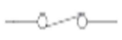
Key Words

potential difference	The amount of push (energy) provided by the battery to a moving charge.
current	The flow of electric charge.
resistance	The measure of how difficult it is for a flow of charge to pass through a component.
independent variable	The variable you change in an investigation to see how it affects the dependent variable.
dependent variable	The variable you measure or observe.
control variable	A variable that could affect the dependent variable so must be kept the same.

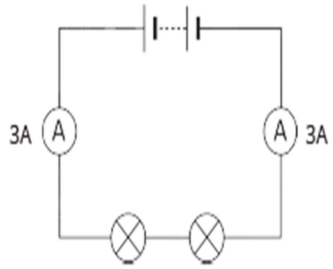
Circuit Diagrams

Electrical circuits are often represented by **circuit diagrams**. They are simple and easy to interpret. **Circuit symbols** are used to represent the **components** used in a circuit.

switch (open)	
switch (closed)	
bulb	
cell	
battery	
ammeter	
voltmeter	
resistor	
motor	

Series Circuits

In a series circuit, the components are connected end to end in a loop as shown in the diagram below. If one bulb breaks, none of the bulbs will be lit as the circuit is no longer complete.



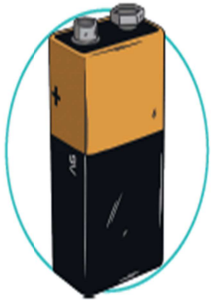
The **current is the same** everywhere in a series circuit. It doesn't matter where you put the ammeter, it will always show the same reading. The more cells or batteries you add, the greater the current. Current is **not** used up.

Batteries

Batteries store **chemical energy** and transfer it as electric current in a circuit.

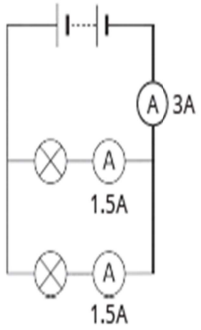
The potential difference of a battery tells us how much **energy** it provides to the components in the circuit.

Batteries contain an **electrolyte** and **two electrodes**. One of the electrodes is **positively charged** and the other is **negatively charged**. A chemical reaction between the two electrodes creates a flow of electrical energy to the circuit.



Parallel Circuits

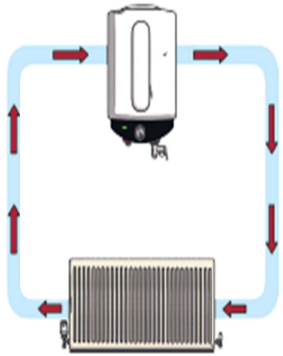
In a parallel circuit, the components are connected on separate branches as shown in the diagram below. This gives the current several different paths to flow down. If one bulb stops working, the other bulbs will remain lit as the circuit is still complete.



The **current is split** between the branches in a parallel circuit.

Modelling Circuits

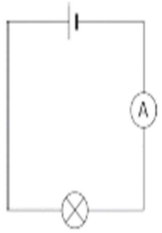
Scientists often use models to help them to explain difficult concepts. Some models are better than others.



In the boiler and radiator model, the pump pushes the water around the system. It does a similar job to a **battery** pushing the **charges** around a circuit. The pipes carry the flow of water around the system, like the **charge** flowing through wires in a circuit. The radiator is similar to a bulb because it transfers **energy** supplied by the system to the surroundings.

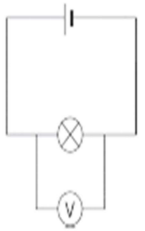
Current

Current is the flow of electrical charge around a circuit. The faster the flow of charge, the higher the current. Current is measured in **amps (A)** using an **ammeter**. An ammeter is connected in **series** with the component.



Potential Difference

Potential difference tells us how hard the battery 'pushes' the electrons around the circuit: the larger the potential difference, the bigger the 'push'. Potential difference is measured in **volts (V)** using a **voltmeter**. A voltmeter is connected in **parallel** with the component.



Resistance

Resistance is a measure of how difficult it is for the current to flow around a circuit.

The **higher the resistance**, the less current will flow around the circuit. The **lower the resistance**, the more current will flow around the circuit.

Resistance is measured in **ohms (Ω)**.

Resistance can be calculated using the equation:

resistance (Ω) = potential difference (V) ÷ current (A)