

Folder: Science P1-3
Topic: Energy – Heat, p11-14
Level: B

- **Measuring temperature**
- **“A further investigation could take place to find out what material keeps the bath water warm”**

Measuring temperature

LogIT Explorer can be used in addition to other temperature-reading equipment, simply as an accurate thermometer, without need for a computer.

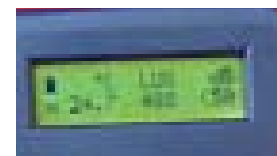
Just switch on the Explorer and read the digital display to measure air temperature. Pupils could see if they can find different areas of the room which are hotter (a radiator) or colder (a draughty window).



Use the temperature probe if you are measuring water temperature. Any use of the probe by young pupils should be under close supervision. Only the metal part, up to the yellow label, should be placed in water. The probe should never be placed in the mouth.



The drawback for young pupils of recording temperature this way is that the display also records sound and light, which may be confusing. Also, the temperature reading will have a decimal point for accuracy, eg 21.3



Using the Explorer in this way may therefore have to be a teacher-led activity.

However, if you have access to a computer, you can use the software to demonstrate temperature changes very clearly, even for young pupils

You need:

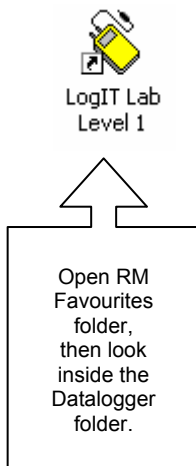
- LogIT Explorer, connected to the computer with the USB cable (see ‘An introduction to using the LogIT Explorer datalogger’ document)**
- 2 temperature probes plugged in to the sensor sockets (it does not matter which ones)**
- 2 tubs, one with cold water, one with warm water**
- Ice cubes (optional)**
- Ideally, a projector so that the whole class can see the display clearly**

Now here's what to do:

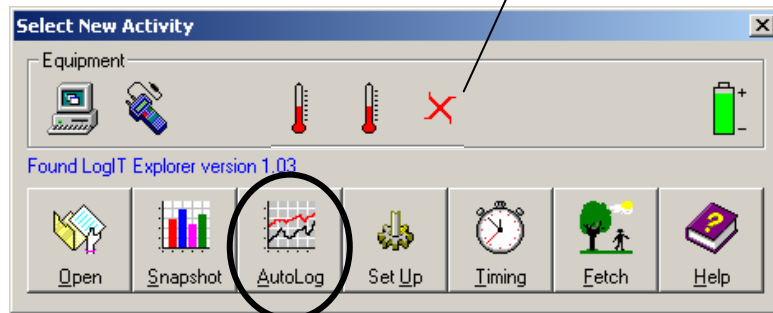
Step 1

Plug the temperature probes into the top of the datalogger.

Step 2



Switch on the datalogger with the green start button. Double click to open LogIT Lab Level 1. Click to cross off the other sensor, leaving the 2 temperature sensors.



Step 3

Click the Autolog option.

Step 4

The Autolog option opens as a graph. (See Step 10 if you feel your pupils are able to interpret a line graph). The best way to introduce the LogIT is to look at the Display Meter first. Find it in the tools above the graph.

Click the Display Meter tool and you will see bars that move as the data changes.



Step 5

Ask pupils what they think will happen to the bars and then place one of the temperature probes into the cold water tub and the other into the hot water tub. The change will be gradual but obvious. Can the pupils tell which probe is in which tub? Make the link – the hotter the temperature, the higher the bar.

Step 6

Further ideas: Try dropping an ice cube into the cold water – what will happen? What will happen to the hot water bar as the water cools? When the probes have returned to air temperature, get 2 pupils to hold the probes tightly in the palm of their hand. Who has the hottest hand?

Step 7

Experiment - Keeping the bath water warm

You will need:

2 margarine tubs

Warm water (40°C)

Insulating material, eg bubble wrap, fabric)

LogIT Explorer datalogger and temperature probe

Warning:

Do not let the datalogger itself come in contact with water or direct heat, only the temperature probe.

Summary of experiment:

One tub is wrapped in insulating material (leave a hole for the probe if you are covering the top too). Both tubs have warm water poured in. LogIT Explorer records the temperatures and the results are displayed on the display meter (see steps 1-4)

Now here's what to do:

Step 8

Discuss the experiment with pupils, thinking about a fair test, eg same size of tub, same level of water, same temperature.

Step 9

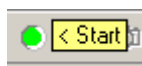
Follow steps 1-4 to get the program ready, so that the display meter is on the screen. Set up the experiment and place the probes into the 2 tubs.

Step 10

The experiment will take time to complete, but the difference between the 2 bars should become obvious quickly. Draw the attention of pupils to the temperature values at the top right of the window. These change as the temperature changes.

The experiment could be timed to see how long the insulated tub retains the heat. How long does it take before the 2 tubs are the same heat (in other words, until the 2 bars are level)? How good was the insulating material at keeping the bath warm? The experiment could be repeated to compare two different insulating materials. Which was the best at keeping the bath warm?

Note: If you feel your pupils would be able to interpret a line graph, the software will draw a graph for you. Miss out Step 4 altogether. Once you are ready to start the experiment, click the green Start Logging button in the tool bar.



A line graph will be drawn as you watch.

