GCSE Physics required practical activity 3: Resistance

Student sheet

Required practical activity	Apparatus and techniques
Use circuit diagrams to set up an appropriate circuit to investigate a factor/the factors that affect the resistance of an electrical component. This should include how the length of a wire (at constant temperature) affects the resistance of the wire.	AT 1, AT 6, AT 7

How does the resistance of a wire depend on its length?

A dimmer switch allows you to control the brightness of a lamp. In this experiment you will investigate how the dimmer switch works. You will construct a circuit to measure the potential difference across a wire and the current in the wire. You will do this for different lengths of wire.

Learning outcomes
1 **2** **Teachers to add these with particular reference to working scientifically**

Method

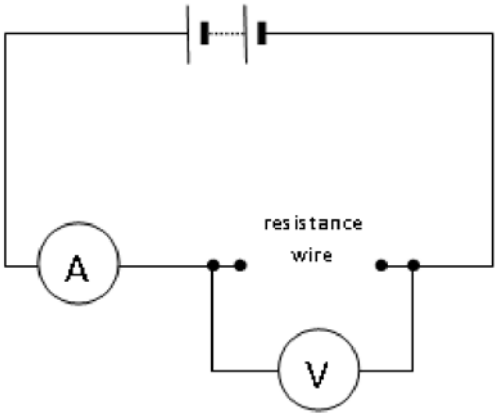
You will use the following:

- a battery or suitable power supply
- ammeter or multimeter
- voltmeter or multimeter
- two crocodile clips
- resistance wire eg constantan of different diameters attached to a metre ruler
- connecting leads.

You should read these instructions carefully before you start work.

1. Connect the circuit. It may be helpful to start at the positive side of the battery or power supply. This may be indicated by a red socket.
2. Connect a lead from the red socket to the positive side of the ammeter.
3. Connect a lead from the negative side of the ammeter (this may be black) to the crocodile clip at the zero end of the ruler.

4. Connect a lead from the other crocodile clip to the negative side of the battery. The main loop of the circuit is now complete. Use this lead as a switch to disconnect the battery between readings.
5. Connect a lead from the positive side of the voltmeter to the crocodile clip the ammeter is connected to.
6. Connect a lead from the negative side of the voltmeter to the other crocodile clip.



7. Record the length of the wire between the crocodile clips, and the readings on the ammeter and voltmeter in a suitable table. You will need just four columns in total.

Length of wire in cm	Potential difference in V	Current in A	Resistance in Ω

8. Move the crocodile clip and record the new ammeter and voltmeter readings. Note that the voltmeter reading may not change. Repeat this to obtain several pairs of meter readings for different lengths of wire.

9. Calculate and record the resistance for each length of wire using the equation:

$$\text{resistance in } \Omega = \frac{\text{potential difference in V}}{\text{current in A}}$$

10. Plot a graph of resistance in Ω against length.

11. You should be able to draw a straight line of best fit although it may not go through the origin. Can you account for the extra resistance?