MR SULLY UNFOLDS PHYSICS ANSWERS

Circuits, current and charge

AQA 4.2.1.1–4.2.1.2
Electricity · Paper 1
Foundation & Higher

Name _____ Class _____ Date _____

Current is a flow of electrical charge around a closed circuit. A source of potential difference makes the charge flow.

KEY EQUATION

$$Q = I t$$

Q = charge flow (coulombs, C)
I = current (amperes, A)
t = time (s)

WORKED EXAMPLE

A current of 0.5 A flows for 2 minutes.
t = 120 s
Q = 0.5 × 120 = **60 C**

Section A · Recall

Grade 4–5

1 What is electric current? [1]

A flow of electrical charge; its size is the rate of flow of electrical charge.

2 State what a circuit must have for a current to flow. [2]

It must be a closed (complete) circuit,

with a source of potential difference (e.g. a cell).

3 Describe the job of each component. [6]

Symbol	Component	What it does
	Cell	**Provides a p.d.**
	Switch	**Opens/closes the circuit**
	Ammeter	**Measures current (in series)**
	Voltmeter	**Measures p.d. (in parallel)**
	Fuse	**Melts if current is too high**
	Diode	**Lets current flow one way only**

Section B · Calculate

Grade 5–6

4 A current of 3 A flows for 20 s. Calculate the charge that flows. [2]

Q = 3 × 20 = 60 C

5 Complete the table. [3]

Charge (C)	Current (A)	Time (s)
120	2	60
300	**0.5**	600
45	1.5	**30**

6 In a single closed loop, a student measures the current at three different points. Each reading is 0.4 A. Explain why. [2]

Current is the same at any point in a single closed loop,

because charge isn't used up: the same charge flows past every point each second.

Section C · Stretch

Grade 7+

7 A phone battery delivers a current of 0.25 A for 2 hours. Calculate the charge that flows. [3]

t = 2 × 3600 = 7200 s

Q = It = 0.25 × 7200

Q = 1800 C

Exam-style question

AQA style

8 A student sets up a circuit with a cell, a lamp, a switch and an ammeter.

a Draw a circuit diagram for this circuit. [2]

Correct symbols (1); all in series in one closed loop (1).

b The ammeter reads 0.2 A. Calculate how long it takes for 36 C of charge to flow. [3]

t = Q ÷ I = 36 ÷ 0.2

t = 180 s

c State what happens to the current when the switch is opened. Explain why. [2]

It falls to zero.

The circuit is no longer closed, so charge can't flow.

Total: _____ / 26

How confident am I?

	Not yet	Nearly	Got it
I can draw and recognise circuit symbols	☐	☐	☐
I can use Q = It	☐	☐	☐
I can explain why current is the same in a series loop	☐	☐	☐