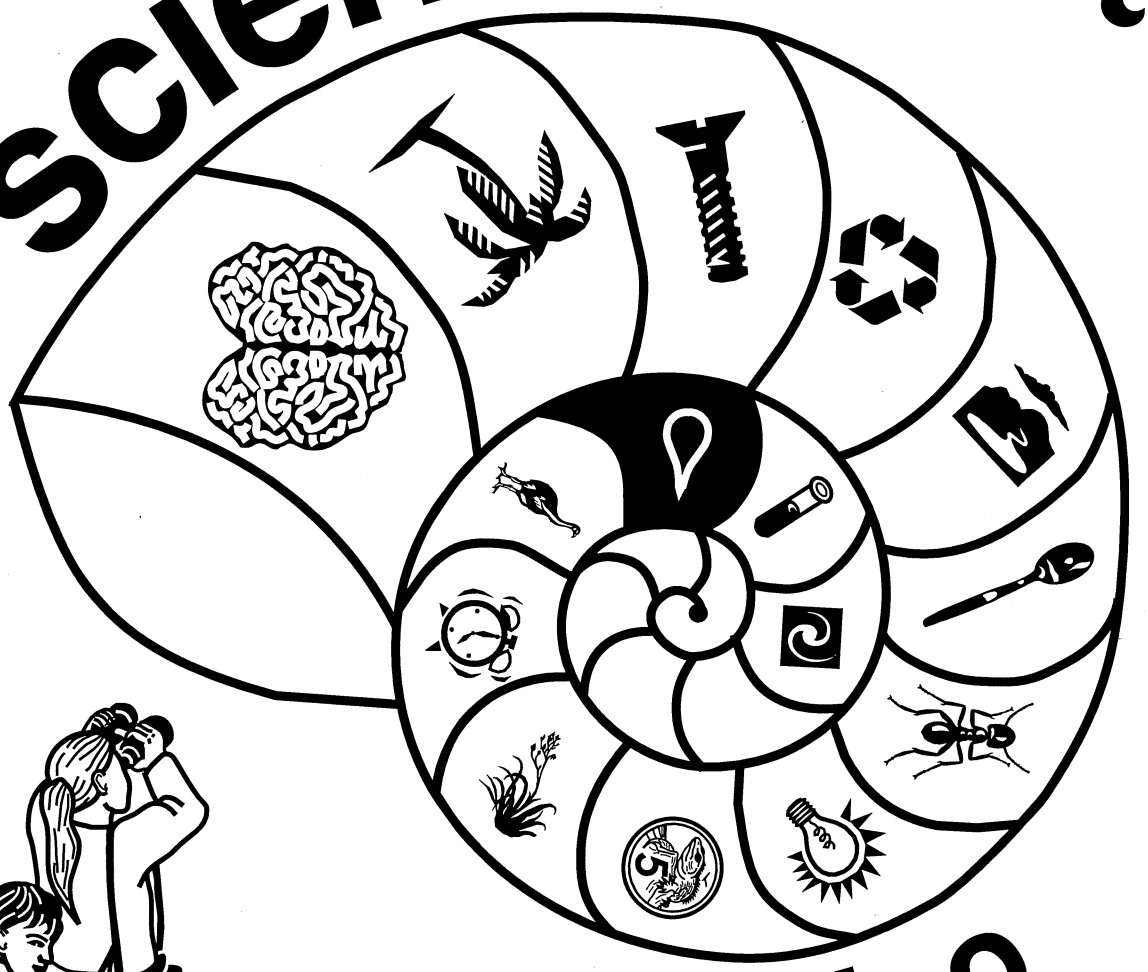
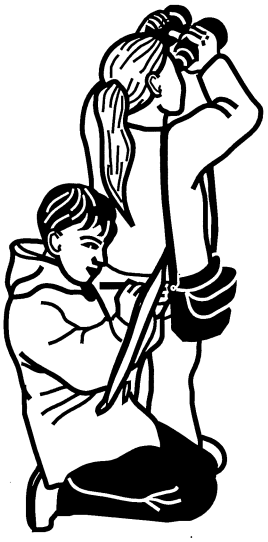
The Correspondence School Te Kura-a-Tuhi

science



pūtaiao



Waters' ways

97/1

SCL328

Water's ways

Ngā huarahi o te wai

How to do the work Me pēhea te whakamahi

You will
- investigate drops of water
- explore ideas about the water's surface
- test the power of water
- report on what you found out.

You have four hours to do this work.
You could do
- all the work in one day
- a 2 hour chunk each week
- an hour a day over 4 days
- 6 x 40 minute chunks over 2 weeks.

You need Whakaarotia ēnei

a tap
a container to hold water
an eyedropper (in your science box)
plastic tubing
foil
cooking oil
greaseproof paper
wood
teatowel
a glass
coins
a drawing pin
a ballpoint pen
two plastic bottles (fruit drink or milk)
a needle
two paper clips
a piece of tissue or paper towel
dishwashing detergent
talcum powder
a handkerchief
a rubber band
a nail
two jars or glasses
food colouring (optional)
empty dishwashing liquid bottle

Assessment Aro matawai

Your teacher will be looking to see how well you
- gather information about water and report your findings.

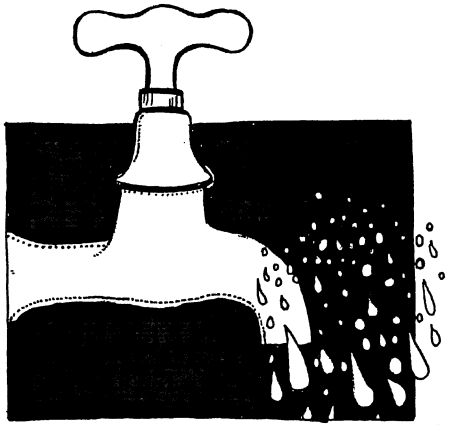
contents

1 What shape are drops of water?

He aha te āhuahanga o ngā kōpata wai

What shape do you think raindrops (kōpata) are?
On the pages of this booklet you'll see drops like this.

Are raindrops this shape?
Is a drop of water from the tap the same shape as a kōpata?



Look closely at a dripping tap.
Put a dark card between the tap and a basin and you'll be able to see the drops more clearly.
What shape is the drop before it falls?
What shape is it as it falls?

1 **Draw** the drop before it falls.

2 **Draw** the drop as it falls.

Turn to the back for ideas.

Take the eyedropper from your science box
Fill it with water.
Squeeze a *small* drop of water on to your Correspondence School plastic bag. **Look** at its shape as it leaves the eye dropper.
Look at its shape on the plastic. **Draw** it.

Squeeze a *big* drop of water on to the bag. **Draw** it.
Is the shape different?
Is it similar?
What happens to the shape of the drop if you slope the bag?

Write your ideas about the shape of drops of water here.

_____

_____

Investigate a drop of water on other materials.

Choose things that water won't sink into.

You could use

- foil
- greaseproof paper
- laminated material
- hard wood.

Choose at least four different materials.

List them and **draw** the shape of each drop of water when it's put on the material.

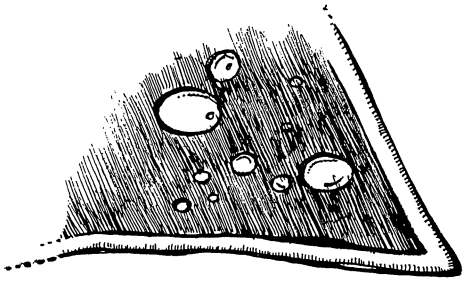
1 2 3 4

◗Look at the back for some ideas.

2 What water can do

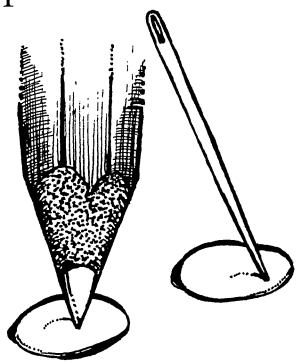
Find out what drops of water can do.
Use the eyedropper to sprinkle water on to a Correspondence School plastic bag.

Make drops of different sizes.



Poke one of the drops with the point of a sharp pencil.
Does it push into the drop?

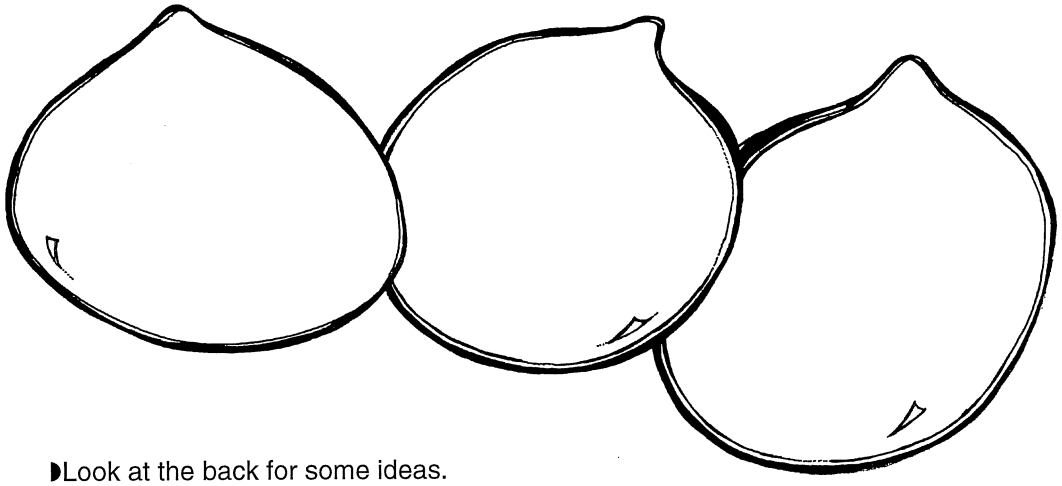
Touch the tip of a needle to another drop.
What happens?



Try to push one drop against another.
Does each drop seem to try to stay complete?

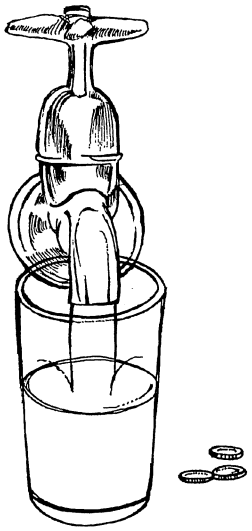
Pour some cooking oil into a saucer.
Sprinkle some drops of water on it.
What do you see?

Write in the drops of water some things you observed.



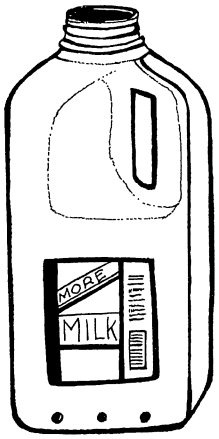
◗Look at the back for some ideas.

Fill a glass



Fill a glass right up to the brim with water.
Slide a coin into the glass carefully.
What happens to the surface of the water?
Slide another coin in to the water. And another...
Watch the surface of the water closely.
When does the water overflow?
Write what happens to the surface of the water as you put the coins in.

Pinch water



You need a plastic fruit drink or milk bottle for this.
Make three holes one centimetre apart near the bottom of the bottle with a drawing pin. Then poke a ballpoint pen in each hole to make it bigger.
Notice what happens in the next three activities, so you can draw them later.

1 **Fill** the bottle with water.
Hold it over the sink to see the water flow.
What do you see?

2 What happens when you pinch together the water flowing from the three holes with your fingers?

3 What happens when you brush your finger across the three holes?

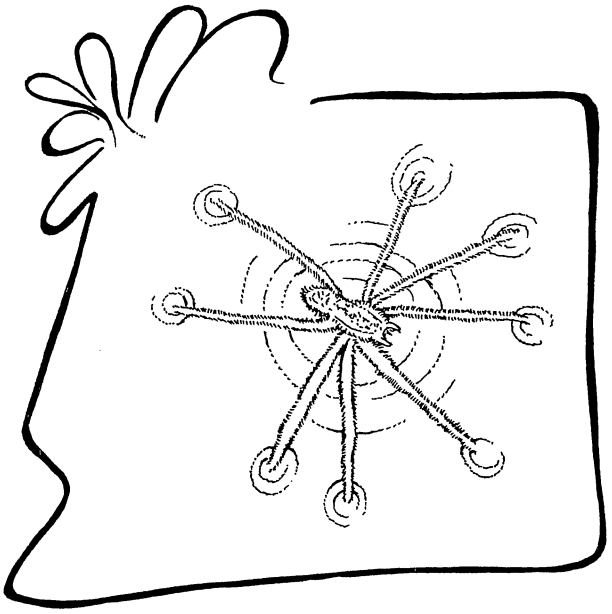
Write what happened.

◗Turn to the back for possible answers.

3 The surface of water

Te mata o te wai

Some insects can walk on water without sinking in.
Look at this picture of a spider standing on water.



The water doesn't give way so the insect doesn't sink.
You can see that the surface bends a little.
The insect's feet make small dents in it.
Why do you think this is?

Write your idea here.

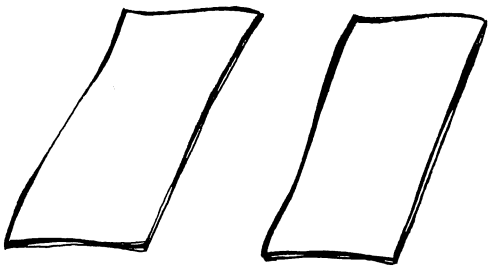
◗Look at the back for some ideas.

Paper clip water walkers

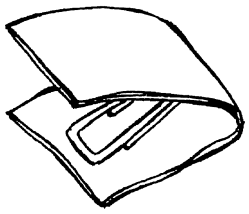
You need

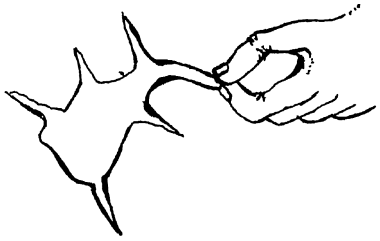
- a clean dish or bowl half filled with cold water
- two paperclips
- two pieces of foil, 8 cm x 4 cm
- eyedropper
- a drop of detergent
- scissors

1 **Cut** the foil into two rectangles 8 cm x 4 cm.

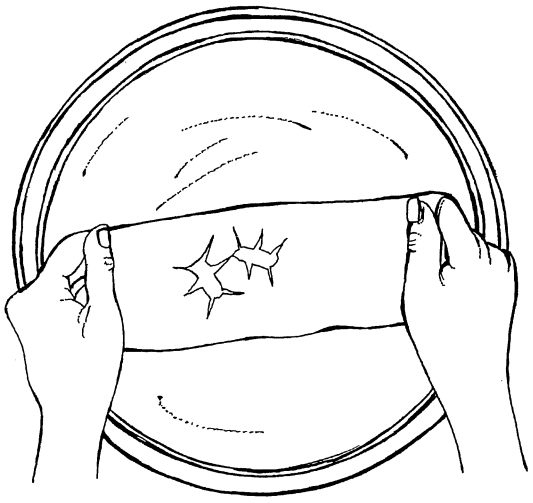


2 **Place** the paperclip in the middle of one half of the foil. **Fold** the foil over. **Pinch** out six legs to make an insect.





3 **Place** your insects on a piece of tissue and carefully lower it onto the surface of the bowl of water.



4 When the tissue is soaked and sinks, what happens to your paperclip insects?

_____

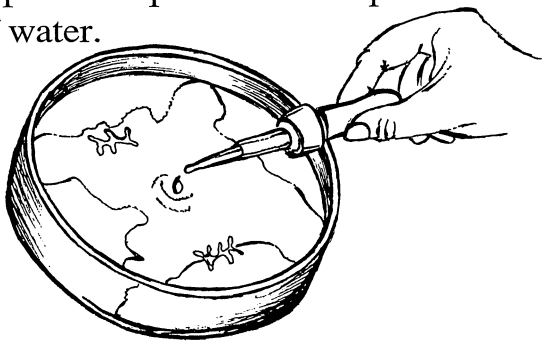
_____

What do you think would happen if you drop a little detergent into the water?

_____

_____

Test your prediction. Use the eyedropper and squeeze one drop of washing-up detergent into the bowl of water.



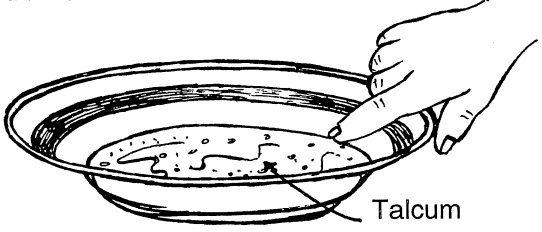
Do the paperclip insects move?

Why do you think this happens?

_____

_____

Do this activity again with a different bowl of water.
This time, sprinkle a little talcum powder on the surface of the water.
Touch the water lightly with a finger.



What happens?
Why?

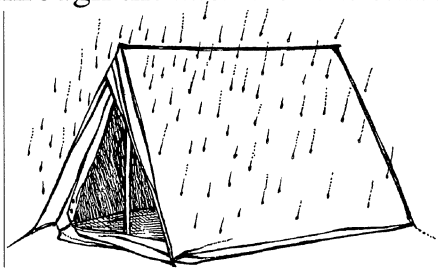
_____

_____

◗Look at the back for possible answers.

Tents and handkerchiefs

Have you been in a tent on a wet day?
Why do you think the rain doesn't come through the fabric of the tent?



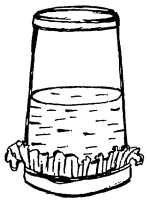
Try this.

You need

- a glass or jar, half-full of water
- a handkerchief
- a rubber band.

1 **Stretch** a handkerchief over the top of the glass.
Tighten it with a rubber band.

2 **Turn** the glass upside down.
What happens?



3 **Hold** the glass upside down over the sink.
Touch the handkerchief with your finger.
What happens?

Report your findings.
Draw pictures of what happened in the boxes below.

The glass is upside down.	I touch the handkerchief with my finger.

Give your reason for what happened.

_____

_____

◗Look at the back for ideas.

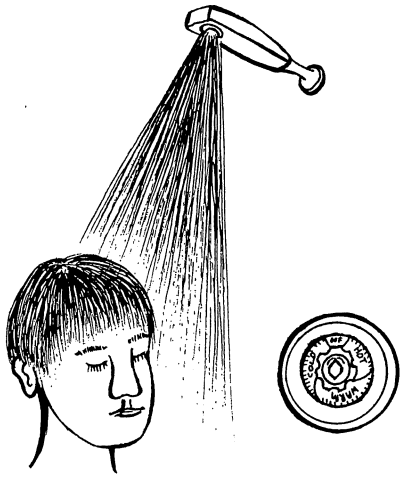
4 Water pressure

Te pēhanga o te wai

Firefighters use hoses to shoot water out at high pressure.

Find out about water pressure

Sometimes the power of water comes from push, its pressure.
If water is squeezed into a small space what happens to its push?



You need

- an empty dishwashing liquid bottle
- to go outside or do this over the sink.

Take the top off and fill the bottle with water.

Put the top back on and lift the cap.

Squeeze the bottle softly.

How does the water flow?

Squeeze it hard. What happens? Why?

Write your idea.

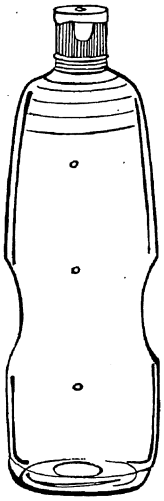
◗Look at the back for ideas.

Find out where water has the most push

Is it at the surface?
Is it where the water is shallow?
Is it where the water is deep?

You need

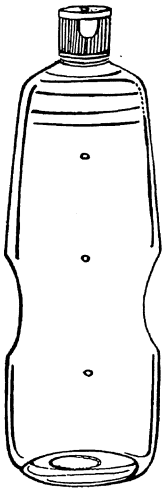
- the dishwashing liquid bottle or a 2 litre plastic milk bottle
- a drawing pin
- a nail
- someone to help you
- to do this over the sink.



Make three holes in the bottle like this.
Use a drawing pin to make the holes, then a nail to make the holes bigger.
Make them one above the other and the same size as each other.

Ask someone to cover the holes with their fingers while you fill the bottle.
What happens when they take all their fingers away at once.
Which spurt of water is longest and strongest?
Which spurt of water is weakest?

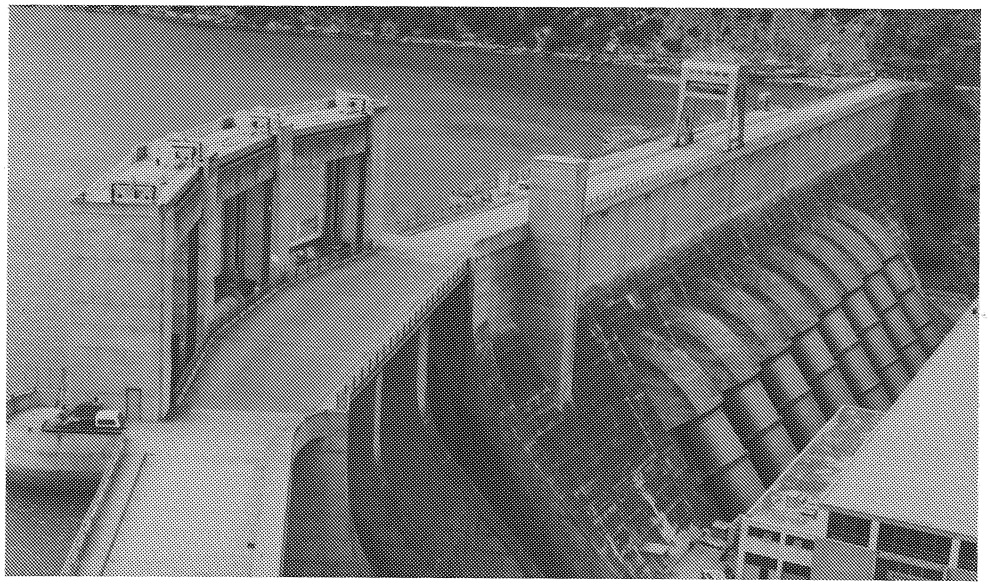
Draw X on the diagram of the bottle on the hole where you think the water pressure was strongest.
Draw **O** on the hole where you think it was weakest.



◗Turn to the back for some ideas.

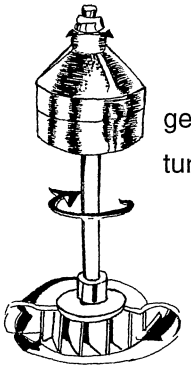
A Hydro-electric dam

Hydro is a Greek word which means *water.*
Hydro-electric dams store water in reservoirs. They use moving water to turn the turbines and generate electricity.

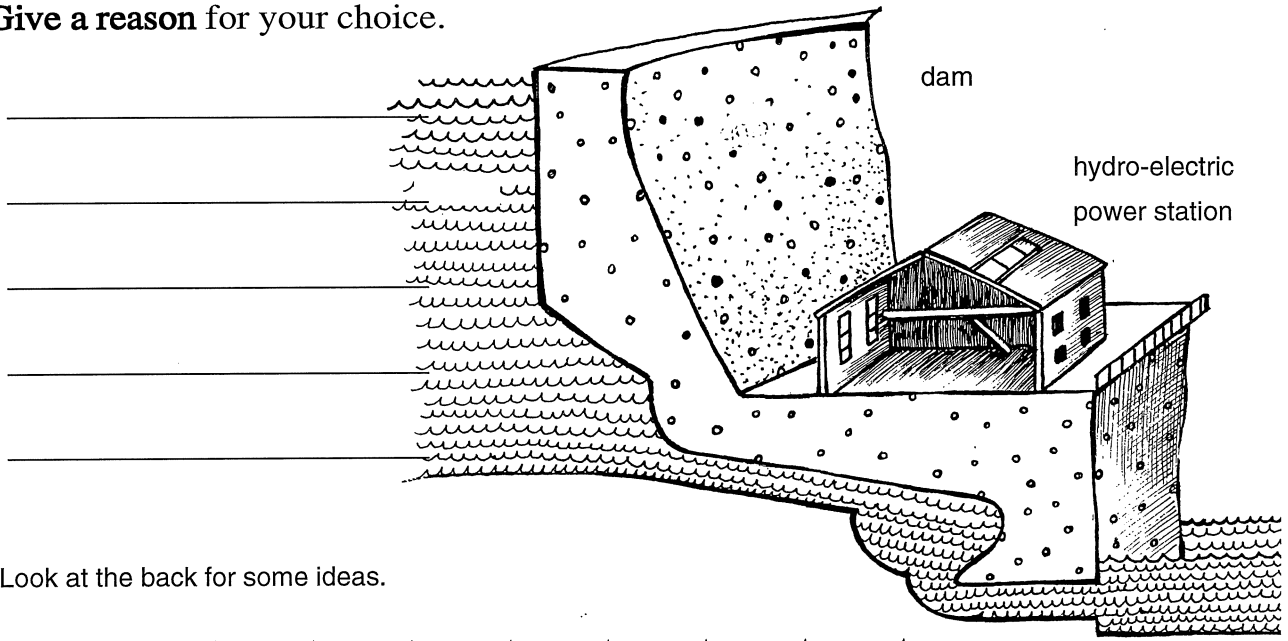


Look at the diagram of a hydro-electric dam cut through the middle.
Where do you think the water pressure is strongest?
Where do you think it is weakest?

Inside the dam the water turns huge turbine blades to generate electricity.



If you had to design a dam, where would you put the turbine?
Draw the turbine on the diagram.
Give a reason for your choice.

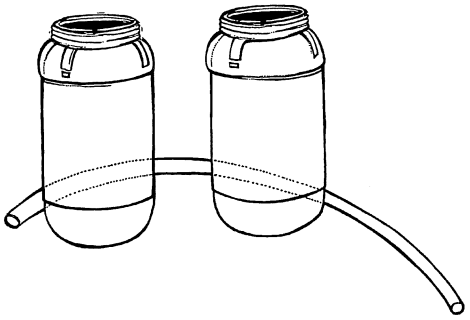


◗Look at the back for some ideas.

5-6 Siphons

Ngā ngongo

Your sink is full of water and it's blocked.
You can't lift the sink and tip the water out.
How will you empty it?
You can use a siphon.



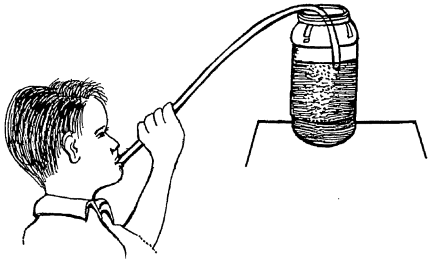
Make a simple siphon

You need

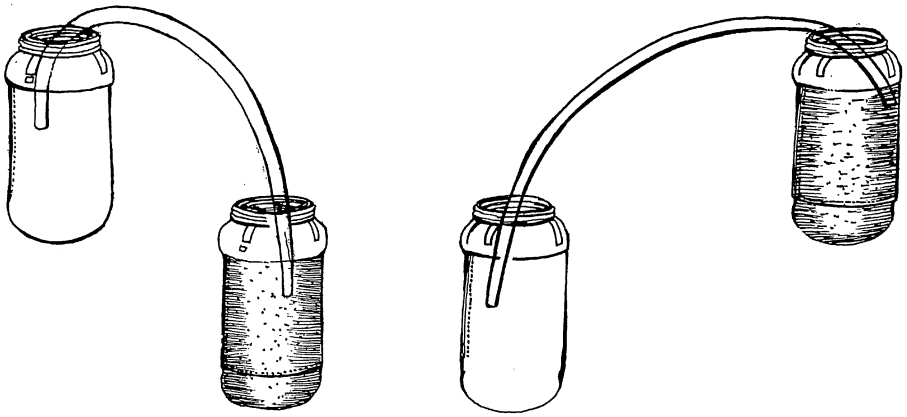
- the plastic tubing in your science box
- two jars or glasses
- water
- a few drops of food colouring in the water (optional)
- to be outside.

Three quarters fill one of the jars with water.
Place one end of the plastic tubing in it.
Suck water up the tube until it's full.
Take your mouth away.
What happens to the water when your head is above the jar?

What happens to the water when your head is below the jar?



When the water in the tubing keeps on running you've made a siphon.
Try siphoning the water from one jar to the other.
Put the empty jar higher than the full jar.
Put the empty jar lower than the full jar.



Write your findings in a report.
Draw diagrams or pictures to show what you did.
Include photos if you like.
Write a sentence about what you found out.
Give a reason for what happened if you can.

Set your report out like this on the next page.

My siphon report

What I did.

What I found out.

Why I think this happened.

◗Your teacher will be looking to see how well you report your findings.

My siphon report

Taku pūrongo ngongo

Possible answers
He whatautu pea

whārangi

4 The shape of water

A small raindrop or drop from a dripping tap is round. That's because in the middle of the drop, tiny particles that you can't see (water molecules) pull towards each other. As drops fall towards the ground, gravity pulls them out of shape and they become pear-shaped.

What would happen in space where there is no gravity? Astronauts have to be careful not to spill their drinks because the tiny drops of water don't drop. Instead, they float around inside the spacecraft.

5 The smaller the drop the rounder it is. As large drops fall gravity pulls them in to a pear shape.

It doesn't matter what material you chose, the drops of water should be all the same shape – round.

6 What water can do

Water molecules are tiny particles that you can't see, even with a microscope. Molecules pull towards each other. Water forms drops because its molecules pull together.

Each drop probably seems to try to stay whole. The *molecules* pull towards each other trying to take up the least possible space. They make the water drop form a sphere.

You probably saw the pencil didn't change the shape of the drop. Nor did the needle. When you try to push drops together each one tries to stay whole. In cooking oil the water doesn't run into the other liquid as you might expect.

7 Fill a glass

Did you discover you could put a lot of coins into the water before it spilled?

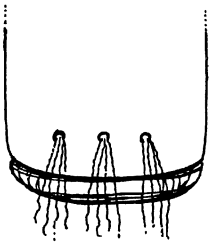
The surface of the water seems to be higher than the top of the glass.

That's because more molecules are crowded together on the surface than in the rest of the water. Those packed-in molecules are strong enough to hold some water above the top of the glass.

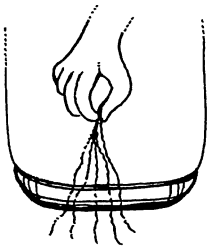
Pinch water

You probably found that

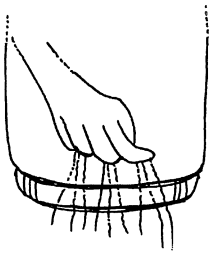
1 Three streams of water come through the holes.



2 Your fingers pinch three streams into one stream.



3 When you brush your fingers across the stream, it goes back into three streams.



8 The surface of the water

You might think that the surface of the water seems to be like a skin. The molecules at the surface of the water are packed together to make a kind of skin. This 'skin' is strong enough for tiny insects to skim across without sinking. Your light paper clip insects stay on the surface for this reason.

9 Paper clip walkers

Some things break the skin on the top of the surface, like detergent. The drop of detergent makes the insects move. When you sprinkle talcum powder on the water and touch it lightly with your finger you disturb the skin of the water and the powder moves away from your finger.

11 Tents and handkerchiefs

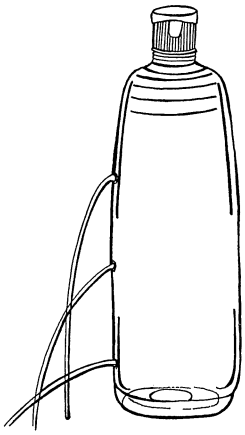
Your handkerchief is made up of fibres of cloth with tiny holes in between them. When you tip the glass upside down, the surface of the water, like a skin, stops the water pushing down through the holes. If you touch the handkerchief, your finger will break the skin and water will come through.
In old fashioned canvas tents, if it rained, you were careful not to touch the roof or the sides because water would come through where you touched.

12 Water pressure

You can make water flow more quickly by trying to squash it into a smaller space. When you squeeze the bottle hard, you squeeze the water into a smaller space. Then the water flows faster than when you squeezed gently.

14 Where water has the most push

Water's push is greater with depth. In the bottle, the water at the bottom is put under more pressure than the water at the top because it is deeper.



You'll probably see that the water doesn't flow very strongly from the top hole, it shoots out a bit more from the middle hole because the pressure there is greater and it spurts out further from the bottom hole because that's where pressure is greatest.

15 A Hydro-electric dam

Dams store water in lakes or reservoirs behind them. The pressure of the water at the bottom of the dam is very great. When the gates of the dam are open the water rushes through and turns the huge turbine blades to generate electricity.

SCL328 Checkpoint
Taupeka matawai

My work				Teacher's comment
I made my water walkers move.				
I can tell where water pressure is strongest.				
I reported on how to use a siphon.				

Supervisor and student comments

Kim went out to find water walkers on the pond after she made her own.

I enjoyed finding out about water pressure with the plastic bottle. I had to really think had about where a turbine would go in a dam.

Acknowledgements

Every effort has been made to acknowledge and contact copyright holders. The Correspondence School apologises for any omissions and welcomes more accurate information and contact.

Photo: Water drops on a leaf, by Sally Hunter. Used by permission

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