Electrical Circuits

Key terms

Current is the flow of electrical charge. Measured in amps (A)

Potential difference is the force that pushes the charge around. Measured in volts (V).

Resistance is something that flows down the flow of current. Measured in ohms (Ω).

Charge

Current depends on the rate of flow of charge.

$$Q = It$$

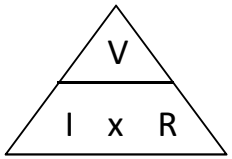
Charge (coulombs, C) ← Q ; I ← Current (A) ; t ← Time (s)

Resistance

Resistance of a component can be calculated if you know the potential difference and the current.

$$V = IR$$

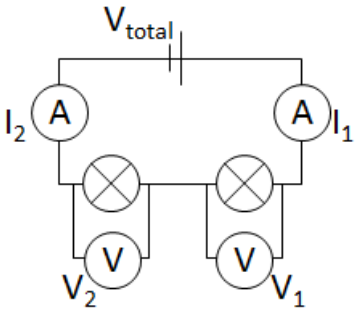
Potential difference (V) ← V ; I ← Current (A) ; R ← Resistance (Ω)



Re-arranged to:

$$R = \frac{V}{I}$$

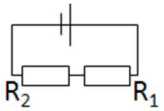
Series Circuits



Current is the same throughout the circuit: $I_1 = I_2 = \ldots$

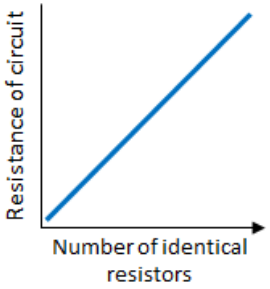
Potential difference is shared across the components: $V_{total} = V_1 + V_2 + \ldots$

Resistance adds up: $R_{total} = R_1 + R_2 + \ldots$

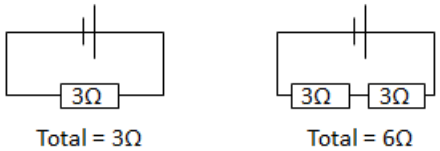


Investigating Resistance

REQUIRED PRACTICAL
SEE PRACTICAL SHEET FOR DETAIL

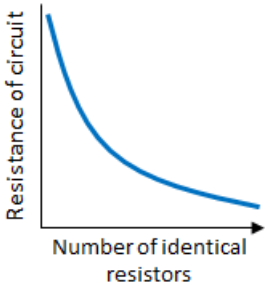


As more resistors are added in **series** the total resistance will **increase**.



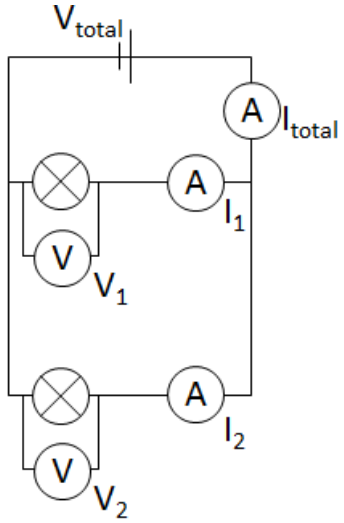
As more resistors are added in **parallel** the total resistance will **decrease**.

This is because resistors in parallel have the **same pd** across them as the power supply. Adding another loop to the circuit means the current has more than one way it has to go. Therefore the **total current** around the circuit **increases**. An increase in current means a **decrease** in **resistance** (V = IR)



V stays the same. If I goes up then R must go down.

Parallel Circuits



Current is shared across the components: $I_{total} = I_1 + I_2 + \ldots$

Potential difference is the same across all components: $V_1 = V_2 = \ldots$

Total **resistance** will fall if two or more resistors are added in parallel.

Factors Affecting Resistance

REQUIRED PRACTICAL
SEE PRACTICAL SHEET FOR DETAIL

Length or diameter of wire, temperature and the types of components affect resistance. These can be investigated.