

Edexcel Physics GCSE

Topic 10.17: Electricity Practical notes



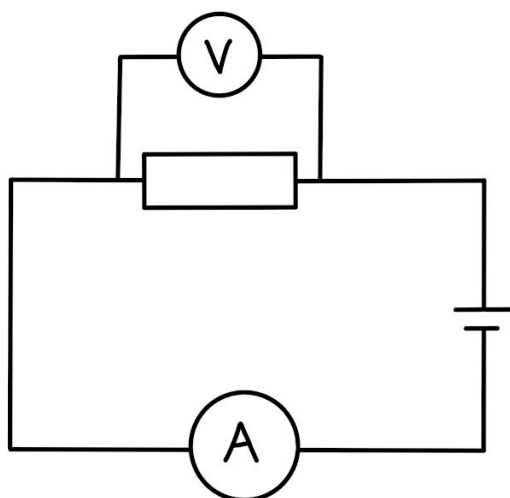
Core Practical 5a: Construct electrical circuits to investigate the relationship between potential difference, current and resistance for a resistor and a filament lamp

Equipment

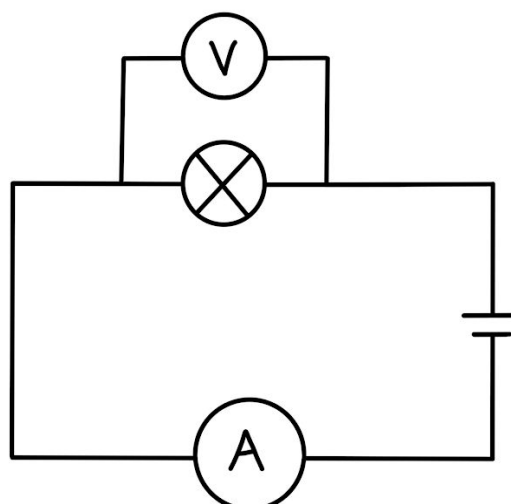
- Filament lamp
- Connecting wires
- Fixed resistor
- Ammeter
- Voltmeter
- Power supply (such as a power pack or a battery)

Diagrams

Circuit 1



Circuit 2



Method (Part 1)

1. Set up a series circuit with the resistor, the power supply and the ammeter, with the voltmeter in parallel across the resistor as in **Circuit 1** below.
2. Starting on a low voltage, turn the power supply on and record the values for the potential difference and the current in the resistor.
 - Take these readings straight away so the resistor does not get too hot and reduce the accuracy of the results.
 - You should also leave a little time after turning off the power supply for the resistor to cool back down to room temperature.
3. Repeat, increasing the voltage in the circuit each time and recording voltage and current.
4. Plot these values on a graph of current against potential difference.
5. The reciprocal of the gradient ($\frac{1}{\text{gradient}}$) will give the resistance of the fixed resistor as $R = \frac{V}{I}$
 - The gradient remains constant, showing that the resistance of the fixed resistor **does not change** as the potential difference across it changes

Method (Part 2)



1. Replace the resistor in the circuit with the filament lamp, as in **Circuit 2** below, and repeat the experiment.
2. The new I-V graph should show a curve that plateaus.
 - Since the resistance is $\frac{1}{\text{gradient}}$, as the gradient decreases, resistance increases
 - This graph shows that the resistance of a filament lamp **increases** as the potential difference increases

Tips

- Always take readings as soon as the power supply has been turned on so that the equipment does not get too hot and reduce the accuracy of results.
- Leave time after each reading for the components to cool to room temperature so that the test is more reliable.
- Do not put the voltage of the power supply too high when using the filament lamp as it may blow the bulb.

Safety Precautions

- Ensure the power supply is turned off before changing anything in the circuit to reduce the risk of electric shock.
- Do not touch the filament lamp while it is on or just after it has been turned off to reduce the risk of burns.



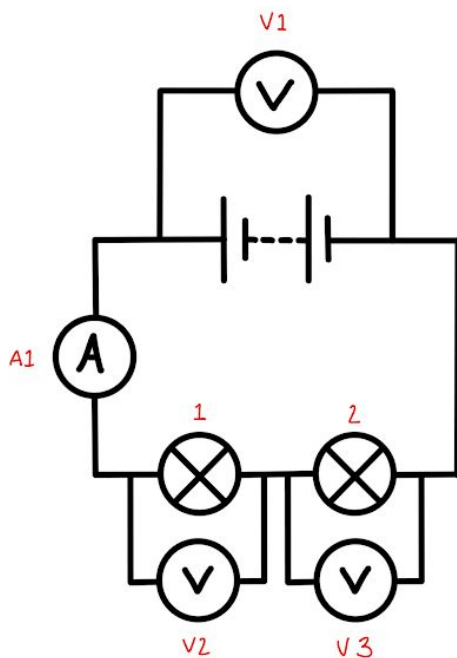
Core Practical 5b: Construct electrical circuits to test series and parallel circuits using resistors and filament lamps

Equipment:

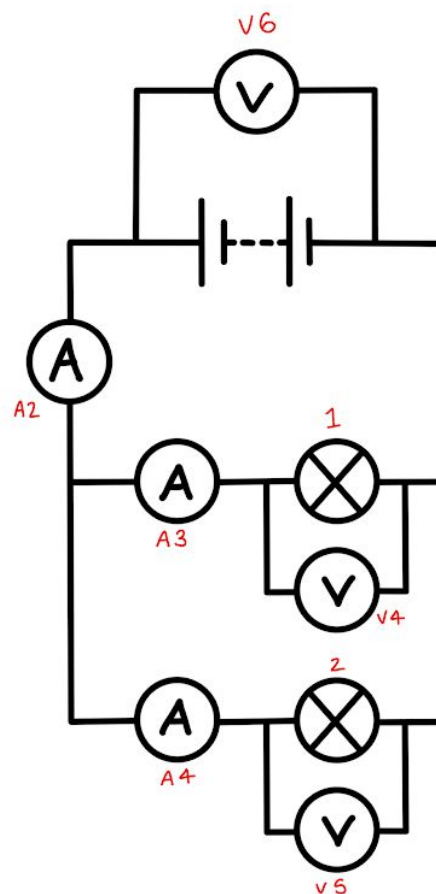
- Two filament lamps with the same resistance
- Connecting wires
- Fixed resistor
- Three ammeters
- Three voltmeters
- Power supply (such as a power pack or a battery)

Diagrams

Circuit 1



Circuit 2



[Images adapted from: 'Revision with Miss Mac'](#)



Method (Part 1)

1. Set up a series circuit like the one in the first diagram below (**Circuit 1**).
2. Start the power supply on 0V and record the values for V1, V2, V3 and A1 (they should all be 0)
3. Increase the voltage of the power supply by one volt and record the values for V1, V2, V3 and A1.
4. Repeat this step, increasing the voltage of the power supply at 1V intervals up to 6V.
 - For each potential difference of the power supply, $V_2 + V_3$ should be the same as V1

Method (Part 2)

1. Set up a parallel circuit like the one in the second diagram below (**Circuit 2**).
2. Repeat the process for the previous circuit, taking readings for V4, V5, V6, A2, A3 and A4 for voltages up to 6V.
 - For each potential difference A3 should be the same as A4, and added together they should equal A2
 - V4, V5 and V6 should all be the same

Tips

- Do not put the voltage of the power supply too high when using the filament lamps as it may blow the bulbs.

Safety Precautions

- Ensure the power supply is turned off before changing anything in the circuit to reduce the risk of electric shock.
- Do not touch the filament lamps while they are on or just after they have been turned off as they can cause burns.

