Your notes

KS3 Science: revision notes

P2.3 Electric circuits and resistance

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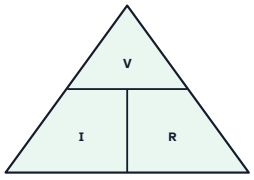
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Resistance

- **Resistance** is how much a component opposes the **current**. It is measured in ohms (Ω).
- For the same voltage, a higher **resistance** means a smaller **current**.
- **Variable resistors** change the **current**, for example in dimmer switches and volume controls.

Ohm's law

- **Potential difference** = **current** × **resistance** (V = I × R), so resistance = potential difference ÷ current.
- A **resistor** with 6 V across it and 2 A through it has a **resistance** of 6 ÷ 2 = 3 Ω.
- For a fixed **resistor** at a constant temperature, the **current** is **directly proportional** to the voltage: double the voltage and the current doubles, giving a straight line through the origin on a graph.
- To measure **resistance**, use an ammeter in series and a voltmeter in parallel across the component, then calculate V ÷ I.



V = I × R

I = V ÷ R

R = V ÷ I

Cover the one you want: what's left shows how to work it out.

What affects resistance

- A longer wire has more **resistance**. A thinner wire has more **resistance**. Metals have more **resistance** when they are hot.

- In series, **resistances** add up: 4 Ω and 6 Ω make 10 Ω. Adding **resistors** in parallel lowers the total **resistance**, because there are more paths for the current.
- High-**resistance** wires get hot, which is useful in kettles, toasters and heaters.
- A **thermistor**'s **resistance** falls as it gets warmer. A **light-dependent resistor**'s (LDR's) resistance falls as the light gets brighter.

Maths in science

- Significant figures: 3.4567 to 3 significant figures is 3.46.
- **Directly proportional**: when one quantity doubles, the other doubles too.

Key terms

Resistance	How much a component opposes the flow of current, measured in ohms (Ω).
Ohm	The unit of resistance.
Resistor	A component that reduces the current in a circuit.
Variable resistor	A resistor whose resistance can be changed.
Ohm's law	For a fixed resistor, the current is directly proportional to the potential difference.
Directly proportional	When one quantity doubles, the other doubles too.
Thermistor	A resistor whose resistance falls as its temperature rises.
Light-dependent resistor	A resistor whose resistance falls as the light gets brighter.
Current	The flow of electric charge, measured in amps (A).
Potential difference	The push that makes current flow, measured in volts (V).

Quick questions

Cover the answers and test yourself: remembering is what makes it stick.

1. What is the unit of resistance?
2. How do you calculate resistance?
3. A resistor has 6 V across it and a current of 2 A. What is its resistance?
4. If the resistance in a circuit increases but the voltage stays the same, what happens to the current?
5. How should a voltmeter be connected to measure the voltage across a resistor?
6. How does the length of a wire affect its resistance?
7. Resistors of 4 Ω and 6 Ω are connected in series. What is the total resistance?
8. What happens to the total resistance when resistors are added in parallel?

Answers

1. The ohm (Ω)
2. Potential difference divided by current

Your notes

3. 3 Ω
4. It decreases
5. In parallel with the resistor
6. A longer wire has more resistance
7. 10 Ω
8. It decreases

What to do next

Practise 14 questions on this topic

Try 4 exam questions, with mark schemes

Read the lesson, one step at a time

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