



## Thermometer - How does a Thermometer work?

### Fact

- A thermometer tells you how hot or cold something is.
- A thermometer is usually a glass or plastic tube with a scale of measurement on the side of it (a bit like a ruler).
- The liquid inside the thermometer expands when it gets hot and contracts when it cools down, so it moves along the scale of measurement that tells us how hot it is.
- If you put a bulb thermometer in your mouth, or somewhere else that's quite warm, the red liquid inside the bulb gets warmer and expands moving up the tube.

### Do you know

- The temperature scale we use is called the Celsius scale after a Swedish man named 'Anders Celsius'.
- On the Celsius scale the freezing point of water is zero and the boiling point of water is one hundred degrees.
- The liquid inside a thermometer is often a liquid called mercury because it expands when it heats up and contracts when it cools down but it won't freeze at 0 degrees Celsius and it will only boil at about 356 degrees Celsius, not 100 degrees like water!
- But because mercury is a poisonous metallic liquid that is very hard to collect if a thermometer breaks most medical thermometers have red alcohol in them, which works the same way.
- Other countries use a temperature scale called Fahrenheit after Daniel Fahrenheit who invented it.

### Experiments you can do

Make your own thermometer;

#### What you need:

Chewing gum or blue tack

A glass jar with a lid that has a small hole in the top

A thin straw (the thinner the better)

A jug of cold water (out of the fridge so it is really cold) with a drop of food colouring in it

A container half full of hot water that's big enough to fit the glass jar in.

Someone to help you with the hot water.

#### What you do:

Fit the thin straw through the hole in the lid of the jar. Use blue tack or chew your chewing gum, then use it to seal around the straw in the hole so that it is nice and watertight. Do this to both sides of the lid – top and bottom.

Fill up the jar, right to the top, with the jug of cold water. Then screw the lid on. Now get an adult to help you put the water thermometer into the container of hot water. Wait and watch.

What happens to the water inside the jar? Why does it do that?  
Can you think of other times when water expands?

### **Other Investigations**

Ask your teacher if you can use some school thermometers to test and compare the outside temperature to the inside temperature. Make sure they all use the same measuring standard.

Do the school thermometers use a Celsius or Fahrenheit temperature scale? Have a look at the temperature scale – is it like a ruler?

What temperature is each thermometer showing right now? Make sure you don't touch the bulb at the bottom of the thermometer because this will change the reading! You can check the thermometers have the same reading by putting them all in a container of cold water. Wait until the temperature on all of the thermometers has stopped changing. Check all the readings without touching the thermometers.

Choose a safe place in the classroom and outside the classroom where you can leave a thermometer for an hour. When the hour is up, write down the temperature showing on both thermometers and compare the temperature taken inside with the temperature outside. Are the temperatures different? Why would that be?

If your school has more than two thermometers put one in a classroom, one outside in the sun and another outside in the shade and compare the results?

### **Jokes**

What did one thermometer say to the other thermometer? On my scale you're hot!