Wonder Project

Water Challenge
Activity booklet

engineering new zealand te ao rangahau

SUPPORTED BY Beca Fulton Hogan GHD Foundation

Conclusion

E hoa mā, you've collected heaps of data, learned lots of new things, and made a splash with your wai networks. It's now time to use this information to answer our challenge pātai.

I wonder how water reaches us?

Activity 1.1: Ask

Get set to make a splash! It's time to think like a STEM superstar and ask lots of pātai to help you understand the challenge problem better.

The pātai you need to answer is:

I wonder how water reaches us?

Let's start by thinking about your goals, and how to achieve them.

I wonder what our goals are?

The main goal of the Water Challenge is to build a network that recreates the journey of wai from natural sources, to our hapori – protecting its mauri (lifeforce) along the way.

E.g. Our goal is to create a wai network that has no wai wastage or leaks.

I wonder what pātai to ask?

What do you need to know more about to achieve your goals?

Get curious and ask pātai about how things work to help solve the problem.

E.g. I wonder how wai connects from natural sources to our school?

I wonder what problems we'll need to overcome?

Thinking about potential problems now will help you find a solution faster.

E.g. I wonder how to stop a leak?

Ka rawe!

Keep your pātai handy as you work through the challenge. You never know when you'll discover an answer.

Activity 1.2: **The Mauri Compass**

Tap into your observation skills and use the Mauri Compass to measure the lifeforce of wai.

When wai has strong mauri (lifeforce), the land, people and native animals around it thrive.

Each of the images below represent a waterbody with different mauri.

In your rōpū, start by thinking about what factors might be impacting the mauri of wai in each picture. Write your ideas in the box below.

Image 1

Image 2

Image 3

The Mauri Compass

Now, let's see if your ideas match the Mauri Compass!

The Mauri Compass is a tool developed by tangata whenua that helps assess the mauri of wai against three factors:

- Tāngata (people)
- Wai (water)
- Whenua (land)

Analysis

How did your combined network perform? Why?	Did you solve your challenge scenario?

Did you meet your challenge goal? How?	Is there anything you would do differently next time?

Activity 6.1: **Hydrate our hapori**

STEM superstars, your hapori needs you! Get ready to make waves in the final competition.

Join a rōpū with another challenge scenario. Then, combine your two wai networks to hydrate the entire hapori!

Do your networks have what it takes to connect your hapori with wai to care for the tāngata and whenua?

You'll need:

- Your final wai networks
- Extra pipes and connectors from the "hydrate your hapori" set
- 1000ml of wai
- Measuring jugs
- Resources to support wai network stability (boxes, tape, bulldog clips)
- 4 x containers that can hold 1000ml of wai

You will not include your treatment plant or wai paru for this activity.

Connect your networks

Step 1

Working with your partner rōpū, come up with a plan to connect your two networks together.

Remember to consider:

- Pipe size, length and shape
- Number of connectors
- Gravity and flow
- How you'll connect each hapori with the right ratio of wai
- How you'll protect the mauri of wai

Step 2

Connect your networks, using any extra resources you have available.

Step 3

Close all taps and check all connections.

Step 4

Place a labelled container at all four hapori connection points – fire station, whare, school, hospital.

Step 5

Measure out 500ml of wai in two measuring jugs.

Step 6

Slowly pour the wai into your water reservoir, one jug after the other.

Step 7

When you're ready, open the tap and watch the wai flow!

Try to include the same wai from previous tests or from your rain gauge.

Step 1

In you rōpū, think about how you'd answer the pātai in the table for each image of wai.

Step 2

Score each image out of 5 for each pātai.

Step 3

Add up your total score for each column to determine the mauri of each waterbody.

Factor	Pātai	Image 1 score (1 – 5)	Image 2 score (1 – 5)	Image 3 score (1 – 5)
Tāngata People	Are people protecting and harvesting kai in and around the waterbody?			
	Do people have a strong connection to the waterbody?			
Wai Water	Are there lots of different kai in and around the water that look healthy enough to eat? (eg, plants, fish, animals)			
	Do the areas around the waterbody look healthy?			
Whenua Land	Does the land around the waterbody have lots of different natural life?			
	Does the water look germ and chemical-free?			
Total score:		/30	/30	/30

Analysis

The wai in image ☐ **had the strongest mauri because:**

Activity 1.3: **Braided river**

Create a braided river to showcase the connection between tāngata, whenua and wai.

When the mauri of wai is protected, so is the whenua, and so are the tāngata. Get crafty and create some artwork for the classroom to display this connection.

Step 1

In your rōpū, collect three different colours of crepe paper – each colour represents one of the three mauri compass factors – tāngata, whenua and wai.

Step 2

Ask your kaiako to print out the braided river template in the Student Hub. Collect one section to work on as a rōpū.

Step 3

Shape the crepe paper into a braid. Twist the ends of your crepe paper together on either side of your braid.

Step 4

Stick your braid down on your template section, making sure it starts on one of the rain drops, and ends on the other one.

Step 5

Use your knowledge on the Mauri Compass to draw things around your river that are signs of strong mauri.

This could be native birds or trees, or a green landscape.

Step 6

Once each rōpū has finished, piece together the braided river on your classroom wall.

Mahi tika ana!
You now have an awesome awa.

Analysis

What did you learn from your test?	Are there any improvements you could make to your prototype before the final challenge?

Test tracker

Journey stage			Result
Collect	How much wai did you add to your network?		500ml
Clean	Before wai network journey	pH	
		Turbidity	
	After wai network journey	pH	
		Turbidity	
	What observations can you make on the mauri of the wai?		
Connect	Hapori connection point 1	Wai flow time (s)	
		Wai flow rate (ml/s)	
	Hapori connection point 2	Wai flow time (s)	
		Wai flow rate (ml/s)	
Care	Hapori connection point 1	Wai supply (% and ml)	
	Hapori connection point 2	Wai supply (% and ml)	
	Did your network protect the mauri of wai? How?		

Activity 2.1: Te Hurihanga Wai

You are now wairehu (water vapour) in the realm of Ranginui. Your challenge is to move through each part of Te Hurihanga Wai faster than the other rōpū in your class, without evaporating too early!

Compete with your classmates to travel through Te Hurihanga Wai and back to the sky!

Wai is always moving and changing forms through Te Hurihanga Wai (the water cycle), nourishing the eternal connection between Ranginui and Papatūānuku. This helps to recycle wai so it doesn't run out.

Kua rite koutou?

Step 1

Divide your classroom/outdoor space into four sections, clockwise, in this order:

1. **Kapua (clouds)** Condensation
2. **Ua (rain)** Precipitation
3. **Awa (river), Moana (ocean), Wainuku (groundwater)** Collection
4. **Wairehu (water vapour)** Evaporation

Step 2

Stand in the kapua (clouds) and find a buddy that's not in your rōpū.

Step 3

Play a game of paper-scissors-rock with your buddy.

Step 4

The winner becomes ua (rain) and moves to the next section of the cycle. The loser stays in the kapua (clouds).

If there's no one in your section, wait until the next round to continue the game. If it's just you and another rōpū member in your section, you can face each other.

Step 5

Find another buddy to play paper-scissors-rock with to continue the game. Each time you win, you can move to the next section of the cycle. Each time you lose, you must evaporate, return to the kapua (clouds), and start again.

Step 6

Once you've travelled through Te Hurihanga Wai and reached the evaporation section, you must win paper-scissors-rock one more time to finish the cycle.

Step 7

Each member of your rōpū must finish the cycle to end the game. The first rōpū to do this are the winners!

Karawhiua!

Activity 2.2: **Wai network plan**

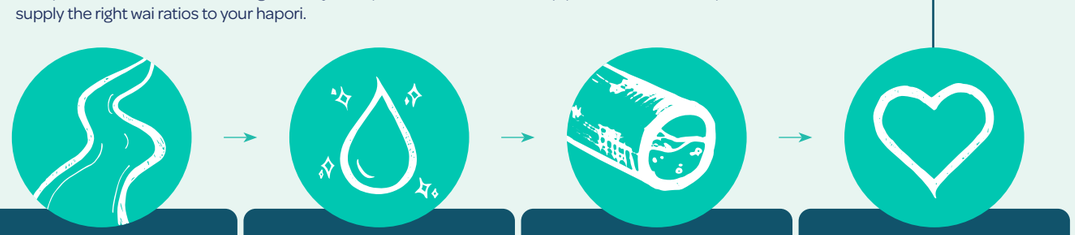
Get your imagination flowing and plan a wai network to solve your challenge scenario!

The wai network plan will help you decide where to put each part of your network, what resources to use, and how to connect them.

Step 1: Imagine

In your rōpū, arrange the imagine cards from your kit into a wai network plan to solve your challenge scenario.

Your plan should include each stage of the journey of wai and consider the pipes and connectors you'll use to supply the right wai ratios to your hapori.



Collect	Clean	Connect	Care
Catchment River	Treatment plant Water reservoir	Pipes Connectors	**Your challenge scenario** Hapori connection point 1 (% and ml) Hapori connection point 2 (% and ml)

Activity 5.2: **Join the journey**

Connect all four stages of the journey of wai and put your prototype to the test.

Does your network have what it takes to solve your challenge scenario? Join the collect, clean, connect and care stages of your wai network journey to test the waters.

You'll need:

- Your water treatment plant
- Your improved wai network
- 500ml wai
- Lemon juice
- Natural debris (dirt, bark, grass, leaves)
- Resources to support wai network stability (boxes, tape, bulldog clips)
- 2 x containers that can hold 500ml of wai
- Measuring scoops
- Measuring jug
- pH strips
- Timer
- Torch (optional)

Step 1

Check the filter layers in your water treatment plant and refresh them if required.

Step 2

Place your water treatment plant on top of your water reservoir.

Step 3

Turn off the tap and check all connections.

Step 4

Add some natural debris and 1 teaspoon of lemon juice into 500ml of wai to make it wai paru.

Step 5

Test the wai for pH and turbidity. Write your results in the clean section of the test tracker.

Step 6

Pour the wai paru into your treatment plant, letting it all flow through into your water reservoir.

Step 7

Open the tap and watch the wai flow!

Step 8

Once the wai has finished its journey through your network, test its pH and turbidity again and record the results in the test tracker.

Analysis

What did you learn from your tests?

What changes worked well? What didn't work well?

Does this result match your conjecture? Why/why not?

Don't waste the wai you send through your network!
You can add the same wai to your network in later tests.

Step 2: Plan

Once you've created your wai network plan with the imagine cards, draw and label it in the box. Your drawing should include:

- The resources you've chosen to use
- The measurements of each pipe (mm)
- The percentage of wai your hapori is supplied (%)
- The elevation of each part of your network (are they higher or lower than other parts)

How will this plan solve your challenge scenario?

What materials do you need to collect to bring your plan to life?

Activity 2.3: **Collect**

Explore the first stage of Aotearoa New Zealand's wai network and collect some water!

What's the most important part of a wai network? Why, wai, of course! Rōpū, you're going to collect wai for your network by creating a rain gauge!

You'll need:

- Clear, recycled 1.5/2L bottle (label and cap removed)
- Tape (masking or washi tape)
- Scissors
- Pen
- Ruler

Create your gauge

Step 1

Cut off the top of your bottle.

Step 2

Place the top half of your bottle upside down inside the bottom half of your bottle.

Step 3

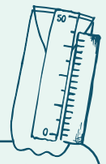
Cut a piece of tape that's the same length as the bottom half of the bottle.

Step 4

Stick the tape straight up from the bottom to the top.

Step 5

With a ruler, draw a scale on the piece of tape in millimetres (mm), starting from 0. The 0 line should start at the flattest part of your bottle, or around 50 millimetres up from the bottom.



Did you know: STEM superstars use rain gauges to measure real-life rainfall? One millimetre of precipitation is equivalent to one litre (L) of rainfall per square meter.

Improve

Improve your wai network to try and solve your challenge scenario. Change one thing each time and then test your network – recording your results in the test tracker.

Test tracker

Test	Improvement	Result						
		Hapori connection point 1			Hapori connection point 2			Observations
		Wai supply (% and ml)	Flow time (s)	Flow rate (ml/s)	Wai supply (% and ml)	Flow time (s)	Flow rate (ml/s)	
Ex.	*Added more pipes leading to the fire station.*	*Fire station: 25% 125ml*	*45s*	*125/45= 2.78ml/s*	*Whare: 75% 325ml*	*20s*	*325/20= 16.25ml/s*	*Water flowed too quickly to the fire station.*
1								
2								
3								
4								
5								

Activity 5.1: **Improve**

Pool together your challenge knowledge to improve your wai network before you join the journey.

STEM superstars are always testing and improving their mahi to find the best solution. It's called iterative thinking.

Manning's equation

$Q = a \times 1.486/n \times R^{2/3} \times \sqrt{S}$

Remember this jumble of letters and numbers? It's the equation by our hoa (friend) Robert Manning that tells us lots of helpful things about what impacts the flow of wai in pipes.

Write down the factors you remember that impact the flow of wai:

I wonder how to make our network even better?

Using your challenge knowledge, Manning's equation, and data from activity 4.2, do a final analysis to decide how you'll improve your prototype. You could think about:

- Pipe internal diameter, length and number
- Number of connectors
- Network elevation, gravity and flow
- How you'll protect the mauri of wai

We will improve our network by:

How will our improvements impact our network's performance?

Our conjecture:

Step 6

Add some water into your gauge until it just touches the 0 line on your tape.

Step 7

Label the gauge with your rōpū name, then place it in a safe, open area outside. Put your gauge somewhere different from other rōpū to see if you get different results!

Precipitation tracker

Measure precipitation in your rain gauge every day for a week. Make sure you check it at the same time each day, so your results are accurate.

Day	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Precipitation (mm)							

Results:

Add the data from each day to get the sum of precipitation.

Sum of precipitation (mm):

Divide the sum of precipitation by 7 to get your average precipitation (mm).

Average precipitation (mm):

Don't waste the wai you collected! Keep it somewhere safe for later in the challenge.

If you can, keep your rain gauge outside for the duration of the challenge to help you collect wai for your network.

Activity 2.4: **Data dive**

No rain? No problem!

Follow the climate data tool link in the Student Hub. Find the historic precipitation data for your hapori and choose one year's worth of data to analyse instead (month by month).

For the climate comparison, find the same data set from 10 years before your chosen set to do your analysis.

Gather information about precipitation in your hapori by diving into the data from your rain gauge.

To extract meaning from your data, you'll follow 3 easy steps:

- Organise
- Analyse
- Draw a conclusion

Step 1: Organise

Visualise your data in a graph, a line chart, or create a drawing to help you see patterns.

What have you learned from organising your data?

Analysis

What did you learn from your test?	What changes could you make to improve your prototype?

Don't waste the wai you send through your network! You can add the same wai to your network in later tests.

Activity 4.2: First flow

Send some wai on its first journey through your pipe prototype.

Let's see whether your prototype has what it takes to solve your challenge scenario, or if there are any ways it could be improved.

You'll need:

- Your pipe prototype
- 500ml of wai (use the rainwater you collected in module 2)
- 2 x containers that can hold 500ml of wai
- Measuring jug

Rōpū, get ready to flow!

Step 1

Label your containers with your two hapori connection points. Eg school and hospital or whare and fire station. Place them underneath your wai network.

Step 2

Open the tap and double check all connections so your prototype won't spring a leak.

Step 3

Measure out 500ml of wai with a measuring jug.

Step 4

Slowly pour the wai into your water reservoir and watch it flow!

Step 5

Measure the amount of wai (ml) that ends up at each hapori connection point.

Step 6

Write your results in the test tracker.

Test tracker

Quantitative data			Qualitative data	Improvements
Wai supply (% and ml)				
Hapori connection point 1	**Hapori connection point 2**	**Total wai**	**What did you observe as the wai flowed?**	
Fire station: 30% 150ml	*Whare:65% 325ml*	*95% 475ml*	*Water flowed too quickly to the fire station. Some got trapped at the start of the network.*	*Swap large internal diameter pipes for small internal diameter pipes leading to the fire station.*

Climate comparison

Step 2: Analyse

See if your data can give you any information on how our climate might have changed over time.

Using the climate data tool in the Student Hub, find the precipitation data for your hapori from this month, 10 years ago.

Write down the average precipitation (mm).

Average precipitation 10 years ago (mm):

Write down the average precipitation (mm) from your rain gauge.

Average precipitation (mm):

Difference between average precipitation 10 years ago, and now (mm):

Precipitation trends

STEM superstars rely on multiple data sources, so their conclusion is accurate.

Take a wider look at precipitation trends in your hapori over time, from 10 years ago to now. Can you find any patterns? What information does this data give you?

Step 3: Draw a conclusion

How does your data compare to the average precipitation in your hapori this time, 10 years ago?
What differences did you find in the online precipitation data? What do you think this means?

Activity 4.1: Create

Create a pipe prototype to connect the journey of wai from collection, to your hapori.

Watch the 'create' video, then bring together your wai network plan, and knowledge on gravity and flow to construct your prototype.

Your prototype plan

Look at your wai network plan.
Have you considered:

- The materials you'll use?
- Gravity and flow?
- How you'll solve your challenge scenario?
- How your network will help protect the mauri of wai?

Take the time to make any final changes to your plan before you start.

You'll need:

- Nozzle
- Nozzle connector
- 1 x clear joiner pipe (long)
- 2 x clear joiner pipes (short)
- Large elbow connector
- Tap
- "Hydrate your hapori" set
- Your reservoir from the clean activity
- Resources to support wai network stability (boxes, tape, bulldog clips)

Create your prototype

Step 1
Twist the nozzle onto your reservoir.

Step 2
Attach the nozzle connector onto your nozzle.

Step 3
Attach the long clear joiner pipe to the nozzle connector.

Step 4
Attach the large elbow connector to the long clear joiner pipe.

Step 5
Attach a short clear joiner pipe to the large elbow connector.

Step 6
Attach the tap to the short clear joiner pipe.

Step 7
Attach the other short clear joiner pipe to the other side of the tap.

Step 8
Attach an elbow connector from your "hydrate your hapori" set to the clear joiner pipe.

Step 9
Attach a short clear pipe from your "hydrate your hapori" set to the elbow connector, followed by a t-bar connector.

Step 10
Bring your wai network plan to life with your choice of pipes and connectors! Make sure you use resources to stabilise it so it can stand on its own.

Karawhiua koutou!

Optional activity: **Siphon science**

What goes up, must come down! Test the power of gravity by creating a siphon.

Aotearoa New Zealand's wai network is gravity-fed. That means gravity is the reason wai flows through the pipes, to our hapori.

Sometimes, wai even travels uphill thanks to gravity and pressure. You can explore this for yourself through the science of siphons.

You'll need

- Silicone straws
- Food colouring
- Wai
- 2 x small flat containers

Step 1

Fill one container with water and one drop of food colouring.

Step 2

Half-fill the second container with water. Place the containers side by side.

Step 3

Fully submerge the straw in water – squeezing it to get rid of any air bubbles. Then, tightly pinch the ends of the straw before you pull it out.

Step 4

Continuing to pinch each end of the straw, place one end in each container – only releasing them when they're both under the water.

Step 5

Watch the siphon flow!

How did wai flow through your siphon?	How did gravity and pressure impact the flow of wai?	How could you apply this to your wai network?

Activity 3.1: **Wai paru investigation**

Put on your detective hats and investigate how to deal with sneaky pollutants in wai.

STEM superstars use many different tools to investigate how clean water is, and how to make it safe to drink.

Begin your own investigation by experimenting with physical and chemical changes in wai.

Physical changes

Experiment: Turbidity and flocculation

Remember! Turbidity is the clarity of water, or how well a light beam can travel through it. Flocculation is when tiny particles clump together to form larger chunks called flocs.

You'll need:

- A clear glass (or jar)
- Clean wai
- Small chunks of natural debris (dirt, bark, grass, leaves)
- Salt
- Measuring scoop
- Torch (optional)

Step 1: Turbidity

- Fill a clear glass with wai.
- Add a spoonful of natural debris and stir well.
- Shine a torch or simply look through the glass.

Observations

Step 2: Flocculation

- Add 1 tablespoon (3 measuring scoops) of salt into the wai.
- Stir gently for about 30 seconds, then leave it to sit.

Observations

After 2 minutes:

After 20 minutes:

Test 1: Observation

Use your senses to observe each glass of wai. How can you tell which wai is paru? Record your observations in the table.

Test 2: pH

Using your pH strips, test the pH level of each glass of wai. Record your results in the table.

Make sure the pH strip is dipped in and out quickly and that you take the reading straight away to get accurate results.

Test 3: Neutralisation

See if you can neutralise each wai glass to a pH of 7 by measuring out an acid, or a base. Then, add it into the wai.

After letting it sit for 30 seconds, test the wai using your pH strips. Record your results in the table.

Continue making changes until you achieve a neutral pH.

Chemical changes

Experiment: pH

Remember! pH is the measure of how acidic or basic something is. It's measured on a scale from 0 (extremely acidic) to 14 (extremely basic). Neutral wai should have a pH of 7.

You'll need:

- Four clear glasses of wai:
  - Wai glass 1: Add 2 teaspoons of lemon juice
  - Wai glass 2: Add 2 teaspoons of salt
  - Wai glass 3: Add a spoonful of natural debris
  - Wai glass 4: Pure wai
- Baking soda
- pH strips
- Measuring scoops

Tests	Wai glass 1: Lemon	Wai glass 2: Salt	Wai glass 3: Natural debris	Wai glass 4: Neutral water
Test 1: Observation				
Test 2: pH				
Test 3: Neutralisation	Acid/base added: pH:	Acid/base added: pH:	Acid/base added: pH:	Acid/base added: pH:
	Acid/base added: pH:	Acid/base added: pH:	Acid/base added: pH:	Acid/base added: pH:
	Acid/base added: pH:	Acid/base added: pH:	Acid/base added: pH:	Acid/base added: pH:
	Acid/base added: pH:	Acid/base added: pH:	Acid/base added: pH:	Acid/base added: pH:
	Acid/base added: pH:	Acid/base added: pH:	Acid/base added: pH:	Acid/base added: pH:

Analysis

What did you learn from your tests? What ratio of lemon juice to baking soda resulted in a neutral pH?	What improvements worked well? What didn't work well?	What does your final improved treatment plant look like?

Test the waters

See if your new treatment plant can turn wai paru, pollutant free!

You'll need:

- 500ml of wai
- Measuring jug
- Measuring scoops
- Lemon juice
- Natural debris (dirt, bark, grass, leaves)
- pH strips
- Torch (optional)

Step 1

Measure out 500ml of wai. Add some natural debris and 1 teaspoon lemon juice.

Step 2

Using your pH strips, test the wai to check whether it's acidic or basic.

Wai is safest for nourishing the hapori when it's neutral at pH level 7.

pH:

Step 3

Test the water's turbidity using your observation skills or a torch.

Turbidity: *clear/turbid*

Step 4

Make sure the water reservoir has its cap on, and that it's underneath your treatment plant. Then, slowly pour the wai paru through your treatment plant.

Step 5

Collect quantitative data by measuring the pH of the wai, and qualitative data by measuring its turbidity and using your observation skills. Write your results in the test tracker.

Qualitative data is information you observe by using your senses. Quantitative data is information in the form of numbers or quantities.

Step 6

Analyse your results to decide if your treatment plant or the pH of wai could be improved. Then, improve it, and test again!

Tip! Improve your treatment plant by changing the amount of lemon juice, or the amount of baking soda.

Test tracker

Test number	Quantitative data			Qualitative data		Data analysis Are your results better or worse? Why? What improvements could you make?
	pH Level (1-14)	**Amount of lemon juice** (tsp)	**Amount of baking soda** (tsp)	**Turbidity** (clear/ turbid)	**What observations can you make?**	
Example	*6 (acidic)*	*1 tsp*	*1/8 tsp*	*Turbid*	*There were some dirt particles in the wai.*	*pH is slightly less acidic. The wai is less turbid. Add more baking soda.*
Test 1						
Test 2						
Test 3						
Test 4						

Analysis

What did you learn from your data? How do you think each experiment helped you investigate wai paru?

Activity 3.2: **Clean**

Healthy wai, healthy hapori. Create a treatment plant for your network to turn wai paru, pollutant-free.

As wai travels through Te Hurihanga Wai (the water cycle), it can come into contact with lots of different things that might make it wai paru (dirty water) – like pollutants and natural debris.

In Aotearoa New Zealand's wai network, collected water passes through a treatment plant that removes any pollutants and debris. This helps protect its mauri before it continues its journey.

Treatment plant

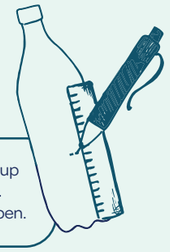
Let's create a treatment plant for your wai network.

You'll need:

- 1 x clear, recycled 1.5L bottle (label removed)
- Cotton balls
- Activated charcoal (rinsed)
- Filter paper
- Baking soda
- Measuring scoops
- Scissors
- Ruler
- Sharpie or other pen
- Resources to stabilise your treatment plant (boxes or a stand)

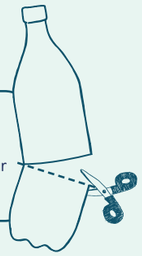
Step 1

Using a ruler, measure 10cm up from the base of your bottle. Then, mark that spot with a pen.



Step 2

Starting from your marking, cut off the bottom of your bottle. The bottom half will become your treatment plant, and the top half will become your water reservoir. Label them so you don't forget.



Step 3

Pierce some large holes into the bottom of the bottle.

Step 4

Turn the top half of your bottle upside down. Then, place the bottom half inside. Make sure you leave the cap on!

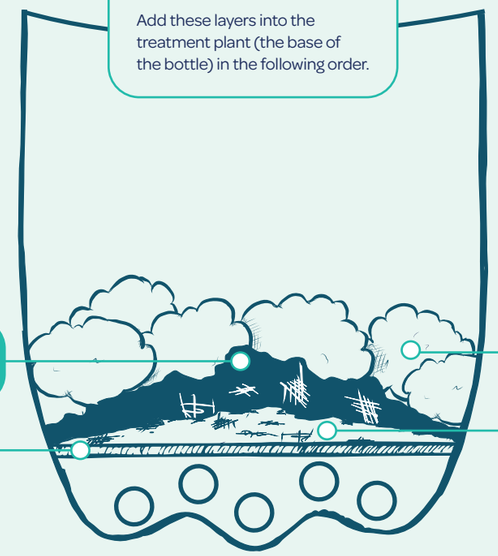
Step 5

Help your treatment plant stand on its own by placing it in a stand, or stabilising it with a box.

Create your filter

Add these layers into the treatment plant (the base of the bottle) in the following order.

To be accurate, use your measuring scoops.



Layer 3: 2.5 tsp activated charcoal (make sure it's rinsed before use)

Layer 1: 1 sheet of filter paper

Layer 4: 6 cotton balls

Layer 2: 1 tsp baking soda

I wonder what the purpose of each layer is? Write your ideas in the box below.