ELECTRIC CIRCUITS

Electric current

- Electric current is the rate at which electric charge flows in a circuit.
- Symbol: I
- Unit: ampere (A)
- The ampere is the same as a coulomb per second ($C \cdot s^{-1}$).
- Measured with an ammeter.
- $I = Q/\Delta t$
- Current in a series circuit remains the same.
- $A_1 = A_2 = A_3$
- Current is divided in a parallel connection. $A_T = A_1 + A_2 + A_3$
  Largest current through smallest resistance.

Potential difference

- Potential difference is the difference in potential energy between any two points in a circuit.
- Unit: volt (V)
- Voltage is defined as the potential energy (U) per unit charge.
- A volt is a joule per coulomb ($J \cdot C^{-1}$)
- Measured with a voltmeter.
- A voltmeter is always connected in parallel in a circuit.
- $V = \frac{W}{Q}$

Resistor (resistance)

- Component that resists the flow of current in a circuit.
- Poor conductor of electricity
- Symbol: R
- Unit: ohm (Ω)
- One ohm is equal to one volt per ampere.
- $R_{total} = R_1 + R_2 + R_3$ for resistors connected in series.
- $\frac{1}{R_P} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$ for resistors connected in parallel.
- Turns electrical energy into other types of energy, e.g. heat or light.
- More resistors in series: R_T increases and I_T decreases.
- More resistors in parallel: R_T decreases and I_T increases.
- Ohm's law: The pd over a resistor is directly proportional to the current through the resistor, provided the temperature remains constant.
- $R = {}^{V}/_{I}$
- Resistors in series are potential dividers.
- Resistors in parallel are current dividers.

Circuits

- For a current to flow, the following is required:
  - A source of energy
  - Conductors
  - Closed circuit
- In a series circuit, components are connected in such a way that there is only one path for the current to flow.
- In a parallel circuit, there is more than one path for the current to flow.