AQA Physics GCSE

RP03 - Resistance

Flashcards

Part 1: Investigating how a wire's resistance depends on its length.

Outline the basic steps of the practical.

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1. Set-up circuit
2. Attach resistance wire to metre rule
3. Move the crocodile clip along the wire in increments, taking measurements for voltage and current each time
4. Calculate the resistance for each length

What two types of meters are needed in the circuit, and how should they be connected?

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1. Voltmeter: Connected in parallel to the resistance wire
2. Ammeter: Connected in series with the resistance wire

What equation is used to obtain the resistance from the current and voltage readings?

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$$R=V/I$$

What should the graph of resistance against length look like?

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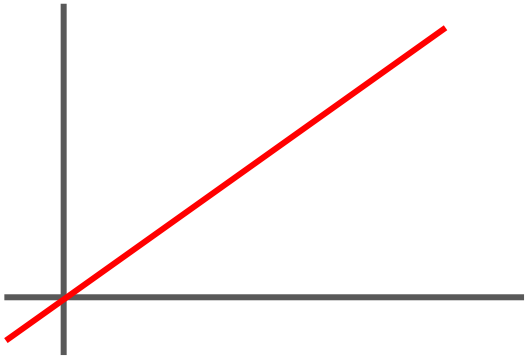
The two variables are directly proportional so should produce a straight line going through the origin.



In reality, why might the line produced not pass through the origin?

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There may be a zero error. This may be because it is hard the attach the stationary crocodile clip exactly at the zero end of the metre rule.

Why should the wire used be thin?

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- For a given material, the thinner the wire, the higher the resistance
- This makes the recorded resistance values large enough to be measured and interpreted

Why should a low potential difference be used when carrying out this experiment?

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To prevent the current getting too high and the wire heating up.

What is the issue if the wire heats up during the experiment?

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Resistance of a wire will increase if the temperature increases, creating an extra variable which will interfere with the results. Temperature should remain a control variable.

Why does resistance increase with temperature?

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The metal ions have more kinetic energy so vibrate more. This causes them to collide more frequently with current-carrying electrons, providing more resistance against the flow of electrons.

What safety precautions should be taken when carrying out this experiment?

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- Avoid touching the wire since it may be very hot
- Keep potential difference values low to avoid overheating

Part 2: Investigating resistance in series and parallel circuits.

Draw two resistors in series.

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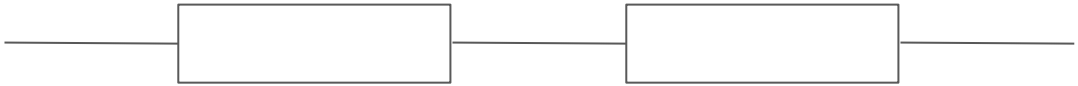

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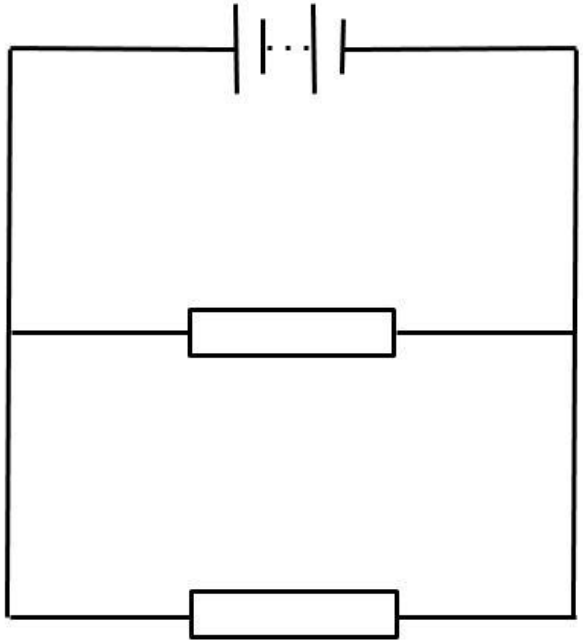

If both resistors are identical, which combination of resistors will have the least resistance?

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The resistors in parallel will have a lower resistance than the resistors in series.

Relative to the resistance of the resistors, describe the total resistance of the parallel combination.

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The total resistance will be lower than the resistance of the smallest of the two individual resistances.