

Year 7 Physics



Keyword List	
Force	A push or pull on an object caused by it interacting with something. Measured in Newtons (N)
Newtons	The unit of Force
Contact force	Forces that act between two objects that are physically touching each other
Non-contact force	Forces that can act between objects that are not touching (e.g. gravity)
Air resistance	The force that acts in the opposite direction to an object moving through the air
Balanced forces	Forces where the effect of one force is cancelled out by another
Unbalanced forces	The force applied in one direction is greater than the force applied in the opposite direction
Resultant force	When a system of forces is acting on an object, the difference between the forces
Force Diagram	A diagram showing all the forces acting on an object, the force's direction and its magnitude
Friction	A force that acts in the opposite direction to movement
Elasticity	The ability of an object to resume its normal shape after being stretched or compressed
Stretching	The result of applying a tensional force pulling outward on an object
Compression	Occurs when a physical force presses inward on an object, causing it to become compacted
Deformation	The change in the shape or size of an object
Hooke's Law	The strain of the material is proportional to the applied stress within the elastic limit of that material

Physics term 1 checklist	
Define a force	<input type="checkbox"/>
Describe how forces can impact an object	<input type="checkbox"/>
State the differences between a balanced and unbalanced force	<input type="checkbox"/>
Be able to calculate resultant force	<input type="checkbox"/>
Be able to describe Hooke's Law in terms of force and extension	<input type="checkbox"/>
Describe the effects of drag and friction	<input type="checkbox"/>
To be able to draw force diagrams on objects	<input type="checkbox"/>
To be able to calculate speed	<input type="checkbox"/>
Describe what is meant by relative motion	<input type="checkbox"/>
Be able to identify what is happening on a distance-time graph	<input type="checkbox"/>
Calculate speed on a distance-time graph	<input type="checkbox"/>



Physics - Speed

Calculating speed

SPEED – a measure of how far you travel in a set amount of time.

$$\text{Speed} = \frac{\text{distance}}{\text{time}}$$

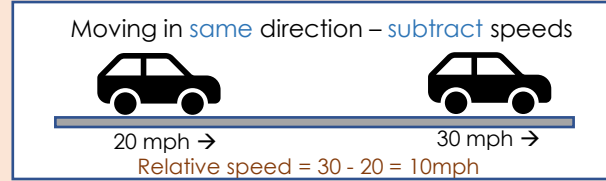
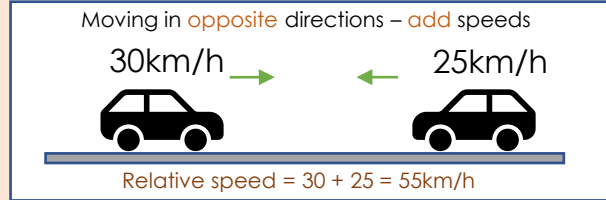
(average)

Three common units for speed:

- 1 Meters per second **m/s**
- 2 Miles per hour **mph or miles/h**
- 3 Kilometers per hour **km/h**

Relative motion

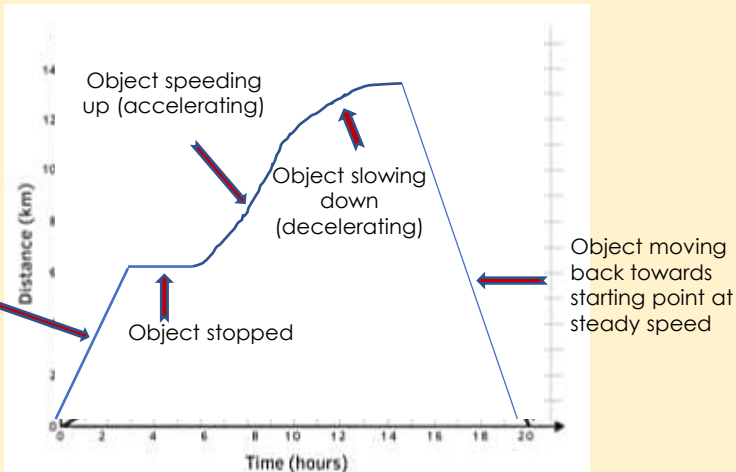
RELATIVE SPEED – the speed an object is moving from the perspective of another moving object.



These two rules only work for objects moving non the same straight line.

Distance-Time graphs

DISTANCE-TIME GRAPH – A graph that shows the distance travelled by an object over time.



The steeper the slope (gradient), the faster the object is moving.

Physics – Forces and Motion

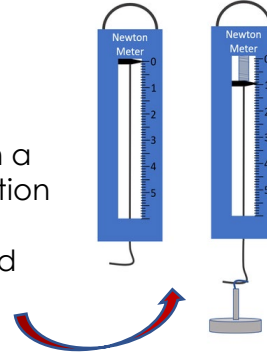


Forces

– a push or pull on an object caused by it interacting with something. Measured in **Newton's (N)**

Forces:

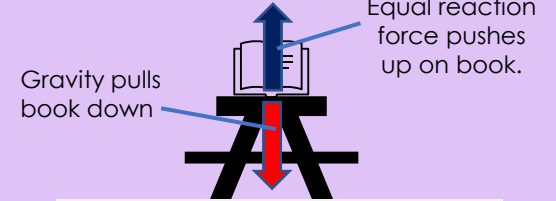
- Usually act in pairs
- Always act in a certain direction
- Are measured with newton meter



Non-contact forces are forces that can act between objects that are not touching (e.g. gravity)

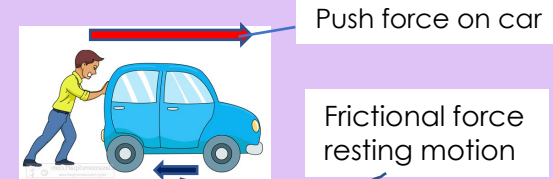
Balanced and unbalanced forces

Balanced forces produce no change in movement.



Forces are **balanced** – book **does not** move.

Unbalanced forces change the speed and/or direction of moving objects.



Forces are **unbalanced** – car **moves**.

Five things forces can make an object do

1 Speed up / Start moving



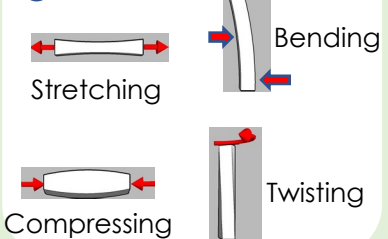
Force must be larger than resting forces acting on object.

2 Speed down / Start moving



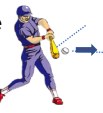
Resting force must be larger than force moving object.

3 Change shape



4 Change Direction

Force must be in different direction to object's original direction.



5 Turn



Physics – forces and frictional forces



Physics – Force diagrams

Frictional forces

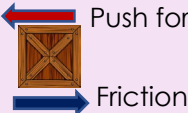
FRictional FORCE –

A force that acts in the opposite direction to movement.

Frictional forces always try to **slow down** moving objects.

3 frictional forces:

1) **Friction** (2 surfaces rubbing together e.g. a box on ground rub together push force ← Push force



2) **Air resistance**

3) **Water resistance**

These are also called 'drag'.

Air resistance when skydiving

1 Skydiver jumps and gains speed as weight pulls down



2 Still gaining speed, but air resistance increasing



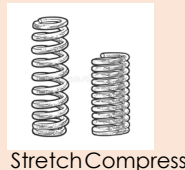
3 Air resistance increases enormously when parachute opened, slowing skydiver down. Soon after, air resistance is equal too weight and the skydiver falls at a steady speed.



Stretching and compressing

Forces can stretch or compress (squash) objects, causing them to deform (change their shape).

When forces deform an object, work is done (energy transferred), e.g:



Stretch Compress

A spring stretched → Energy transferred from kinetic energy store to elastic potential energy store.

When a spring 'springs' back into its original shape, the energy is transferred back to kinetic store.

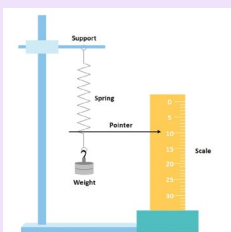
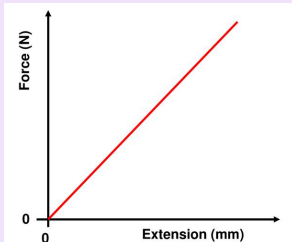
ELASTIC OBJECT – an object that goes back to its original shape and length after forces have been removed (e.g. a spring).

Hooke's Law

The extension of a spring is directly proportional to the force applied →

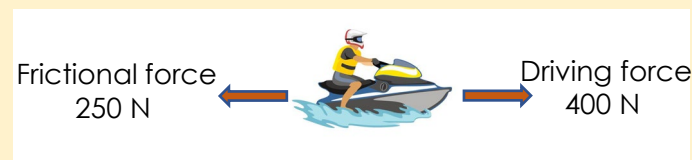
$$F = k \times e$$

Force in Newtons (N) Extension (in meters, m)
 Spring constant (in Newton meters, N/m)



Arrows in force diagrams

FORCE DIAGRAM – a diagram that shows the forces acting on an object.



Arrows are used to represent the forces. If two arrows pointing in opposite directions

The larger the arrow, the larger the force it represents.

Object ... the same size, then forces are **balanced**. Object is either stationary or moving at a steady speed in one direction.

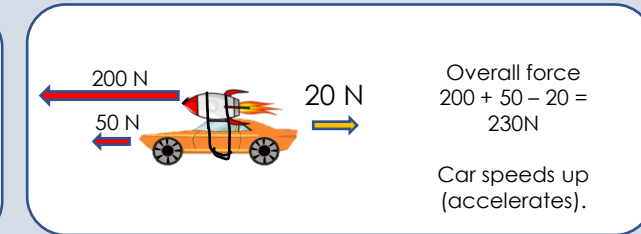
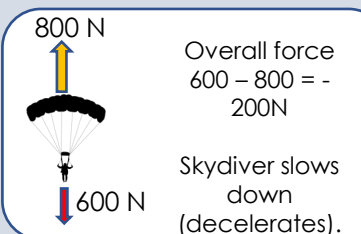
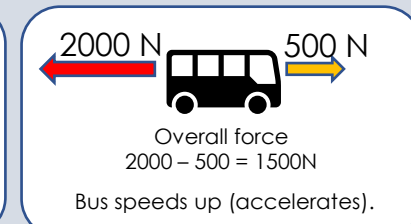
Object ... different sizes, forces are **unbalanced** – object will either accelerate (speed up) or decelerate (slow down).

TWO rules for calculating overall force from force diagrams

1 **Subtract** forces acting in opposite directions.

This only works for forces acting along the same line (in 'one dimension')

2 **Add** forces acting in same directions.



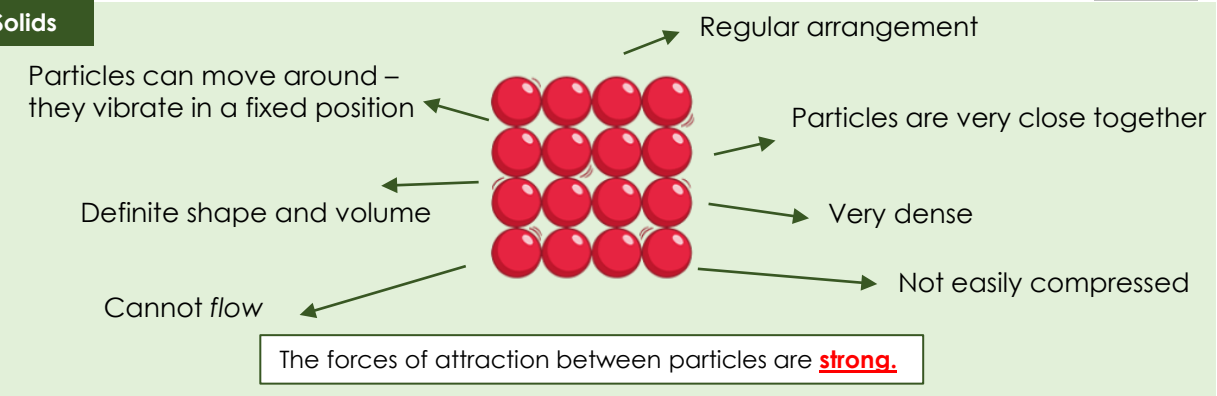
Year 7 Chemistry

Chemistry – Particle models

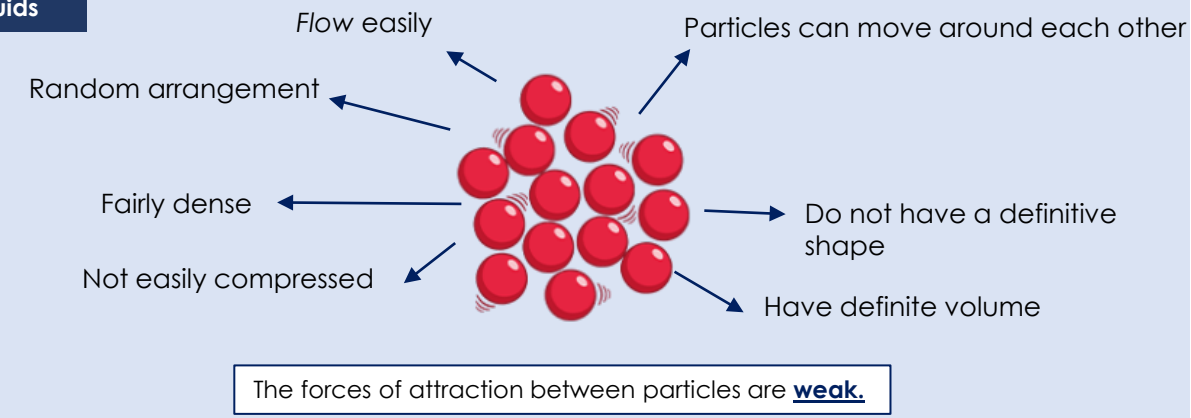


Key Word	Definition
Boiling	The process by which a liquid turns into a vapor when it is heated to its boiling point
Boiling point	The temperature at which a liquid turns into a gas as it is heated
Chromatography	A method used to separate and identify the components of a mixture of soluble substances
Condensing	A change of state from gas to liquid
Diffusion	The random movement of a substance from a region of high concentration to a region of low concentration
Dissolving	A solution is made when a substance dissolves into a liquid
Distillation	A process used to separate liquids based on their boiling points
Filtration	A method to separate a solid and a liquid
Freezing	A change of state from liquid to solid
Insoluble	A substance that does not dissolve in the solvent
Melting	A change of state from solid to liquid
Mixture	Made from two or more elements or compounds being mixed together
Pure	A pure substance consists only of one element
Solute	A substance that will dissolve into a liquid
Solution	When a solute is dissolved in a solvent
Solvent	The term used for the liquid in which a substance (solute) is dissolved
Sublimation	A change of state from solid to gas

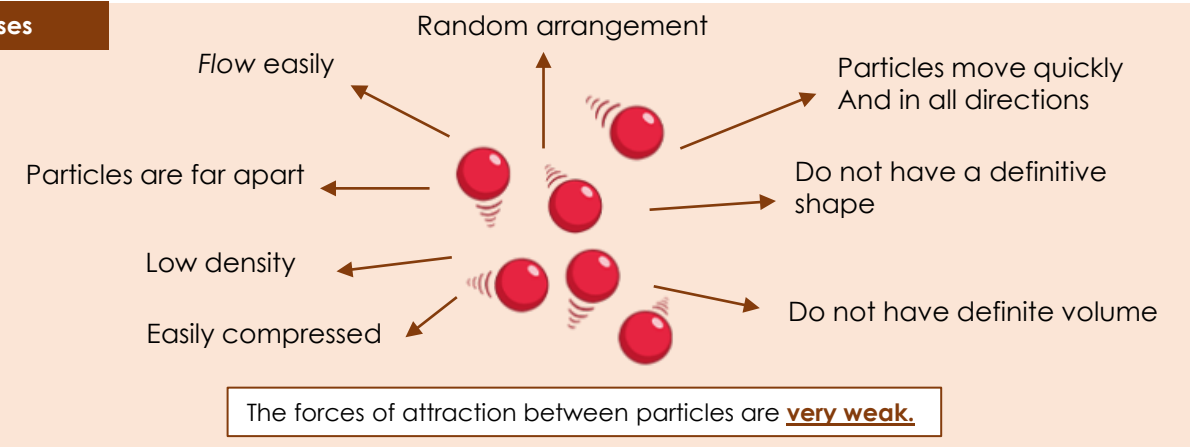
Solids



Liquids



Gases



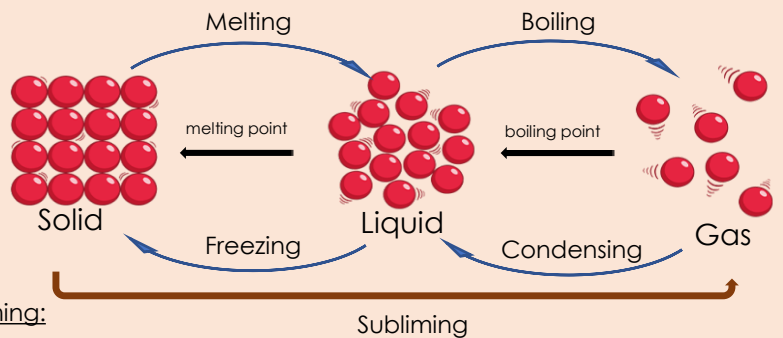
Chemistry term 1 checklist	<input checked="" type="checkbox"/>
Draw out particles in a solid, liquid and gas	<input type="checkbox"/>
Describe the properties of a solid, liquid and gas	<input type="checkbox"/>
Understand the difference changes in state	<input type="checkbox"/>
Define melting and boiling point and be able to identify what state a substance would be in	<input type="checkbox"/>
Use the particle model to describe diffusion	<input type="checkbox"/>
Use the particle model to describe dissolving	<input type="checkbox"/>
Define solvent, solute, solution	<input type="checkbox"/>
Describe the process of filtration	<input type="checkbox"/>
Describe the process of chromatography	<input type="checkbox"/>
Describe the process of distillation (simple and fractional)	<input type="checkbox"/>



Chemistry – Pressure, diffusion and changes of state

Changes of state

A change of state does not involve a change in mass, only a change in energy.



Melting, Boiling and Subliming:

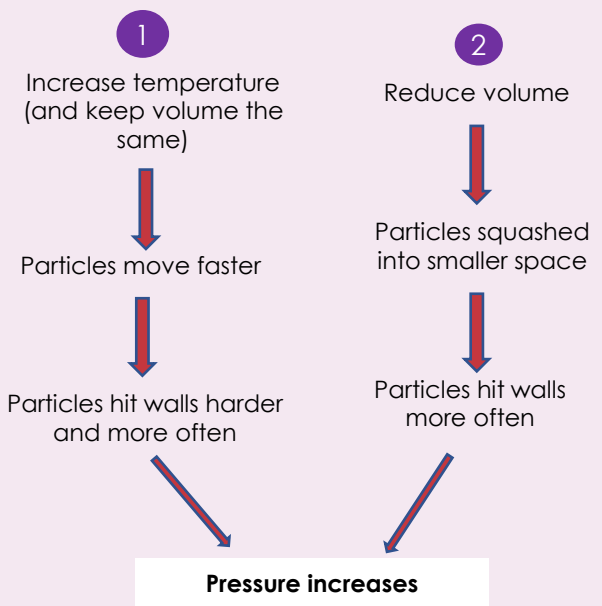
Substance heats up → Particles gain energy → Forces between particles weaken → Particles break free from position

Condensing and Freezing:

Substance cools down → Particles lose energy → Forces between particles strengthen → Particles held in position

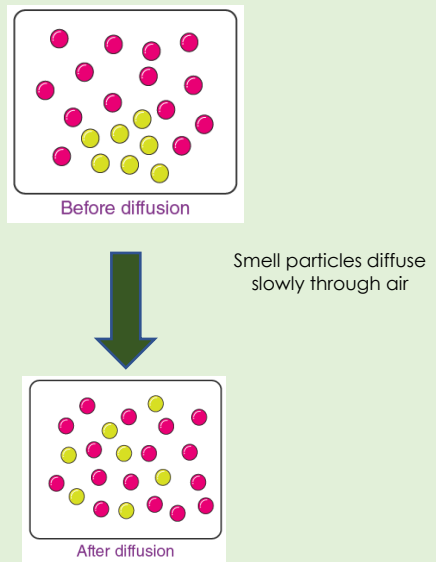
Pressure

Gas pressure is caused by particles hitting a surface.
 Two ways to increase pressure:



Diffusion

DIFFUSION – The process of particles spreading out from an area of higher concentration to an area of lower concentration.



Chemistry – Purity and separating mixtures

Purity

PURE SUBSTANCE – a substance made up of only one type of element or compound. Pure substances have a fixed melting and boiling point.

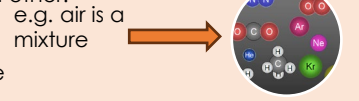
e.g. pure water boils at 100°C and pure ice melts at 0°C.



You can test the purity of a substance by measuring its boiling or melting point.

Mixtures

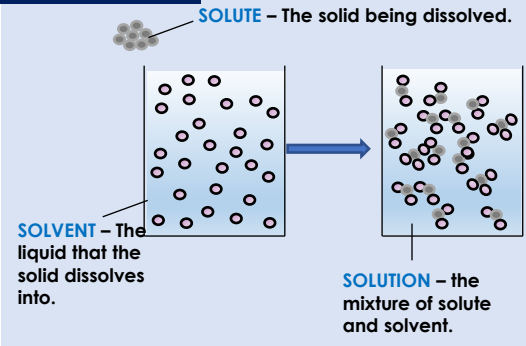
MIXTURE – a substance made up of two or more elements or compounds that are not chemically bonded to each other.



Mixtures have the properties of the substance they are made from.

Mixtures can be separated by physical methods, e.g. filtration, evaporation, chromatography and distillation. These methods do not involve chemical reactions or form new substances.

Dissolving



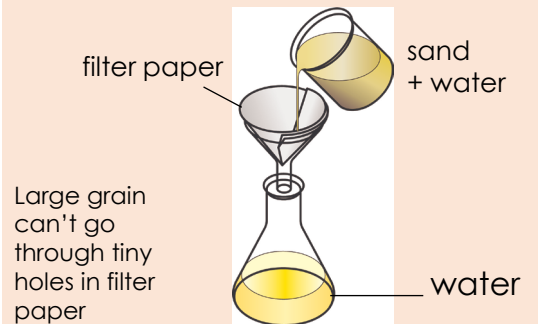
SOLUBLE	WILL dissolve
INSOLUBLE	WILL NOT dissolve
SOLUBILITY	A measure of how much solute will dissolve

A solution is called **saturated** when no more solute will dissolve

Filtration

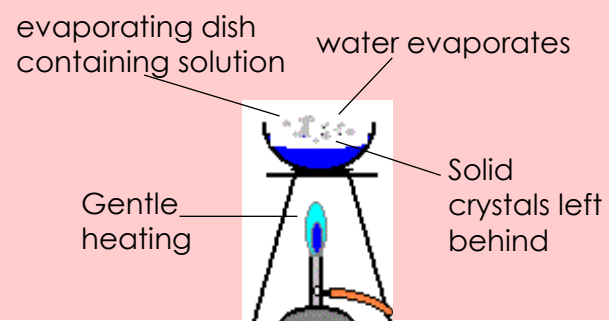
Separates **insoluble** solids from liquids.

- e.g. sand and water:



Evaporation

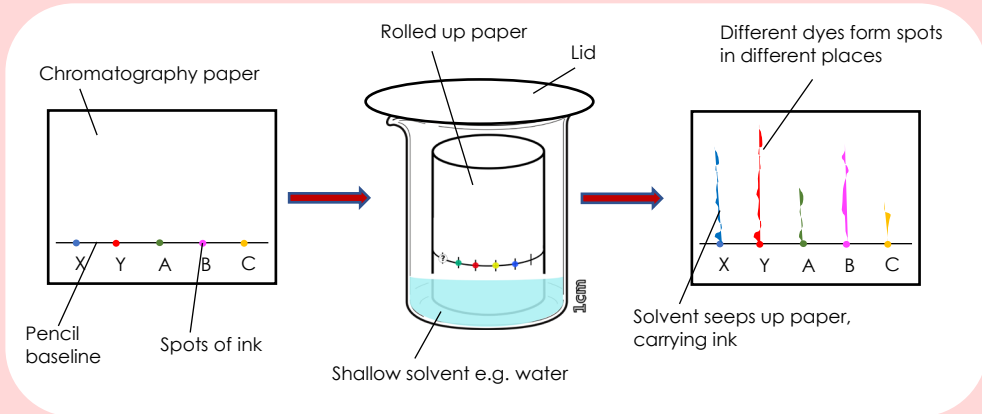
Separates **soluble** solids from liquids
 - e.g. a salt and water solution:





Chromatography

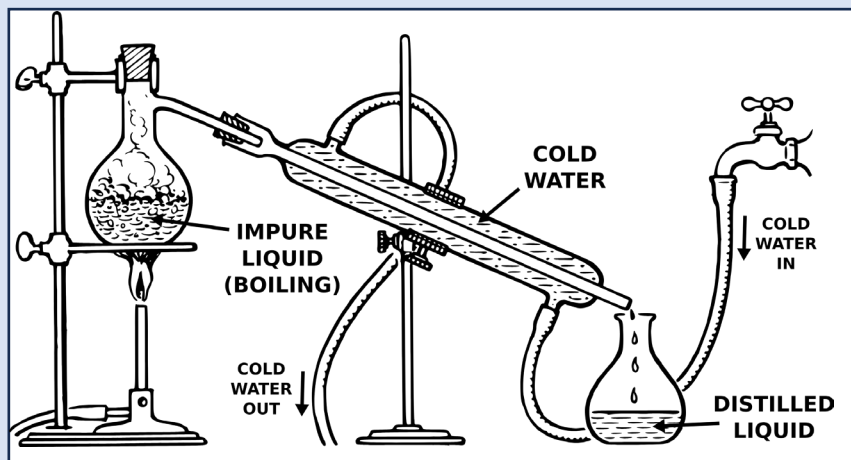
Chromatography can separate dyes in ink – they travel through paper at different rates.



You can identify **unknown substances** with chromatography by comparing the pattern of spots to known substances.

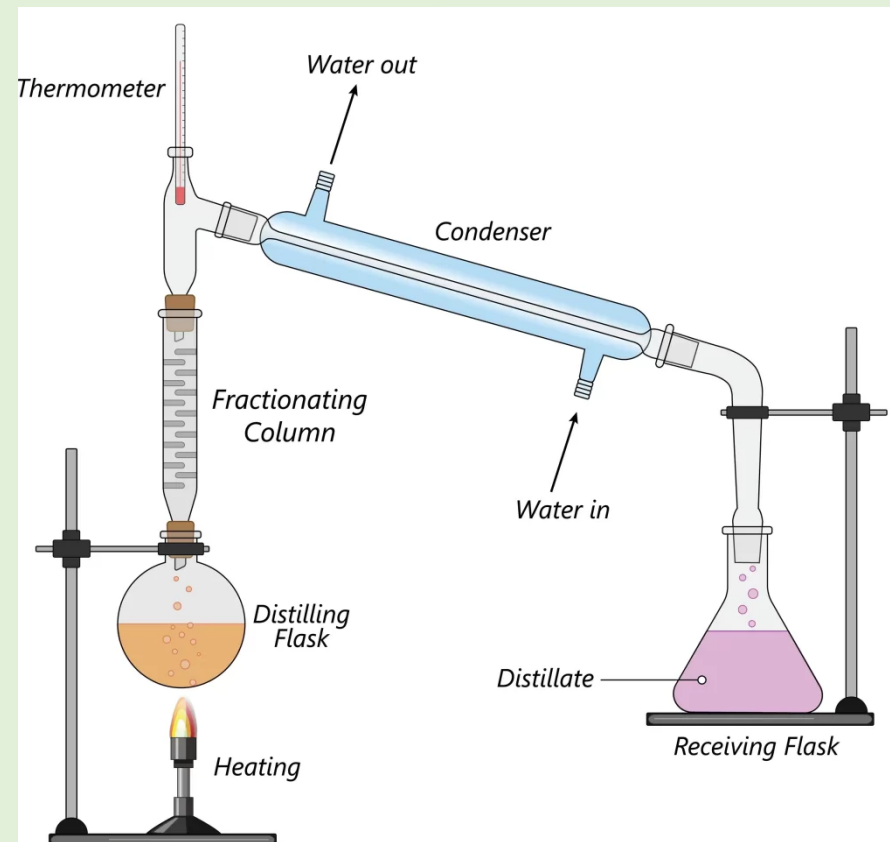
Simple distillation

Simple distillation can separate a mixture of two liquids or a solid and a liquid. The liquid is heated → boils and evaporates → condenses → is taken out. The liquid with the higher boiling point OR the solid will be left in the round bottomed flask.



Fractional distillation

Fractional distillation can separate a mixture of two or more liquids that have different boiling points. The liquid mixture is heated → the liquid with the lowest boiling point boils and evaporates → condenses → is captured in the receiving flask. Once all of the first liquid (fraction) has been removed, the temperature will rise until the next boiling point is reached. The next liquid (fraction) can be evaporated and condensed into a new receiving flask. This continues until all of the fractions have been separated out.



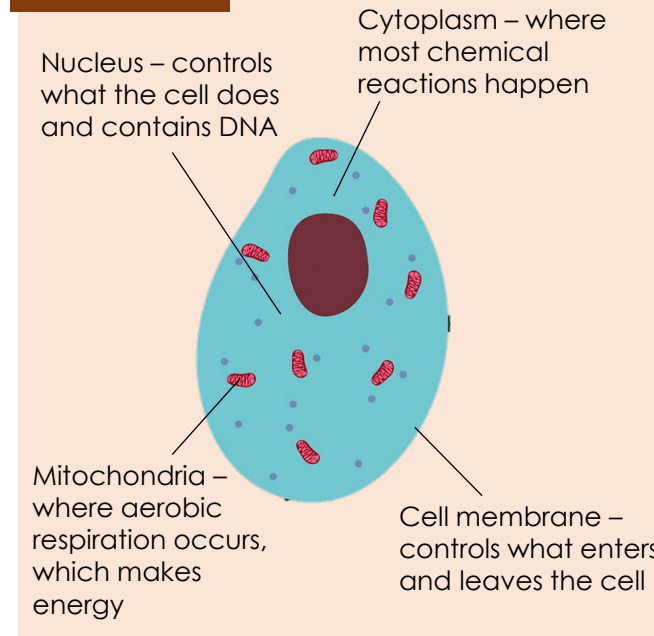
Year 7 Biology



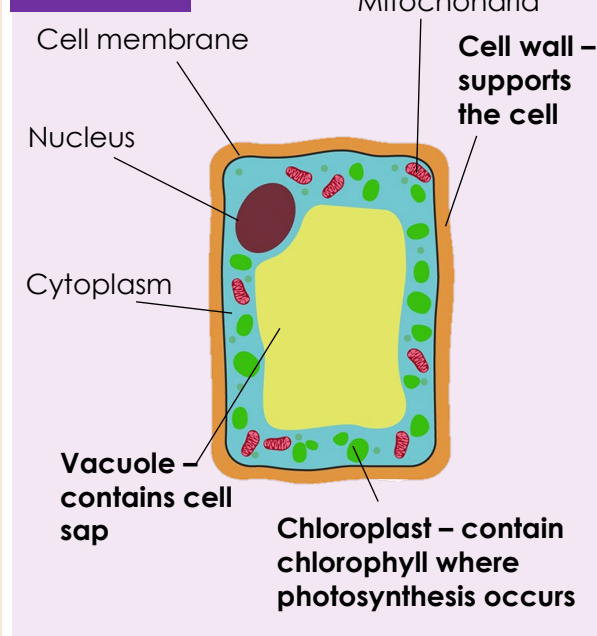
Biology - Cells

Keyword List	Definition
Cell	The fundamental unit that makes up living things
Cell membrane	The border of all cell types that controls the movement in and out of cells
Cell wall	It helps support the plant and gives the cell a rigid structure
Chloroplast	Organelle that contains chlorophyll, which absorbs light energy for photosynthesis
Cytoplasm	A jelly-like material that contains dissolved nutrients and salts and structures called organelles
Magnification	How many times bigger an object is in an image, than in real life
Microscope	They magnify small things that can't usually be seen by the naked eye
Mitochondria	The place where aerobic respiration takes place
Multicellular organism	Organisms made of many cells
Nucleus	An organelle which contains genetic material (DNA) in all eukaryotic organisms
Organ	A structure made up of groups of different tissues, working together to perform specific functions
Organ system	A group of organs with related functions, working together to perform certain functions within the body
Tissue	A group of cells working together to perform a shared function, and often with similar structure
Unicellular	A living organism that is just one cell
Vacuole	A sac-like cell organelle that stores fluids

Animal cell

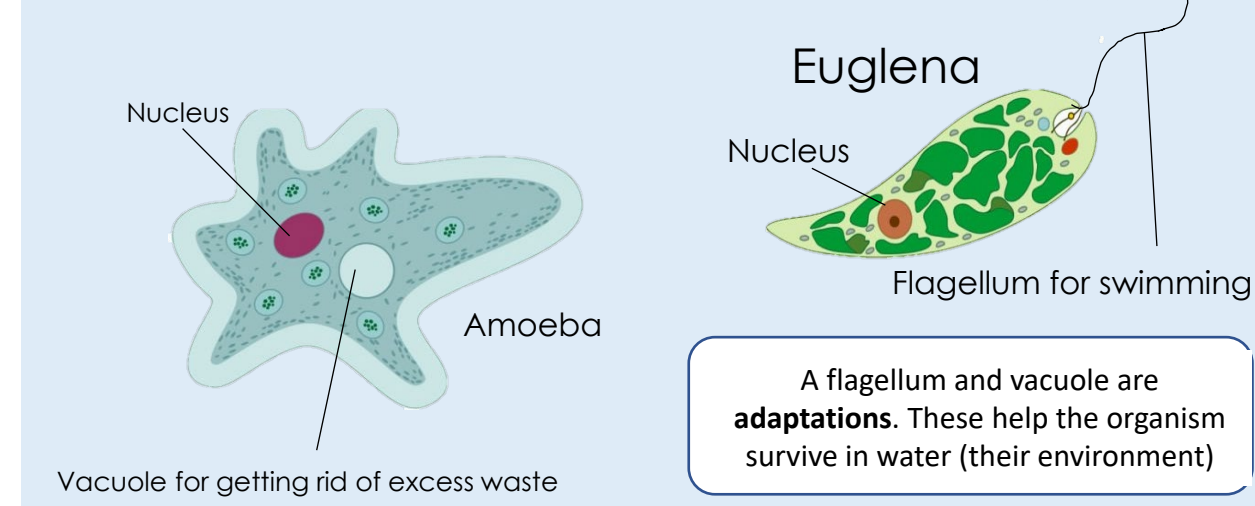


Plant cell



Unicellular organism

Unicellular organism – a living organism made up of only one cell

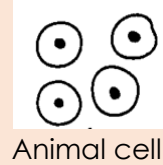


Biology term 1 checklist	<input checked="" type="checkbox"/>
Be able to identify parts of an animal cell	<input type="checkbox"/>
Be able to identify parts of a plant cell	<input type="checkbox"/>
Compare an animal and plant cell	<input type="checkbox"/>
Describe what is meant by unicellular organism	<input type="checkbox"/>
Define the terms cell, tissue, organ and organ system	<input type="checkbox"/>
Give examples of cells, tissues, organs and organ systems	<input type="checkbox"/>
Describe what a multicellular organism is	<input type="checkbox"/>
Label the difference parts of a microscope and understand what they do	<input type="checkbox"/>
Know how to use a microscope	<input type="checkbox"/>
Be able to draw from an image seen from a microscope	<input type="checkbox"/>

Biology – Organisation and Microscopy

Cell organisation

CELL – the basic building block that makes up all living organisms

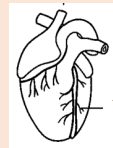


TISSUE – a group of similar cells working together



Muscle tissue

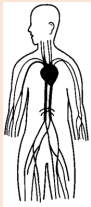
ORGAN – a group of different tissues working together



The heart

ORGAN SYSTEM – a group of organs working together

The circulatory system

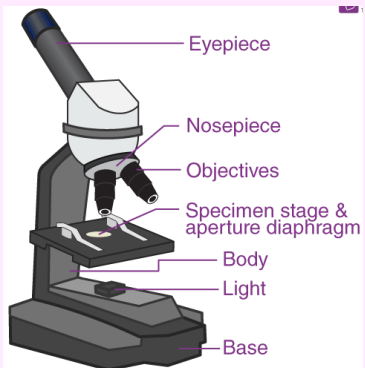


ORGAN SYSTEMS work together to make an entire **organisms**.

Multicellular organisms are usually made up of several organ systems.

Microscope

A Microscope can be used to magnify objects so we can see them in more detail.



Using a microscope

Turn the light on

Clip slide with the specimen on to view onto the stage.

Start with the lowest powered objective lens and move it down to just above the slide by turning the course focus knob.

Look down the eyepiece and adjust the focus with the fine knob until you get a clearer image of what's on the slide.

4 R's And Scientific Vocabulary



Revision is a very important part of education and here at Highfields we break it down into the 4 R's:

1. **Revisit** – after a set time, come back to review past content
2. **Reduce** – summarise content learnt into smaller pieces e.g. mind map, flashcards, abbreviation and acronyms
3. **Rehearse** – practice learning the information
4. **Retrieve** – bringing back and remembering content learnt in the past

4Rs: Rehearse

4Rs: Revisit

4Rs: Reduce

4Rs: Retrieve

Key scientific vocabulary which is important throughout all years of science and during practical work:

- **Independent variable:** variable which is purposely changed in an experiment.
- **Dependent variable:** variable which is measured in an experiment.
- **Control variable:** variables which are kept the same throughout an experiment.
- **Reliability:** how trustworthy the results are. We increase this by repeating an experiment.
- **Accuracy:** how close a result is to its true value.
- **Validity:** How suited the method used in an experiment is for the purpose.
- **Average:** adding up the values and dividing the value by how many they are
- **Anomaly:** an odd result, which does not fit the pattern of results.
- **Data:** the results from an experiment

