Exercise walk-through

2.1
Circuit symbols, electrical charge and current (4.2.1.1–4.2.1.2)

AQA · GCSE · Physics

Circuit symbols, charge and current

- Circuit diagrams use standard **circuit symbols** .
- Learn the symbols for a cell, battery, open and closed switch, lamp, fuse, resistor, variable resistor, ammeter, voltmeter, **diode**, LED, **thermistor** and **LDR**.
- An ammeter is always connected **in series** with a component, and a voltmeter **in parallel** across it.
- For charge to flow, there must be a closed circuit with a source of potential difference, such as a cell. **Electric current** is the rate of flow of electrical **charge** :

$$Q = It$$

Current, resistance and potential difference

- The current through a component depends on the potential difference across it and on its **resistance** :
- V is potential difference in volts (V), I is current in amperes and R is resistance in ohms (Ω).
- For the same potential difference, a bigger resistance gives a smaller current.
- **Worked example 4.** A potential difference of 0.45 V drives a current of 0.0075 A through a coin.

$$V = IR$$

Key terms (2)

- **Ohmic conductor**: a conductor whose current is directly proportional to the potential difference at constant temperature.
- **Alternating current**: current that keeps reversing direction.
- **National Grid**: the network of cables and transformers that links power stations to consumers.
- **Electric field**: a region where a charged object feels a force.

Exercises 2.1·2.2

2.1 Name components A and B. [2]



2.2 A current of 2.0 A flows through a heater for 5.0 minutes. Calculate the charge that flows. [2]



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2.1

- A: diode; B: thermistor

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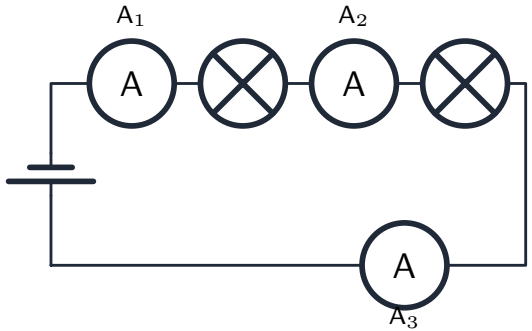


2.2

- $2.0 \times 300 = \mathbf{600}$ C

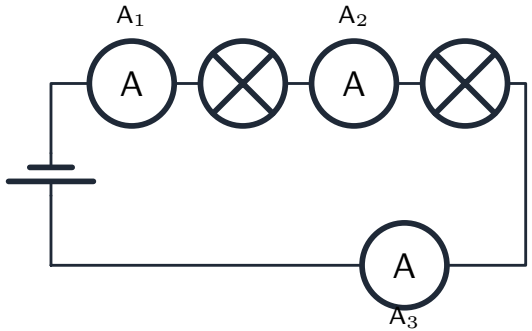
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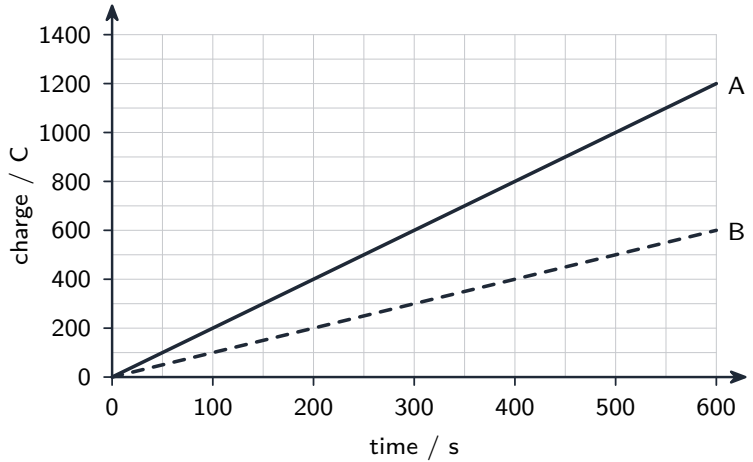
3.1

- A_2 reads 0.30 A
- A_3 reads 0.30 A
- the current is the same at every point in a series circuit

Exercise 3.2 (a)

3.2 Two phone chargers, A and B, are tested. The graph shows the charge that flows from each charger into a phone.

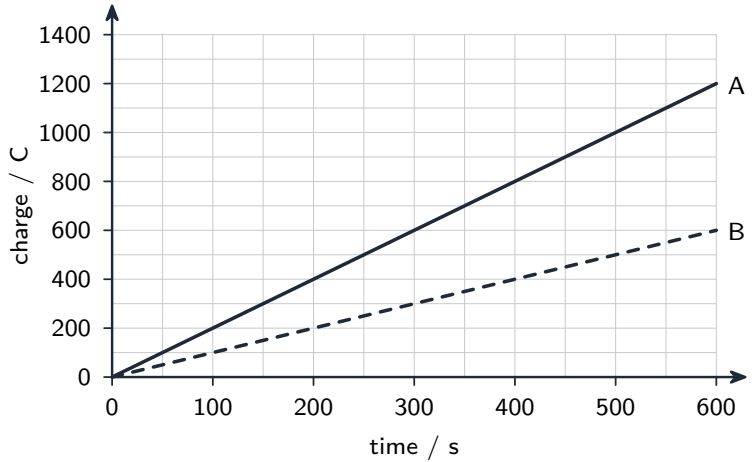
(a) Use the graph to find the charge from charger A in 300 s. [2]



Exercise 3.2 (a)

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(a) Use the graph to find the charge from charger A in 300 s. [2]



(a) read line A at 300 s; **600** C

Exercise 3.2 (b)

3.2 Two phone chargers, A and B, are tested. The graph shows the charge that flows from each charger into a phone.

(b) Calculate the current from charger B. [3]

Exercise 3.2 (b)

3.2 Two phone chargers, A and B, are tested. The graph shows the charge that flows from each charger into a phone.

(b) Calculate the current from charger B. [3]

(b) 600 C in 600 s read; $600 \div 600 = \mathbf{1.0}$ A

Exercise 3.2 (c)

3.2 Two phone chargers, A and B, are tested. The graph shows the charge that flows from each charger into a phone.

(c) Describe how a student could use ammeters to show how current behaves in a series circuit and in a parallel circuit. [6]

Exercise 3.2 (c)

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(c) Describe how a student could use ammeters to show how current behaves in a series circuit and in a parallel circuit. [6]

(c) points to include:

- build a series circuit of a cell, a switch and two lamps
- connect an ammeter in series at different points, e.g. before, between and after the lamps
- the readings are all the same, so the current is the same everywhere in a series circuit
- build a parallel circuit with the two lamps on separate branches
- put an ammeter in the main circuit and one in each branch
- the branch currents add up to the main current

Levels: **5–6** a full, logical answer with correct physics and correct terms; **3–4** several correct points, partly linked; **1–2** one or two relevant points.