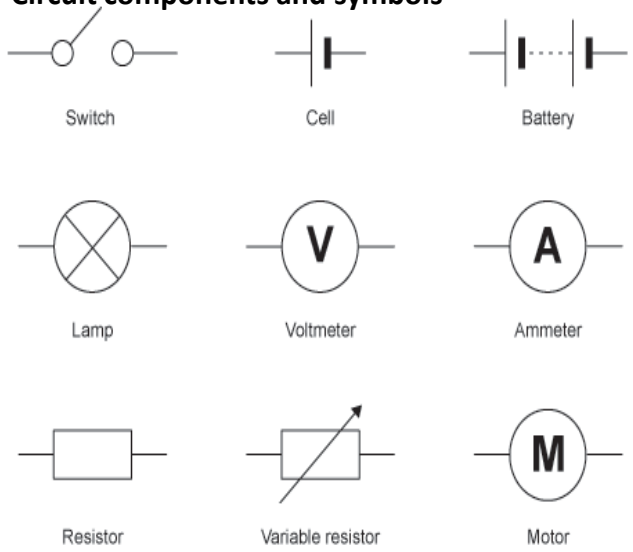
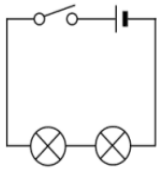
Electricity

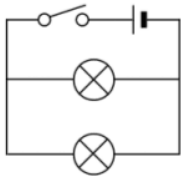
Circuit components and symbols



Series and parallel circuits



The circuit diagram shows a circuit with two lamps connected in series. If one lamp breaks, the other lamp will not light.



The circuit diagram shows a circuit with two lamps connected in parallel. If one lamp breaks, the other lamp will still light.

Current, voltage and resistance

The current (**I**) in an electrical circuit refers to the flow of electrons in that circuit. Current is measured in **Amps (A**) using an ammeter

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

Voltage (V) is a measure of the difference in **electrical energy** between two parts of a circuit. The bigger the difference in energy, the bigger the voltage. Voltage is measured in **volts**. The symbol for volts is **V**. For example, 230V is a bigger voltage than 12V.

$$V = IR$$

Resistance is measured in **ohms (Ω).** It can be calculated from the voltage across a component and the current flowing through it. The total resistance of a series circuit is the sum of the resistances of the components in the circuit. The resistance in a wire increases as:

- The length of the wire increases
- The thickness of the wire decreases

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

Static electricity

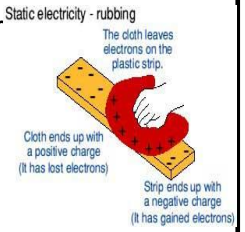
Objects can be positively charged, negatively charged or neutral (no charge). A substance that **gains** electrons becomes **negatively charged**, while a substance that **loses** electrons becomes **positively charged**.

When a charged object comes near to another object they will either attract or repel each other.

If the charges are the same - **they repel**

If the charges are opposite - **they attract**

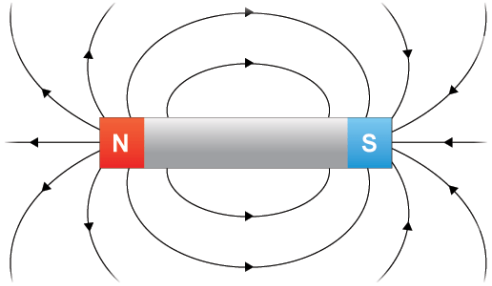
If one is charged and the other is not - **they attract**



Magnetic fields

Key points to note:

- The field lines have arrows on them which go from N to S
- The field lines are more concentrated at the poles.
- The magnetic field is strongest at the poles, where the field lines are most concentrated.



Electromagnets

When an electric current flows in a wire it creates a magnetic field around the wire. By winding the wire into a **coil** we can strengthen the magnetic field. Electromagnets are made from coils like this.

Making an electromagnet stronger

We can make an electromagnet stronger by doing these things:

- Wrapping the coil around an **iron core**
- Adding **more turns** to the coil
- **Increasing the current** flowing through the coil.