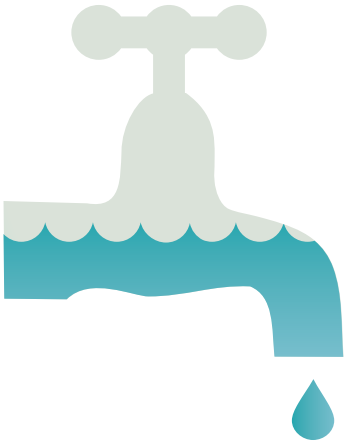
Weird and Wonderful Water



Pure water is colourless, odourless and tasteless which makes it seem quite dull. This is not the case at all! Water has some amazing properties which makes it invaluable in everyday life.

Main Activity

Conduct five short experiments to observe the different properties of water. Each experiment is outlined in detail on the following pages.

Activity 1 – Sticky Water

Use water, a coin and detergent to examine surface tension.

Activity 2 – Water Weight

Compare the difference in the density of hot and cold water.

Activity 3 – Scared of a Little Water?

Help oil overcome its fear of water in this colourful experiment.

Activity 4 – Ice Action

Explore the density of ice and water in this simple but effective activity.

Activity 5 – Solid, Liquid, Gas...Oobleck?

Think you know all the properties of solids and liquids? What happens when a substance behaves like both?

FACT: Did you know that hot water can freeze more quickly than cold water? This is called the Mpemba effect. While this phenomenon has been verified, there is yet to be a clear explanation as to how and why it happens.

Engage

Conduct or observe the experiments in the Main Activity, then record your observations in the **Engage & Connect - Weird and Wonderful Water worksheet** provided.

Connect

Conduct or observe the experiments in the Main Activity then record your observations in the worksheet provided. Select one experiment to investigate further and present your results in a creative way such as a poster or informative video.

Explore

The experiments outlined under the Main Activity explore density, surface tension and polarity of water, but water has a range of other amazing properties. Conduct the experiments, then investigate two other properties of water and design an experiment or create a video to explain these properties of water to a younger audience.

Activity 1

Sticky Water

Use water, a coin and detergent to examine surface tension.

Materials

- 10 or 20 cent coin
- eye dropper
- water
- detergent
- paper towel

Method

1. Wash your coin using tap water and then dry it thoroughly.
2. Using the eye dropper, slowly drop water onto the coin, counting each drop as you go. How many drops did you fit on the coin before it overflowed?
3. Dry the coin then smear a small amount of detergent over the surface with your finger.
4. Repeat Step 2.

Activity 2

Water Weight

Compare the difference in the density of hot and cold water.

Materials

- 2 glass cups that are the same size
- hot tap water (not boiling)
- cold tap water
- red food colouring
- blue food colouring
- a thin plastic card (a flat square cut from an ice cream container works well). It must be larger than the diameter of your glass.
- large tray

Method

1. Sit the 2 glasses in the tray—this will minimise the mess if you accidentally spill your experiment.
2. Add 2–3 drops of blue food colouring to one glass then fill right to the top with cold water.
3. Add 2–3 drops of red food colouring to the other glass and fill right to the top with hot water.
4. Place the plastic card on top of the hot cup. Then, holding the card in place, tip the glass upside down; if you have filled the glass right to the top there should be enough pressure to hold the card in place. Slowly remove the hand holding the card against the glass.
5. Carefully place the upside down glass of hot water over the cold glass of water.
6. Before you remove the plastic card, predict what you think will happen. Ask your partner to record the prediction in your worksheet.
7. Slowly and carefully, remove the card by sliding it out. What do you notice? Record your observations in your worksheet.
8. What do you think would have happened if the cold water glass was on top? Record your prediction in your worksheet.
9. Place one hand around the cold glass of water and one hand around the hot glass of water. Hold the glasses together and turn them so the cold cup is on top. Be sure you do this over your tray in case you spill your experiment.

Activity 3

Scared of a Little Water?

Help oil overcome its fear of water with this colourful experiment.

Materials

- clear jar or bottle with a tight fitting lid
- detergent
- cooking oil
- water
- food colouring

Method

1. Add 3 drops of food colouring to the jar.
2. Add equal amounts of oil and water to the jar, each about 1/3 of the jar's volume.
3. Screw the lid on tightly then shake the jar.
4. Let the liquids settle and observe them. Record your observations in the worksheet provided.
5. Add a few drops of detergent to the jar then shake it again.
6. Observe the results.

Activity 4

Ice Action

Explore the density of ice and water in this simple but effective activity.

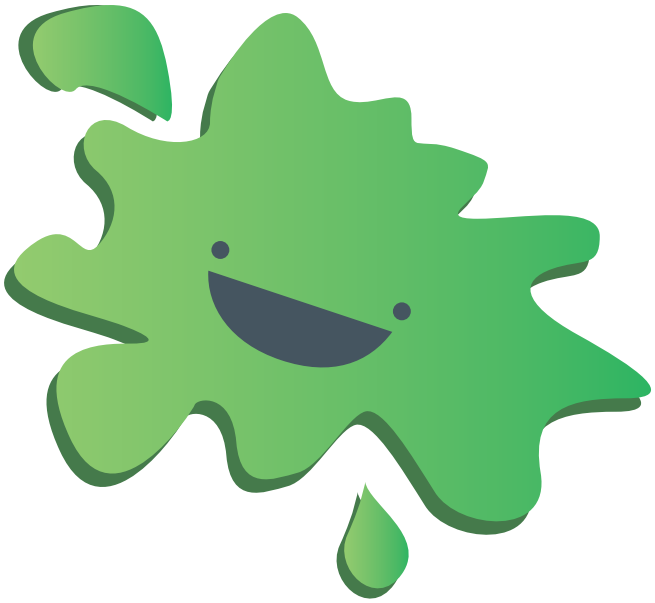
Materials

- glass cup
- water
- oil
- tongs
- ice cube coloured with food colouring

Method

1. Half fill a clear glass with water.
2. Carefully top up the glass with oil by slightly tilting the glass of water and letting the oil run down the inside of the glass.
3. Carefully place your coloured ice cube in the oil using tongs. Be sure to place it carefully in the glass—don't let it drop in!

Ensure you dispose of the oil correctly (not straight down the sink!).



Activity 5

Solid, Liquid, Gas... Oobleck?

Think you know all the properties of solids and liquids? What happens when a substance behaves like both?

Quicksand, many pastes and glues, gelatine and shampoo are all non-Newtonian fluids. They get their name from the fact that they do not fit Newton's laws of how true liquids behave (specifically, in how they react to sharing forces). Cornflour slime, also known as oobleck (from the Dr. Seuss book *Bartholomew and the Oobleck*), is a non-Newtonian fluid, a fluid that can change its viscosity (thickness).

Materials

- large mixing bowl
- large spoon
- 2 cups of cornflour
- 2 cups of water
- food colouring

Method

1. Add 2 cups of water and a few drops of food colouring to the mixing bowl.
2. Gradually add the cornflour until you achieve a smooth consistency. It should flow smoothly when you stir very slowly but should be difficult to stir quickly.
3. Roll up your sleeves and try the following activities:
   a. *Drop your hands quickly into the Oobleck, then slowly lower your hands into it.*
   b. *Hold a handful in your open palm—what happens?*
   c. *Try squeezing it in your fist or rolling it between your hands—how does it behave differently?*
   d. *Move your fingers through the mixture slowly then try moving them fast.*
   e. *Pour the mixture from one container to another. Try pulling at the slime mid-stream.*
   f. *What else can you do to test the mixture's properties?*

Engage & Connect – Weird and Wonderful Water

Experiment	PREDICT *Before you start each experiment, think about what might happen. Complete the following sentences:*
Sticky Water	I predict that the clean coin will hold _____ number of drops of water before it overflows. I predict that the coin covered in detergent will hold _____ number of drops of water before it overflows.
Weighty Water	I predict that when the hot cup is on top... . . . . I predict that when the cold cup is on top... . . . .
Scared of a Little Water?	I predict that when I combine oil and water I will see... . . . . I predict that when I combine oil, water and detergent I will see... . . . .
Ice Action	When I add a coloured ice cube to a glass of water and oil, I think I will see... . . . .
Solid, Liquid, Gas... Oobleck	When I mix cornflour (solid) with water (liquid), I think my new substance will behave like... . . . .

Experiment	OBSERVE *During your experiment, use your senses to observe what is happening. Record your observations below and include a diagram.*	EXPLAIN *After you have finished your experiment, try to explain what happened. You may need to do some research.*
Sticky Water		My prediction was/was not very close to what actually happened. The person in my class whose guess was closest was . . . . . . The . . . . . coin was able to fit more drops on it. I think this is because . . . .
Weighty Water		When the hot water was on top the colour of the water was . . . . . . I think this is because . . . . . . When the cold water was on top the colour of the water was . . . . . . I think this is because . . . .
Scared of a Little Water?		When I mixed oil and water, I noticed that . . . . . . I think this is because . . . . . . When I added detergent to the oil and water mixture I noticed that . . . . . . I think this is because . . . .
Ice Action		When I put the ice block into the oil, I noticed that . . . . . . I think this is because . . . .
Solid, Liquid, Gas...Oobleck		I think my new substance, oobleck, was more like a solid/liquid/solid and liquid. This is because . . . .