water

learn it. live it.

an education resource
for primary and
secondary schools

Volume Three: Water in the Community

A joint initiative of

Yarra Valley Water

City West Water

South East Water

Acknowledgements

Water – learn it. live it.
Fourth Edition (2013)

Developed by Melbourne's government-owned water retailers:
City West Water
South East Water
Yarra Valley Water

Authors
Chiara Pacquola, Water - learn it. live it.
Nicole Leivers, Water - learn it. live it.
Shannon Haintz, freelance writer

Advice and Editorial Assistance
Jenny Hiller, Yarra Valley Water
Sophie Pritchard, South East Water
Shannon Haintz, freelance editor
Mary Catus-Wood, Melbourne Water

Design and Production
Green Scribble, greenscribble.com.au

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Subject Key Science English Environment Geography Maths

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Introduction

Schools play an important role in delivering sustainable messages to our future generations.

Melbourne's government-owned metropolitan water businesses, City West Water, South East Water and Yarra Valley Water, have joined forces to bring you the new Water – learn it. live it. (Water-lili) Curriculum Resource, a collaboration between educators and water industry professionals.

This resource for primary and secondary teachers provides fun, interesting and interactive projects to assist students to learn about all aspects of the water story. From properties of water and catchments, to sewage treatment, recycling, health and hydration and responsible gardening, water is explored at a local, national and global level.

Bloom's Taxonomy underpins this collection of activities and asks more of the students than simple recall, instead requiring knowledge, comprehension, application, analysis, synthesis and evaluation. Great care has also been taken to cater for the varying interests and strengths of students, and offer activities based around Science, Mathematics, English and Communications, Art, Music and Geography, all with a focus on water.

The resource has been designed to be flexible in its use and allows educators the opportunity to pick and choose which activities will suit the needs of their students. There are three volumes in the series.

- *Volume One: Water in the Natural Environment*
- *Volume Two: Water in the Urban Environment*
- *Volume Three: Water in the Community*

Using the Resource

Volume Three: Water in the Community investigates the way we use, consume and value water. This volume is broken into five sections: Understanding Water Use, How We Use Water, Water Meanings, Water Supply and Efficient Water Use, and Water for Health and Wellbeing. Each section provides a collection of relevant activities for students from Years Prep to 10 and includes a main activity supported by three scaffolded options to explore the subject further.

The scaffolds are aimed at different levels of student ability, and are categorised as Engage (Prep-2), Connect (3-6) and Explore (7-10). These categories are a guide only, and you may find an activity that suits your students in any of the sections.

A selection of specific worksheets, thinking tools and graphic organisers are provided to assist students to clarify their processes and explore each subject completely. Specific worksheets are found directly following the relevant activity, and graphic organisers are kept together in the Templates section of the resource. An outline of the graphic organisers and their applications can be found at the beginning of the Templates section of this document.

Icons have been used in the Table of Contents to indicate the subject area to which the activity belongs. An Activity Matrix has also been included to allow you to easily identify the learning style and area each activity belongs.

 Hands on Activity

 ICT

 Pen and Paper

 Out and About

Suggestions, links and additional information are provided where deemed appropriate, however specific references have generally been avoided to insure against broken links or superseded information, and to allow for flexibility in using your favourite sites and programs. There are a variety of online sites for your students to create their works, including flipbooks, stop motion, animations, films and cartoons. Just use an online browser to find the information or program you require.

Activity Matrix

Activity Name	Page	Activity Type			
		Main	Engage	Connect	Explore
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Melbourne's Water Businesses

City West Water

City West Water

City West Water provides drinking water, sewerage, trade waste and recycled water services to approximately 342,000 residential and 36,000 non-residential (industrial and commercial) customers in Melbourne's central business district and inner and western suburbs.

City West Water's boundaries contain the local government areas of Brimbank, Hobsons Bay, Maribyrnong, Melbourne (north of the Yarra River), Moonee Valley, Wyndham, Yarra and parts of Melton and Hume.

Relative to the other metropolitan Melbourne water retailers (South East Water and Yarra Valley Water), City West Water has a smaller customer base and geographic area, with a greater proportion of non-residential customers. These non-residential customers come from a range of sectors, including brewing, chemical manufacturing, oil refining, textile and automotive manufacturing.

South East Water

South East Water

South East Water provides water and sewerage services to over 1.6 million people in Melbourne's south east. Across a region spanning 3,640 square kilometres and fronting 300 kilometres of coastline, South East Water provides drinking water, sewerage, trade waste and recycled water services.

South East Water is responsible for $3.2 billion of assets. This includes managing over 23,000 kilometres of water and sewer pipeline.

South East Water's vision is to provide healthy water for life. This includes educating our schools and community about the value of water.

Yarra Valley Water

Yarra Valley Water

Yarra Valley Water is Melbourne's largest water and sewerage business, providing services to over 1.7 million people and over 50,000 businesses in the northern and eastern suburbs of Melbourne.

Yarra Valley Water safeguard the community's health by effectively removing wastewater and running operations in a way that protects the environment. Its district covers around 4,000 square kilometres, from as far north as Wallan and extending to Warburton in the east and Malvern in the south.

Yarra Valley Water helps customers to enjoy a healthy, environmentally friendly and low-cost community lifestyle through the Choose Tap initiative. The program supports community sport, local festivals, education, parks and gardens, the business sector, and cafes and restaurants.

Melbourne Water

Melbourne Water

Melbourne Water is a water resource manager owned by the Victorian Government.

Melbourne Water manages Melbourne's water supply catchments, removes and treats most of Melbourne's sewage and manages rivers, creeks and major drainage systems throughout the Port Phillip and Westernport regions.

Melbourne Water is responsible for managing $8.7 billion of water supply, sewerage and drainage assets, as well as natural assets such as rivers and creeks. These assets service 3.4 million people in an area spanning 12,000 square kilometres.

Melbourne Water manages Melbourne's water resources in a way that aims to ensure that future generations enjoy one of the best urban environments in the world. This means that Melbourne Water plays a major role in the total water cycle.

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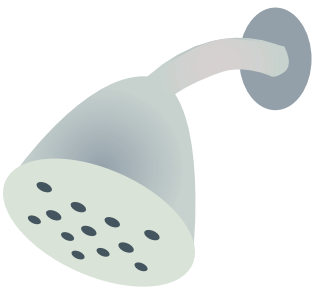
1

Understanding Water Use



Understanding Water Use

If scientists could simply make water out of hydrogen and oxygen molecules, we wouldn't need efficient water practices or reservoirs to capture and store our drinking water. Unfortunately, we can't just make our own water. Water is a finite resource, and we have as much in the atmosphere today as we will ever have.

Solid

Gas

Liquid

At any given time, water can be found in our homes as a solid (ice), liquid (water) and/or gas (steam). Water is versatile and behaves differently in different states. Because it exists in different forms, there are also different measurements we have to consider when using water:

State of Matter	Measurement	Unit	Conversions
Solid	Weight	Kilogram (kg) Gram (g) Milligram (mg)	1,000 g in 1 kg 1,000 mg in 1 g
Gas	Volume (height x length x width)	Cubic metre (m^3) Cubic centimetre (cm^3)	1,000,000 cm^3 in 1 m^3
Liquid	Volume (height x length x width)	Gigalitre (GL) Litre (L) Millilitre (mL) Megalitres (ML)	1,000,000,000 L in 1 GL 1,000 mL in 1 L 1,000,000 L in 1 ML 1,000 ML in 1 GL

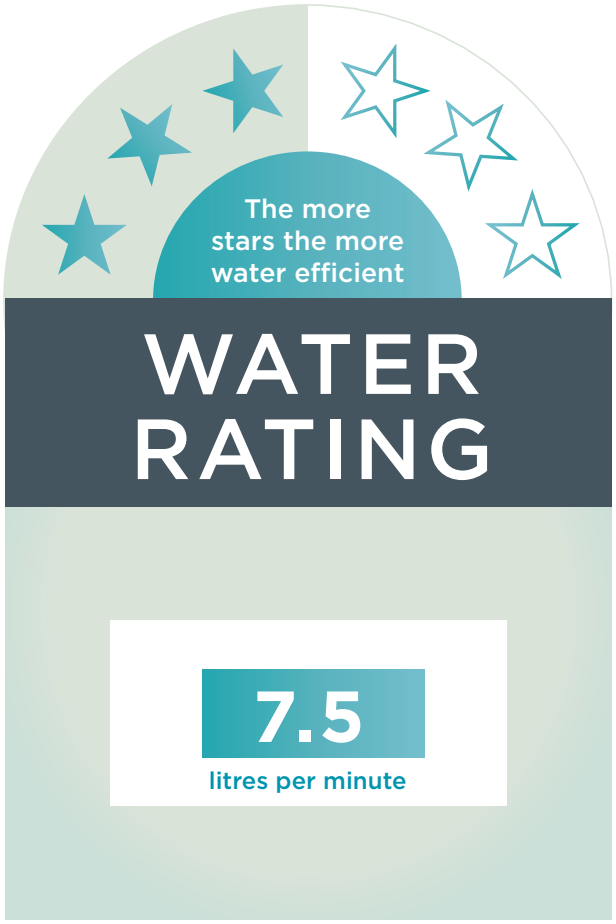
Imagine no hot showers or flushing toilets. How would you manage? Although plumbing might seem like a modern invention, it's actually been around for several thousand years. An ancient Minoan Palace in Crete (built around 2000 BCE) was discovered to have sewerage and water pipes, taps, hot and cold water, and even a flushing toilet! Plumbing has come and gone in the centuries since then, and has returned as something we frequently take for granted.

Melburnians use water every day. It is piped into our homes for drinking, but also for hand washing, toilet flushing, dish washing, cleaning clothes, brushing teeth, showering and gardening. A common misconception is that business and industry use the most water in Melbourne, but it's actually homes (domestic use of water by people). In fact, Melburnians use between 150 and 200 litres of water per person per day; that's around 15-20 buckets of water each. It may not sound like a lot over one day, but if you add it up for each person, that's around 6,000 buckets per year. Imagine how many buckets of water a person uses over a lifetime!

The introduction of WELS (Water Efficiency Labelling and Standards) in 2005 meant that finding water efficient appliances for your home was no longer a difficult task. This program labels products so that when you compare one product to another, you know how much water is being used or saved. Water meters and data loggers are another method of keeping track of your water use and ensuring there are no leaks at your property. A single dripping tap can waste up to 20,000 litres per year! That's a lot of water.

The water you do use is delivered to you by your local water retailer; in Melbourne the local water retailers are City West Water, South East Water and Yarra Valley Water. These water retailers also take away your sewage each time you flush the toilet or wash water down the drain, and are responsible for some infrastructure and additional water services.

A water bill is sent to your home, school or business each quarter. It lists charges for the delivery of water and removal of sewage, and also includes charges for the purchase and maintenance of infrastructure, parks and waterways in the local area.



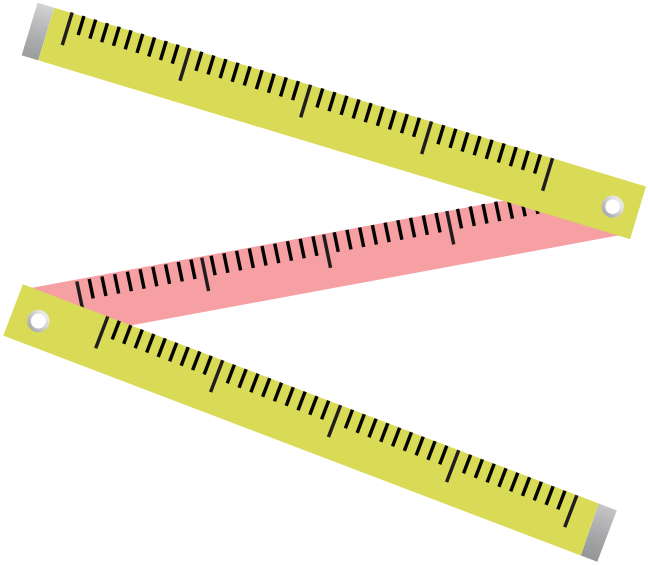
Volumes and Measurements

You know that water exists in three different states: solid, liquid and gas. We measure these states in different ways and describe them with different units of measurement:

State of Matter	Measurement	Unit
Solid	Weight	Kilogram (kg) Gram (g) Milligram (mg)
Gas	Volume (HxLxW)	Cubic metre (m^3) Cubic centimetre (cm^3)
Liquid	Volume (HxLxW)	Gigalitre (GL) Megalitre (ML) Litre (L) Millilitre (mL)

Main Activity

Visit the Yarra Valley Water website to watch the video *What Does Your Shower Mean to You?* Discuss the issues raised, and consider how many buckets of water you use in the shower or bath every day just to keep clean. Compare your answers with the rest of the class.



Engage

Think about how you measure water at home or at school. Do you use a cup, a teaspoon, an eyedropper or a bucket? Complete the **Engage – Volumes and Measurements worksheet** to find out more about measurements.

Connect

Identify which units of measurement would be best used to describe the volume of each item shown in the **Connect – Volumes and Measurements worksheet**. Match the measurement to the item and complete the equations.

Explore

Complete the mathematical equations based on volumes and measurements in the **Explore – Volumes and Measurements worksheet.**

FACT: While you can measure the quantity of water in different ways, you can also measure different qualities of water, like pH level, turbidity and temperature. Volume 1 has a water testing activity that allows you to discover lots of different information about water.

Engage – Volumes and Measurements

1. Different amounts of water take up different amounts of space. When we measure capacity, we are measuring how much a container can hold.

a On another sheet of paper, draw three columns, labelled: Full, Empty and Half Empty.

b Cut out the pictures below and group them under the correct heading.

Teacher Tip: This worksheet will need to be printed one sided to allow for students to cut and paste.

Engage – Volumes and Measurements cont...

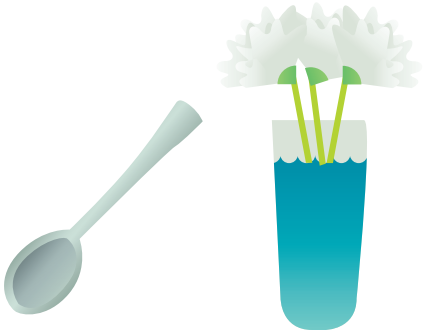
2. Circle the container you think holds the most out of the two options.

a.

b.

c.

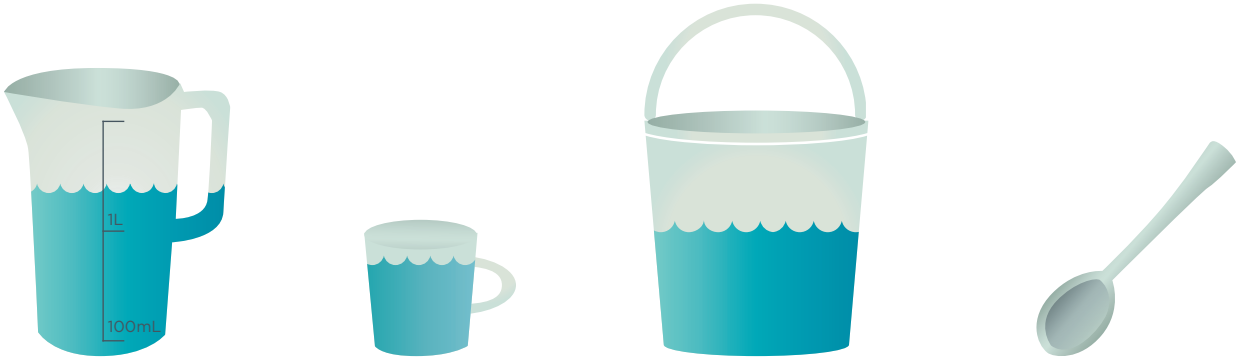
d.



3. Cut out the pictures, and on another piece of paper, paste the containers in order from which holds the most water to which holds the least.

a.

b.



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Engage – Volumes and Measurements cont...

4. The following pictures are filled to different levels with water. How would you describe how full the containers are?

   Use the following words to fill in the blanks: empty, full, half full, nearly full or nearly empty.

a. 

_____

b. 

_____

c. 

_____

d. 

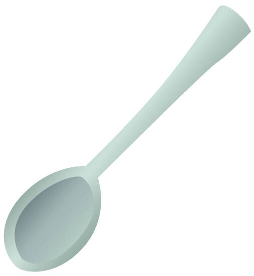
_____

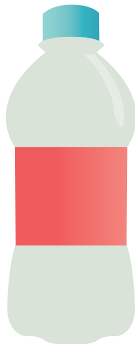
Connect – Volumes and Measurements

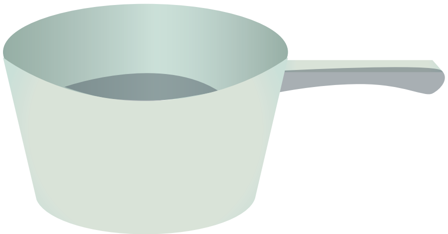
1. **Water can be in one of three states: gas, liquid or solid. Draw a line between the object and its measurement/s. Some units of measurement will be used more than once and some objects can be measured with more than one unit of measurement.**

hailstone	kilogram
water in a cup	millilitre
ice cube	cubic metre
water in a tank	gram
raindrop	cubic centimetre
water vapour	milligram
iceberg	litre

2. **Which unit would you use for measuring the capacity of each of these objects. Write L for litres or mL for millilitres:**



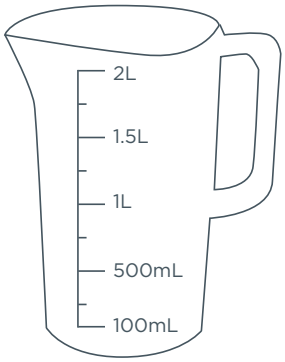




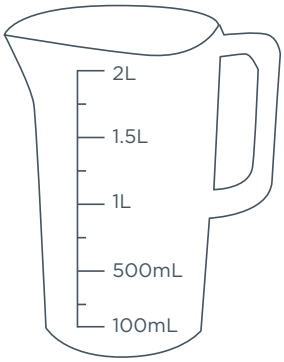
Connect – Volumes and Measurements

3. Colour in the jugs to show the quantities listed:

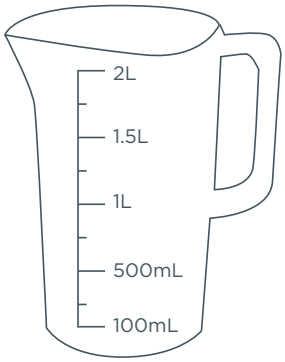
a. Half a litre



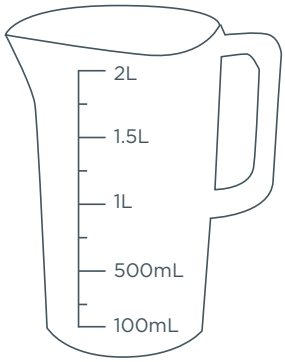
b. 1.4 litres



c. ¾ litre



d. 900 mL



Now, solve these problems:

4. Justin wanted to fill up a 3 L jug with orange cordial. He only had a 250 mL cup. How many times would he have to fill up his cup to fill the cordial jug?

. . . . . .

answer

5. a. Nathan poured 450 mL out of a 2 L milk container. How much was left?
b. Nathan then poured out 375 mL more. How much was left in the container then?

. . . . . .

answer

6. How many 275 mL glasses can be filled from a 1.8 L jug? Is there any liquid left over? If so, how much?

. . . . . .

answer

7. Danni is making a fruit punch for a party. She uses 1.25 L of pineapple juice, 750 mL of orange juice, 500 mL of guava juice, 1.25 L of lemonade, and 1.25 L of ginger ale. How much punch does she have altogether? How many 250 mL cups will she be able to fill?

. . . . . .

answer

Explore – Volumes and Measurements

Water can be found in three states: gas, liquid and solid.

Find out the following:

1. What unit/s of measurement indicates the weight of a solid? . . . . . .

2. What unit/s of measurement indicates the volume of a solid? . . . . . .

3. What unit/s of measurement indicates the weight of a liquid? . . . . . .

4. What unit/s of measurement indicates the volume of a liquid? . . . . . .

5. What unit/s of measurement indicates the volume of a gas? . . . . . .

Quick Conversions:

Convert the following equations (you may like to create your own conversion table to help you calculate your answers):

9,000 mL = ... L

10,609,080 L = ... L

7,653 L = ... kL

12.3 kL = ... L

43,009,150 L = ... ML

999,999,999,999 L = ... GL

500 GL = ... L

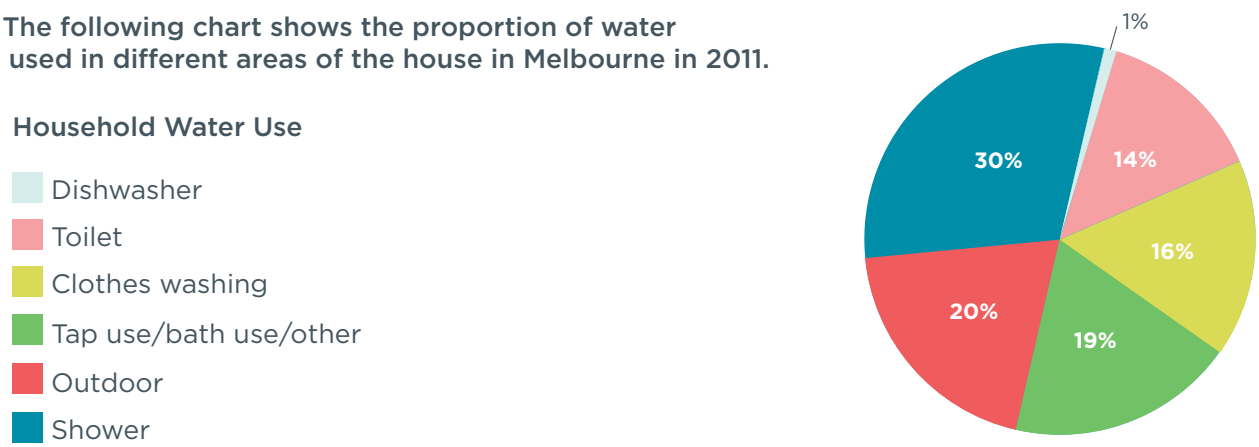
CONVERSION
1,000 mL = 1 L
1,000 L = 1 kL
1,000 kL = 1 ML
1,000 ML = 1 GL

Now, solve the following equations and problems about volume and measurement.

1. **Grace wants to fill up her swimming pool with water. What information will best help her decide how much water she's going to use? Circle your answer.**

   a. depth of the swimming pool **b.** capacity of the swimming pool **c.** perimeter of all swimming pool walls **d.** area of all swimming pool walls

2. **The following chart shows the proportion of water used in different areas of the house in Melbourne in 2011.**



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Explore – Volumes and Measurements cont...

3. Using the chart, write the areas of water use in the house from the least water used to the highest water used.

.....*answer*

4. Which of the following amounts of liquid is largest? Circle your answer.

   a. 6,350 ML **b.** 6 L **c.** 6.5 L **d.** 0.645 kL

5. Joe needs 500 ice cubes for a party. If each cube weighs 20 grams, how heavy will his bag of ice be in kilograms?

.....*answer*

6. A rectangular swimming pool with uniform depth is 25 metres long, 6 metres wide and 2.5 metres deep. Using the formula length x width x height, calculate its capacity.

.....*answer*

7. Humidity is the amount of what in the air?

.....*answer*

8. Find out what today's humidity level is.

.....*answer*

9. Callum uses 9 litres of water every minute when he has a shower using a water efficient showerhead. He uses 100 litres of water when he has a bath. Does Callum save water by having a 3.5 minute shower instead of a bath? Find out which is the most efficient and write it down here.

.....*answer*

10. A water tank has a capacity of 7.75 kilolitres.
    How many litres does the water tank hold when it is full?

.....*answer*

BONUS QUESTION: You have a 7.75 kL tank. There are 5 people in your house using tank water for all of their activities. If they each use 150 L per day, how long would the tank water last (assuming there was no rain)?

.....*answer*

Reading your Water Bill

When you turn on the tap at home, the water has to come from somewhere; when you flush the toilet at home, the sewage has to be taken elsewhere. These are two of the services your local water retailer provides to homes around Melbourne. When a bill comes to your home, it includes charges for the delivery of water, water use, and the removal of sewage. It also includes charges for the purchase and maintenance of infrastructure, parks and waterways in the local areas.

Main Activity

Read the bill provided. Use a highlighter or coloured markers to show the different sections of the bill, using the following key:

- Essential for Customers
- Essential for the Water Business
- Interesting Information
- Information I don't understand

Write down a list of any other information you think might be useful on your water bill. Discuss the results with your classmates.

FACT: Did you know water bills arrive four times a year? People come to read your meter, then send the meter reading information to a database. The amount of water is then calculated and added to your bill.

Engage

What other kinds of things do you have to pay for in your home? Make a list, then think about which you could last the longest without. Decide on your answer and share your reasons with the rest of the class.

Connect

Bring in a water bill from home or use the Main Activity example provided. Complete the **Connect – Reading your Water Bill worksheet** to explore a water bill and understand what each section means.

Explore

Collect two bills from home; one current and one from the same time last year. Complete the **Explore – Reading your Water Bill worksheet** to help you understand the information provided on a water bill and how water is used by households.

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MS A SAMPLE
UNIT 4, 67 MADEUP STREET
NOTOWN VICTORIA 3001

Quarterly Account

Enquiries	1300 123 456
Emergencies (24hrs)	13 12 34

Account Number	1234 4567 8912
Invoice Number	998 765 4444

Please Pay	$282.05
Due Date	3 October 2014

Copy Tax Invoice Issued 12 September 2014

Summary of Charges - Residential

Unit 4, 67 Madeup Street, Notown

Lot 4 Plan 097643

Product/Service	Charge Period (your meter was read 11/09/13)	Amount
Water and Sewerage		
Usage Charges	8 June 2013 - 11 Sep 2013	$97.13
Service Charges	1 Jul 2013 - 30 Sep 2013	$96.89
Other Authority Charges		
Waterways & Draining Charge	1 Jul 2013 to 30 Sep 2013	$21.27
Annual Parks Charge	for year ending next June	$66.80
Less Rounding		-$0.04
Please Pay		$282.05

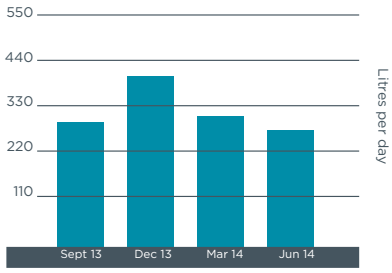
See reverse for details

Payment Summary

Last Account	$220.45
Paid/Adjusted	-$220.45
Balance	$0.00
Total this Account	$282.05
Amount Due	$282.05

Average daily usage

The average cost of water used for this account is $0.55 per day



Same time last year: 290 litres per day
This account: 305 litres per day

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UNIT 4, 67 MADEUP ST, NOTOWN
LOT 4 PLAN 097643

*362 000012718839

POST billpay®

Payment slip

Please pay	$282.05
Due date	03 Oct 2014

Please see over for payment methods

Account Details

Water usage

Meter number	Bill days	Previous reading	Current reading	Consumption in kilolitres (kl)	Rate $	Total $
ABC13579	95	00559	00588	29.00		
Total Water Consumed				29.00	1.7854	$51.78
Sewage Disposal		09/06/13-30/06/13		6.30	1.7374	$10.95
		01/07/13-11/09/13		19.80	1.7374	$34.40
Total - Usage Charges						**97.13**

Service Charges

Water Service Charge	$42.60
Sewerage Service Charge	54.29
Total - Service Charges	**96.89**

Other Authorities' Charges	Net annual value (NAV)	Rate in NAV $	Charge $
Waterways & Drainage Charge			$21.27
Annual Parks Charge	$5,513	0.004020	$66.80
Total - Other Authorities' Charges			**$88.07**
Less rounding			-$0.04

Please Pay - GST does not apply		**$282.05**
Payments Received	03/07/2014	-$220.45

Your charges explained

Usage charges

Water Usage
This is the cost for the amount of water used at the property, as recorded by your water meter.

Sewage Disposal
This is the cost of transporting, treating and disposing of wastewater from the property.

Service Charges
Water and Sewerage Service Charges enable your Water-lili WS to ensure water quality and to construct and maintain water and sewer mains.

Other Authorities' Charges

Waterways and Drainage Charge
This charge is collected on behalf of Melbourne Water, who use the funds to look after rivers and creeks and manage drainage and floodplains in your area.

Customers are billed for the Waterways and Drainage Charge at a flat rate for each rateable dwelling on their property.

For more information about this charge, visit **melbournewater.com.au**

Annual Parks Charge
The once-a-year Parks Charge which Water-lili WS collects on behalf of the Department of Sustainability and Environment helps fund the purchase, development and maintenance of Melbourne's major parks, gardens and waterways, zoos and public facilities as well as our Royal Botanic Gardens and the Shrine of Remembrance. For further information on the Parks Charge, please visit **parks.vic.gov.au**.

Important Information

If you have sold your property and your details have not been updated, please notify us immediately.

Payment Assistance is available if you are having difficult paying your account, call **1300 123 456**.

Concessions are available to eligible customers. If eligible, call **1300 123 456** with your details. Water-lili WS will require your consent to confirm your eligibility with Centrelink or DVA. This consent will be ongoing and can be revoked by contacting us.

Large Print and Braille accounts, call 1300 123 456.

Interpreter service:
For assistance in other languages, please call (TIS) **13 22 33**.

Talk to us:
If you are dissatisfied with any aspect of our services, please contact us on **131 1111**. If we are unable to resolve your concern, you can contact the Energy and Water Ombudsman (Victoria) on **1800 500 509** or visit **www.ewov.com.au**.

Visit our website **www.notreal.com.au** or email enquiry **waterlili@notreal.com.au**.

How to pay

Please pay $282.05 | Amount paid | Date paid | Receipt No.

Direct Debit
Call **1300 123 456** to request a form or visit **notreal.com.au**

If you have moved recently, make sure you update your Direct Debit account

By Mail
Post this slip with your cheque (no staples) to:

Water LiLi
PO Box 123
Melbourne,
Vic 3000

Centrepay
Call 13 1691 to arrange a regular amount to be automatically deducted from Centrelink payments.

Centrepay Ref No.
555054971L

BPAY

Biller Code: 1234
Ref: 1234 1234 1234

BPAY Make this payment via internet or phone banking.

BPAY View Receive, view and pay your bill using internet banking.

BPAY View Registration No.
Please use the 'Ref:' number above shown under the 'Biller Code'.

Credit Cards
Go to **notreal.com.au** to make credit card payments up to $10,000.

OR call **13 1971** to pay up to $10,000 by Visa or Mastercard anytime.

Postbillpay
To pay using Postbillpay go to **postbillpay.com.au** or call **13 1816**.

Billpay Code: 0362
Ref: 1234 1234 1234

In person
Pay this bill at Australia Post stores (cash or cheque).

00000000000000000012718839+016+0000215530+3124+13

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Connect – Reading your Water Bill

Find the following information on your water bill:

Account Number: . . . . . .

Customer Number: . . . . . .

Total Due: . . . . . .

Due Date:. . . . . .

Contact number for Account Enquiries: . . . . . .

Website:. . . . . .

Meter Number: . . . . . .

Write an explanation for each of the following charges. Try to find the information on your bill, or use your online search engine to help you find the answers.

Water Usage: . . . . . .

Sewage Disposal:. . . . . .

Service Charges: . . . . . .

Waterways and Drainage Charge: . . . . . .

What are the different ways you could pay this bill?

Create a sum that shows the Current Reading minus the Previous Reading and include the correct answer.

Multiply the Consumption amount with the Rates to find out how much the Total Water Consumed will cost for your bill.

Explore – Reading your Water Bill

Find the following information on your water bill and write an explanation of why you think it is required. If you don't know, try to find the information elsewhere on the bill or online.

Account Number: . . . . . .

Customer Number: . . . . . .

Total Due: . . . . . .

Due Date:. . . . . .

Summary of Charges: . . . . . .

List the product/service and explain what each item means: . . . . . .

What are the different ways you could pay this bill? . . . . . .

Explore – Reading your Water Bill cont...

What different charges contribute to this bill?
Create a pie chart to show the breakdown of the total bill amount.

Find another bill to compare with your current bill. Use a bill that is the same time of year.
Explain why this is a better comparison that simply using the previous water bill.. . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

Create a bar graph that shows the comparison of your two bill amounts, broken down into sections.

What might be some of the reasons for the differences in these (and any other) water bills?
List your answers below.

. . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

Water at Home

Most of the water in Melbourne is not used by businesses or industry, but by people in their homes. Showers, washing machines, dishwashers, taps, toilets and gardens all use water. In fact, Melburnians use 150–200 litres per person per day! That's around 15–20 buckets. What do you use your water for?

Main Activity

Think about how you use most of your water (15-20 buckets) each day. Visit *savewater.com.au* to play Mission H2O and learn how to use water more efficiently around the home.

Note: teacher resources are available from the savewater website.

FACT: A dual flush toilet is a toilet that has a full flush and a half flush button. Older toilets only have a full flush.

Engage

Use the **Engage - Water at Home worksheet** to investigate where you use water at home.

Connect

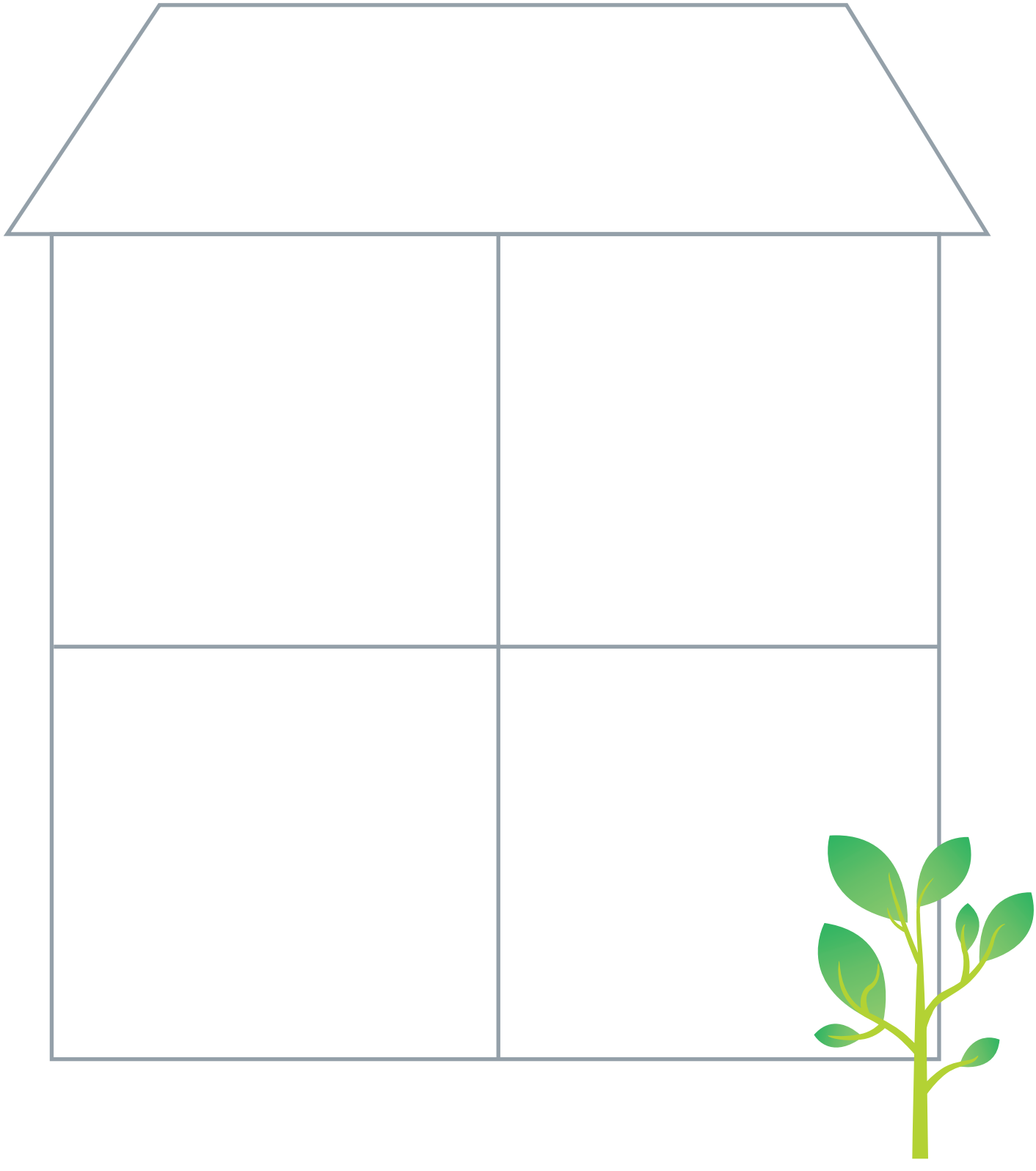
Complete the **Connect – Water at Home worksheet** to understand how to read a water meter. Use this information to calculate how much water you use at home.

Explore

In groups, create an educational board game (like Snakes and Ladders, Monopoly or Trivial Pursuit) to teach younger students about efficient water use at home. You will need to come up with a set of rules, clear instructions and ensure there is a winner at the end. Be creative, have fun–but make sure your information is accurate.

Engage – Water at Home

Fill the empty house below with pictures of where you use water at home; you might like to cut out pictures from a magazine, download them or draw your own. Each area should show a different room in the house and how water is used in that room. You may like to enlarge this page to A3 to allow for even more creativity.



Connect – Water at Home

Reading the meter is something that is usually done by someone from your local water retailer, but you can do it too. Understanding how to read your water meter can help you to know how much water you're using and whether you need to be more efficient.

TIP: Your local water retailer website has information that can help you read your water meter.

1. **Find an adult who can help you find the water meter at your house. Usually the water meter will be near the front of your property. It comes up out of the ground and looks like a bulky metal pipe with a tap and counter attached. This meter is used to measure the amount of water that your property uses. If you live in an apartment, your meter may be in a special cupboard in a shared area of your block.**

2. **When you've found the meter, look for the numbers displayed on it. Ask someone in your household to turn on a tap while you're watching the numbers. What happens?**

3. **Read the numbers from left to right–this is your meter reading. The black figures measure kilolitres, while the remaining figures show part of a kilolitre. Write down the full number displayed on your meter.**

4. **Return to your water meter at the same time the next day. Write down the number again. Calculate how much water your family used in a day.**

5. **Compare your results with your classmates. Discuss why some households might have used more than others.**

Where do the hundreds of litres per household go? Use the table below to keep track of the areas within the household where your family uses water. Tally how many times YOU used water in each area in one day.

Bathroom	Toilet	Kitchen	Laundry	Garden	Outdoors

Are any of your results surprising? Could you and your family be more water efficient? Create a list of ways you might be able to use water more efficiently in each of the areas listed above.

School Water Audit

There are lots of places around your school where water is used, including the drinking taps, toilets, gardens and the art room. Conducting an audit (or inspection) will allow you to find out where and when water is being used in and around your school, and whether there are any fixtures or leaks that need to be repaired. It may also help you discover areas where you can encourage behaviour change in the students and teachers at your school.

Main Activity

As a class, or in small groups, take a tour of your school and school grounds to review all of the places water is used. Complete a water audit using the **Main – School Water Audit worksheet**. You will need to review all of the fixtures and fittings around your school and note any that are broken or leaking. Collate the information you collect.

FACT: For every litre of water you drink at a bubbler, up to seven litres of water goes down the drain. Use a water bottle for drinking, and collect the wasted water in buckets under the bubblers for use on the garden.

Engage

As a class, review the results of your water audit and discuss when and where water is used in your school. Think about how water use compares from summer to winter in each of these areas. Use a Venn Diagram on the board to help record your answers.

Connect

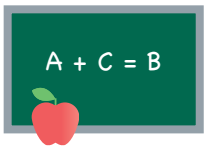
Obtain copies of the water bills for your school from the past two years (there should be eight) and use the information to complete the **Connect – School Water Audit worksheet**. If your school has a data logger connected to a water meter, you may be able to access the water use information online. Include the results from your school water audit in a set of graphs to explain where most water is used and when. What might influence the amount of water used in each situation? What suggestions can you make to ensure your school is using water efficiently? As a class, make a list of recommendations and include them in a letter to your principal or school council.

Explore

Obtain copies of the water bills for your school from last term (there should be one or two) and use the information to complete the **Explore – School Water Audit worksheet**. If your school has a data logger connected to a water meter, you may be able to access the information online. If your research uncovers any leaks or inefficient appliances, prepare an action plan to present to your principal encouraging more efficient water use. Your action plan should include graphs, charts and a proposed set of recommendations.

Main – School Water Audit

Walk around the school to review where water is used. Remember to check all areas of the school grounds, and don't forget the science and art rooms! Use the table below to record all of the fixtures and fittings, and note any that are broken or leaking. Write down the actions required. Use this information to put together a report for your school green team or principal.

Category	Area	Total number	Total number broken/leaking	Actions needed
Showers and sinks 				
Toilets				
Classrooms 				
Drinking fountains 				
Taps 				
Garden/Outdoors 				
Other (e.g. staffroom)				

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Connect – School Water Audit

Your water bill shows much more information than just the price you have to pay. Collect the water bills for your school for the past two years. Water is billed quarterly so you should have a total of eight bills. If your school has a data logger connected to a water meter, you may be able to access the information online. If not, you will need to calculate the answers.

1. **Find the total amount of water used for each bill. List all eight answers.**

1. . . . . 3. . . . . 5. . . . . 7. . . . . .

2. . . . . 4. . . . . 6. . . . . 8. . . . . .

2. **Add these answers to find the total amount of water used over two years in kilolitres.**

   How many kilolitres does your school use on average?

. . . . . per year . . . . . per month

. . . . . .per quarter . . . . . .per day

3. **Find the water service or supply charge on each bill. List it here.**

4. **Find the price of water usage charges on each bill. List it here.**

1. . . . . 3. . . . . 5. . . . . 7. . . . . .

2. . . . . 4. . . . . 6. . . . . 8. . . . . .

5. **Add the water service or supply charge to the water usage charge for each bill. List the eight answers.**

1. . . . . 3. . . . . 5. . . . . 7. . . . . .

2. . . . . 4. . . . . 6. . . . . 8. . . . . .

Connect – School Water Audit cont...

6. Add these answers up to find the total amount spent on water service or supply and water usage for two years.

7. What is the average price your school spends on water?

. . . . . per year . . . . . per month . . . . . per quarter . . . . . .per day

8. Now, find the sewerage system or service charge and the sewage disposal charge. Complete the same calculations as above.

. . . . . per year . . . . . per month . . . . . per quarter . . . . . .per day

9. Create a graph of your results on a separate sheet of paper. You could choose a line graph, bar graph or pie chart.

10. Find the trends in water use. Does your school use less water over summer or more? Why do you think this is?

11. What do you think your school could do to use water more efficiently?

12. Use your collection of bills to compare this year's use to last year's. Are there any changes? Can you explain this? (For example, you might have a new toilet block, had a water tank installed, or have lots of extra students.)

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Explore – School Water Audit

Collect the water bills for your school for the past term. Bills are issued every three months so you should have one or two. If your school has a data logger connected to a water meter you may be able to access the information online. Write the answers down, then use the information to assist you to create an action plan for your school principal or green team.

1. List the different charges and usages on the bills. Look for extra information like a charge for recycled water.

2. Note your school's water usage. Are there any major changes over the past few months according to the graph on the bill? If yes, what could these be caused by? (If your research uncovers any leaks or inefficient appliances, let your principal know so they can be fixed.)

3. On average, how many kilolitres are used every day (taking into account that schools aren't used much on Saturday and Sunday or school holidays)?

4. Go online to find out: how sewage charges are calculated by your local water business, whether the amount you pay for water depends on how much you use, and what a 'part service charge' is.

5. Taking all of the charges on the water bill into account, how much does it cost to make one litre of tap water? (Note that the Parks charge is annual and all other charges are per quarter.) This price also includes taking away all your sewage or wastewater!

6. Use the internet to find the price of one litre of bottled water. What percentage of the price is a litre of tap water compared to a litre of bottled water?

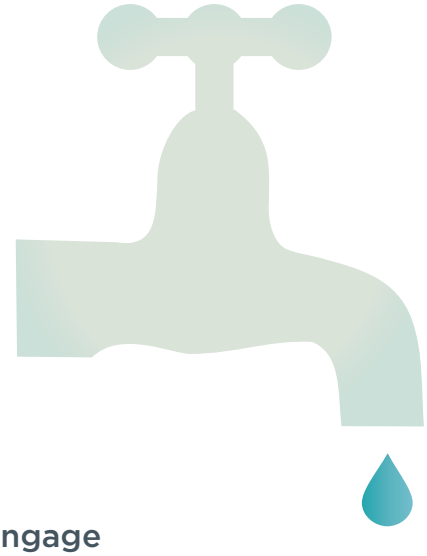
7. Using the Bureau of Meteorology website, look up the rainfall for your area for the last year. Compare the rainfall to your school's water usage. Is there any correlation between water usage and rainfall levels.

8. Compare both on a line graph.

9. Use the internet to find out more about the Waterways and Drainage charge and the Parks charge. Why are these charges important?

Using Water Efficiently

A single dripping tap can waste up to 20,000 litres of water per year. If found early, leaking taps may be fixed by simply replacing a worn washer. Water efficient appliances are another effective way to use only the water you need at home. Your local water retailer can help you be more water efficient at home through a series of programs and exchanges.



Main Activity

Do you have water efficient appliances at home? What about leaky taps? Use the **Main – Using Water Efficiently worksheet** to audit your home. Report back to your class with your results.

FACT: Old and inefficient showerheads can use between 15 and 22 litres of water per minute, while water efficient models use less than 9 litres per minute.

Engage

Have you ever noticed the stickers on some appliances at home, like the washing machine or dishwasher? Find an image of the WELS sticker that is used to rate water efficient products in Australia. Find out what WELS stands for. Draw your own version of a water efficient sticker. You can keep the star rating system or create a system of your own, and use colours, words and images you think work best. Make sure it helps people easily find water efficient products.

Connect

It might not seem like a lot when you see it happening, but dripping taps can waste a lot of water. Complete the **Connect – Using Water Efficiently worksheet** to discover how much water can be lost.

You may like to complete the School Water Audit activity before or after this activity to help you understand water use at school.

Explore

The Water Efficiency Labelling and Standards (WELS) scheme labels can help you select a water efficient washing machine, dishwasher, flow controller, toilet, showerhead or tap. Investigate an appliance of your choice. Compare the features, purchase cost, running cost and benefits of your piece of equipment with an older version (i.e. a front loader washing machine compared with a top loader washing machine). Use the information you find to create a sales pitch or brochure.

Main – Using Water Efficiently

Use the table below to record all leaks and water efficient appliances in your home. Sometimes they're obvious, but if you're not sure, you may need to ask your parent or guardian.

Consider how you might be able to fix the leaks (or find a use for the water that leaks) and whether you can replace any appliances with a more water efficient model.*

Room	Number of Leaks	Water Efficient Appliances
Bathroom/s		
Kitchen		
Laundry		
Outdoors		
Other		

TIP: You can use food dye to test if your toilet is leaking. Put a few drops of dye into the cistern. Leave the toilet (don't flush it) and come back and look in the bowl after 10 mins. If you notice any of the food dye colour in the toilet bowl then you have a leak! Let your parent or guardian know to contact a plumber.

**Your water retailer offers a range of incentives and programs that can help you be more water efficient at home.*

Connect – Using Water Efficiently

Are there any dripping taps at your school? Find a leaky tap and measure the water that is leaking. Break into groups if you find more than one leaky tap. Place a measuring container underneath your leaky tap for one minute; use a timer to make sure you're accurate. Get one student to count the number of drops that fall during that time.*

Bring your information back to the classroom. Measure the amount of water you collected, using a measuring cylinder.

Record your results in the table below. Write down the results of the other group/s.

Tap Location	Drops per Minute	Water Collected (mL)

Create equations to find out the following answers for each of the taps:

If the tap was leaking for a whole day, how much water would be wasted?

If the tap was leaking for a whole week, how much water would be wasted?

If the tap was leaking for a whole year, how much water would be wasted?

Add up all of your results for the whole year to find out how much water would be wasted by all of the taps. List two things you might do to help fix the leaks at your school.

1.

2.

Can you think of any other leaks that may occur in the school grounds that you can't see?

**If you don't have any leaky taps–well done! Try turning on the tap really lightly so that it only drips and pretend it's a leaky tap for this experiment. Remember to turn it off again when you're finished!*

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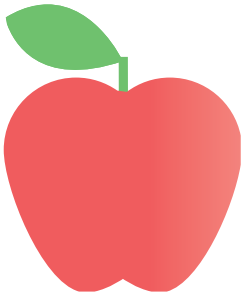
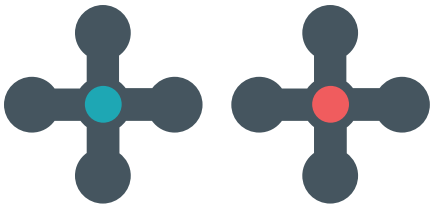
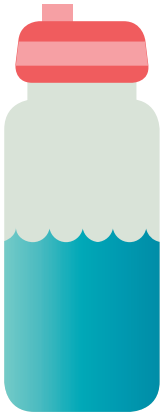
How We Use Water







How We Use Water

Humans, plants and animals all need water to survive, but water is more than just a thirst quencher. Water is used in a variety of ways across all parts of the community. It is used frequently in the home, but is also an important aspect of most industry and agricultural activities.

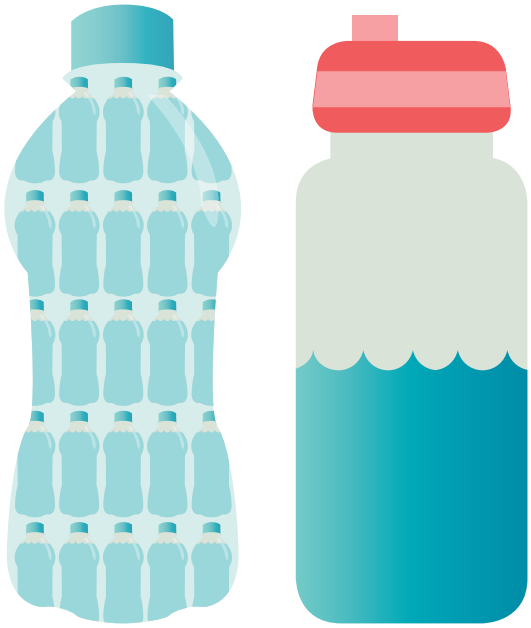
Melbourne's population continues to grow. With more people comes an increased demand for all kinds of resources, including water. Melbourne supports a wide range of industries, from car manufacturers, oil refineries and hospitals, to small businesses like hairdressers, sporting clubs and car washes–all things we often take for granted.

Industrial water use is quite different to household water use. Just like at home or school, employees still use water for drinking, toilet flushing and washing, however, the business may also use water to heat and cool equipment, as a solvent for other substances, to produce electricity, and as an ingredient in the production of food/clothing or other materials. This water use adds up pretty quickly.

Industrial water use can also often result in a waste product known as 'trade waste'. That is, water that contains chemicals, fats or detergents. Melbourne's water retailers work closely with business customers to manage what does and does not go down the drain, so that water doesn't need to be more heavily treated and can be returned to the environment in a cleaner, cheaper and more sustainable way. They also help to find solutions and alternatives to any water use or re-use within a business, and ensure they run as efficiently and environmentally sustainably as possible.

Agriculture is another sector where large quantities of water are consumed. Farms raise animals and crops for human use, where the end product may be food (grains, beef, etc.) or goods (like clothing). The agricultural industry is one of Australia's largest water users and, even though there aren't a lot of farms in Melbourne, Melburnians still enjoy much of the bounty they produce.

Access, availability and use of water aren't always under the control of the farmers. However, some innovative solutions have been developed to improve water efficiency and



maintain agricultural yields. A simple example of this would be the use of recycled or tank water instead of precious drinking water to hose down a milking shed, which could save hundreds and thousands of litres of water for other uses every year.

Whether you spend your days in a factory, farm, school, hospital, office or at home, all people use water for something, and we all need water to survive.

You may not realise it, but Melbourne has some of the cleanest drinking water in the world. It meets the high standards set by the Australian Drinking Water Guidelines and the Safe Drinking Water Act. Melburnians are particularly lucky that most of the water that is piped into houses is collected in protected (or closed) natural catchments, where no agricultural or human activity is allowed. Because of this, it is of a high quality and requires very little treatment before it is consumed.

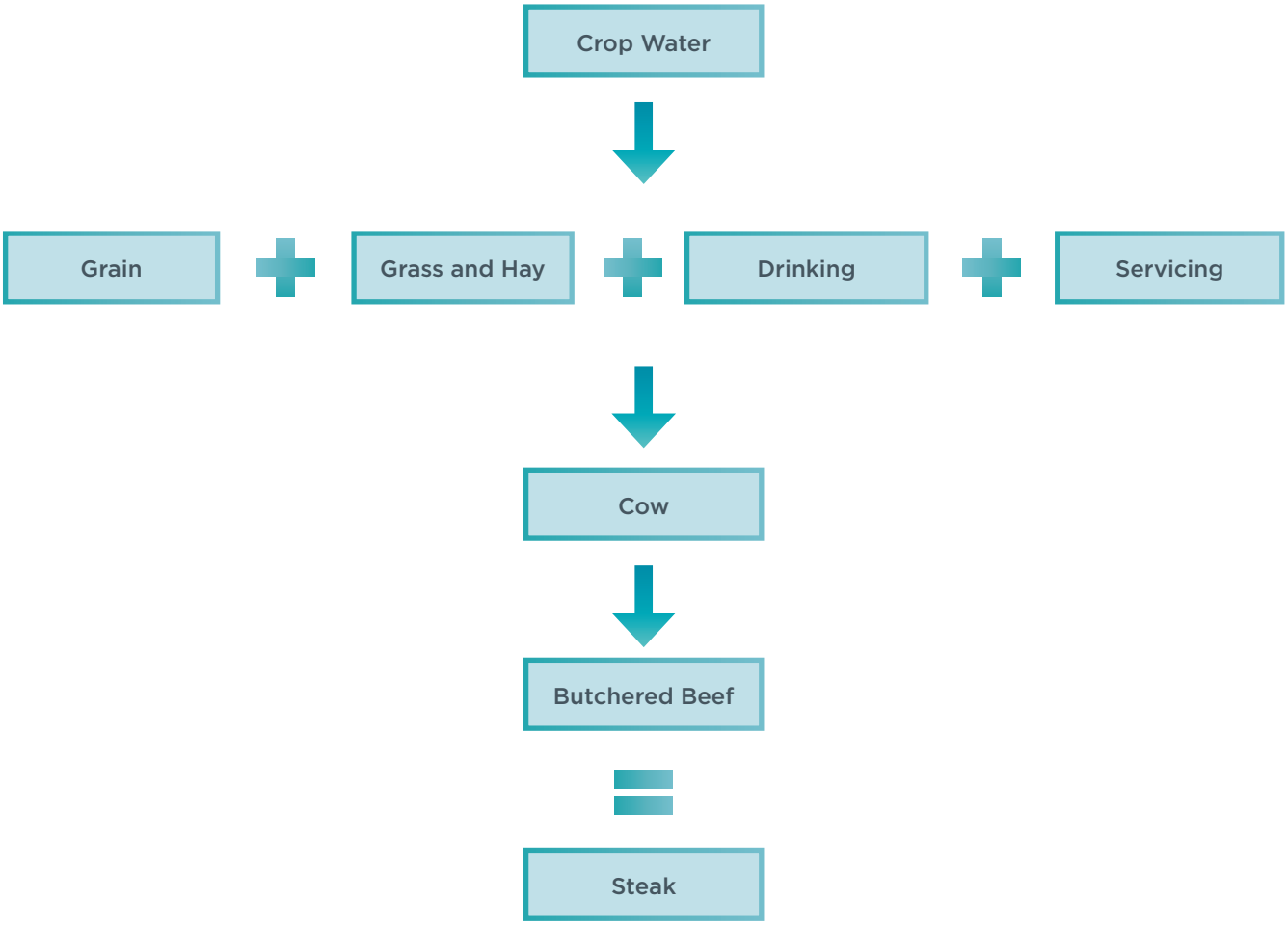
It seems surprising, then, that bottled water has become commonplace over the past few decades. Tap water from a re-usable bottle is much better for the environment AND saves you money. For the price of one litre of bottled water, you can refill a one litre bottle from a tap every day for around two and a half years! PET plastic is the main material used to produce bottles for bottled water. A great deal of water and energy goes into making these single-use bottles, and more than half of the bottles end up as litter and in landfill, with only a small amount recycled.

It is not hard to see how much water goes into a bottle of water...or is it? We can't always see water use–even when we're the ones using it! People use water for many activities, but may not realise all of the ways they consume the Earth's water. Embodied (virtual or hidden) water refers to the total amount of water that goes into making something. Water is used not only to help grow a food item, but is also used in other aspects of production, like cleaning, packaging, and transportation. Embodied water might be found in something organic, like an apple or a loaf of bread, but could also be something that can't be eaten, like a couch, a car or a plastic bag.

Using water is inevitable, but the way in which we use it can be controlled by us. Valuing water and using it only where necessary means water sources won't be under such a constant strain.

Embodied Water

Being aware of embodied water can inform our decisions about the food we eat and the goods and services we consume. Let's use 300 grams of beef as an example. Embodied water takes into account the water the cow drinks as it grows, the water to grow the grass, grain and pellets the cow eats, and the water it takes to process and package the meat. Water is also used to clean equipment, sterilise containers and in several other parts of the manufacturing and transport processes. When all of this is added together, it can take around 4,650 litres of water to produce just 300 grams of Australian beef!



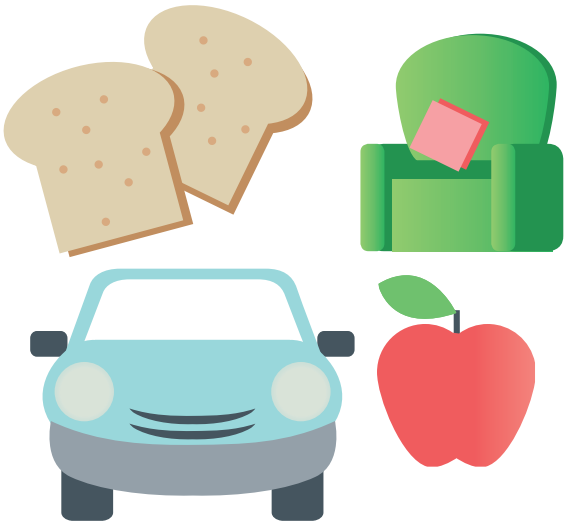
Embodied Water

Embodied water, sometimes called 'virtual' or 'hidden' water, refers to the total amount of water required to produce a single item. The item might be something organic, like an apple or a loaf of bread, but could also be something we don't eat, like a brick, a couch or a car. Our awareness of embodied water can help us make good decisions about the things we buy and use.

Main Activity

Use the **Main – Embodied Water Worksheet** and investigate how much embodied water goes into producing a range of 'apple' products. Use a search engine to find an embodied water calculator online to assist in calculating how much water is in each product. Discuss your results as a class. Consider where you might be able to use less embodied water in your daily life.

FACT: The embodied water of one egg is 198 L! A 100 g bar of chocolate has 2,400 L embodied water. Think about that next time you are hungry. There are a range of apps and online calculators that can give you lots of information about the embodied water of different products.



Engage

Do you ever throw perfectly good food in the bin? Do you sometimes have to throw old fruit or bread away because it has gone off? Produce a storyboard or comic strip that explains why you shouldn't waste food, especially in relation to its embodied water.

Connect

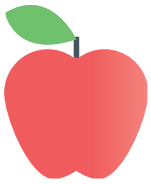
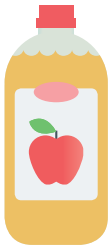
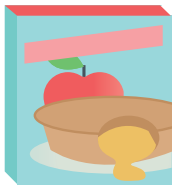
Use the **Connect/Explore – Embodied Water worksheet** to record all the food and beverages you consume in one day. Use an online embodied water calculator to reveal how much water is 'hidden' in the items you consume. Expand on this further by researching the costs and environmental impacts of food packaging. Consider alternatives to regular packaging and organise a nude food day to encourage less packaging at your school. You might like to make this a regular activity.

Explore

Use the **Connect/Explore – Embodied Water Worksheet** to record all the food and beverages you consume in one day. Now, research the cost of fashion. How much water would it take to produce your favourite outfit? Be sure to follow the process from the raw materials your clothing is made from (e.g. wool) to the delivery and sale of your clothing in a shop. Create a flow chart that covers every step of the process, including where it is produced, how it travels and how it's packaged.

Main – Embodied Water

Brainstorm all of the ways water might be used to produce each of the 'apple' items below.
Find an app or website to calculate the embodied water (search for an embodied water calculator).
Discuss your results with the rest of your class.

Apple product	Brainstorm all water used in process	Water use calculation/s
An apple 		
A bottle of apple juice 		
A frozen apple pie 		
An Apple iPod nano 		

Connect/Explore – Embodied Water

List the food and drinks you consume in one day. Go online to find out how much embodied water each item contains; you may need to break down some meals into individual items. Add up all of the embodied water for the entire day. Compare these results with your class.

Time	Food and Drink Consumption (list of items)	Embodied Water (for each item)	TOTAL
Morning			
Afternoon			
Evening			
			Total embodied water:

Industrial Water Use

Where would we be without cars, schools or our local sporting clubs? Melbourne supports a range of industries that are important to all of us. These include large organisations like car manufacturers, oil refineries, hospitals, and small businesses like hairdressers and car washes.

Industrial water use is quite different to residential (household) water use. While employees still use water for drinking, toilet flushing and washing, businesses also use water for many other purposes. These include heating and cooling equipment, as a solvent for other substances, to produce electricity and as an ingredient in production.

Main Activity

Watch the award winning animated film WALL-E. Discuss the film's different characters and themes. Could Earth ever really end up like this? What can you do about it? Share your thoughts with the class.

TIP: You may like to do this in conjunction with the Water Relay activity in Volume 2.

Engage

Using recycled materials, create a sculpture or collage of WALL-E or the world that he lived in. You may like to do this activity individually, in small groups or as a whole class project.

Connect

What does industrial mean? Conduct some research and make a list of industry types in Australia. Select one business type and find out how they use water. Put together a report about the business you've chosen and how they use water. Use the Five Ws (who, when, where, what, and why) to help you organise your findings.

Explore

Research online to find an example of a business changing their processes to become more water efficient. There are lots of examples online of businesses in Australia and around the world who are working to be more efficient. Summarise the information and produce a promotional flyer for that business, outlining their achievements and the benefits gained from the alterations made.

Water for Life

Water is more than just a liquid we drink. Humans use water for many things, including cooking and bathing. We also need water for the production of goods, including growing, manufacturing, transporting and packaging. There are many processes that need to happen before groceries and goods reach our supermarkets. The vegetables we eat require water to grow. In fact, all of the products on our supermarket shelves require water in their production.

Main Activity

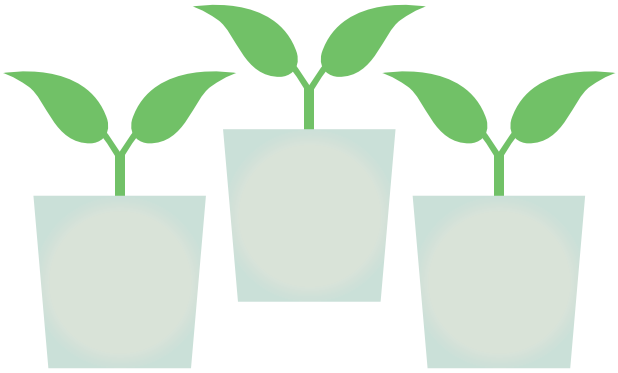
If you've ever been to a desert, you may have noticed that there are still some plants and animals living in the area. So can a plant grow without any water at all?

Materials

- 3 cups
- 3 broad bean or snow pea seeds
- water
- soil
- gloves

Method

1. Place 3 plastic cups on the table in front of you. Put on your gloves.
2. Fill each of the cups $^{2}/_{3}$ full with soil.
3. Plant the seeds as per the packet instructions. Place 1 seed in each of the cups.
4. Label/mark each of the cups with your name and the conditions they will be under:
   - Plant 1 – water and sunlight
   - Plant 2 – water only
   - Plant 3 – sunlight only
5. Place each of the cups in the appropriate location (as marked) and make sure you water those that require it.
6. Use the **POE template** to record your predictions.
7. Check back on your plants on the same day each week for 3-4 weeks.
8. Complete the **POE template** to record your observations and explanations.



FACT: Did you know that humans can survive several weeks without food but only a few days without water!

Engage

As a class, discuss all the different ways you use water. You may find that water is even more important than you realise. Decide what is the most important activity you do that requires water, then create a collage or drawing that shows water being used in this way.

Connect

Think about the different ways you interact with water every day. Imagine you're a frog! How might you use water now? Discuss your ideas as a class, and then write your own story about a day in the life of 'Freddy the Frog'. Use the **Story Map template** to help plot out your story.

Explore

As a class, share your ideas about the variety of ways the beans you've grown could now be used if it was a larger scale operation. Now, choose any plant or animal that interests you, and create a flowchart to show how it is grown, what it would be used for, how it uses water and how it fits in with the whole water cycle. You'll need to do some research. Make note of any adaptations your selected plant or animal may have developed over time to survive in a world with either ample or limited water available.

Agriculture

Agriculture is another word for farming. Farms raise animals and crops for human use, either as food or to produce goods (such as clothing). We need farms to produce many of the foods and goods we use, however farms can consume large amounts of water. Although access to water can be out of the control of the farmer, there are many things they can do to make sure they are as efficient with their water use as possible.

Main Activity

Organise a visit to a local farm, or use your search engine to find an online virtual farm tour. Try to remember, or make a list of, all the times you see water or hear it mentioned during the tour. As a class, discuss the ways water is used on different types of farms.

TIP: For a fun, quick activity, visit *www.save-the-rain.com/SR2*. Take turns to follow the instructions to map out the roof of your school or home (or both) to find out how much rain you can catch and how many crops you could grow with that water. Secondary schools may also like to investigate working with the Cows Create Careers group to find out more about animal farming.

Engage

Listen to the audio book or read the book *My Farm* by Alison Lester or *A Year on Our Farm* by Penny Matthews. While the story is being told, draw everything you can think of that holds or produces water on a farm (e.g. a windmill). The book mentions lots of ways water can be used. Did you draw them all?

Connect

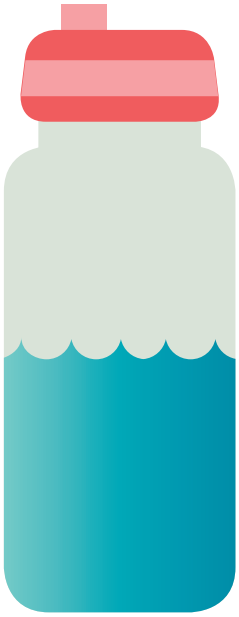
Many of the online virtual farm tours mention using water sustainably. In a group (on a large piece of paper), select a type of farm, then list as many things as you can think of to do with sustainability. Which areas would be most important to consider? Is it only water that farmers try to use efficiently? What else contributes to their environmental sustainability? Include your answers on the paper. Decorate the paper with drawings that relate to your responses, then explain your information sheet to the class.

Explore

Many grain crops are considered staples due to their high level of availability and low costs to the consumer. Of course, there are other factors to consider when growing crops, including how much water is needed to sustain them and what to do when there is no water available.

Investigate these four staples: wheat, rice, maize and potatoes. Find out their ideal conditions, and where they are being grown in an efficient and inefficient way. Present your information as a slide show—include images as well as some facts and other interesting information.

Bottled Water



Melbourne has some of the cleanest and best quality drinking water in the world. This is largely because our water is collected in protected catchments and requires very little treatment before we drink it.

Bottled water has become more and more popular over the past few decades, however, it is an expensive way to drink water and all of that plastic is bad for the environment. It can take up to three litres of water to produce one litre of bottled water, when you take into account producing the bottle, its label and packaging, and transporting it. Drinking tap water in a re-usable bottle is not only better for the environment, but also saves a whole lot of money.

Main Activity

Complete the first part of the **Main – Bottled Water worksheet** to list the good and bad aspects of bottled water and tap water. Put your worksheet to the side. Watch *The Story of Bottled Water* video on *youtube.com* as a class. Do you have any new information to add to your sheet? Complete the rest of your worksheet. Discuss the additions you made with the rest of the class.

TIP: Writing a Slogan

A slogan is a memorable phrase or saying that is used to express an idea or message. Use the below information to help you come up with your own slogan:

- **What slogans do you remember? Why?**
- **Try to focus on just one message.**
- **Use creative language, but ensure it is clear.**
- **Short slogans are most memorable.**
- **Keep your art design simple.**
- **Try to link your artwork to your message.**

Engage

Come up with a chant, song or poem to share at your school assembly that reminds other students to use a refillable water bottle and not to buy bottled water. You might like to include some hand movements or dancing to help express your message.

Connect

As a class, plan a campaign to ban bottled water being sold or used at your school, or have a celebratory week without bottled water. You might like to involve one year level or the entire school community.

Explore

Come up with an advertising campaign for the slogan: Are you getting what you paid for? Watch an episode of the ABC TV series Gruen Transfer to get 'behind the scenes' information about advertising. Be sure to consider the triple bottom line when putting your ad together (those are the financial, social and environmental benefits and impacts).

Main – Bottled Water

Think about your experiences with bottled water and tap water. Do you like one more than the other? Are you aware of the good and bad things about either? Before you watch the video *The Story of Bottled Water*, complete Section 1 (before) of each table by writing a list of the good and bad things about bottled water and tap water. After the video, fill out Section 2 (after) with any new information you've learnt.

BOTTLED WATER (bought from a store)

	Good	Bad
BEFORE		
AFTER		

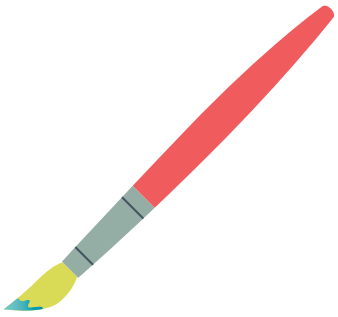
TAP WATER

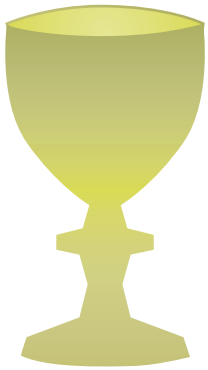
	Good	Bad
BEFORE		
AFTER		

water
learn it. live it.

3

Water Meanings





Water Meanings

Water may seem dull, but it is actually a very interesting substance. Water can evoke emotion through all five of our senses; we can touch, see, hear, smell and taste water and it can make us feel a number of different ways.

Human perception of water plays an important part in all cultures. Of course, we need water to survive, but it's also used as a way of bringing depth of meaning to our more spiritual or artistic sides, through language, art, religion and a range of other cultural practices.

Water is often used as a symbol to represent many different characteristics, and has been used in this way for many centuries. It may represent purity, cleansing and a source of life, but can also symbolise destructive power and strength. It can also be used in a more literal sense, as a water body, rainfall or another form of water.

You may have heard someone use the phrase 'testing the water' if they want to gauge a situation, they might be 'in hot water' if they are in trouble, and if they've had an argument that has been settled they may say the issue is 'water under the bridge'.

Folklores and sayings are a common (and fun) part of many cultures all around the world. Water plays an important role not only in the language of other cultures, but also the beliefs of many religions, including Christianity, Buddhism, Hinduism and Islam. Christians use water in the ritual of baptism while Buddhists use water during funeral services. Hindus believe water has the power to purify the spirit and they bathe before entering a temple. Muslims use water for purification. Water is also a key part of Indigenous Australians' Dreamtime stories.

Indigenous Australians have lived on the land for around 40,000 years. Aboriginal people used rivers, creeks, wetlands and other natural water features as sources of drinking water. They also accessed groundwater and used waterways to transport them from one place to another. Well before electricity, running water and plumbing, our Indigenous population understood the importance of sourcing fresh water and carefully disposing of their waste to avoid water pollution.

Water is a common theme in the fine arts. Albert Namatjira's 'Wildlife near the Gosse Range' and Claude Monet's 'Water Lilies' both feature literal landscapes of water. Other artists explore symbolism and may use water in their work to demonstrate calm, change, fertility or destruction. You may not be consciously aware of it, but many books, movies and songs also use water, both literally and symbolically, to help portray the message of the artist.

Folklores

- Denmark: Morning red gives wet days, Evening red gives sweet days;
- Ireland: Red sky at night, shepherd's delight, Red sky in morning, shepherd's warning.

Sayings

- China: Dripping water pierces a stone; a saw made of rope cuts through wood;
- Germany: Blood is thicker than water;
- Africa: Where water is boss, the land must obey;
- England: Don't throw the baby out with the bath water.

Cultural Use

Water often plays an important role in the beliefs and rituals of many of the world's religions including Christianity, Buddhism, Hinduism and Islam. Water is often used as a symbol that can represent a number of things, including purity, cleansing and a source of life. It can also symbolise destructive power or strength.

Main Activity

Use the **Idea Wheel template** to brainstorm all of the different ways you use water in four different areas: 1. water for inside tasks, 2. water for outside tasks, 3. water used for recreation and fun, and 4. water used for religious or cultural activities. Do you think everyone will have the same responses? Share your responses with a classmate to find out some of the similarities and differences in the way you and your classmates use water!

TIP: Consider visiting the Melbourne Immigration Museum to discover how water has been used through history by Indigenous Australians and others.

Engage

Create a large patchwork to share your experiences with others. Use art supplies to decorate calico squares with images that represent the role water plays in your life. Think about your daily routine and any beliefs you and your family have. Once all of the artwork is complete, use a friend of the class to join all of the squares together. Display the patchwork in your classroom.

Connect

How do you use water? Find some books in the library or use the internet to find out how water is used in other countries. Use the **Compare and Contrast template** provided to compare the way you use water with the way a person from India or Northern Africa uses water. You might like to start with the results you came up with in the **Main Activity**.

Explore

In small groups, investigate the use of water in a particular religious ceremony, such as Ablution, Aspersion, Baptism, Ghusl, Mikvah or Amrit Sanskar. You should consider how the water is used, what it symbolises and the origins of this symbolism. Script and record a short film about the religious ceremony you've selected. You should include images and footage (if available), and provide a voice-over to narrate your film.

Indigenous Use

Indigenous Australians have lived on the land for more than 40,000 years. It is hardly surprising, then, that they used water differently to how we use it today—before electricity, running water, taps and plumbing. Their relationship with water is much more than just a liquid to drink, cook and bathe in; it is included in many of their rituals and beliefs.

Main Activity

Go online to find clips and films about our Indigenous population and their relationship with water. Share the most interesting information you find with your class.

FACT: People haven't always had digital recorders, computers, or even pens and paper to record their tales and history. Instead, storytelling was used by Indigenous Australians to pass information from one generation to the next. While this method is still often used today...we've got a number of ways to record and distribute it so the stories don't get lost.

Engage

Create a short storybook about the different ways Indigenous Australians use water. You may like to compare the way traditional Indigenous Australians use water to how you use water today.

Connect

Use a Venn Diagram to compare and contrast how Indigenous Australians have used water in the past and how we all use water today. You will need to conduct your own research. Be sure to include cooking, cleaning, recreation and the removal of sewage in your comparison.

Explore

Australian families today are familiar with the four seasons of the year: summer, autumn, winter and spring. However, traditional Indigenous Australians have their own seasons, depending where in the country they live. Pick a region and find out what the Indigenous Australian seasons are for that particular area and how they impact the way these communities interact with water. Create an interactive poster or infographic that displays your findings.

Water Art

Water is used in the arts world in a variety of different ways, but especially as an artistic material or as inspiration for a theme. Some artists are literal and paint landscapes, while others explore the symbolism of water and use it to represent something other than what it is.

Main Activity

Search online or use library books to find images of watercolour paintings, famous watercolour artists and any other artworks that portray water as a main theme. Be sure to include Indigenous Australian artworks in your search; they are often images that focus on nature. Select your favourite piece and explain what it is you like about the artwork to the rest of the class.

TIP: Visit a local gallery and take a tour to explore more about the use of water in art. Or refer to NGV's Water Trail for a tour and downloadable resource for the trail that explains the water connection.

Engage

Create your own watercolour drawing or painting, inspired by a theme your teacher provides. Alternatively, try wetting your paper first and then use watercolour paints to create an unusual piece of art.

Connect

Use the **Connect – Water Art worksheet** to draw an art style 'out of a hat'. Do some research and find some examples of your art style, then create an image showing what water means to you in the style you picked. Write a short paragraph to accompany your artwork that explains why water is an important part of your life.

Explore

Investigate the symbolism of water in art. You may want to focus on literature, film, paintings, music or sculpture. Analyse the use of 'water' in one piece of artwork and present your findings in a five minute oral presentation. You should include an image or excerpt of the work and explain how it is used in a symbolic way.

Connect – Water Art

Cut out the rows from the table below. Ensure there are enough pieces for each student in the class (you may need to make more than one copy).

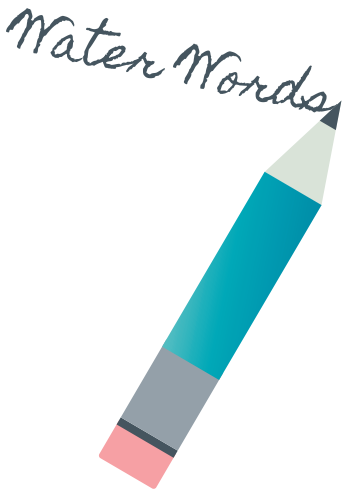
Students will pick a style 'out of a hat', then use their piece of paper to write down the features they discover about their art style.

Students should then create a piece of art using the selected style features to show what water means to them.

Abstract	**Features:**
Cubism	**Features:**
Expressionism	**Features:**
Pop Art	**Features:**
Primitivism	**Features:**
Realism	**Features:**

Water Words

How does water make you feel? Water can make you feel scared when it's pouring down in a storm, or make you feel relaxed when it flows down a waterfall. It might surprise you when it's unexpected, and make you laugh when you play with it. Words about water can create wonderful imagery and can deliver strong messages.



Main Activity

Many poems and songs have been written about water throughout time. Find a selection online (or bring in your own poem or song about water) and share them with the class.

FACT: The word 'water' can act as a verb and a noun. As a verb it describes the act of watering something (to water) and as a noun it describes water as the name of a physical liquid.

Engage

As a class, use the **ABC Brainstorming template** to come up with words about water. You can include words that describe water and also how you use it. Choose one word each and write it on a card. Decorate your card with an illustration and include a definition of your word. Display the class set of cards on a Word Wall.

Connect

Use the **ABC Brainstorming template** to come up with words about water; the words can describe water in terms of your senses, or might relate to how you use water. Using the words you have come up with, create a poem or song about how water makes you feel.

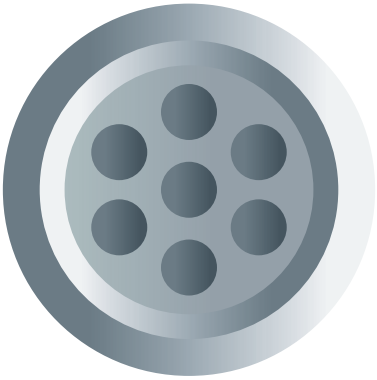
Explore

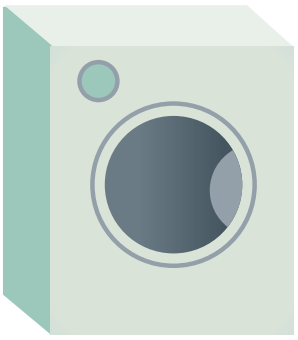
Songs aren't just nice to listen to–sometimes they have political or social motivation. Research online to find songs or poems that have been written in response to environmental issues concerning water. Research who wrote the song/poem and why. Was it a successful form of communication? Why or why not? Present your information as a news article. If you have time, you might like to try writing an environmental song of your own.

water
learn it. live it.

4

Water Supply and Efficient Water Use





Water Supply and Efficient Water Use

Earth simply can't produce any more water than we already have; our water supply is finite. Over time, humans have had a huge impact on the world's water supply. Pollution and water wasting behaviours have been common for many centuries, causing the price of water to increase and accessibility to decrease. While some impacts, such as bushfire and drought, are out of our direct control, the way we use water and the way we live in our environment today is something we can all manage as a community and as individuals.

Water use on Earth has grown at twice the rate of population growth over the past century.* Humans are using more water in homes, businesses and farming than can possibly be maintained in the long term. Our impact on Earth's water affects both the quality and availability of water.

The impact on supply doesn't just come from using more than our fair share. There are also obvious impacts such as pollution (small and large scale), and less obvious impacts like global warming and climate change.

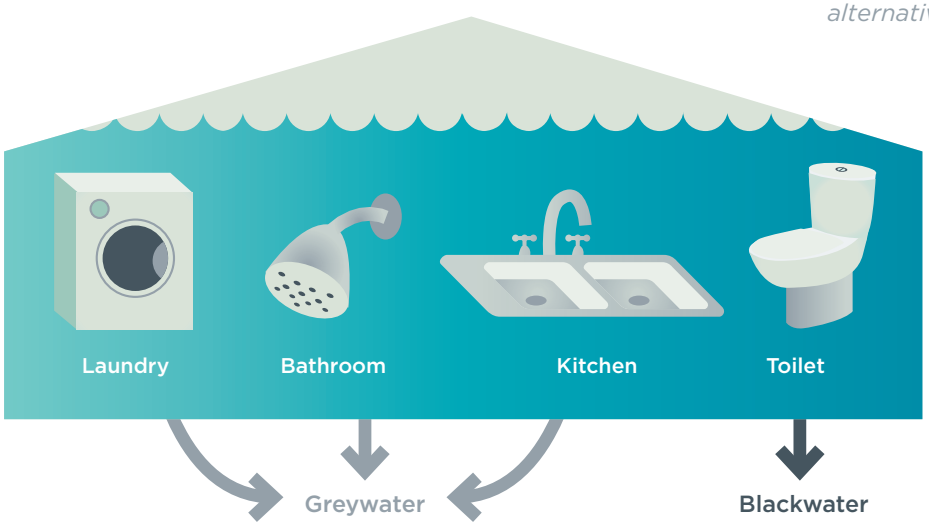
When limited water is available in Melbourne, water restrictions are one way that the State Government helps to preserve drinking water. Water restrictions are rules that outline the ways in which a person in the local community may or may not use the drinking water supplied by their local water retailer. Rules are based around non-essential activities, and might include limited car washing and watering of gardens. Permanent Water Use Rules (PWUR) provide Melburnians with guidelines for sensible water use, and are used until more stringent water restrictions may be required. The rules do not apply to the use of bore water (where available) or tank water. Water restrictions aim to preserve the drinking water needed to keep communities healthy when there is limited water available.

Due to the effect humans have on drinking water supply, many innovations have been investigated and developed. Alternative water sources like recycled water and greywater are obvious ways to reduce the use of drinking water when it's not being used for consumption or bathing.

Greywater is a type of 'used' water that flows down the drain from your dishwasher, washing machine, sink, bath and shower. It doesn't include any toilet waste. Water that contains fecal matter is called blackwater; it must be treated more heavily before being filtered, purified and returned back into the environment. Greywater cannot be re-used for drinking, due to the contaminants it carries, such as soap, toothpaste and detergent. However, it may be re-used for tasks at home like watering specific parts of your garden or flushing the toilet.

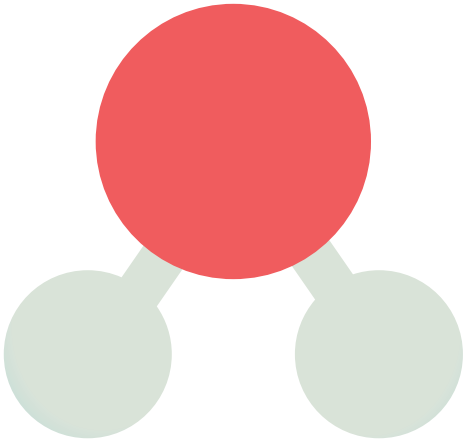
Some home greywater systems are quite complex and include a variety of pumps, storage vessels and filters. A simple method most people can easily undertake is to collect the used water from a shower or sink in a bucket and simply pour it onto your garden beds. Greywater that isn't collected and re-used at home is sent to a sewage treatment plant for full treatment (refer to Volume 2 for appropriate information and activities).

** Source: unwater.org. See Volume 2 for more on alternative water sources.*



Valuing Water

Water is a finite resource. That means there is the same amount of water on Earth today as there was when Earth first formed. More water cannot simply be created by mixing a few hydrogen and oxygen atoms together, so it is important to consider how we use this valuable resource.



Main Activity

How do you and your classmates value water? Think, Pair and Share to find out. Interview each other about how you use water each day. Record your partner's answers and share the one you find the most interesting with the rest of the class. You can make up some questions of your own, but your list should include:

- What time of the day do you use a lot of water?
- Have you been to another country that doesn't have clean water?
- What is your favourite way to use water?
- What do you use water for at home and at school?

Engage

As a class, read Graeme Base's book *The Waterhole*. Discuss the themes in the book. What happens to the water as you read through the story? How do you think the animals are feeling as they watch the water disappear? What does the term 'value' mean to you?

Write a list of the things you value. List them in order of the things you value most highly to the least valuable to you. Think about how you use these values in your everyday life.

Connect

At the moment, you probably use between 150 and 200 litres of water per day. How would you cope with only 60 litres of water per day for drinking, toilet flushing, washing and everything else you need to do? What about 10 litres? Brainstorm the ways you use water at home. Use the **Connect – Valuing Water worksheet** to plot out the ways you could reduce your water use and how having less water would affect you. Use the **Ranking Ladder template** to help you rank the importance of the activities that use water–and where you can make changes to be more efficient in your everyday life.

Explore

Select a developing country and explore the availability of water for its people. Include the distance to travel, frequency of travel, how heavy it is to carry, how it is carried, the quantity used and how it is used. Present your information as a digital presentation or as a short non-fiction book. The internet has lots of information, including photographs, statistics, videos and quotes that can help your research.

Connect – Valuing Water

Here in Melbourne, we are very fortunate to have access to clean drinking water for our daily activities. In fact, we each use an average of 150-200 L per day. Around two thirds of the people on Earth use less than 60 L of water per day. How do you think they use their water?

Use the table below to think about how you use water now and what you would do if you had less water. The **Ranking Ladder template** will help you prioritise which activities are most important to you.

Area Category	How would you use the water with the amounts listed below?		
	150 L	60 L	10 L
Bathroom			
Toilet			
Kitchen			
Taps and Leaks			
Garden/Outdoors			

Human Impacts on Water Supply

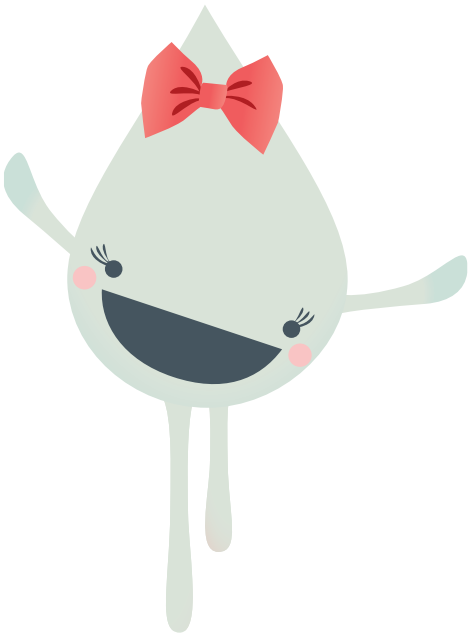
Water is a finite resource; we have as much on Earth today as we will ever have. Over time, humans have had a large impact on the world's water supply, through pollution and water wasting behaviours. There have also been many environmental factors (fire and flood) and pressures from population growth and climate change.

Melburnians have done a good job of saving water in recent years, but this behaviour needs to continue into the future. If it doesn't, water may become too difficult to access, even in Australia.

Main Activity

Individually, or as a class, brainstorm all of the different human activities that can pollute water or impact its natural flow. Once your list is complete, highlight the destructive activities you think could be altered or minimised. Come up with solutions for three of the activities you considered changeable and share them with a classmate.

Teacher tip: You may want to do this activity in conjunction with a home or school water audit.



Engage

Read Bill Peet's picture books *The Wump World* and/or *Farewell to Shady Glade* or *The Tomorrow Book* by Jackie French. As a class, discuss your feelings about the characters in the story. Use craft items to make a piece of art that re-creates your favourite scene from one of the stories.

Connect

Tell the story of 'A Day in the Life' of a water drop that starts in an irrigation area or reservoir. What will your water drop be used for? How will it travel? Do some research to find out what might happen to your water drop on its journey. Use the **Story Map template** to assist you in planning your story.

Explore

As a class, watch the documentary *Flow: For Love of Water* or *A World Without Water*. You may be able to access these videos on *youtube.com* or at your local library. At the end of the film, take 10 minutes to write down your thoughts about the impact the film had on you and any actions you'd like to take as a result of this new information. This can be a personal reflection or something you share with the class.

Using Greywater

Greywater is a type of 'used' water that flows down the drains from your dishwasher, washing machine, sink, bath and shower. It doesn't include any toilet waste. Greywater cannot be re-used for drinking, due to the contaminants it carries, such as soap, toothpaste and detergents. However, it may be re-used for tasks at home, like watering specific parts of your garden or flushing the toilet.

Main Activity

When using water in your home, contaminants like detergents, oils or soap can enter the water and you may not be able to see them. Care must be taken when and where you use greywater. Complete the following experiment to see how tricky everyday household contaminants can be. Use the provided **POE template** to record your predictions, observations and explanations.

Materials

- 3 cups water
- 2 L plastic soft drink bottle
- 1 cup cooking oil
- 1 cup dishwashing detergent

Method

1. Read through the steps of this experiment and complete the Predict part of your **POE template**.
2. Put 3 cups of water into a large soft drink bottle.
3. Add 1 cup of cooking oil.
4. Screw the lid on the bottle and shake it. Record your observations.
5. Add 1 cup of dishwashing detergent.
6. Screw the lid on the bottle and shake it. Record your observations.
7. Leave the bottle to settle for 10 minutes and record your observations about the water. Does it look safe enough to drink? If you were to use it on your garden, what effects do you think it might have?
8. Review your results and complete your **POE template**.

Engage

Use the provided **Engage – Using Greywater worksheet** to determine the appropriate type of water for each activity. Colour, cut and paste the images provided into the **Idea Wheel template**. Ensure you enlarge these sheets to A3 to allow room for all of your artwork.

Connect

In groups, collect empty laundry or dishwashing packaging to create a sculpture to display in your school foyer. Research detergents to find out what the ingredients are. Are there phosphates? Find out what impact greywater with phosphates would have on plants in your garden.

Write an explanation to go with the sculpture to inform visitors about responsible use of greywater, including when and where it should be used. You may like to run an art show to promote your new knowledge.

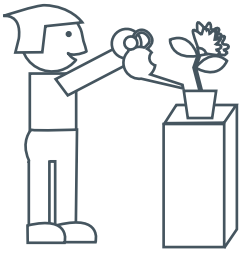
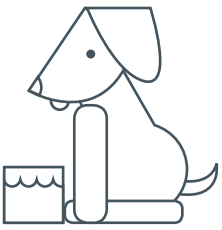
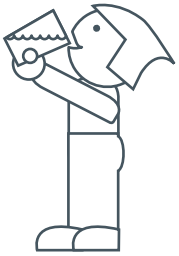
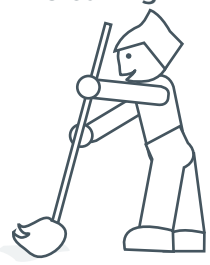
Explore

Create an advertising campaign to explain why non-phosphate detergents are a better choice than those with phosphates. You might like to create and run a survey (in person or online) to find out what people already know about these issues and in which areas they require more information. Your advertisement should include impacts on greywater re-use, stormwater pollution and treatment, and can be in the form of a brochure, poster, TV ad or billboard.

TIP: Greywater use during periods of heavy rain is not recommended. Stormwater isn't treated before it enters our waterways, meaning any greywater that washes off a garden or road then into the street gutters may pollute any waterway it ends up in.

Engage – Using Greywater

Label the sections of your A3 **Idea Wheel template** as: Recycled, Tap, Tank and Greywater. Colour and cut out the images below and stick them into the correct area on the **Idea Wheel template** to show which sort of water is able to be used, when possible, for each activity. You might like to draw your own pictures in the idea wheel if you can use more than one type of water for any of the activities.

Washing the car 	Filling a fish tank 	Watering outdoor plants 
Washing the vegies 	Cooking 	Flushing the toilet 
Showering 	Brushing your teeth 	Washing a pet 
Watering indoor plants 	Clothes washing machine 	Filling the swimming pool 
Feeding pets 	Drinking water 	Cleaning 

Behaviour Change

There isn't an endless supply of water on Earth. We need to be careful with the water we use and ensure we are being efficient when possible. We can change our water behaviours in lots of different ways. Water restrictions are one method of guiding people to be more water efficient. Water restriction are rules that are based around using less water for non-essential water activities, like car washing and the watering of lawns. There are many other ways to change your water behaviour, including sharing tips and tricks with friends, learning more about water availability and making your own rules about when and where it's appropriate to use water.

Main Activity

How do we change people's water use behaviours? Are rules and restrictions the only way? Come up with a list of different ways that have been used to help people change the way they use water. Use the **PMI template** to work out which idea you think is best.

Towards the end of a long period of drought, in 2008, Stage 3a water restrictions were applied across metropolitan Melbourne. Reservoir levels continued to drop down to a low of 25.6% in June 2009, but have since increased due to a period of increased rainfall.

Engage

Showers use most of the water in a typical Melbourne home. Water efficient showerheads and shorter showers are two quick ways to save water in the home. Imagine how many litres of water you could save in a year! In small groups, or as a class, create a short song that you can sing in the shower. When you've finished your song you'll know it's about time to finish your shower. Share your song by performing it for another class (or at assembly).

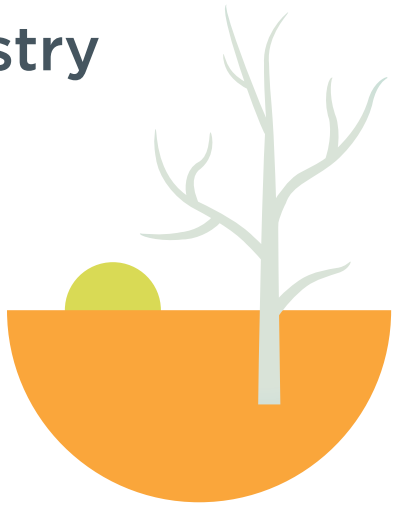
Connect

Investigate the different stages of water restrictions that have applied to your local area in recent years. In groups, select one 'stage' and find out all of the information about those restrictions. Create a poster or a brochure that would inform people if those restrictions were in place today.

Explore

How do water retailers manage water supplies? What types of things might influence the decisions they make? Prepare an electronic presentation to display your findings. Include information about restrictions and initiatives that have been used in the past, and whether or not they were successful. Use sound bites, photos, graphs, etc. You should include a recommendation for how to promote any successful restrictions or guidelines to your school community at the conclusion of the presentation.

Impacts of Supply on Industry



When water is scarce, people are forced to behave differently. Water restrictions may be put in place, and everyone must change the way they do things. Businesses aren't any different. They are required to behave and function in a different way so as to continue their work, including following water restriction rules.

Main Activity

Consider all of the different industries that might be affected by drought or water restrictions. Remember that some may thrive, while others would seriously suffer. Use the **Lotus Diagram template** to brainstorm the impacts a lack of water in Melbourne would have on an industry of your choice.

FACT: Almost 5 trillion litres of water is consumed each year worldwide. That can be broken down to 70% agriculture, 20% industrial and 10% domestic use. Here in Melbourne, most water (around 60%) is used in our homes.

Engage

Think about a time when you've been to a business that used water. It might have been a car wash, hairdresser, swimming pool or nursery. Would they have been able to do the same job without water? Use your imagination to come up with some ideas the business could use instead of water. Write a story that shares some of your ideas.

Connect

Collect a newspaper article relating to impacts on water supply. Analyse the article in relation to the themes explored, any scientific content, social attitudes and whether the article is balanced or biased. Share your findings with the rest of your class. After a full class discussion, write an opinion piece about the impacts of supply on industry.

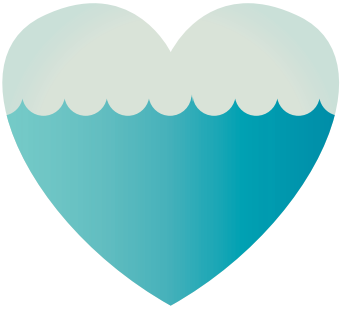
Explore

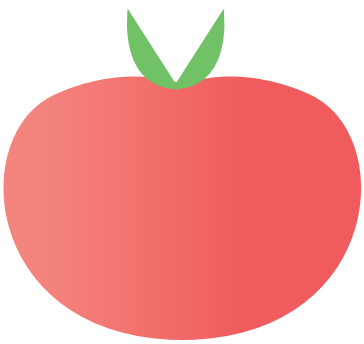
Investigate government initiatives that have been developed to reduce the impact of water supply on agriculture. There may be incentives to change practices or to implement efficient systems. In small groups, think about industries you know that use a lot of water, and come up with an incentive or efficient system of your own. Put together a brochure or poster that explains your initiative to reduce the impact of limited supply on industry.

water
learn it. live it.

5

Water for Health and Wellbeing





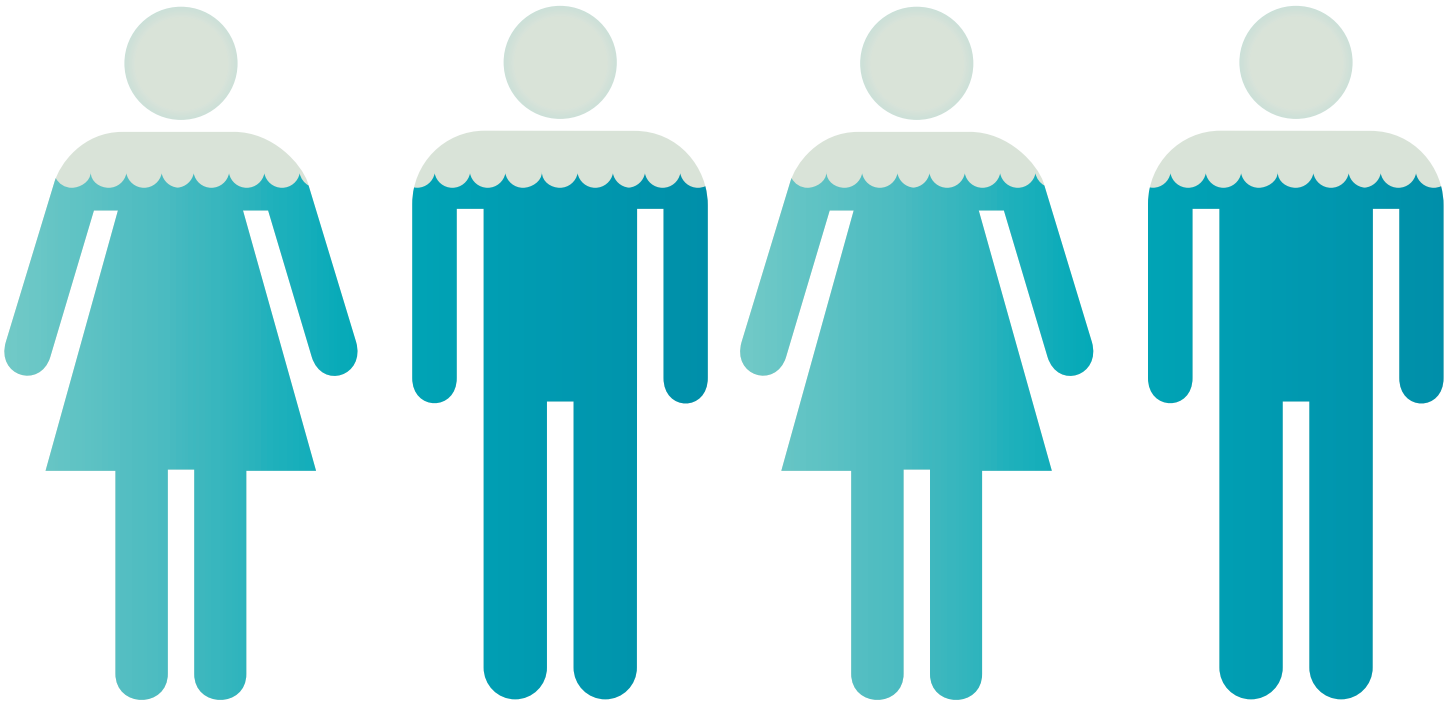
Water for Health and Wellbeing

Both plants and animals need water to survive–that includes us! Water is essential for the human body, which is composed of around 70% water. The body can't store water for very long and needs fresh supplies every day to function properly and stay healthy. Although human bodies can last weeks without food, they can survive only days without water.

Water forms the basis of blood, digestive juices, urine and perspiration, and is contained in lean muscle, fat and bones. It helps the body digest food, maintain a constant body temperature, protect the body's organs, transport nutrients, flush out toxins and works as a moisturiser to improve the skin's texture and appearance. The average adult loses around two litres of water from their body per day by simply going through their normal routine. This water needs to be replaced for a human body to function properly. Experts recommend drinking around eight glasses (or two litres) of water per day, and even more if it's hot or you've been exercising.

There is a flip side to drinking not enough water, and that's drinking too much water too quickly. This condition is called water intoxication and occurs when too much water is consumed at one time, which dilutes the body's sodium to a dangerously low level. Sodium helps the body maintain blood pressure, as well as allowing nerves and cells to function properly. While the adult body can handle around 15 litres of water per day, it needs to be taken in gradually over time. Unless you are a marathon runner or an infant, it is unlikely you will ever come across this condition...but it's best to be aware.

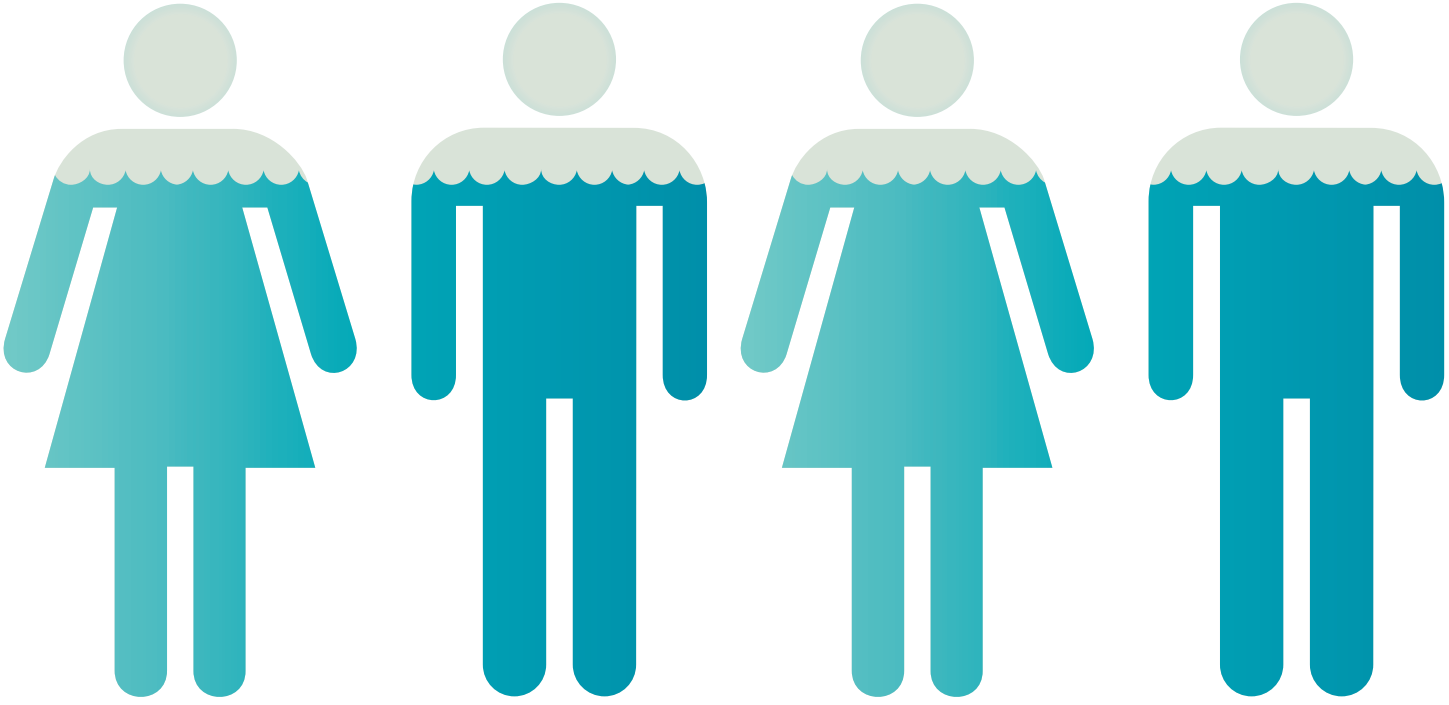
Access to water in Melbourne is easy! Water is delivered to homes and businesses across Melbourne via pipes, plumbing and taps. This easy access to a clean supply of water means Melburnians can maintain a good level of hydration and health. But spare a thought for the one billion people in the rest of the world who live without access to clean drinking water and appropriate sanitation. Some people in developing countries spend several hours every day simply finding and transporting limited quantities of water that is often quite dirty. This can lead to many health, social and economic issues. Access to clean drinking water can not only stop the spread of disease, but allows people more time to do other things, like growing food, building houses and staying in school. This is important for the development and progress of a healthy and productive community.



Along with Victorians' access to clean water, a temperate climate and access to a rich and diverse natural surrounding are other benefits (and privileges) of living in this country. The ability to engage with nature plays a vital role in health, wellbeing and development. We now know that trees, plants and green spaces are more than just beautiful places to visit. Research shows that humans are, amongst other things, dependent on nature for psychological, emotional and spiritual needs that are difficult to satisfy with anything else. If water is available, gardens and green spaces can offer great health benefits to local communities.

Urban heat islands are built up urban areas that have a higher temperature than the rural areas surrounding it. There are several contributing factors to urban heat islands, including surface thermal conductivity and heat capacity of building materials. It is possible to reduce the urban heat island effect by planting rooftop and vertical gardens. These gardens assist to absorb and reflect some of the heat and thus keep the area cooler than it would otherwise be.

Different plants serve different purposes in different areas. A big gum tree might provide a home for animals or shade for humans, while a parsley plant can be used to cook a delicious meal. Some plants need lots of water, while others don't need much at all. By selecting the right plants, fruits and vegetables for the area in which you live, you can have all the benefits of a garden or vegie patch nearby without wasting any water at all (and saving some money too!).



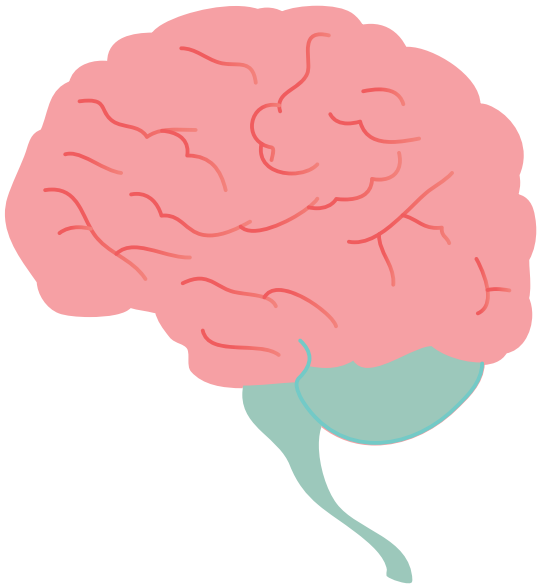
Health and Hydration

Did you know that the human body is made up of around 70% water and the brain is made up of 80% water? It's hardly surprising, then, that we need plenty of water to stay hydrated throughout each day. Water helps the body digest food, maintain a constant body temperature, protect the body's organs, transport nutrients, flush out toxins and keep you looking and feeling well.

Main Activity

Review the **Main – Health and Hydration worksheet**. Are there any surprises? Do you think you drink enough water to help your body function properly? Think about the water you've had today, and then complete the second part of your **Main Activity** worksheet.

FACT: Light-headedness, dizziness, headaches and dark coloured wee are signs that you are not getting enough water.



Engage

Use the **Engage – Health and Hydration worksheet**. Surround this picture of yourself with activities you do and items you use to keep yourself healthy and hydrated. You can draw images yourself, print them from the internet or cut them from magazines. You should also add any words that are suitable.

Connect

Use the **Compare and Contrast template** provided to compare the human body with research you do on another beast in the animal kingdom. Create a presentation or infographic that reviews both beings, and their need for water. Include information that explains how each being takes water into their body, and how it might be removed.

Explore

Create signs to be placed above the drink taps at your school to promote the health benefits of staying hydrated. You might like to include facts about the signs of dehydration, the amount of water in different parts of the body, or what you should do to stay hydrated.

Main – Health and Hydration

Facts and Figures about Water in your Body

The average human body is composed of around 70% water. All parts of the body contain some water. Here are some of the most 'watery' parts and some of the ways water helps to keep us alive.

Brain: 80%

Allows cells to reproduce

Keeps eyes and mouth from drying out

Assists blood flow

Blood: 82%

Skin: 80%

Enables absorption of nutrients

Helps remove toxins and waste

Muscle: 75%

Lungs: 90%

Aids digestion

Delivers body fluids throughout

Stabilises heating and cooling of the body

Bones: 22%

Main – Health and Hydration cont...

Using the table below, write down the number of drinks you have had today in each of the columns.

A quick sip at the bubblers	A long slurp at the bubblers	Half of my drink bottle	All of my drink bottle	I've been drinking water ALL DAY!

Have you had more or less water than you thought?

Do you think this is enough water to keep you hydrated?

Using the table below, write down the reasons you like to drink water and don't like to drink water.

I like to drink water because...	I don't like to drink water because...

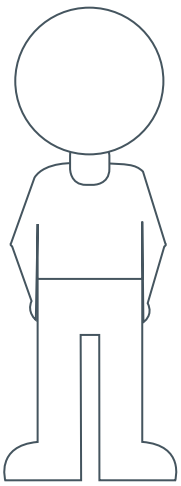
Share your answers with a friend. Do you have similar reasons?

Write a list of things that might make you want to drink more water. Are any of these ideas possible?

Share your best idea with the class and see if you can implement a new system that encourages everyone to stay hydrated throughout the day.

Engage – Health and Hydration

Complete this picture of yourself, then surround it with activities you do and items you use to keep yourself healthy and hydrated. You can draw images yourself, print them from the internet, add your own photos, or cut them from magazines. You should also add any words that are suitable. You may like to increase this page to A3 to allow for LOTS of artwork.



Water Use and Health around the World

Melburnians have some of the cleanest water in the world, and it is conveniently delivered to us via pipes, plumbing and taps. We are all very lucky.

Over 600 million people in the rest of the world don't have access to safe water; that's one in ten people! The average person in a developing country only has 10 litres of water per day for drinking, washing, cooking and anything else they need it for.

Main Activity

Visit *youtube.com* to find and watch one of the *'A Day in the Life of...'* videos produced by World Vision. Imagine you are visiting one of the people in the films. Write a postcard home to your parents or friends to share with them what you've learnt about water use, health and conservation in another country.

FACT: Nearly 80% of illness in developing countries is linked to poor water and sanitation conditions. Find out more about water issues in developing countries at *wateraid.org.*

Engage

Imagine you live in a village and don't have access to clean water. How would this change your life?

It's your job to collect the clean water from a neighbouring village that is one hour away. How many buckets can you carry at a time? Take turns in carrying one or two buckets of water the whole way around the school oval or basketball court to see what some people around the world have to cope with. Write three sentences that express how lucky you are to live in a city with easy access to clean water.

Connect

Choose a part of the world that interests you, and investigate the treatment processes (or lack of) used to provide the population with clean drinking water. Find out what impact this has on the local communities and environment. Put together a poster that includes: a map and images, and facts about the country, water use, health and sanitation.

Explore

A lack of access to clean water or appropriate sanitation causes a great deal of suffering in developing nations. Health issues, lack of education, stunted agricultural progress, regional conflict and low productivity are just some of the ways communities might be impacted by these water issues.

In small groups, choose a developing country to investigate. Research the quality and accessibility of drinking water and sanitation for the local population and the impact that it has on health, education, productivity and regional conflict.

Create a campaign or fundraiser to assist these communities in their quest for clean water and sanitation. You should include interesting facts and appeal to the conscience of your own local community (school, family and friends) in your campaign material.

Water and Sanitation around the World

Water is used all around the world for drinking, cleaning, washing and cooking. Unfortunately, water in many developing countries can carry a range of nasties, including bacteria from human and animal poo. Lack of clean water means disease can be easily spread when washing, cooking and drinking. In fact, 2,000 children die from diarrhoea caused by unclean water and poor sanitation every day!

Main Activity

Have you ever been on a camping holiday? Have you visited another country? Brainstorm all of the different kinds of toilets you have used or know about. See if you can find out any information about how these toilets work and share the information you find with the class.

TIP: Read the story of Typhoid Mary to find out more about how communicable diseases can spread.

Engage

In small groups, try to design a toilet that can be used without water. Draw a picture of your invention then present your toilet design to the rest of the class.

Connect

Find and write down a definition of a 'developing country', then find out more about the toilets the people in one of these countries use. How are they different to the toilets most Victorians use? Why do you think these toilets need to be so different? Draw a picture of the toilet you choose and write down a sentence that expresses how you would feel about using this toilet instead of your regular toilet at home.

Explore

Find and write down a definition of a 'developing country'. Now, research the diseases that can be caused by poor sanitation in these countries and how it impacts the local and wider communities. Present your results in any format you choose (poster, presentation, infographic, documentary, essay, etc.).

Outdoors and Healthy Urban Habitats

Gardens are often the first thing to go when drought hits a region. Plants can be very thirsty and require a lot of maintenance, so people often keep their water for other uses when water restrictions are in place. However trees, plants and green spaces are more than just beautiful places to visit. If water is available, gardens and green spaces can offer great health benefits to the local community.

Main Activity

Complete this simple experiment: peg out a section of grass on a warm day. Take the temperature of the soil in the middle of the day. Take your shoes and socks off and stand in the area; note how it feels. Record the results and note your feelings. Water the grass (or go back once it's been irrigated), take the temperature again and stand in the watered area barefoot again. Record your results and note how it feels. Compare the differences and discuss the reasons for this. *You may also like to complete the Perspiring Trees activity featured in Volume 1.* Consider how these results apply to the broader community.

TIP: Indigenous plants are a great addition to any garden. They have good survival rates, establish quickly and require less maintenance than many introduced species.

Engage

Visit a local community garden, local botanical garden or the Melbourne Botanical Gardens to complete a fun and informative excursion. If you can't get out for an excursion, look at the different types of gardens in your school grounds. When you get back to class, create a collage of your favourite type of garden, using organic materials like leaves, flowers, grass, dirt, sand and sticks.

Connect

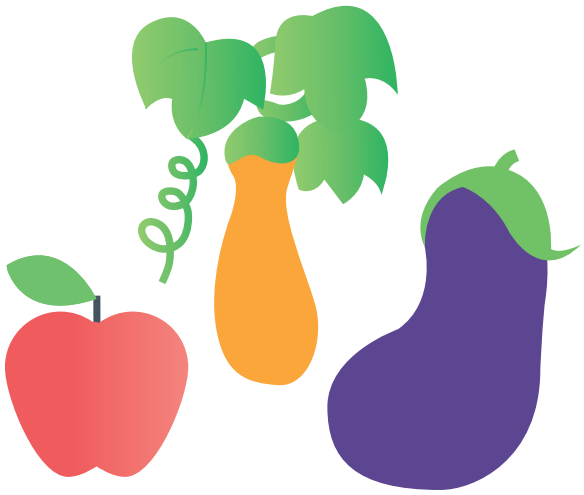
In groups or as a class, research and design a garden for your school using native and drought tolerant plants. You may like to make this a competition where all the teachers (or students) vote and the winning team gets to plant their design. Fundraising or grant applications might be required to fund this project. If your project goes ahead, you might like to test out different mulch products to find out which is the most efficient!

Explore

What are urban heat islands? Investigate the term and explore methods of reducing the 'heat island effect'. Create an informative poster or short animation to explain your findings and some solutions.

Vegetable Gardens

Have you been lucky enough to taste the difference between store-bought fruit and vegetables, and those that are grown at home? By selecting the right plants, fruits and vegetables for the area in which you live, you can enjoy all of the benefits of home grown produce, whilst also being more water efficient.



Main Activity

Mulch refers to a layer of material laid over soil to reduce water loss, discourage weeds, nourish plants and make gardens look nice. Brainstorm as many types of mulch as you can, either organic or man-made. Think about the positives and negatives of three ideas and write them down using the **Decision Making template** provided. Test some of the suggestions on your school garden. Use a soil moisture stick (available from nurseries and hardware stores) to test which one is most effective. *Use the instructions provided by the product you choose to determine how and when to use the soil moisture stick*.

WARNING: There are some risks associated with the use of bagged compost and potting mix. To reduce these risks, please:

- **read the warning on the bagged compost/ potting mix before use**
- **always wear gloves when handling soil, potting mix or compost**
- **avoid inhaling the mix by wearing a face mask**
- **carefully dampen the mix to reduce airborne particles**
- **wash hands thoroughly after using potting mix or compost, even if you've been wearing gloves.**

Engage

Which fruit and vegetables contain a lot of water and which don't contain much at all? Bring in any fruit or vegetable you are curious about and weigh them. Record the measurements for each item. Write down your prediction in the **POE template** provided. Leave the vegetables next to a sunny window to dry. Leave them for one week then weigh them again. You may need to slice your vegetable up to speed up the drying process. Write down the results in your **POE template** and explain the differences.

Connect

Brainstorm the issues involved in having your own vegetable garden (which vegetables to plant, where to plant your garden and how to water your garden). Use the **Ripple Effect template** to outline the positive benefits of a vegetable garden and keep adding 'ripples' until you can't think of any more ideas.

Explore

Research water efficient edible gardens. In groups or as a class, design an edible garden for your school. Before any planting begins, you will need to consider what plants should be included in your garden and how your school can benefit from this project. Put together a project brief for your principal. This document should outline the costs and benefits of the entire project.

Other Types of Gardens

Gardens come in all shapes and sizes. Some people only have space for some pot plants on the front porch, some have large manicured gardens with hedges and standard roses, while others enjoy a vegie patch in the backyard. No matter which garden you prefer, all of them have benefits.

Main Activity

Do you have a garden at home? Is it a big backyard garden filled with trees and flowers, a little vegie patch or perhaps a few pot plants by the front door? Consider the garden you have at home, then make a list of the positive and negative aspects of it. You should include how much water it requires, how it functions as a living space, and what other benefits or disadvantages you think it has. You could do this activity individually or as a class.

FACT: The water you use on your garden is often sourced from drinking water, but you might also be able to re-use water from your home. You should consider how appropriate the re-used water is for this purpose, and may be able to find assistance online. There are also many ways you can reduce your water use by the selection of plants and the way you build or plant your garden.

Engage

Use the **Engage – Other Types of Gardens worksheet** to brainstorm the plants that appeal to your five senses (sight, sound, taste, feel and smell). Draw a picture or create a collage of how the garden might look with all of the plants and the surroundings that make you happy. Now, combine the favourite ideas from all of your classmates, and design a sensory garden for your school.

Connect

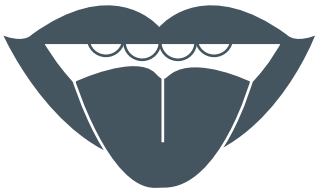
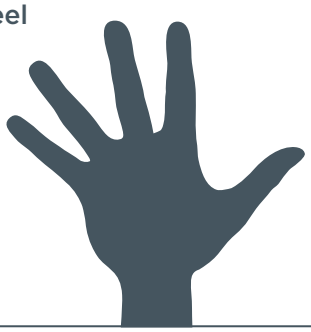
What sorts of plants might you find in an 'edible' garden? Find out, then design an edible garden that would produce food throughout the year. Use the **ABC Brainstorming template** to help you list all of the things you will need to consider, including season, watering, re-using water, sun/shade, space, etc.

Explore

Research vertical and rooftop gardens. Find out what the benefits of these gardens are and find some examples. Design a vertical or roof garden (including a watering system) for your school and present it as a 'pitch' to your class. You might like to use a digital presentation, posters or an infographic to help sell your ideas.

Engage – Other Types of Gardens

Use the table to brainstorm the favourite things you like about gardens and how they appeal to your senses.

Sight 	
Sound 	
Taste 	
Feel 	
Smell 	

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Templates

Template	Description
ABC Brainstorming	Use each of the letters of the alphabet to help you come up with all of the possible ideas about a topic.
Compare and Contrast	Use the boxes at each side of the page to write down the features of your topics, and the ovals in the middle to list the similarities.
Decision Making	Write down the full problem, then use the space provided to outline three alternative solutions, including the advantages and disadvantages of each. Using this information, write down the solution in the space provided.
Idea Wheel	Write the title of your subject in the middle of the wheel, then label each of the four sections with your topic. Brainstorm the answers and fill in each section of the wheel with images, words or both.
Lotus Diagram	Write your main topic in the centre of the page and expand each subtopic in the squares around it. Copy these topics into the centre squares of the next part of the lotus and surround these with new subtopics.
Plus, Minus, Interesting	Consider the different parts of your problem or issue and write them down in the sections provided. Review your lists and summarise your findings in the space provided.
Predict, Observe, Explain	Complete each section (Predict, Observe and Explain) before, during and after each experiment.
Ranking Ladder	Complete the pertinent details of your topic and use the ladder to rank your responses to the issues or problems, with the most important issue at the top and the least important at the bottom.
Ripple Effect	Write the question you want answered in the drop, then complete the ripples with all of the potential answers and consequences.
Storyboard	Plot out your film, play or animation with basic illustrations, a story outline, and notes about the mood, sounds and other effects required.
Story Map	Complete each of the boxes to outline and plan a story from start to finish.

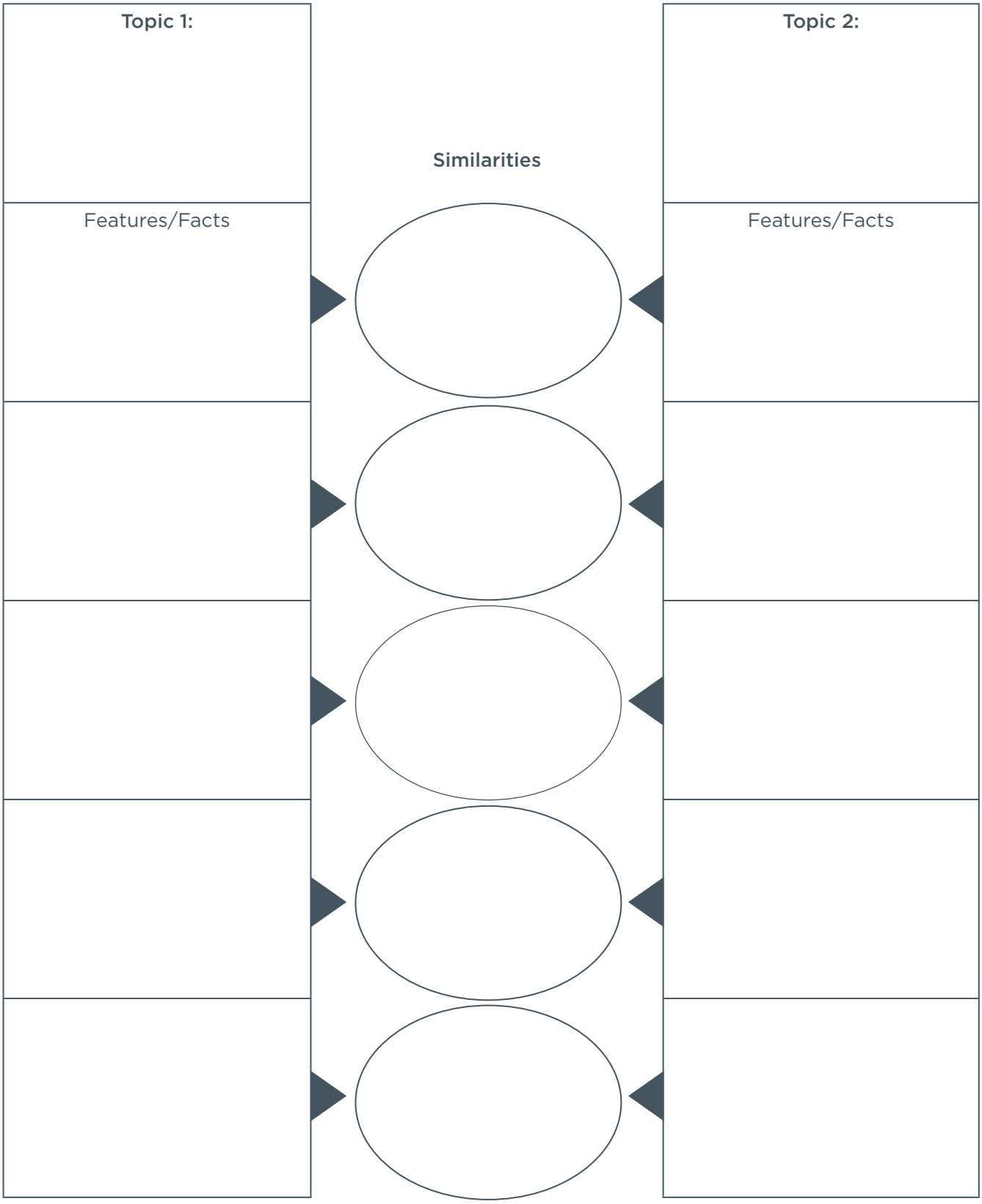
ABC Brainstorming

Write your ideas for your topic under each of the letters of the alphabet. See if you can think of at least one answer for every letter!

A	B	C	D	E	F
G	H	I	J	K	L
M	N	O	P	Q	R
S	T	U	V	W	X
Y	Z				

Compare and Contrast

Use the two boxes at the top of each column to write down the two different things you're comparing. Use the boxes to write down the features or facts about each of your topics, and the ovals in the middle to write down any similarities you find.

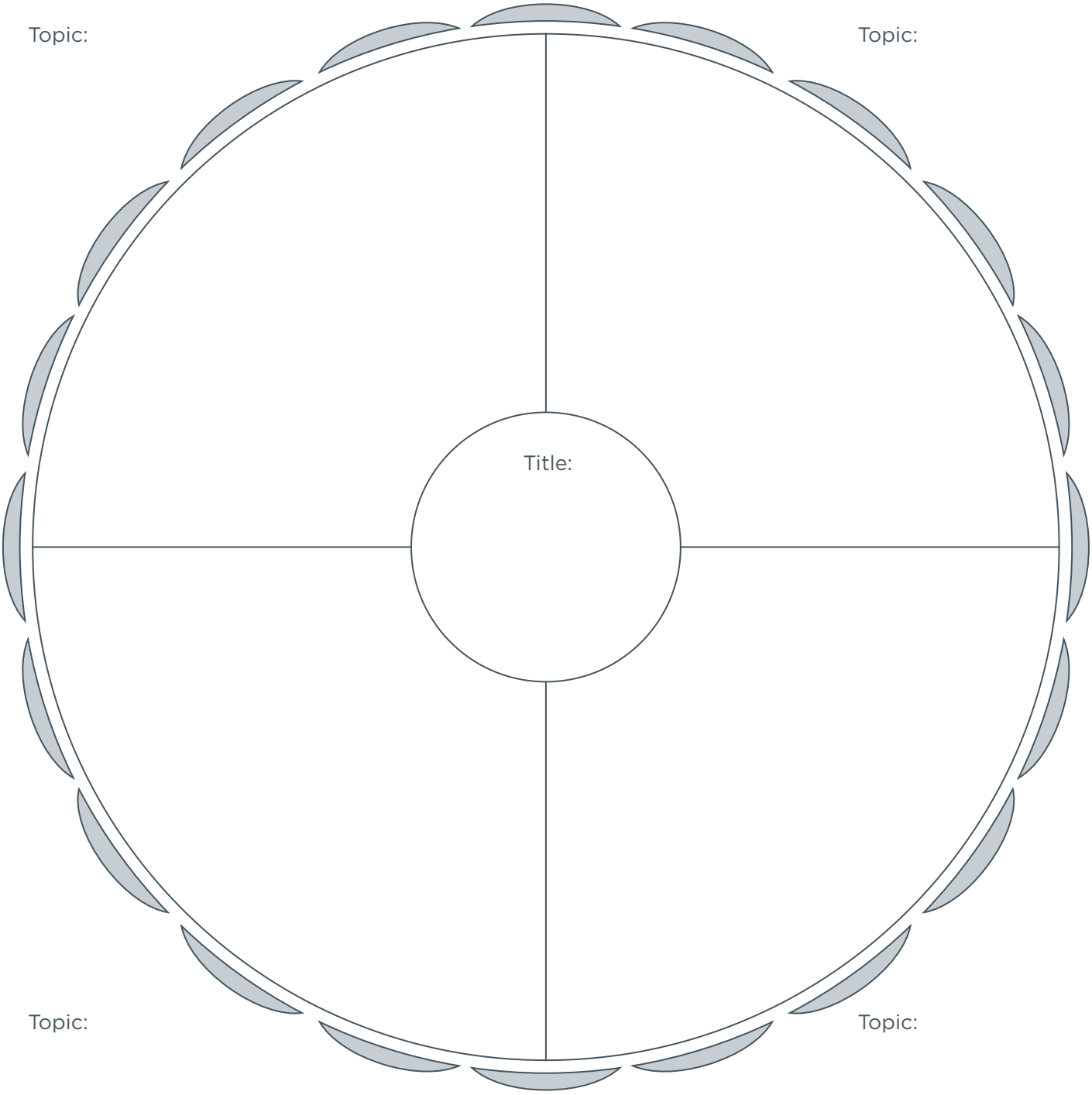


Decision Making

Problem:					
Alternative 1:		Alternative 2:		Alternative 3:	
Advantages	Disadvantages	Advantages	Disadvantages	Advantages	Disadvantages
Solution:					

Idea Wheel

Write your title in the middle, then label each section of the idea wheel with your topics. Brainstorm the answers and fill in the wheel using images, words or both.



Lotus Diagram

Start with your main idea in the centre square before using the surrounding squares to break your idea into subtopics, and explore them even further.

Teacher Tip: Print this page in colour to help students follow the lotus format more easily.

	Subtopic 3			Subtopic 4			Subtopic 5	
			Subtopic 3	Subtopic 4	Subtopic 5			
	Subtopic 2		Subtopic 2	Main topic	Subtopic 6		Subtopic 6	
			Subtopic 1	Subtopic 8	Subtopic 7			
	Subtopic 1			Subtopic 8			Subtopic 7	

Plus Minus Interesting (PMI)

Think about the different parts of your problem or issue and write them down in the Plus, Minus or Interesting columns. Once you have completed the table, summarise your findings with a conclusion.

Plus Write down the positive results of taking a particular action	**Minus** Write down the negative results of taking a particular action	**Interesting** Write down the implications and possible outcomes of taking a positive, negative or indecisive action
Conclusion:		

Predict Observe Explain (POE)

Repeat the Predict, Observe, Explain process for each experiment you undertake.

Title: . . . . . .

Topic/Activity	
Predict Before you start, think about what might happen. Write down your prediction.	
Observe During your experiment/ activity, use your senses to observe what is happening. Record your observations. You may want to include diagrams.	
Explain After you have finished your experiment/activity, try to explain what happened. You may need to do some research to complete this section.	

Ranking Ladder

Ranking ladders help to consider all possible responses to a question or circumstance, rather than just an obvious response or knee-jerk reaction. This tool ensures you consider and justify your responses.

Complete the table below then use the ladder to rank your responses to the issue/problem, with the most important at the top and the least important at the bottom.

Task: . . . . . .

State the issue/problem in your own words:

. . . . . .

. . . . . .

Brainstorm all of the possible answers,

then rank them using the ladder : . . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

Justify your most important response: . . . . . .

. . . . . .

. . . . . .

. . . . . .

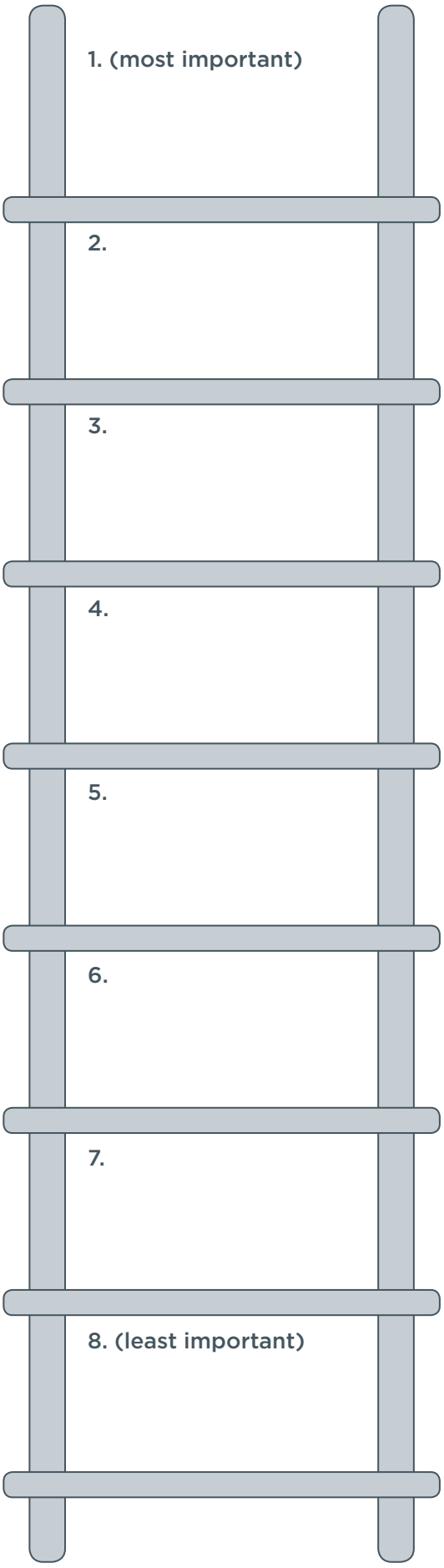
Justify your least important response: . . . . . .

. . . . . .

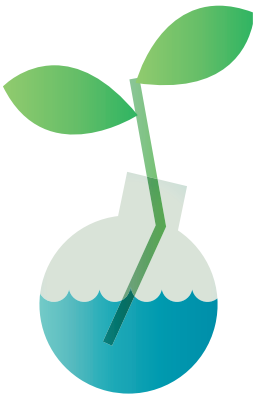
. . . . . .

. . . . . .

(If you can't justify a response, you should remove it from your list entirely.)



Ripple Effect



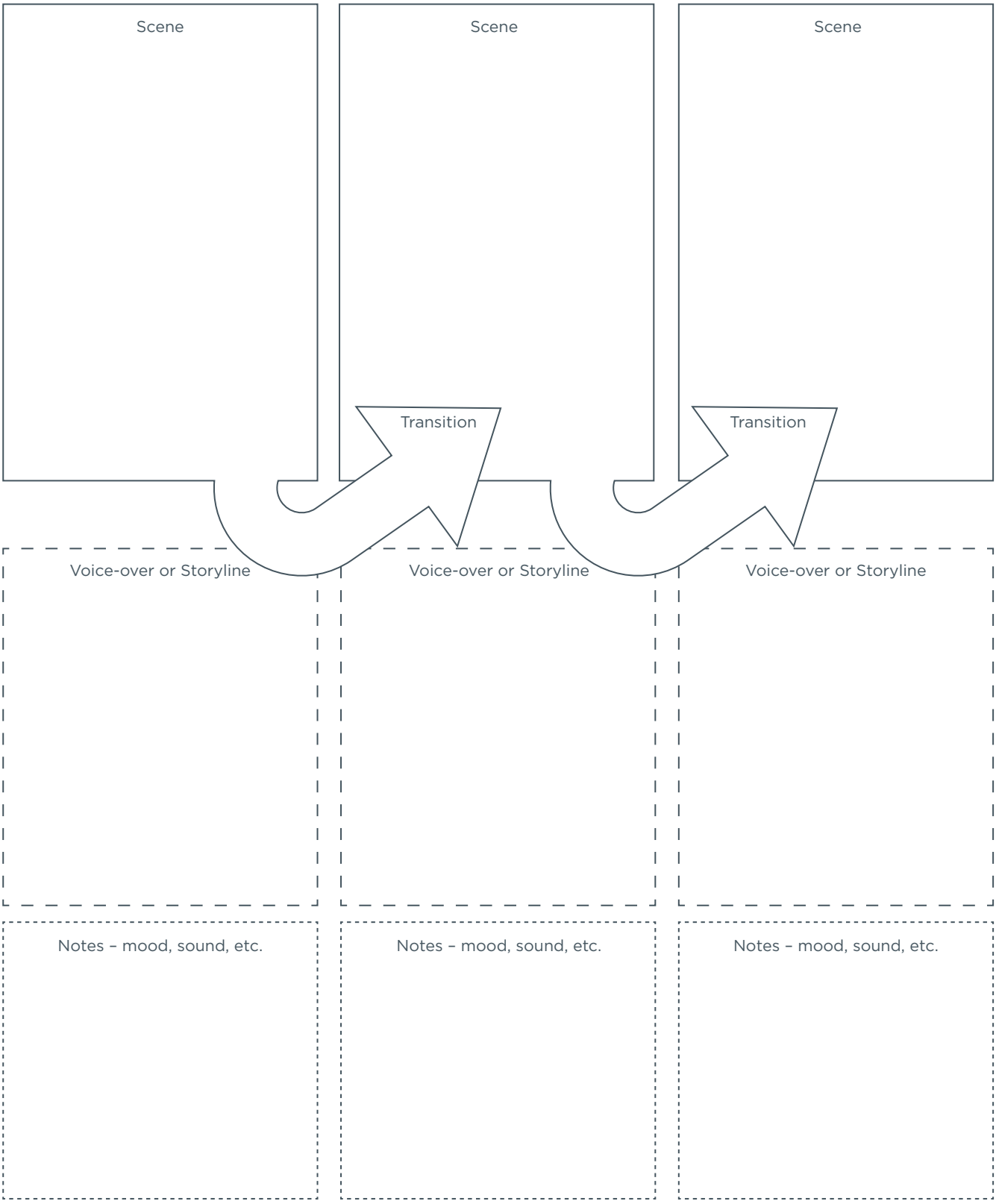
Write your question in the centre of the drop and consider all the potential consequences. Write down each consequence in a ripple. See how many ripples you can fill in—you may need to add some of your own!

Question:

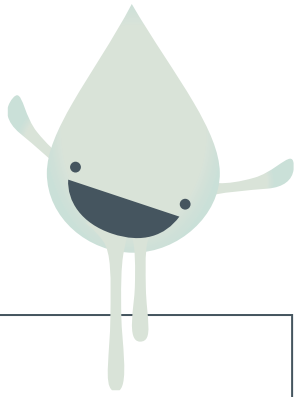
Storyboard

Plot out your film, play or animation by filling in the details for each scene below. You can draw images or write dot points to explain each scene. Print as many sheets as you need to plot out your entire storyline.

Title: . . . . . .



Story Map



Title: . . . . . .

SCENE

Where:

When:

CHARACTERS

Major Characters:

Minor Characters:

Challenge/Event 1

Challenge/Event 2

Challenge/Event 3

How the Challenges are Overcome:

Now that you've completed your plan, fill in the details and write your full story!

Glossary

Agriculture: the cultivation of animals and crops for human use; farming.

Atmosphere: the gaseous envelope surrounding Earth; the air.

Audit: an evaluation or inspection used to review the different aspects that contribute to a system, process or organisation.

Bore water: water accumulated in aquifers below the earths' surface but available for use by sinking a bore pipe in the aquifer. May discharge naturally to the surface or need to be pumped.

Catchment (open): a public area of land that collects rainfall and directs it to a low-lying body of water. Once the water is treated, it can be used as drinking water.

Catchment (closed): an area of land that is closed to public access, where rainfall water is collected and directed to a low-lying body of water. The water only needs minimal treatment before it can be distributed as drinking water.

Climate: the prevailing weather conditions of a region: temperature, air pressure, humidity, precipitation, sunshine, cloudiness, and winds throughout the year, averaged over a series of years.

Climate change: the significant and lasting change of weather patterns over a long period of time (from decades to millions of years).

Contaminant: the presence of an unwanted substance that can have adverse effects.

Data logger: an electronic device that records data over time.

Developing country: a country with a relatively low standard of living, including issues of poverty, literacy, education and life expectancy. Developing countries generally have an undeveloped industrial base and rely on agriculture rather than manufacturing or technology.

Drought: a period of dry weather that is inadequate for the needs of crops, animals and humans, generally due to an extended period of low rainfall.

Embodied water: the water used in the production of goods or services, e.g. 4,650 litres of water is required to produce 300 g of beef; this number considers preparation of food required to feed the beef, transportation, land management, etc.

Finite: subject to limitations; not infinite.

Flood: inundation of normally dry land by overflow of water from a usually confined area.

Folklore: traditions or knowledge passed by word of mouth, usually in a particular group.

Freshwater: water with less than 500 parts per million (ppm) of dissolved salts. Freshwater can be found on Earth as ice caps, glaciers, billabongs, lakes, rivers and streams, and underground as groundwater in aquifers and underground streams.

Global warming: the continual rise of the average temperature on Earth since 1900.

Greywater: the water generated from domestic activities such as clothes washing, showering, hand washing and dish washing, that may be recycled for some household uses.

Groundwater: the water beneath the surface of the ground, consisting largely of surface water that has seeped down; the source of water in springs and wells.

Habitat: an environment where a particular species of animal or plant is found.

Hydrate: to supply water to a person in order to restore or maintain fluid balance for health and wellbeing.

Industry: a factory or business that produces goods or services for use by the community.

Infiltration: the seepage of water into soil or rock.

Infographic: a graphic representation of an idea or message that presents complex information clearly and efficiently.

Innovation: the development of an action, item or process that intends to make a current version of something better.

Invention: the development of an action, item or process that is newly created.

Organic: derived from living matter; natural.

pH: the measure of acidity or alkalinity of a chemical solution. Anything neutral, for example, has a pH of 7. Acids have a pH lower than 7, bases (alkaline) have a pH higher than 7.

Pollution: the introduction of harmful substances or products into the environment.

Recycled water: sewage that has been treated to remove solids and impurities so it can be re-used for certain practices instead of using drinking water.

Reservoir: a natural or artificial place where water is collected and stored for use, especially water for supplying a community, irrigating land, producing power, etc.

Residential: accommodations in which people live.

River: a large natural stream of freshwater flowing along a definite course, usually into another body of water (ocean, lake, sea), being fed by tributary streams. Small rivers may also be called a stream, creek, brook or tributary.

Saltwater: water that contains 35,000 parts per million (ppm) of dissolved salts; approximately 97% of Earth's water is saltwater, held in the major ocean areas of the Atlantic, Antarctic, Indian, Pacific and Artic.

Sanitation: the provision of facilities and services to promote hygienic practices and conditions.

Sewage: the water that is carried away from homes and businesses from toilets, sinks, showers, washing machines, dishwashers and drains.

Sewerage: the infrastructure (pipes) that carries sewage from homes and businesses to sewage treatment plant facilities.

Solvent: a substance that dissolves another to form a solution.

Stormwater: water that originates from precipitation (rain, hail, snow, sleet). It may also include the debris or anything else the water carries with it. Stormwater is often collected from the road. It flows through stormwater drains and into water bodies.

Sustainability: the quality of not being harmful to the environment to ensure long-term ecological balance.

Trade waste: any discharge to a sewerage system other than domestic waste from showers, baths, toilets and basins. Trade waste can include grease, oil and chemicals.

Turbidity: not clear or transparent because of stirred-up sediment or the like; clouded; opaque; obscured.

Urban heat islands: a metropolitan area that has a higher temperature than its surrounding rural area due to human activity.

Vertical gardens: garden structures created against walls or walkways used to screen areas, absorb odours and noise, generate a cooler environment, provide a relaxing ambience and create an aesthetically pleasing area when larger gardens aren't practical.

Volume: the amount of space, measured in cubic units, that an object or substance occupies.

Water cycle: the continuous movement of water on, above and below the earth's surface.

Water restrictions: a set of rules to guide people how to use water during times of low rainfall or limited water accessibility.

Water quality: the physical, chemical and biological characteristics of water; drinking water in Australia must reach the standards outlined in the Australian Drinking Water Guidelines (ADWG).

WELS: Water Efficiency Labelling and Standards; an Australia-wide rating and labelling scheme.