

# KS3 Electromagnetism: Electricity

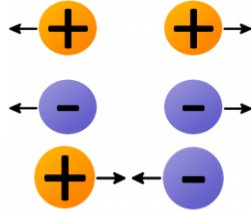
## Charges

A charged object is either positive or negative.

Opposite charges will **attract**.

The same charges will **repel**.

**Static** electricity is an imbalance between negative **electrons** and positive **protons** where the charge cannot move. Earthing an object will mean the **electrons** can transfer to the ground by the path of least resistance.



## Electric Fields

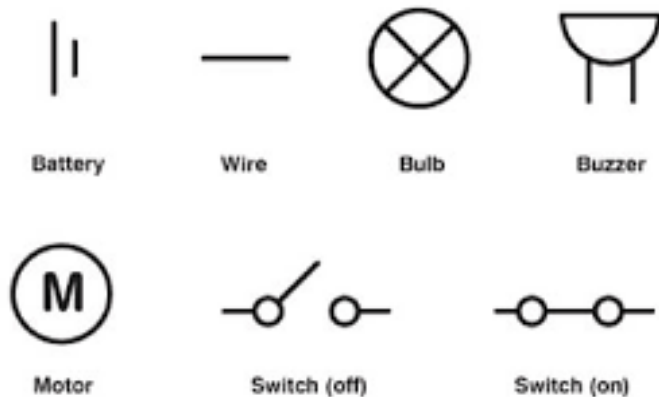
An **electric field** is a region surrounding a charged object where other charged objects can experience a force.

When charged objects enter the electric field, they experience a force and can repel or attract.

## Keywords

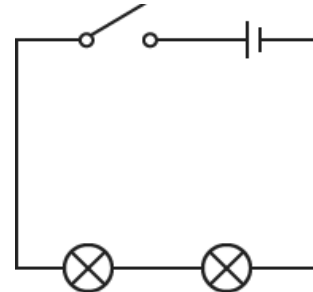
- Static
- Electron
- Repulsion
- Attraction
- Non-contact force
- Electric field
- Current
- Ammeter
- Potential difference
- Voltmeter
- Series circuit
- Parallel circuit
- Resistance
- Conductor
- Insulator

## Circuit Symbols

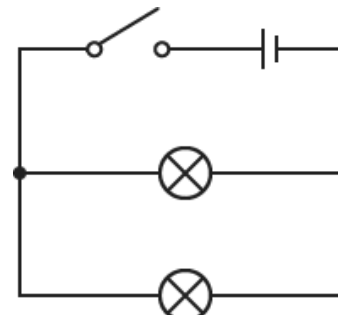


## Series and Parallel

**Series circuit** - A circuit where the current has only one route to flow.




**Parallel circuit** - A circuit with different 'branches' the current can flow through.



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## Current

Current is a flow of negative charge in a complete circuit.

An ammeter  is a device that is used to measure current. An ammeter measures current in Amperes (or Amps).

The ammeter is placed in series.


Current is constant throughout a series circuit.

Current across branches adds up to the current before and after the branches.

## Potential Difference

Potential difference can also be called voltage.

Potential difference is the difference in the amount of energy that negative charges have between two points in a circuit.

A voltmeter  is a device that measures potential difference.

A voltmeter measures potential difference in Volts.

The voltmeter is placed in parallel to the two points it is measuring.

## Resistance

Resistance is the opposition to the flow of current in a closed circuit.

Current will always flow the path of least resistance.

Resistance is measured in Ohms ( $\Omega$ ) and is produced by any device in the path of a current. For example, a lamp produces resistance.

The higher the resistance, the lower the current.

Resistance is a ratio between potential difference and current that can be represented by the formula:

$$\text{Resistance} = \frac{\text{Potential Difference}}{\text{Current}}$$

## Resistance in objects

Electrical conductors are materials that allow electrical current to flow through easily.

Metals are good electrical conductors.

Electrical insulators are materials that do not allow electrical current to flow through easily.

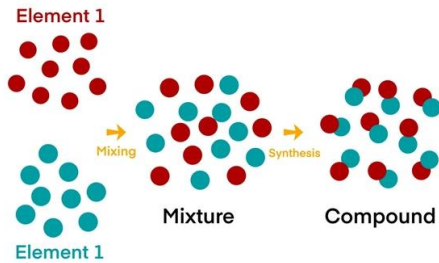
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# KS3 Pure and Impure Substances

**Pure Substances:** A pure substance consists of only one type of particle with fixed composition and distinct properties.

**Determining Purity:** A pure substance has a sharp melting and boiling point, while mixtures melt and boil over a range of temperatures.



**Mixtures:** Mixtures contain two or more substances physically combined, where each retains its properties.

**Compounds vs Mixtures:** A compound is chemically combined in a fixed ratio, while a mixture is physically combined and separable.

**Dissolving & Solutions:** When a solute dissolves in a solvent, it forms a solution.

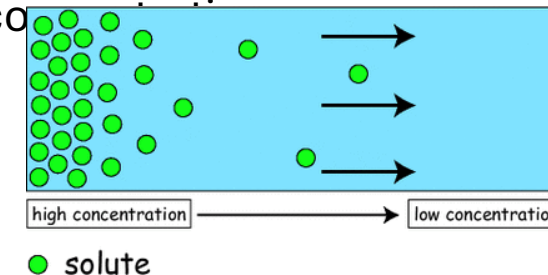
## Keywords

- Pure Substance
- Mixture
- Compound
- Element
- Filtration
- Crystallisation
- Distillation
- Chromatography
- Diffusion

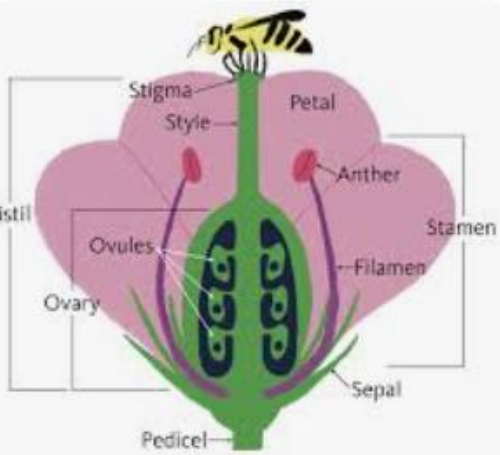
Common separation techniques include:

- Filtration: Separates insoluble solids from liquids.
- Crystallisation: Separates dissolved solids by evaporation.
- Distillation: Separates liquids based on boiling points.
- Chromatography: Separates substances based on solubility.

**Diffusion:** The movement of particles from high concentration to low concentration.



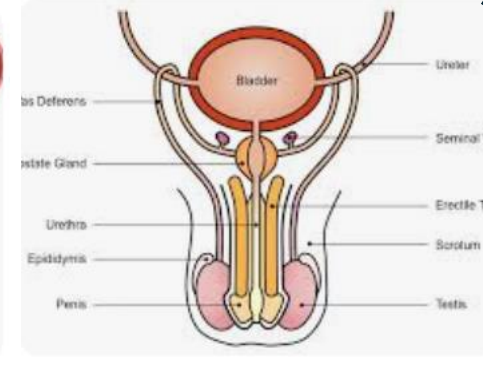
# KS3 Reproduction



Reproduction  
in plants.

Pistil: female.

Stamen: male.



The ovum travels from the ovary, through the oviduct, uterus, cervix & out of the vagina.  
Sperm travels from the testes, through the sperm ducts, urethra & out of the penis.

Fertilisation occurs when 1 sperm fuses (not meets) an ovum.  
The sperm travels from the vagina, through the cervix, the uterus, the oviduct where it fuses with the ovum.



When pregnant, to keep the foetus healthy, Mum needs to:

Eat a healthy, balanced diet.

She will need to eat more protein and some substances like iron & calcium.

If she smokes, the baby can be born early and smaller.

If she drinks alcohol, it can affect the foetus' brain.

She needs to be vaccinated to prevent the foetus being affected by diseases like measles.

## Keywords

- Reproduction
- Ovary
- Oviduct
- Uterus
- Vagina
- Cervix
- Testes
- Sperm duct
- Urethra
- Penis
- Fertilisation
- Fuse
- Foetus