

FACTORS AFFECTING THE RESISTANCE OF A WIRE

Aim

To investigate how the resistance of a wire depends on its length, on its cross-sectional area and on its composition.

Equipment

Power supply	metre rule
different wires on a base	connecting wires
DC ammeter	DC voltmeter
Micrometer screw gauge	

Method

1. Identify the different wires, and label them as A, B, C... Some are of the same diameter, some of the same material. All are of the same length.
2. Set up a circuit where the current and potential difference of one wire can be measured. Determine the limit of reading error for each scale on each meter.
3. To vary length - Using one wire only, measure the resistance of different lengths of the same wire. Record the potential difference, current, and length of wire, for 5 different sets of data.
4. To vary composition – identify all the wires of the same diameter. For each of these wires, record the potential difference, current, and composition, for 5 different sets of data (if possible).
5. To vary cross-sectional area – identify all the wires of the same composition. For each of these wires, record the potential difference, current, diameter and cross-sectional area, for 5 different sets of data (if possible).
6. For each set of data, plot a suitable graph (some will be bar graphs, and some join-the-dots) including uncertainties.

Questions

1. What is the formula relating these quantities? What can you predict about the shapes of the graphs?
2. Do the graphs confirm the expected relationships?