

Current, Voltage & Resistance

Current

→ Current is the rate of flow of charge.

- Charge is carried through the wires by electrons and has the unit Coulombs.
- Charge can be thought as "bags of electrons".

$$I = \frac{\Delta Q}{\Delta t}$$

rearranged →

$$\Delta Q = I \Delta t$$

- A current of 1 amp is flowing if 1 coulomb of charge passes a point in a circuit per second.

Potential Difference (Voltage)

- When a charge flows through the power source it is "raised" through a potential and energy is transferred to the charge as electrical potential energy.

→ Potential difference between two points is defined as work done per unit charge.

$$V = \frac{W}{Q}$$

hence →

$$1V = 1JC^{-1}$$

Resistance

→ Resistance is the amount of current you get for a particular potential difference.

- Resistance can be thought as "how difficult it is to get a current to flow through it".

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

Ohm's Law and Ohmic conductors

- Conductors that obey Ohm's law (mostly metals) are called **ohmic conductors**.
- Ohm's law states that provided the physical conditions, such as temperature, remain constant, the current through an ohmic conductor is directly proportional to the potential difference across it.

- Factors such as **light level** or **temperature** will have a significant effect on resistance and hence does not obey Ohm's law.

- Ohm's Law is only valid if the temperature of the conductor remains constant.

$$I \propto V$$

