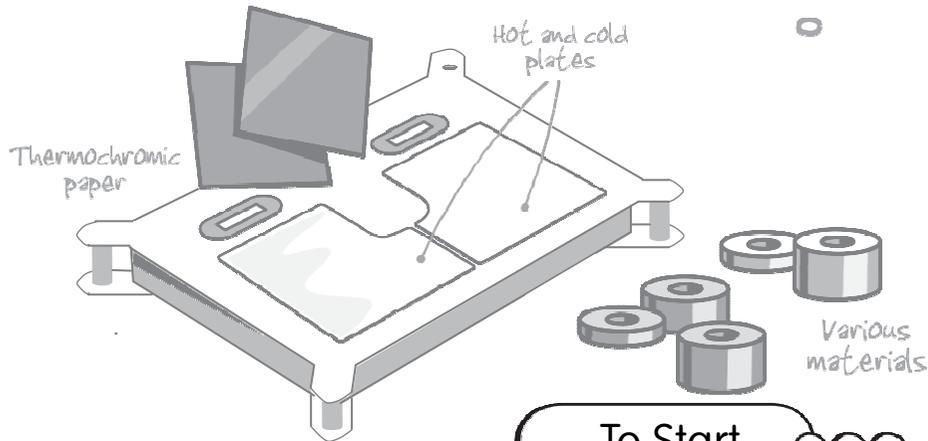
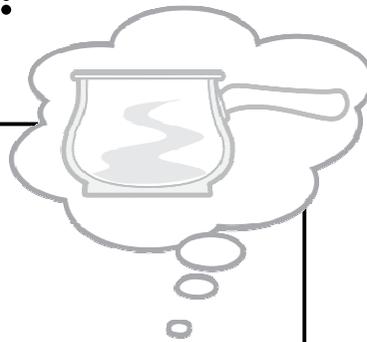


HOT OR COLD?

Challenge



To Start

Touch the two metal plates

You are provided with:

- 3 x '25-30°C' thermochromic tiles
- 3 x '30-35°C' thermochromic tiles
- 3 x aluminium disks of different thickness
- 1 x wooden block
- 1 x plastic block

HOT OR COLD?

1. Place your hands on the two plates
Complete the paragraphs below:

The hot plate feels **warm** because it is **above** the temperature of my skin, so **heat** energy transfers from the **plate** to my hand.

The cold plate feels **cold** because it is **below** the temperature of my skin, so **heat** energy transfers from **hand** to the plate.

2. Different materials, same thickness.

- a) Place a wooden block, plastic block and aluminium disk of the same thickness on the hot plate.

Place a '25-30°C' thermochromic tile on each material.

In the boxes below, show the order in which the tiles changed colour.

1st **Aluminium**

2nd **Plastic**

3rd **Wood**

- b) Can you explain why (using the words in box below)

Aluminium is a metal and so a good conductor, so the heat energy is rapidly transferred. Wood and plastic are both non-metals and insulators, so heat is transferred more slowly. Wood is the best insulator, as it changed colour last.

HOT OR COLD?

c) Replace the tiles with '30-35°C' ones.

What do you notice? **Only the aluminium changes colour.**

Imagine you were designing a saucepan.

Which material would you use for the pan? **Aluminium**

Why? **It's the best conductor and the heat from the stove would reach the pan contents quickly.**

Which material would you use for the handle? **Wood or Plastic**

Why?

It is an insulator so it would not become too hot to pick up. (May also say that plastic might melt and that would may catch fire).

3. Same materials, different thickness

Place the 3 aluminium disks on the hot plate and cover each one with a '30-35°C' tile.

	Time (s)
Thick	
Medium	
Thin	

Time how long each one takes to turn blue.

Measured time should increase with thickness

HOT OR COLD?

Why are the times different?

Heat energy through the aluminium by conduction and so it takes longer for the heat energy to be transferred through the thicker layer.

4. Place one aluminium disk on the cold plate.
Read the temperature on the red display and place the relevant tile on the disk.

Why does it not change colour?

Because the transfer of heat energy through the block is not completely (100%) efficient, and some of the energy is lost to the surrounding air.

