Electric Charge & Current – IGCSE Physics Worksheet

Reading Comprehension: Electric Charge & Current

Electric charge is a fundamental property of matter. There are two types of charge: positive and negative. Like charges repel each other, while unlike charges attract. Charge is measured in coulombs (C). Electrons carry a negative charge, and protons carry a positive charge. In metals, electric current is caused by the movement of free electrons.

Electric current is the rate of flow of charge. It tells us how much charge passes a point in a circuit every second. The equation is:

$I = Q / t$

where
I = current (A),
Q = charge (C),
t = time (s).

Current is measured in amperes (A) using an ammeter, which is always connected in series.

When a voltage (potential difference) is applied across a conductor, electrons move through the circuit, creating a current. The size of the current depends on the voltage and the resistance of the circuit.

In a series circuit, the current is the same everywhere. In a parallel circuit, the current splits between branches. Understanding charge and current helps explain how circuits work, how electrical devices function, and how electricity is safely used in homes and industries.

Section A: Multiple-Choice Questions

1. Electric current is defined as: [1 mark]

A. Charge × time

B. Charge ÷ time

C. Voltage × charge

D. Voltage ÷ resistance

2. The unit of electric charge is: [1 mark]

A. Ampere

B. Coulomb

C. Volt

D. Ohm

3. In a series circuit, the current: [1 mark]

A. Splits between branches

B. Is zero

C. Is the same everywhere

D. Depends on the length of the wire

Section B: Short-Answer Questions

4. A charge of 12 C flows through a wire in 4 s.

Calculate the current. [2 marks]

5. Explain why an ammeter must be connected in series. [2 marks]

6. A current of 0.8 A flows for 10 s.

Calculate the total charge that passes a point. [2 marks]

Section C: Application Questions

7. In a parallel circuit, the current in the main supply is 3.0 A.

One branch has a current of 1.2 A and another has 0.8 A.

Calculate the current in the final branch. [3 marks]

Section D: Longer-Answer Question

8. Describe the movement of electrons in a metal when a voltage is applied.

Explain how this relates to electric current. [4 marks]

Answer Key

Section A

1. B

2. B

3. C

Section B

4.

I = Q / t = 12 / 4 = 3 A

5.

Current must pass through the ammeter to be measured.

Connecting it in series ensures all the current flows through the meter.

6.

Q = I × t = 0.8 × 10 = 8 C

Section C

7.

Total current = sum of branch currents

3.0 = 1.2 + 0.8 + I

I = 3.0 - 2.0 = 1.0 A

Section D

8. (Model answer)

Metals contain free electrons that can move between atoms.

When a voltage is applied, these electrons drift toward the positive terminal.

This movement of electrons forms an electric current.

The greater the voltage, the faster the electrons drift, producing a larger current.