

Electricity and Magnetism

5.1 Electric Currents

Current is the rate of flow of Charge Electric charge is the movement of electrons.

To measure current, we use an ammeter.

The unit of current is amperes or amps (A).

The negatively charged electrons flow from the negative terminal of an ammeter to a positive terminal while current flows from the positive terminal to a negative terminal.

For electrons to flow, 2 main things are needed:

- A source of potential difference is also known as voltage. It provides the pressure that makes the current flow
- A complete circuit with no brake or a closed circuit.

To measure Current:

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

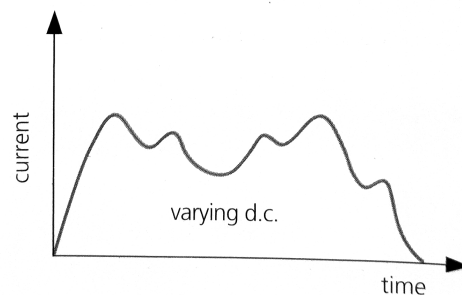
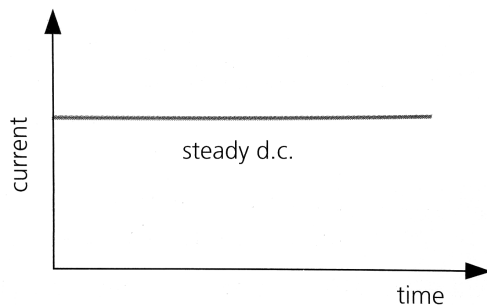
I is current Q is charge flowing

t is time

the unit of charge is Coulomb (c)

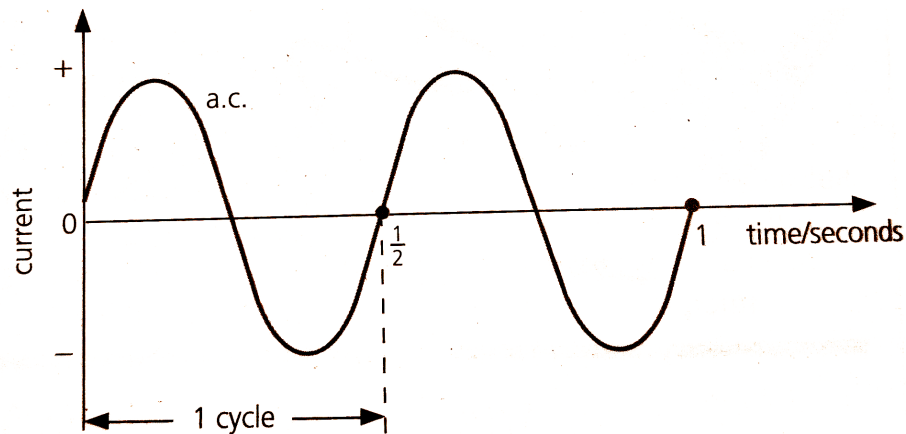
There are two types of current:

1) Direct current (d.c): The flow of electrons in one direction only. For example, d.c is found in batteries and electronic devices.



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2.) Alternating current(a.c): The flow of current constantly changes directions. For example in power distribution.



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5.2 Current, Voltage and resistance

Voltage is the electrical Potential energy difference per unit charge

The unit of voltage is *Volt (V)*.

Resistance: They can be provided on a circuit by devices called resistors. They resist the flow of energy.

Resistance is measured in the units ohms (Ω) using the Greek symbol omega

- Long wires have more resistance than short wires because electrons have a greater distance to travel.
- Thinner wires have more resistance than thicker wires

Resistance and current are inversely related

Increasing resistance in a Circuit decreases the current flow

Voltage=Current x Resistance

$$V=I \times R$$

An increase in voltage will cause an increase in current.

Increasing the resistance will decrease the current.

5.3 Magnetic fields and electromagnetism

Properties of magnets:

Magnetic materials:

- Ferromagnetic materials: these materials can be magnetized to form a retain their magnet. They retain their magnetization after the exposure of a magnetic field.
- Paramagnetic/diamagnetic materials are materials that have weaker magnetic properties. They do not retain magnetization after the removal of an external magnetic field.

Law of magnetic poles:

Like poles repel, unlike poles attract.

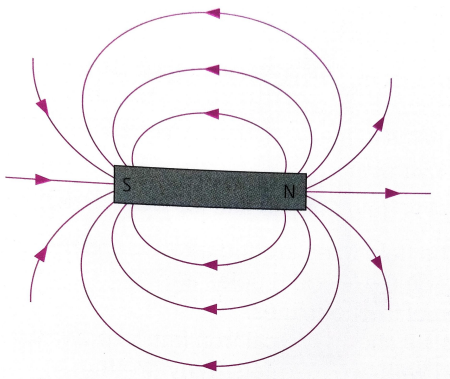
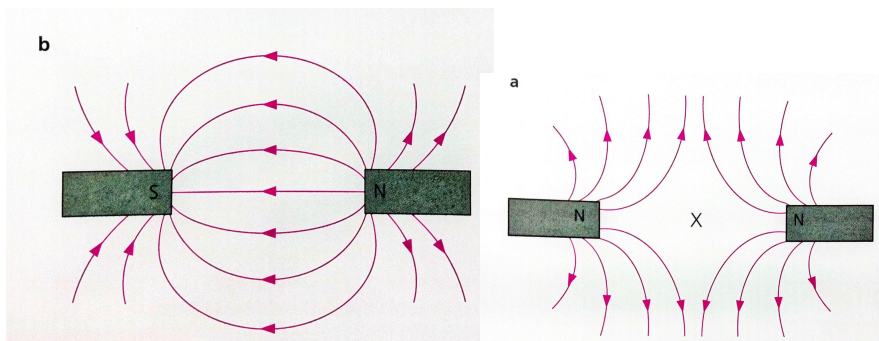
For example:

The South Pole and South Pole will repel while the South Pole and North Pole will attract.

Magnetic fields:

These are regions around a magnet or a moving electric charge where magnetic forces are exerted.

Note: Magnetic field is stronger in regions where the field lines are close together than when they are further apart.



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