Your notes

GCSE Physics: revision notes

Current, potential difference and charge

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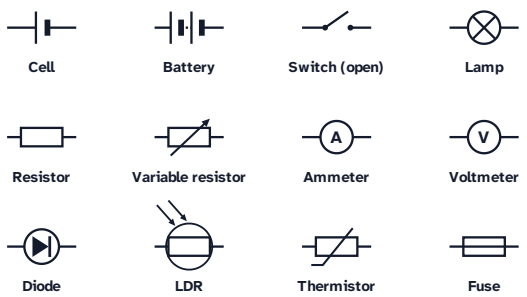
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Start here: what electricity is

- An **electric current** is a flow of **charge**, carried by electrons moving through the wires. It only flows round a complete loop: a **closed circuit**.
- The cell or battery pushes the **charge** round. That push is the **potential difference** (voltage), measured in volts.
- Components such as lamps and resistors resist the flow. The bigger the **resistance**, the smaller the current for the same push.

Circuit symbols

- Circuits are drawn with standard symbols: cell, battery, switch (open and closed), lamp, fuse, resistor, variable resistor, diode, LED, thermistor, LDR, **ammeter** and **voltmeter**.
- An **ammeter** measures current and is connected in series. A **voltmeter** measures **potential difference** and is connected in parallel across a component.



Charge and current

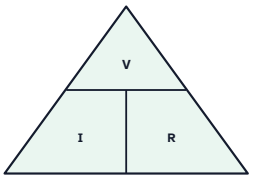
- For **charge** to flow through a **closed circuit**, the circuit must include a source of **potential difference**, such as a cell or battery.
- **Electric current** is a flow of electrical **charge**. The size of the current is the rate of flow of **charge**.
- Q = I t: **charge** (**coulombs**, C) = current (amperes, A) × time (seconds, s).
- The current is the same at any point in a single closed loop.

Potential difference

- **Potential difference** (pd, or voltage) is the energy transferred per unit of **charge** passing between two points. It is measured in volts (V).
- A cell provides the **potential difference** that pushes **charge** around the circuit.

Current, resistance and potential difference

- The current through a component depends on both the **resistance** of the component and the **potential difference** across it.
- The greater the **resistance**, the smaller the current for a given **potential difference**.
- V = I R: **potential difference** (V) = current (A) × **resistance** (ohms, Ω).



V = I × R

I = V ÷ R

R = V ÷ I

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

Exam tip

- Learn V = IR and Q = It, with their units. An **ammeter** goes in series, and a **voltmeter** goes in parallel.
- In a calculation, change minutes into seconds first.

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Common mistakes

- Confusing current (the flow of **charge**) with **potential difference** (what pushes it).
- Drawing a **voltmeter** in series.

Worked examples

A current of 2 A flows for 30 s. Calculate the charge that flows.

Write the equation: charge = current × time. **Q = I t**

Put the numbers in (time in seconds). **2 × 30**

Answer: 60 C

A 12 V supply makes 0.5 A flow through a lamp. Find the lamp's resistance.

Start from V = I R and rearrange for R. **R = V ÷ I**

Put the numbers in. **12 ÷ 0.5**

Answer: 24 Ω

Key terms

Electric current	The rate of flow of electrical charge, measured in amperes (A).
Charge	A property of particles such as electrons, measured in coulombs (C).
Potential difference	The energy transferred per unit charge between two points, measured in volts (V).
Resistance	How much a component opposes the flow of current, measured in ohms (Ω).
Ammeter	A meter connected in series to measure current.
Voltmeter	A meter connected in parallel to measure potential difference.
Closed circuit	A complete loop that current can flow around.
Coulomb	The unit of charge (C).

Quick questions

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

1. What is electric current?
2. What is the unit of charge?
3. How much charge flows when a current of 2 A flows for 30 s?
4. How is an ammeter connected?
5. How is a voltmeter connected?

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6. What does a circuit need for charge to flow?
7. What is the pd across a 12 Ω resistor with 0.5 A through it?
8. What is the resistance of a component with 12 V across it and 3 A through it?

Answers

1. The rate of flow of electrical charge
2. Coulomb (C)
3. 60 C
4. In series
5. In parallel across the component
6. A source of potential difference and a complete loop
7. 6 V
8. 4 Ω

What to do next

Practise 11 questions on this topic

Try 7 exam questions, with mark schemes

Read the lesson, one step at a time

Free revision for GCSE and KS3 at lycolearn.co.uk. Some notes are for one exam board only, and say so in brackets.

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