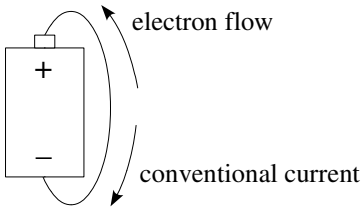
Current Electricity

When charges flow through a circuit (transporting energy), this is electrical current. In a wire the the electrons flow from negative to positive, and the current direction (sometimes called 'conventional' current) is from positive to negative, the same direction as electric field lines.



Electricity flows less easily in some substances than others, this is called resistance.
Resistance depends on:

- type of material
- length (longer wire has more resistance)
- cross sectional area (thinner wire has more resistance
- temperature (hotter wire has more resistance)

The voltage and current in a circuit are related to the resistance, this formula is called Ohm's Law:

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

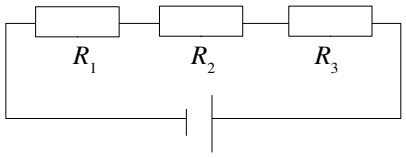
resistance in Ω (ohms)

potential difference (voltage) in V (volts) or JC^{-1}

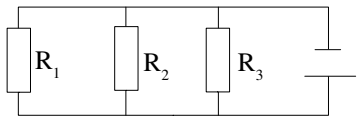
current in A (amperes or amps) or Cs^{-1}

The total resistance in a circuit will be different depending on the way the resistors are arranged.

Resistors in *series*: $R_T = R_1 + R_2 + R_3$



Resistors in *parallel*: $R_T = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}}$



The power flowing in a circuit is how much energy is being transported over time.

$$P = \Delta V\, I$$

power in W (watts) or Js^{-1}

potential difference (voltage) in V (volts) or JC^{-1}

current in A (amperes or amps) or Cs^{-1}