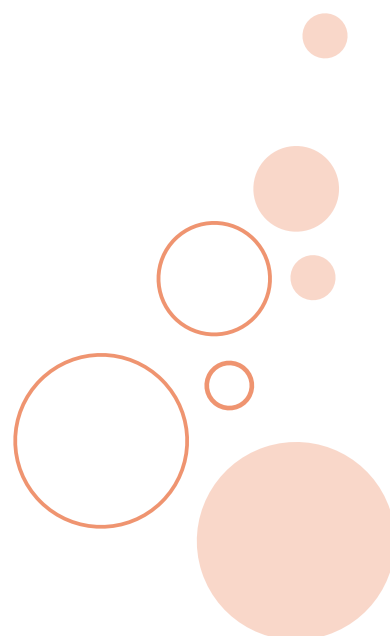
Lesson steps

1. Review the TWLH chart, map, waterdrops, wonder wall and word wall from Lesson 1 and remind students about the special gift they found on the puzzle hunt.
2. Ask students what they already know about rain gauges and measuring rainfall and why it is important to find out about the amount of rainfall. Add students' ideas to the TWLH chart.
3. Ask students to share experiences about measuring and recording rainfall and the use of rainfall data in the media, including weather reports, maps with rainfall figures, and maps showing weather predictions.
4. Show the students a pre-made plastic bottle rain gauge and the commercial rain gauge and ask students to discuss the similarities and differences between the two gauges.
5. Provide materials for each group to construct a rain gauge. Students work in groups and follow a procedural text to construct a rain gauge (Resource 2).
6. Ask students to suggest where they should place the rain gauges and how they can record the amount of rainfall so that it is easy to compare the amount of rain collected in the bottle gauge with the amount collected in the class gauge. Discuss why the rain gauge should be placed in an open area.
7. Refer to the map of the school from Lesson 1 for possible locations, and discuss the advantages and disadvantages of suggested places. Mark the position of the class rain gauges on the map of the school.
8. Show the students a 'Rainfall recording sheet' (Resource 4) and discuss how to use it to record rainfall data.

9. Set up the commercial rain gauge and bottle rain gauges and begin a recording sheet for each rain gauge. Allocate time each day—at the same time if possible—for students to read and record the amount of water in each gauge. Discuss the reasons why it is important to read the rain gauge at the same time each day.
10. Add new vocabulary, additional ideas and further questions to the word wall, wonder wall and TWLH chart.

Optional activity

Students can make and use their own rain gauge at home.



Resource 2

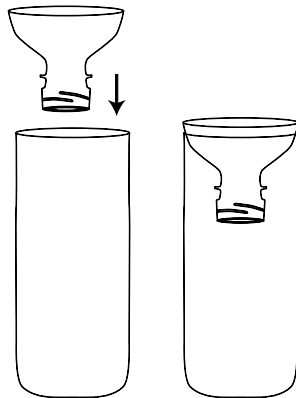
❖ Making a rain gauge

Materials

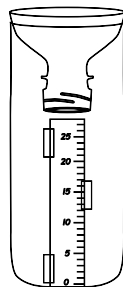
- 500 mL flat-bottomed plastic bottle with the top cut off
- top of the bottle to use as a funnel
- waterproof clear tape
- ruler or laminated measuring strip
- permanent marker

What to do

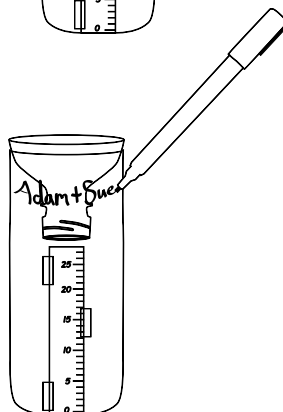
1. Place the funnel in the top of the bottle.



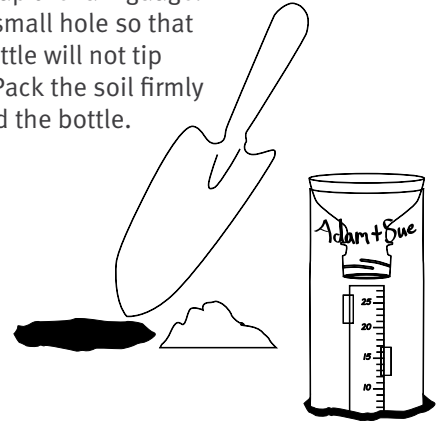
2. Tape the ruler to the side of the bottle, making sure that the '0' on the ruler is level with the base of the bottle.



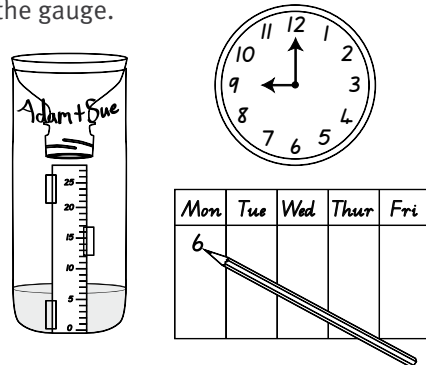
3. Use a permanent marker to write your names on the gauge.



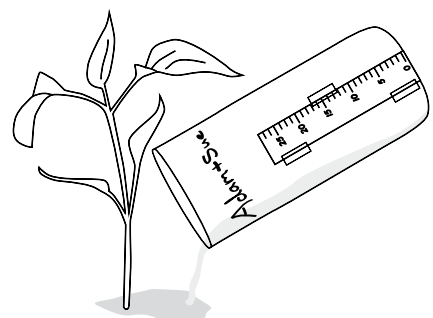
4. Decide on an open place to set up the rain gauge. Dig a small hole so that the bottle will not tip over. Pack the soil firmly around the bottle.



5. Check the rain gauge at the same time each day and record how much water is in the gauge.

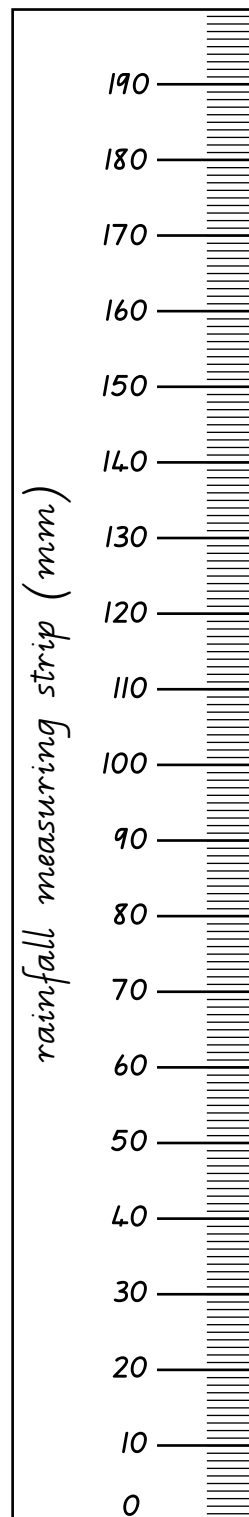


6. Empty the gauge each day after the amount of water is recorded.



Resource 3

❖ Rainfall measuring strip



Resource 4

☼☼☼ Rainfall recording sheet

[illegible]

❖ Explore

» Lesson 3: What can water do?

Lesson overview

In the previous lesson, students constructed rain gauges and began collecting data about rainfall using rain gauges. In this lesson, students participate in four tasks to develop an understanding of the properties of water, including how water can exist in the three states of matter—as a solid, liquid or gas. In each task, students will engage in the processes of predicting, observing and explaining.

Lesson objectives

In this lesson students will:

- respond to and pose questions about water
- participate in guided investigations to explore and respond to questions
- use informal measurements in the collection and recording of observations
- use a range of methods to sort information, including drawings and provided tables
- compare observations with predictions
- compare their observations with the observations of other students
- represent and communicate observations and ideas in a variety of ways.

Equipment

For the class

- kettle
- plastic jug
- enlarged copies of Resources 5, 6, 7 and 8

For each group

- three clear plastic cups
- three coloured ice cubes (same colour)
- ice cold water
- water at room temperature
- hot water
- clear plastic cup of water
- clear plastic cup of water with cordial
- brush
- container of water
- plain ice cubes
- piece of chalk
- copy of Resource 5: Temperature change
- copy of Resource 6: Heating water
- copy of Resource 7: Painting with water
- copy of Resource 8: Liquid to solid

Preparation

The activities can be organised in a variety of ways such as:

- activity stations
- students engaged in one activity at a time as a whole class
- students working with buddies from a higher year level.

Try the 'Temperature change' activity (Resource 5) prior to the lesson to find out what students might observe and how long the melting process might take.

SAFETY NOTE: Be aware of safety with water.

Ensure that students know that it is essential to report any spillages immediately. Any activity involving heating water should be done only by an adult, as a demonstration. Ensure the students are a safe distance from the hot water.

Refer to Resource 9 for additional information about the activities.

Begin organising the guest visit to the class in Lesson 9. Refer to Lesson 9 for more details.

Lesson steps

1. Review previous lessons including the TWLH chart, word wall, rainfall measurements and the questions and responses on the waterdrops on the wonder wall. Focus on what students think they know about water, particularly any ideas that they may have expressed about the properties of water.
2. Ask students whether they can think of anything special that water can do. Accept and record all responses, then ask students whether they think that water can change. Ask students to give evidence to support their responses; for example, 'if I put water in the freezer, the water will change from a liquid and become frozen or a solid'.
3. Explain to the students that they will be following directions to participate in activities to find out about water. Explain the procedure for each activity and add students' ideas to the first column of the TWLH chart.
4. Before they begin each activity, students predict what they think will happen and record their predictions using words and/or drawings. Students complete each activity and make and record observations.
5. For the 'heating water' demonstration, place the water in a plastic jug before it is poured into the electric jug and ask students to feel the water to find out whether it feels cold. A thermometer could be used to record the water temperature, before it is heated. As the water is heated, ask students to listen and watch for steam. Ensure students are a safe distance from the water as it is heating.
6. When the activities are completed, students discuss what they observed with the class and teacher.
7. Record students' observations and ideas on the TWLH chart and add new vocabulary, ideas and questions to the waterdrops on the wonder wall and word wall.



Learning about evaporation—see Resources 7 and 9 for other ideas

Resource 5

❖❖❖ Temperature change

Question 1:

What happens when you hold an ice cube in your hand?

What do you think is going to happen?

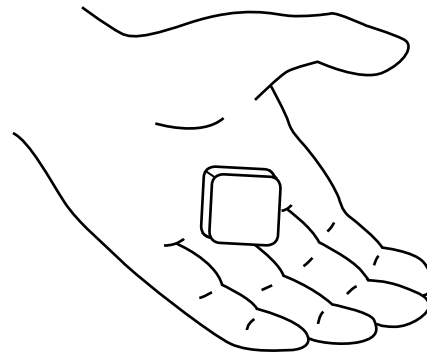
I think that _____

because _____

What happened?

I saw _____

I felt _____



My drawing of what happens

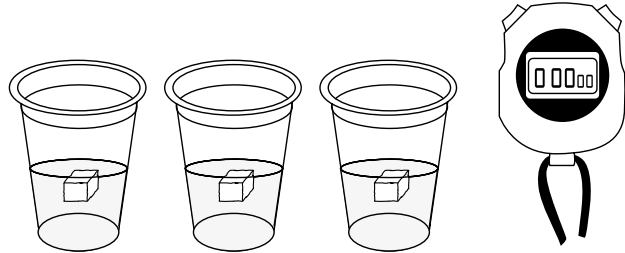
Resource 5 (continued)

Question 2:

What happens to the ice cube when we change the water temperature?

You need:

- 6 coloured ice cubes
- 3 transparent plastic cups
- ice cold water
- lukewarm water
- hot water
- stop watch (optional)



To make sure this is a fair test, look at all three cups at the same time.

What do you think is going to happen?

I think that _____

because _____

What happened?

I saw _____

I touched the plastic cups and _____

My drawing of what happens

Resource 6

❖ Heating water

Question: What happens to water when we heat it up?

You need:

- one kettle
- one plastic jug

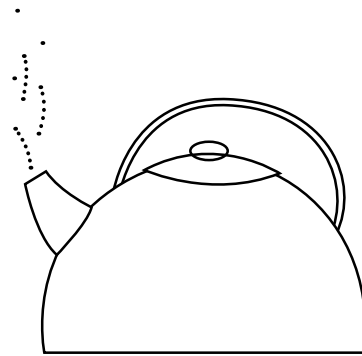
What do you think is going to happen?

I think that _____

because _____

What happened?

I saw _____



My drawing of what happens

Resource 7

❖ Painting with water

Question: What happens to the picture when we do a painting with water?

You need:

- one container for water
- one brush
- one piece of chalk
- art paper

Draw an outline of a picture with a piece of chalk and then colour it in with water.

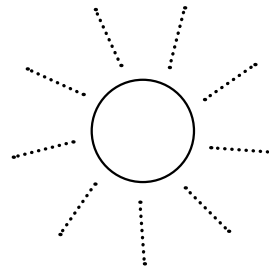
What do you think is going to happen?

I think that _____

because _____

What happened?

I saw _____



My drawing of what happens

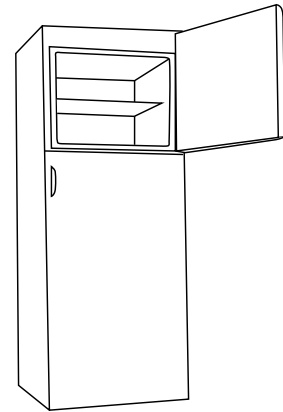
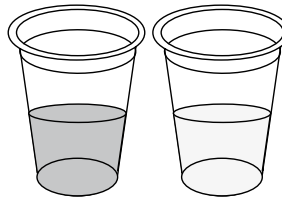
Resource 8

❖ Liquid to solid

Question: What happens to water and food colouring when we put it in a freezer?

You need:

- clear plastic cup of water
- clear plastic cup of water with food colouring
- access to a freezer



What do you think is going to happen?

I think that _____

because _____

What happened?

I saw _____

My drawing of what happens

Resource 9

❖ Additional information for teachers

Resource 5

What happens to the ice cube when we change the water temperature or place the ice cube in our hands?

Temperature change

An ice cube held in a hand will begin to melt, due to the difference between body temperature and the temperature of the ice cube.

A coloured ice cube will melt at varying rates when it is placed in very cold water, in water at room temperature, and in hot water.

Resource 7

What happens when we paint with water on a surface that is exposed to sunlight?

Painting with water

Although evaporation may be a difficult concept for students to comprehend, students may realise the effect of heat from the sun on the water. Students may be able to relate this to fabric drying in the sun.

To help develop students' understandings about evaporation, pour water onto a hard surface—for example concrete, metal or plastic—and draw around the outline of the puddle. Check at regular intervals and re-draw the outline each time to indicate changes in the size of the puddle as the water evaporates.

Resource 8

What happens when we place water in a very cold place?

Liquid to solid

Liquid water will turn into ice, which is classified as a solid. Students may be familiar with other liquids that become solids when placed in freezers or very cold places. This task could be extended by using water coloured with food dye or water with cordial.

❖ Explore

» Lesson 4: Where is water used?

Lesson overview

In the previous lesson, students participated in guided investigations to explore the properties of water. In Session 1 of this lesson, students identify places in the school grounds where water is used and add the places to the map used in Lesson 1. In groups, students participate in a school water audit in a specific place to determine how much water is being used, and for what purposes.

In Session 2, students observe and record data about a dripping tap to develop and consolidate understandings about water usage and possible wastage.

Lesson objectives

In this lesson students will:

- respond to and pose questions about water
- participate in different types of guided investigations to explore and answer questions
- use informal measurements in the collection and recording of observations
- use a range of methods to sort information, including drawings and provided tables
- compare observations with predictions
- compare observations with the observations of other students
- represent and communicate observations and ideas in a variety of ways.

Equipment

For the class

- map of school grounds from Lesson 1
- tap
- bucket
- measuring container
- timer or classroom clock
- enlarged copy of the 'Lower primary school water audit' (refer to the web link in Preparation)
- plastic bottles

For each group

- clipboard
- school water audit sheet for a specific area—laminated or in a plastic pocket
- waterproof marker
- map of school

For each student

- A4 waterdrop shape

Preparation

Access the 'Lower primary school water audit: Preparatory to Year 3' from <www.derm.qld.gov.au/waterwise/education>. Go to the 'Curriculum resource' page and select the 'DVD version' link to order a free copy of the curriculum resource DVD. Prepare audit sheets, using resource sheets from the audit document or adapt the resource sheets to suit the school's facilities.

Decide whether all groups will be involved in the school water audit at the same time—with groups supervised by teacher aides, parents or older students. Also decide how long a tap will be left dripping in Session 2, as the period of time will determine how many plastic bottles are required for step 6.

Lesson steps

Session 1—Water at school

1. Review previous lessons including the TWLH chart, the wonder wall and the map of the school grounds showing the places visited during the puzzle hunt.
2. Ask students to think of as many places as possible where water is used. List the ideas and mark the places on the large map.
3. Divide the class into groups and walk around the school grounds to verify places where water is used, and add any additional places to the map. Each group can list or draw places on their clipboard sheet.
4. Return to the classroom and discuss the places that students recorded.
5. Discuss with students how water is used in each place and where water might be wasted. Add students' ideas to the TWLH chart.
6. Explain that each group will be conducting a school water audit in an allocated area.
7. Display an enlarged copy of an audit sheet and explain how to use it. Explain health and safety rules and the importance of washing hands thoroughly before returning to the classroom.
8. Have students participate in the audit and return to class to share their findings.
9. Update the TWLH chart, waterdrops for the wonder wall and the TWLH chart, and display students' audit sheets near the map of the school. Audit sheets can be joined to their location using pieces of coloured wool or streamers so that students are aware of water places in the school.

Session two—Dripping taps

1. Ask students if they observed any dripping taps during the school water audit task and mark the locations on the map of the school.
2. Ask students what might happen if a tap is not turned off properly, and the consequences of dripping taps. Record students' ideas on the TWLH chart.
3. Explain to the students that, as a class investigation, a tap will be left dripping for a certain time. The drips will be collected in a bucket to be measured and then recycled.
4. Ask students to predict how much water might be collected in the bucket and record their predictions on the TWLH chart.
5. Set up the investigation and check the water level in the bucket at regular intervals.
6. At the conclusion of the investigation, measure the amount of water in the bucket and compare the amount with students' predictions.
7. Pour the water into the plastic bottles so that students can see how much has been wasted and compare the amount with other familiar liquids such as water, milk or cordial.
8. Discuss and decide how and where the water can be used in the school grounds. Record students' ideas about recycling water, and reuse the collected water wisely.
9. Ask students to write a take-home message about dripping taps and water wastage on an A4 waterdrop to share with their families.
10. Update the TWLH chart, waterdrops on the wonder wall, and word wall.

❖ Explore

» Lesson 5: Where does water come from?

Lesson overview

In the previous lesson, students conducted a school water audit and investigated how much water was wasted when a tap was left dripping. In this lesson, students refer to common shared experiences from previous *Explore* lessons and relate these experiences to the water cycle. The Water Cycle poster forms the basis for this lesson, with students observing and talking about the poster then relating what they see on the poster to what they have discovered about water supplies, water use, and the properties of water.

Lesson objectives

In this lesson students will:

- respond to and pose questions, and make predictions about the water cycle
- participate in different types of guided investigations to explore and answer questions, such as accessing information sources
- compare observations with those of others
- represent and communicate observations and ideas in a variety of ways, such as oral and written language, and drawing.

Equipment

For the class

- the Water Cycle poster
<www.derm.qld.gov.au/waterwise/education>
- post-it notes to cover words on the poster
- large cut-out Whizzy shape—at least 20 cm high
- small cut-out Whizzy shape—about 7 cm high—laminated if possible
- nine word cards with one word on each (as shown in the circles on the poster)
- copy of The Water Cycle series available from
<www.derm.qld.gov.au/waterwise/education>
- Whizzy's Incredible Journeys Pick-A-Path big book

For each group

- A3 sheet with key terminology—words from the poster
- A3 waterdrop sheet per group (Resource 1)

For each student

- sheet of A3 paper

Preparation

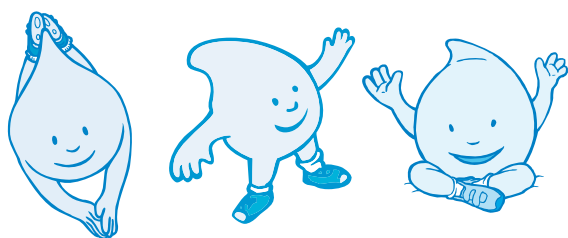
This lesson is best done with small groups, working with one group at a time. Another group could be accessing websites with water activities. For example:

- The water cycle song—
Go to <www.kidsknowit.com>. Select the 'Geography' link and then 'The Hydrosphere Cycle' and then select the 'Play a song for this topic' button
- Water cycle pictures, quizzes and puzzles—
Go to <www.neok12.com/Water-Cycle.htm>. Select 'Water cycle' under the 'Geography' heading
- Water cycle links—
Go to <www.teachers.ash.org.au/jmresources>. Select 'The water cycle' which is found under 'Water and catchments' in the 'Science Links'.

Cover the words on the poster with post-it notes before beginning the task with each group so that students are suggesting ideas based on what they know or have found out in the previous *Explore* lessons, instead of reading words from the poster.

Prepare a space where the waterdrops from this lesson can be displayed.

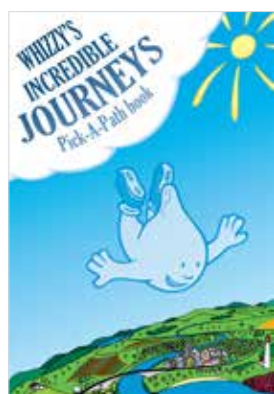
To download a Whizzy image, go to 'Whizzy resources' on the Water: Learn it for life! web page at <www.derm.qld.gov.au/waterwise/education>, then find the 'Downloadable Whizzy images'. There are three to choose from: Whizzy standing, Whizzy flying, Whizzy sitting. Enlarge the image so that it is at least 20 cm high.



To make the small Whizzy cut-out shapes, resize one of the images above using an application such as Microsoft Office Picture Manager to 35 per cent of its original size and insert it in a new document such as a Word document.



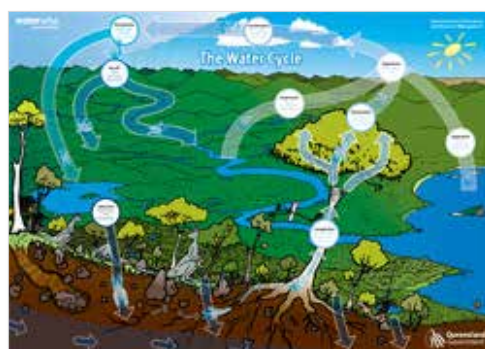
Read The Water Cycle series guidelines prior to the lesson, particularly the section about using the Water Cycle poster. Go to www.derm.qld.gov.au/waterwise/education and select 'The water cycle series' link for information about ordering the posters and downloading the teacher guidelines.



The Whizzy's Incredible Journeys Pick-A-Path big book can also be ordered online from the 'Whizzy's resources' link on the Water: Learn it for life! web page at www.derm.qld.gov.au/waterwise/education.

Lesson steps

1. Introduce Whizzy to each group; ask students to describe him, including his shape; and talk about what they think they know about Whizzy. Record students' ideas on the TWLH chart. Explain that Whizzy is going to help them learn more about water.
2. Ask the students to briefly contribute five things that they learned about water in the previous lessons, and record each group's ideas on a large waterdrop, with the group members' names on it.



3. Show students the poster—with the word circles covered—and ask students to use the small Whizzy shape to trace one of Whizzy's journeys and to talk about what they think is happening to the water shown on the poster. Ask students whether what they see on the poster can be related to what they have explored in previous lessons, and discuss their ideas.
4. Show the word cards to the group and discuss what students think they know about the words. Discussion can include:
 - the meaning of the words
 - whether the words can be related to the previous *Explore* tasks
 - the actual structure of the words.
5. Ask students to suggest where the words could be placed on the poster and to give reasons for their suggestions. Place the words where students suggest.
6. Uncover the words on the poster and check and discuss the accuracy of students' suggestions.

7. Discuss the water cycle processes by asking questions including where and how evaporation is happening, where and how the water runs off, and where and how transpiration is occurring.
8. Introduce the term 'water cycle', relate it to the common use of the word 'cycle', and add students' ideas about the water cycle to their group's large waterdrop poster.
9. Students can act out the 'water cycle' in a small group using mime and sound. For example, they could mime rain coming out of the sky.
10. Explain that students will be returning to their work area to draw and write what they have learnt from the poster on an A3 sheet.
11. When all groups have explored the Water Cycle poster, re-assemble as a class and refer to the newly learned terminology. Read and discuss one or more journeys from Whizzy's Incredible Journeys big book and how Whizzy's journeys relate to the Water Cycle poster.
12. Provide time for each group to add more ideas to their large waterdrops. Display the waterdrops for future reference.

❖ Explain

» Lesson 6: Precious water

Lesson overview

In the previous lesson, students explored the Water Cycle poster and related the processes depicted on the poster to their shared experiences in the *Explore* phase. In this lesson, students draw on their prior knowledge and shared experiences to collaboratively develop explanations about water uses and the water cycle. Use the Total Water Cycle Management poster to further consolidate their understanding.

Lesson objectives

In this lesson students will:

- develop the understanding that Earth's resources are used in a variety of ways
- become aware of how people use science in their daily lives, including when caring for their environment and living things
- respond to and pose questions, and make predictions about familiar objects and events
- participate in different types of guided investigations to explore and answer questions, such as accessing information sources
- compare observations with those of others
- represent and communicate observations and ideas in a variety of ways.

Equipment

For the class

- Total Water Cycle Management poster from the water cycle series of posters (refer to Preparation)
- Whizzy's Incredible Journey Pick-A-Path big book
- map of the local area or satellite images showing places in the area

Preparation

To source posters and The Water Cycle package guidelines, particularly the information about using the Total Water Cycle Management poster, refer to the Preparation instructions in Lesson 5. Source a Google Earth map of local places and facilities similar to those shown on the Total Water Cycle Management poster.

Organise to work with each group individually. Place the Total Water Cycle Management poster on the floor and sit around the poster with the students.

For information about sourcing Whizzy's Incredible Journeys Pick-A-Path big book, refer to the Preparation instructions in Lesson 5.

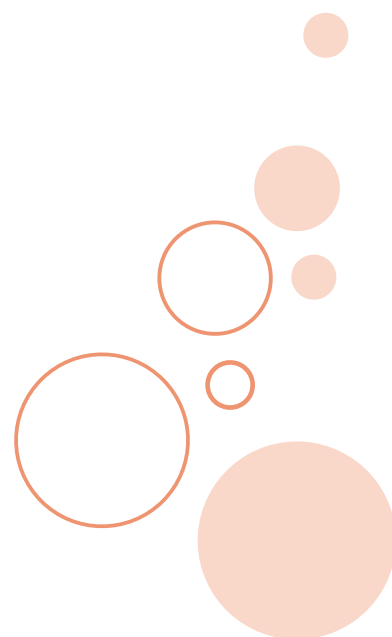
Decide whether students will draw their own version of the total water cycle or whether they will be given a map or picture of a landscape to which they can add natural and made features.

Lesson steps

1. Review previous lessons including the TWLH chart, word wall, wonder wall, school map, school water audit sheets and waterdrop word displays. Discuss and list the uses of water that students can recall from Whizzy's Incredible Journeys big book.
2. Discuss with students the scientific language they discovered in the previous lesson and used when they were drawing to show what they had learnt about the water cycle.
3. Display the Total Water Cycle Management poster and ask students what they can see on the poster. The Total Water Cycle Management poster builds on the concepts introduced in the Water Cycle poster by illustrating the integrated flow of water within catchments as a result of human presence. This is sometimes referred to as the urban water cycle. List students' ideas.
7. Discuss with students how the Total Water Cycle Management poster can be compared with the Water Cycle poster and look for similarities and differences in language.
8. Students discuss and relate the poster components to the students' local area.
9. Re-visit the map and add any appropriate scientific language to the map of the school and the wider community. A map of the community could be used to enhance this lesson step.
10. Pose a 'what if' question, based on the Total Water Cycle Management poster. For example, 'What if there was a burst pipe in the Drinking Water Treatment Plant?'. Pose questions related to both natural and made features.
11. Conclude the lesson by asking students to draw their own version of a total water cycle, to indicate what they learned about the water cycle.



4. Model selecting a place shown on the poster such as the house in the foreground of the poster. Discuss how water is used there, where the water comes from and how wastewater is removed. Include both a natural and built place.
5. Ask students to take turns to describe places they see on the poster. Students could work in pairs or address the whole class. Record students' descriptions including both the everyday language and scientific terminology they use.
6. Working in pairs, students find scientific language on the poster and write the words on post-it notes. Display the post-it notes and discuss with students the meanings of the scientific words.



❖ Explain

» Lesson 7: Water watchers

Lesson overview

In the previous lesson, students learnt about the water cycle by exploring the Total Water Cycle Management poster and relating it to their own community. In this lesson, groups re-visit the areas where they conducted a school water audit to determine whether water is being used wisely, over-used or wasted. Students then discuss the possible viability and consequences of reducing the amount of water used—taking into account factors such as the effect on health, safety, plant and animal growth and industry.

Lesson objectives

In this lesson students will:

- understand that people use science in their daily lives, including when caring for their environment and living things
- understand that Earth's resources including water are used in a variety of ways
- respond to and pose questions, and make predictions about familiar objects and events
- use informal measurements in the collection and recording of observations
- use a range of methods to sort information, including drawings and provided tables
- discuss and compare observations with predictions
- compare their observations with those of other students
- represent and communicate observations and ideas in a variety of ways, such as oral and written language, role play and drawing.

Equipment

For the class

- map of the school showing water points and audited areas from Lesson 4

For each group

- school water audit sheet from Lesson 4
- clipboard
- A4 paper
- pencil

Preparation

- Decide whether groups will be given a choice about how they present and share their observations with the whole class, or whether all groups will use the same mode of presentation.
- Decide whether the whole class will visit audited water points or whether additional adults or older students can help small groups of students to visit specific water points.

Lesson steps

1. Review previous lessons including scientific terminology about the water cycle and students' observations and ideas about how water is used, including in the school, at home and in the wider community.
2. Remind students about their group's school water audit. Discuss whether and how water usage might change during the year, such as with weather changes, and how some activities and events depend on water and the weather.
3. Discuss how water wastage might occur due to carelessness or leaking taps and pipes.
4. Remind students how much water was wasted when a tap was left dripping in the controlled investigation in Lesson 4 and how the water was reused.
5. Explain that groups will be revisiting the places where they audited water use to find out if there have been any changes in the amount of water being wasted or to the actual facilities. For instance, were all the taps turned off properly or was a leaking tap fixed?
6. Explain to students that they need to observe carefully and refer to their groups' original school water audit sheets. When students have checked the place where they conducted a water audit, they will be working in groups to create a representation to show what they know about that area and how wisely the water is being used. The representation could include oral and written language, a role play or a drawing.

7. Have groups check their areas and record their observations, noting if there are any variations since the previous audit.
8. Allocate time for each group to prepare an oral or visual presentation and to share it with their peers.
9. As a class, discuss the possibility of reducing water wastage and improving the efficiency of water appliances, while considering possible consequences. Factors might include health, safety, effect on plant growth and animals, and on industry and the community in general. Record students' ideas and add ideas to the word wall and TWLH chart.

❖ Elaborate

» Lesson 8: Water users

Lesson overview

In the previous lesson, students revisited water sites to observe any differences in water usage and water facilities, and then presented information to their peers. In this lesson, students prepare questions to use when interviewing a community water user, water specialist or water provider. Students ask the prepared questions and record responses. Students will also ask the visitor about their ideas for reducing the amount of water being wasted and how some of the water could be recycled.

Lesson objectives

In this lesson students will:

- understand how Earth's resources including water are used in a variety of ways
- respond to and pose questions
- use a range of methods to sort information, including drawings and provided tables
- represent and communicate observations and ideas in a variety of ways.

Equipment

For the class

- questions prepared by the class

Preparation

Invite one or more guest speakers to the class and explain the process to each guest. Students could make an invitation to send to each guest speaker—explaining the purpose of the visit. The lesson will need to be conducted as two sessions—preparing questions for the visitor and then the guest speaker's visit to the class.

Lesson steps

Session one—Writing questions

1. Review previous lessons, particularly about how we use water and the water shortage scenarios.
2. As a class, make a list of people who use water in their occupations, who are involved in water provision and infrastructure, and who work in water-related roles such as local council water—for example, DERM staff and reservoir staff.
3. Explain to students that a guest speaker will be visiting the class to talk about how the guest uses water in his or her role. Ask the students what they would like to find out.
4. As a class or working in groups, write questions to ask the guest. Discuss with the students the format that the presentations will take—for example, a ten-minute presentation followed by students asking prepared questions, then the possibility of more time for additional spontaneous questions from the students.

Session two—Our special visitor

1. Ask a speaker from each team of four students to present their questions to the class. Collate the questions on butcher's paper into a class list. Students can add new questions to this list as they arise from discussions. Prompt the students to ask questions about how the council manages its water supply sustainably.
2. Allocate the guest speaker questions to individual students, and ask them to record their question in their journal. Check that each student has a different question.

3. Allow students time to practise asking their question with a partner to develop confidence. Remind the students that they need to look at the guest when asking a question, and that the volume and pace of their voice needs to be appropriate.
4. Recruit a student to welcome the guest speaker, and another student to thank the guest speaker at the end of their visit. The student who welcomes the guest should prepare by asking the guest their name, title and the type of work they do. The student will present this information to the class in their welcoming speech.
5. Direct the student thanking the guest to summarise a number of key points from the guest's presentation, state some ways in which the guest's presentation helped the class, and thank the guest for their presentation.
6. Following the visitor's presentation, have students record and discuss the visitor's responses to their questions, and write thank you letters to the visitor.

❖ Elaborate

» Lesson 9: Water challenges

Lesson overview

In the previous lesson, students interviewed water users to find out how people use and manage water. In this lesson, students refer to what they have explored, observed and discovered in previous lessons for responding to hypothetical scenarios about water shortages.

Lesson objectives

In this lesson students will:

- respond to and pose questions, and make predictions about familiar objects and events
- participate in different types of guided investigations to explore and answer questions, such as accessing information sources
- compare observations and ideas with those of others
- represent and communicate observations and ideas in a variety of ways, such as oral and written language, drawing and role play.

Equipment

For the class

- water shortage scenario cards (Resource 10) or 'No water' pictures (Resource 11)

For each group

- A3 paper to record possible solutions and consequences

Preparation

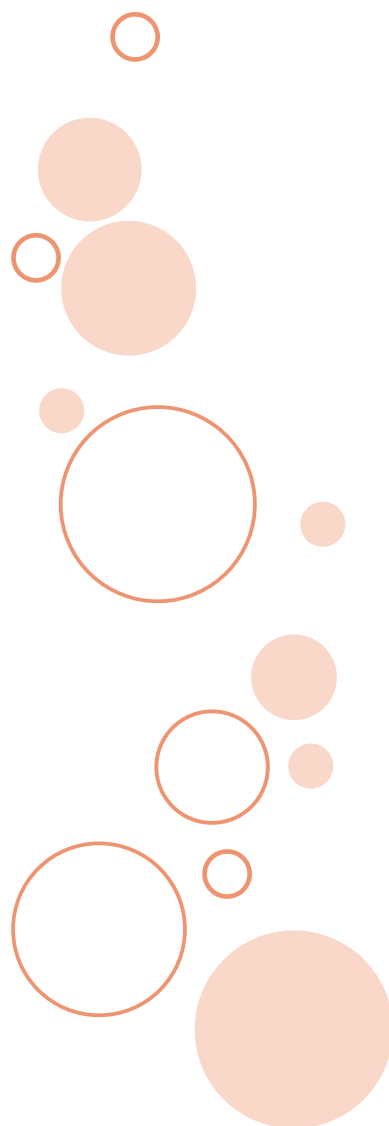
Prepare 'what if' water scenario cards, with text or images from the ideas listed in Resource 10. Alternatively, print the 'No water' pictures in Resource 11. Use scenarios that are suitable for the class.

Source a fiction text about a water shortage or change in the amount of water available in a community. Suitable books include:

1. Base G. 2001. The waterhole. Penguin, Melbourne.
(Excellent for teaching the impact of a drying waterhole for animals across the globe.)
2. Hooper M & Coady C. 1998. The drop in my drink – The story of water on our planet. Frances Lincoln, London, UK.
(Explores where water comes from, how it behaves, and why it matters.)
3. Oxenham H, Stephens B & Brown K. 2008. Whizzy's incredible journeys pick-a-path book. Queensland Department of Natural Resources and Water, Brisbane.
(Enables early years teachers to use narrative fiction to engage students in learning about water conservation and the water cycle.)
4. Rosenfeldt R. 1980. Tiddalik: The frog who caused a flood. Puffin Books, Melbourne.
(An adaptation of an Aboriginal story about a thirsty frog that drank up all the rivers and billabongs in the land. The other animals had to find a way to get the water back.)
5. Strauss R. 2007. One well. ABC Books, Sydney.
(Uses the analogy that all the water on Earth is contained in one well and explores a range of topics such as the water cycle, how water is recycled, and how water is used.)

Lesson steps

1. Review previous lessons, the word wall, wonder wall, TWLH chart and the waterdrops. Discuss the rainfall data the class collected from the rain gauge. Is there a pattern? What rainfall does your area normally get at this time of the year? What does the rainfall or lack of it mean to the way that you use water? Remind students that even if you have plenty of rain, it is still very expensive to pump water and to treat it to a safe standard for drinking.
2. Direct students' attention to the waterdrop with the question about what we use water for and ask students whether they have additional ideas to add to the list.
3. Ask students whether they have experienced water shortages or have had to survive on a limited supply of water for some reason. Discuss why water shortages or restrictions might occur.
4. As a class, discuss a specific water shortage scenario and talk about what might have caused the water shortage and the possible consequences of the shortage. Record students' ideas.
5. Have students suggest ways that they could manage the situation. Discuss possible risks involved including hygiene and safety.
6. In groups, discuss a scenario from Resource 10 or Resource 11 as in Lesson steps 4 and 5. Have students record possible reasons for the shortages, possible consequences and ways to manage the situation.
7. Ask groups to record their ideas in both writing and drawing, and then present their ideas to another group or to the whole class.
8. Display the scenarios and students' ideas to be used as resources for the *Evaluate* lesson.
9. Conclude the lesson by reading a text about a water shortage, such as a suitable book from the bibliography.



Resource 10

❖ Water shortage scenarios

Use the following ideas to prepare 'what if' cards for the students.

1. What if the water coming out of the taps looked dirty? How might it affect our use of the water? What could we do about the dirty water?
2. What if you could only have a specific amount (for example, bucket or jerry can) of water each day? How could you manage the water available to you? Teacher's note: This could be a real-life scenario; for example, during a natural disaster.
3. What if the water supply where you live was to be cut off for a specified period of time? What could you do?
4. What if we had a limited supply of water? How might it affect our life-style and what could we do about it?
5. What if we had to pay for the water that runs down our drains at school or at home? How could we re-use or reduce the water?
6. What if it didn't rain enough in the wet season to fill our dams and tanks? What can we do to make the water last longer?
7. What if you could only take a limited supply of fresh water on a camping trip to the beach? Could you use salt water for anything and, if so, how?

Resource 11

❖❖❖ 'No water' (What's wrong?)



Resource 11 (continued)

❖❖❖ 'No water' (What's wrong?)



Resource 11 (continued)

❖ 'No water' (What's wrong?)



Resource 11 (continued)

❖❖❖ 'No water' (What's wrong?)



❖ Evaluate

» Lesson 10: Water carers

Lesson overview

In the previous lesson in the *Elaborate* phase, students considered hypothetical water scenarios and interviewed a water user or provider to find out about water usage. In this lesson, students draw on their understandings about water, developed throughout the unit, to design and produce persuasive posters. These are to be placed in prominent places in the school and possibly in the wider community to inform people about reasons and strategies for reducing water usage. Students also complete a sorting task to demonstrate their understanding of water and how it is used.

Lesson objectives

In this lesson students will:

- demonstrate their knowledge of how Earth's resources including water are used in a variety of ways
- demonstrate their understanding about how people use science in their daily lives, including when caring for their environment and living things
- represent and communicate observations and ideas in a variety of ways, such as written language and drawing
- design and create persuasive posters.

Equipment

For each student

- paper for a draft of the poster
- A3 paper for the published copy of the poster
- pencils, textas and other materials
- 'What do we know' (Resource 12)
- glue

For the class

- examples of persuasive texts and posters
- enlarged copy of the poster design brief—'Design a persuasive poster to inform our school community about how to use water wisely and the reasons why we need to use water wisely'

Preparation

Source appropriate examples of persuasive texts and posters.

Prepare an enlarged copy of 'What do we know'—Resource 12.

Prepare an enlarged copy of 'What do we know' cards.

Lesson steps

Session 1—Persuasive posters

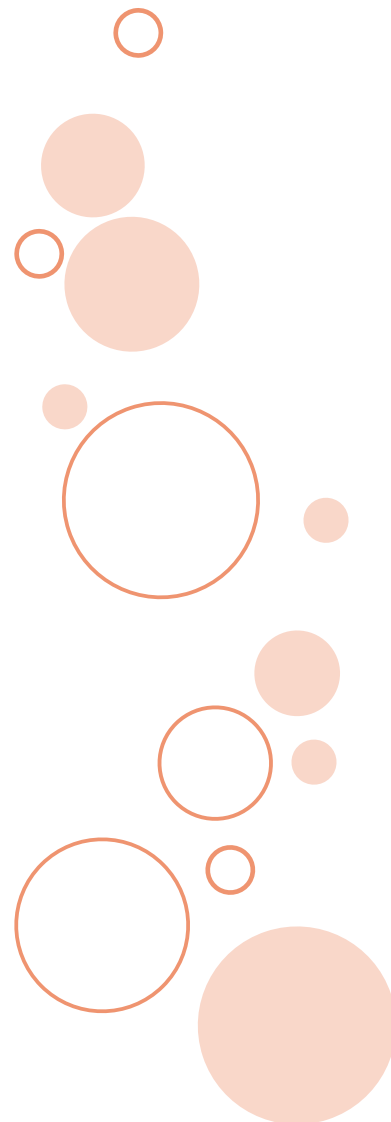
1. Review previous lessons, the word wall, wonder wall, TWLH chart and resources produced and used throughout the unit.
2. Discuss with students how they could inform others about the need to save water and the reasons for saving water, as well as ways of recycling water.
3. Show the design brief to students and read through it with them. Discuss with students the language features of a persuasive poster, including an opening statement, visuals that might include images and diagrams, reasons, and actions that people can take to reduce water usage.
4. Ask students to suggest places where the posters can be placed, give reasons for their suggestions, and identify the intended audience. For example, the intended audience could be early childhood students, teachers, parents, community members or a combination of these people.
5. Discuss with students how the text needs to be appropriate for the audience. Identify the locations for the posters and list the names of students who will be creating the posters for each place. Students prepare drafts then publish their posters. Arrange to display the posters.

Session 2—What do we know?

1. Show students the enlarged copy of 'What do we know' (Resource 12) that will be used in the sorting task. Read the headings with the class. Explain that they will be cutting, sorting and gluing the images under the four headings to show what they know about water.
2. Allow time for students to complete the task. Use the students' completed sheets to assess their understanding about water.

This assessment item enables students to:







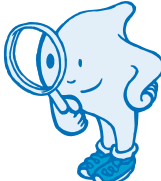








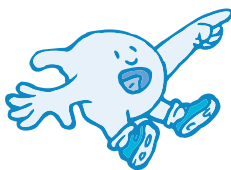
- identify human use of water in a range of contexts
- recognise water as one of the Earth's resources that is required by all living things
- identify ways to conserve water usage to protect Earth's resource
- recognise the sources of water and where it goes.



Resource 12

❖ What do we know?

Cut out these cards and glue them in the correct column of the blank table.

<p>All living things need water.</p> 	<p>Soap your hands with the tap off.</p> 	<p>Drinking</p> 	<p>Rain</p> 
<p>Shower for less than four minutes.</p> 	<p>Oceans and rivers</p> 	<p>Water has three forms—solid, liquid and gas.</p> 	<p>Cleaning</p> 
<p>The amount of water on Earth hasn't changed for millions of years.</p> 	<p>Growing crops</p> 	<p>Underground</p> 	<p>Use the half flush button.</p> 
<p>Pipes</p> 	<p>Brush your teeth with the tap off.</p> 	<p>There is a weather cycle on our Earth.</p> 	<p>Fighting fires</p> 

Resource 12 (continued)

<i>Why is water special?</i>	<i>How do we use water?</i>	<i>Where does water come from and where does water go?</i>	<i>How do we save water?</i>

Resource 12 (continued)

❖ Teacher answers

Why is water special?	How do we use water?	Where does water come from and where does water go?	How do we save water?
All living things need water.	Drinking	Rain	Soap your hands with the tap off.
Water has three forms—solid, liquid and gas.	Cleaning	Oceans and rivers	Shower for less than four minutes.
The amount of water on Earth hasn't changed for millions of years.	Fighting fires	Underground	Use the half flush button.
There is a water cycle on our Earth.	Growing crops	Pipes	Brush your teeth with the tap off.