

# GCSE Combined Science: Trilogy

## Worksheet: Electrical charge and current

|                       |                          |                              |                                   |
|-----------------------|--------------------------|------------------------------|-----------------------------------|
| TIME<br><b>30 min</b> | TOTAL<br><b>30 marks</b> | CALCULATOR<br><b>Allowed</b> | DIFFICULTY<br><b>Easy, Medium</b> |
|-----------------------|--------------------------|------------------------------|-----------------------------------|

**Topics:** Electrical charge and current

|             |              |             |
|-------------|--------------|-------------|
| <b>NAME</b> | <b>CLASS</b> | <b>DATE</b> |
|-------------|--------------|-------------|

- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Answer all questions in the spaces provided.
- In all calculations, show clearly how you work out your answer.
- The marks for questions are shown in brackets.

0 1

0 1 . 1 In a metal wire, an electric current is a flow of...

Tick (✓) **one** box.

protons

☐

electrons

☐

neutrons

☐

ions

☐

**[1 mark]**

0 1 . 2 State the instrument used to measure current, and how it is connected in a circuit.

.....

.....

.....

.....

**[2 marks]**

0 2

The current in a torch lamp is 0.7 A.

0 2 . 1

Calculate the charge that flows in 330 s.

Use the equation:

charge flow = current  $\times$  time

.....

.....

.....

.....

Charge flow = ..... C

[2 marks]

0 3

A student sets up a simple circuit containing a cell, a switch and a lamp.

0 3 . 1

Complete the sentence.

Electric current is a flow of electrical ...

Tick (✓) **one** box.

charge.

☐

energy.

☐

power.

☐

resistance.

☐

[1 mark]

0 3 . 2

Which component in the circuit is the source of potential difference?

Tick (✓) **one** box.

the cell

☐

the lamp

☐

the switch

☐

the wires

☐

[1 mark]

0 3 . 3

The current in the lamp is 0.40 A.  
Calculate the charge that flows through the lamp in 60 s.  
Use the equation:  
charge flow = current  $\times$  time

.....

.....

.....

.....

Charge flow = ..... C

[2 marks]

0 3 . 4

Give the unit of charge.

.....

.....

.....

.....

[1 mark]

0 4

The current in a car headlamp is 4.5 A.

0 4 . 1

Calculate the charge that flows in 180 s.  
Use the equation:  
charge flow = current  $\times$  time

.....

.....

.....

.....

Charge flow = ..... C

[2 marks]

0 5

0 5 . 1

A student says: 'Conventional current and the flow of electrons in a wire are in the same direction.'

Is the student correct? Explain your answer.

.....

.....

.....

.....

[2 marks]

0 6

A mobile phone battery is being charged.

0 6 . 1

Write down the equation that links charge flow (Q), current (I) and time (t).

.....

.....

[1 mark]

0 6 . 2

In 30 minutes, 2700 C of charge flows into the battery.

Calculate the mean charging current.

.....

.....

.....

.....

.....

Mean current = ..... A

[3 marks]

0 6 . 3

In a different circuit, a lamp and a resistor are connected in series with a battery.  
The current in the lamp is 0.25 A.  
State the current in the resistor.  
Give a reason for your answer.

.....

.....

.....

.....

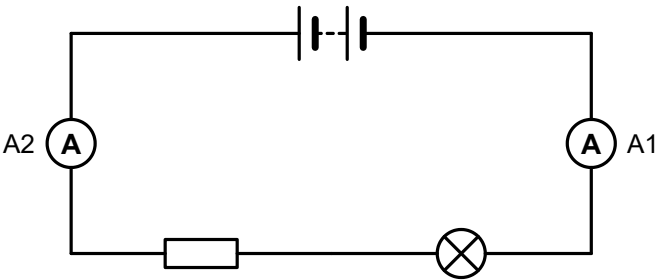
Current = ..... A

[2 marks]

0 7

A student set up the circuit shown in Figure 1. Ammeter A1 reads 0.30 A.

Figure 1



0 7 . 1

State the reading on ammeter A2.  
Give a reason for your answer.

.....

.....

.....

.....

Current = ..... A

[2 marks]

0 7 . 2

Calculate the charge that flows through the lamp in 2.0 minutes.

.....

.....

.....

.....

.....

Charge = ..... C

[3 marks]

0 7 . 3

The student replaces the resistor with one that has a greater resistance. The battery is not changed.

Explain what happens to the amount of charge that flows through the lamp each second.

.....

.....

.....

.....

[2 marks]

0 8

0 8 . 1

A wire carries a current of 2 A.

Explain what this means, in terms of charge.

.....

.....

.....

.....

[2 marks]

0 8 . 2

In which direction does conventional current flow, outside the power source?

Tick (✓) **one** box.

From the negative terminal to the positive terminal

☐

From the positive terminal to the negative terminal

☐

It depends on which way round the electrons move

☐

**[1 mark]**

---

### END OF QUESTIONS

Original practice questions written to match the specification. Not produced by, affiliated with or endorsed by AQA.

# Mark scheme

## GCSE Combined Science: Trilogy · Worksheet: Electrical charge and current · 30 marks

---

---

### Question 1 (3 marks)

01.1 [1 mark]

**Correct:** electrons

---

01.2 [2 marks]

**Answer:** An ammeter, connected in series.

- ammeter (1)
  - connected in series (with the component) (1)
- 
- 

### Question 2 (2 marks)

02.1 [2 marks]

**Answer:** 231 C

- $Q = 0.7 \times 330$  (1)
  - $Q = 231$  (C) (1)
- 
- 

### Question 3 (5 marks)

03.1 [1 mark]

**Correct:** charge.

---

03.2 [1 mark]

**Correct:** the cell

---

03.3 [2 marks]

**Answer:** 24 C

- $Q = 0.40 \times 60$  (1)
  - $Q = 24$  (C) (1)
- 

03.4 [1 mark]

**Answer:** coulomb (C)

- coulomb / C (1)
-

---

## Question 4 (2 marks)

04.1 [2 marks]

**Answer:** 810 C

- $Q = 4.5 \times 180$  (1)
  - $Q = 810$  (C) (1)
- 

## Question 5 (2 marks)

05.1 [2 marks]

**Answer:** No — conventional current flows from positive to negative (outside the source), but electrons, which are negatively charged, flow from negative to positive, in the opposite direction.

- no, the student is incorrect (1)
  - conventional current flows from positive to negative (outside the source), but electrons flow from negative to positive — the opposite direction (1)
- 

## Question 6 (6 marks)

06.1 [1 mark]

**Answer:**  $Q = I t$

- $Q = I \times t$  / charge flow = current  $\times$  time (1)
- 

06.2 [3 marks]

**Answer:** 1.5 A

- $t = 1800$  s (1)
- $2700 = I \times 1800$  (1)
- $I = 1.5$  (A) (1)

**Notes:** An answer of 90 (A) (time in minutes) scores 1 mark.

---

06.3 [2 marks]

**Answer:** 0.25 A — the current is the same at every point in a single closed loop.

- 0.25 (A) (1)
- the current is the same at any point in a single closed loop / series circuit (1)

**Notes:** The reason mark can be awarded without the value.

---

---

## Question 7 (7 marks)

### 07.1 [2 marks]

**Answer:** 0.30 A — the current is the same at any point in a single closed loop.

- 0.30 (A) (1)
- the current is the same at any point in a single closed loop (1)

**Notes:** The reason mark can be awarded without the value.

---

### 07.2 [3 marks]

**Answer:** 36 C

- $t = 120 \text{ s}$  (1)
- $Q = 0.30 \times 120$  (1)
- $Q = 36 \text{ (C)}$  (1)

**Notes:** An answer of 0.6 (C) (time in minutes) scores 1 mark.

---

### 07.3 [2 marks]

**Answer:** The total resistance increases, so the current decreases; current is the rate of flow of charge, so less charge flows through the lamp each second.

- the (total) resistance increases so the current decreases (1)
  - current is the rate of flow of charge, so less charge flows (through the lamp) each second (1)
- 

---

## Question 8 (3 marks)

### 08.1 [2 marks]

**Answer:** 2 coulombs of charge pass a given point in the wire every second.

- a current of 2 A means 2 coulombs of charge (1)
  - pass a given point (cross-section) of the wire every second (1)
- 

### 08.2 [1 mark]

**Correct:** From the positive terminal to the negative terminal

---