Series and Parallel Circuits – IGCSE Physics Worksheet

Reading Comprehension: Series and Parallel Circuits

Electric circuits can be connected in two main ways: series and parallel. Understanding the differences between these two types of circuits is essential for analysing how current, voltage, and resistance behave.

In a series circuit, all components are connected one after another in a single loop. This means there is only one path for the current to flow. Because of this, the current is the same everywhere in a series circuit. However, the potential difference (voltage) supplied by the battery is shared between the components. If more components are added, each one receives less voltage, so bulbs become dimmer. If one component breaks, the entire circuit stops working.

In a parallel circuit, components are connected on separate branches. This creates multiple paths for the current. The most important rule is that the voltage across each branch is the same as the supply voltage. The current splits between the branches depending on their resistance. If one branch breaks, the others continue to work normally. This is why household lighting circuits use parallel connections—each light receives full voltage and works independently.

The behaviour of current and voltage in series and parallel circuits helps engineers design safe and efficient electrical systems, from simple torch circuits to complex home wiring.

Section A: Multiple-Choice Questions

1. In a series circuit, the current: [1 mark]
A. Splits between branches
B. Is the same everywhere
C. Depends only on voltage
D. Is zero

2. In a parallel circuit, the voltage across each branch is: [1 mark]
A. Different
B. Half the supply
C. The same as the supply
D. Zero

3. If one bulb breaks in a parallel circuit: [1 mark]
A. All bulbs go out
B. The current becomes zero
C. Only that branch stops working
D. The voltage becomes zero

Section B: Short-Answer Questions

4. Explain why bulbs in a series circuit become dimmer when more bulbs are added. [2 marks]

5. A parallel circuit has a supply voltage of 6 V. What is the voltage across each branch? [1 mark]

6. In a series circuit, a 9 V battery is connected to two resistors. If the first resistor has 4 V across it, calculate the voltage across the second resistor. [2 marks]

Section C: Application Questions

7. A current of 3.0 A flows into a parallel circuit. One branch has a current of 1.2 A and another has 0.8 A. Calculate the current in the third branch. [3 marks]

8. Explain why household lighting circuits are connected in parallel rather than in series. [3 marks]

Section D: Longer-Answer Question

9. Compare the behaviour of current and voltage in series and parallel circuits. Explain how these differences affect the brightness of bulbs in each type of circuit. [4 marks]

Answer Key

Section A

1. B

2. C

3. C

Section B

4.
The total voltage is shared between the bulbs.
Each bulb receives less voltage, so they become dimmer.

5.
6 V (voltage is the same across each branch).

6.
Total voltage = 9 V
$V_2 = 9 - 4 = 5$ V

Section C

7.
Total current = sum of branch currents

3.0 = 1.2 + 0.8 + I
I = 3.0 - 2.0 = 1.0 A

8.
Each branch receives full supply voltage, so bulbs are bright.
Each light works independently—if one fails, others stay on.
This makes the system safer and more practical for homes.

Section D

9. (Model answer)
In a series circuit, current is the same everywhere and voltage is shared between components.
In a parallel circuit, voltage is the same across each branch and current splits.
Because voltage is shared in series, bulbs are dimmer.
In parallel, each bulb receives full voltage, so they shine brighter and independently.