Practical Techniques: Before the Experiment

Read through the method and equipment and complete the risk assessment below.

Risk Assessment

Hazard	Risk	Control
Electricity		
Wires		

Variables

Dependant Variable	
Independent Variable	
Control Variable/s	

Practical Techniques: After the Experiment

Reflect on the experiment you have just conducted.

Are there any ways you could improve your results/accuracy?

How might comparing your results with another group help?

List any possible sources of error or uncertainty in your readings/results.

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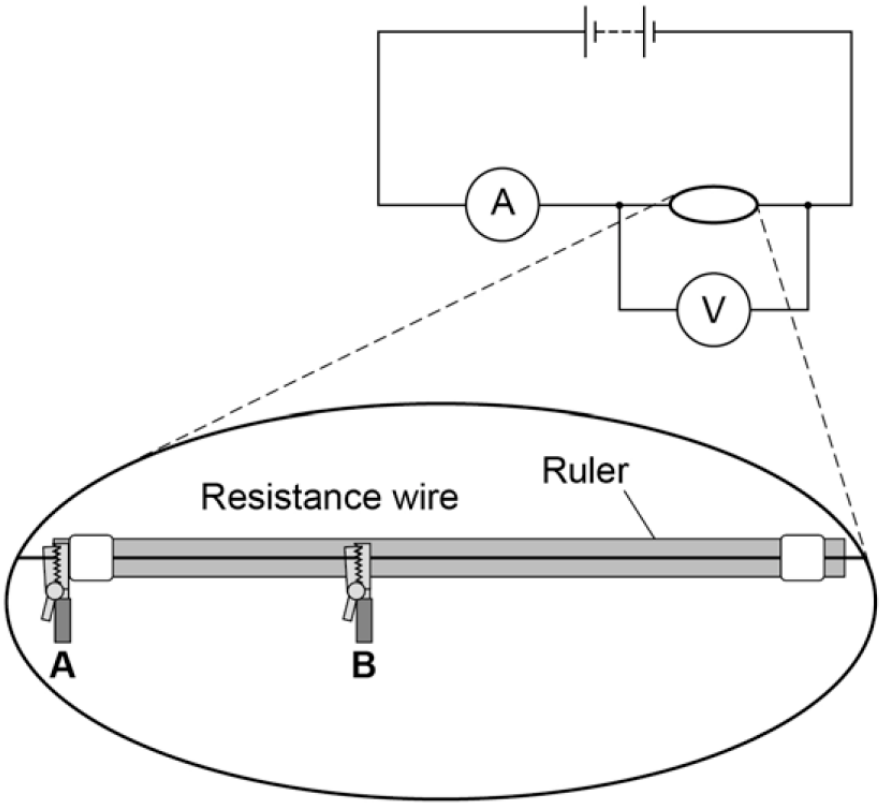
Experiment: Investigate Factors that affect the resistance of electrical circuits.

Equipment:

A battery or suitable power supply.
Multi-meter (Ammeter/Voltmeter)
Crocodile clips.
Switch.
Resistance wire attached to a metre Ruler.
Two 10 Ω resistors
Connecting leads.



Activity 1: How does the length of the wire affect the resistance at a constant temperature?

Method

1. Use the circuit diagram above to set up and connect the circuit.

2. Connect a lead from the negative side of the ammeter to the crocodile clip at the zero end of the ruler. Connect a lead from the other crocodile clip to the negative side of the battery. Use this lead as a switch to disconnect the battery between readings.

3. Decide the interval distance (e.g. 10cm) you will investigate and connect the first distance to be tested between crocodile clips A and B.

4. Measure the readings on the voltmeter and ammeter at this distance between.

5. Record your results in **table 1.**

6. Move crocodile clip B and record the readings for the different lengths of wire e.g. 20cm, 30cm.

7. Calculate the resistance for each length of wire using the equation:

$$\textbf{Resistance}(\Omega) = \frac{\textbf{Potential Difference (V)}}{\textbf{Current (A)}}$$

Before moving onto activity 2 please complete the results analysis on the next page.

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Results: **Table 1**

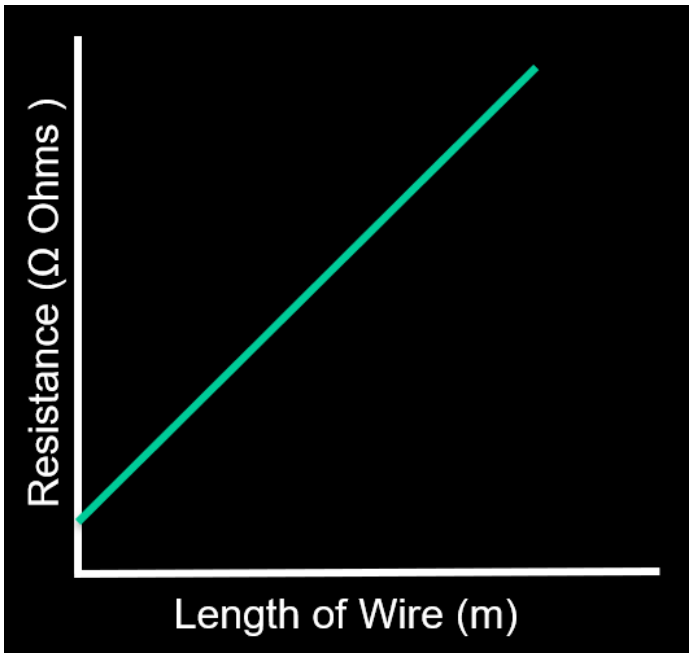
Length of wire (cm)	Potential Difference (V Volts)	Current (A Amps)	Resistance (Ω Ohms)
10			

Results Analysis: Effect of length of wire on resistance.

a. Plot a graph of resistance against length of wire.

Example: Sketch of results graph.

(please ensure you draw a proper graph using squared or graph paper)



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b. You should be able to draw a straight line of best fit although it may not go through the origin.

Why might this be the case?

_____

_____

c. What type of relationship is there between resistance and length?

_____

Activity 2: How does the arrangement of resistors in series and in parallel affect resistance?

Method

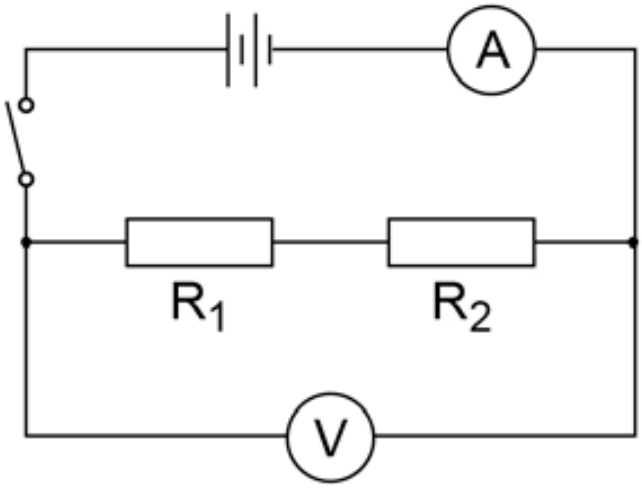
Series Circuit

1. Use the circuit diagram to set up and connect the circuit for two resistors in series, R_1=R_2

2. Switch on and record the readings of the ammeter and the voltmeter.

3. Calculate the total resistance of the series circuit.

$$\textbf{Resistance}(\Omega) = \frac{\textbf{Potential Difference (V)}}{\textbf{Current (A)}}$$



Parallel Circuit

4. Use the circuit diagram to set up and connect the circuit for two resistors in Parallel, R_1=R_2

5. Switch on and record the readings of the ammeter and the voltmeter.

6. Calculate the total resistance of the parallel circuit.

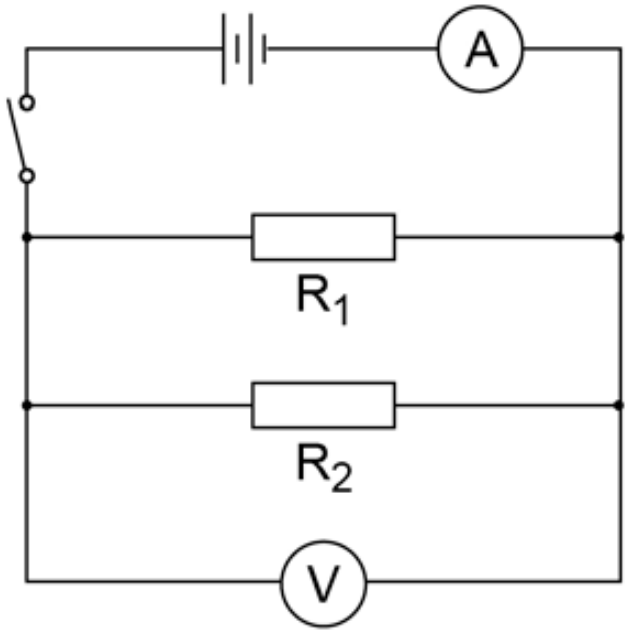


Table 2

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Circuit	Potential Difference (V Volts)	Current (A Amps)	Calculated Resistance (Ω Ohms)
Series			
Parallel			

Results Analysis: Total Resistance in Series and Parallel Circuits

a. What conclusions can you make about the effect of adding resistors;

• in series?

• In parallel.

b. How could you check the value of the resistance of R1 and R2 in either circuit?

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