Climbing Water

On SCOPE's Things that... Climb episode, Julia experimented with the properties of water. Here's how you can do it at home:

What you need:
Small water bottle
Tap water
Food colouring
Modelling clay
Clear straws
Small tray
Hot water
Large bowl
Ice

What to do:

1. Fill the small bottle about ¾ full of water.
2. Add food colouring to the water so it is easier to see.
3. Using the modelling clay, position the straw inside the bottle, so one end is touching the water and the other end is sticking out the top. Make sure you make an air-tight seal around the opening of the bottle.
4. Fill a tray with hot water.
5. Place the bottle in the tray.

Watch as the water level climbs up the straw and even over the edge!

6. Fill a bowl with ice.
7. Place the bottle in the bowl of ice.

Watch as the water level climbs back down the straw!

8. Try changing the size of the bottle or the thickness of the straw, and see how that changes the level of the water!

What's happening?
Water is a pretty incredible substance! It is tasteless, odourless and colourless; it can be a solid, liquid or gas; it can flow, freeze and now it can climb!

When you place the small bottle into the hot water bath, the water heats up. When that happens it absorbs heat energy, all the particles move faster and so it expands.

The air inside the bottle also heats up and so that too expands, which puts pressure on the water in the air-tight bottle. Both the expanding water and air causes the water to climb up and out of the straw.

When you place the bottle into a bowl of ice, it has the opposite effect. The air and water cool down and lose energy. The particles then contract and the water moves down the straw.

Stick thermometers work using a similar principle. A liquid is sealed inside a narrow tube and moves up and down according to the temperature. The liquid is often alcohol mixed with a red dye, or even mercury- a metal that is liquid at room temperature.