Year 7 Science BiE2

Exam content and knowledge organisers

Paper 1 will assess the following content:

Knowledge Organiser Topics:

- 7.01 Particles
- 7.03 Energy
- 7.04 Cells
- 7.05 Structure and Function
- 7.06 Fundamental Chemistry
- 7.07 Separation
- 7.13 Power & Resources
- 7.14 Pressure

Oak National Academy Topics:

- https://classroom.thenational.academy/units/cells-tissues-and-organs-03b2
- https://classroom.thenational.academy/units/particles-f50c
- https://classroom.thenational.academy/units/energy-0b08

Paper 2 will assess the following content:

Knowledge Organiser Topics:

- 7.02 Motion
- 7.08 Reproduction
- 7.09 Chemical reactions
- 7.10 Forces
- 7.11 Acids & Bases
- 7.12 Variation

Oak National Academy Topics:

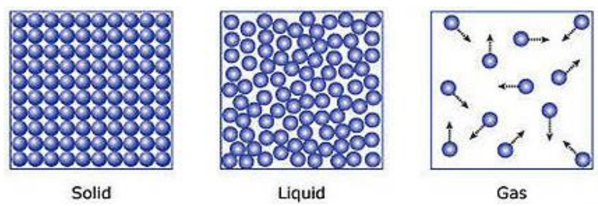
- https://classroom.thenational.academy/units/reproduction-and-variation-f60f
- https://classroom.thenational.academy/units/chemical-reactions-5ffa
- https://classroom.thenational.academy/units/forces-and-motion-b426

Year 7 Chemistry Knowledge Organiser – Pg 1
Topic 1: Particles

Key Terms	Definitions
particle	A tiny piece of matter, which can be modelled as a tiny, hard sphere
model	A way of representing reality that is simplified but still useful
state of matter	Matter is divided into three states: solid, liquid, and gas
melting	Change of state from solid to liquid
freezing	Change of state from liquid to solid
evaporation	Change of state from liquid to gas
condensation	Change of state from gas to liquid

Particle Theory

All matter is made up of particles. Particles are found in all three states of matter. Particles in the three states have different movement and arrangement. We use a model to represent particles in different states of matter:

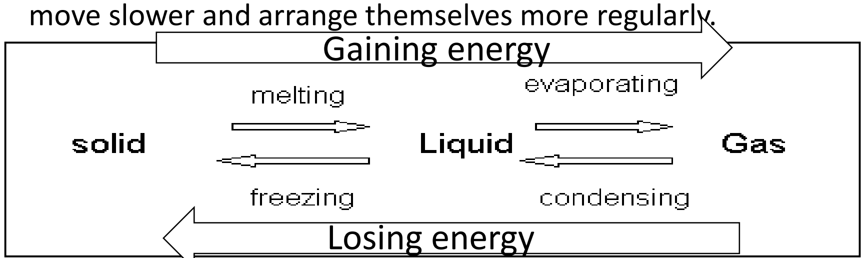


- In solids, particles are arranged in a regular pattern and they can only vibrate in a fixed position. Particles are held together by strong bonds.
- In liquids, particles are arranged randomly but are still touching each other. Particles can slide past each other and move around.
- In gases, particles are far apart and are arranged randomly. Particles carry a lot of energy and they move in all directions in a high speed.

Changes of State

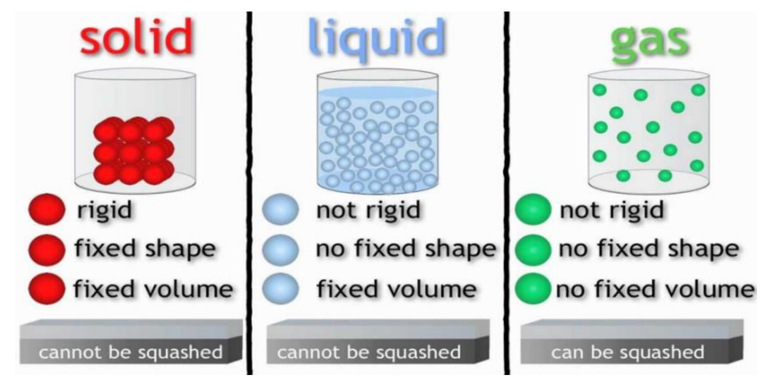
Changes of state take place at specific melting and boiling points when the particles have gained or lost enough energy.

- When energy is applied, particles gain energy, move faster and move further apart.
- When energy is lost, particles become closer to each other, move slower and arrange themselves more regularly.



Properties of Solids, Liquids and Gases

Due to their arrangement and movement, the three states each have different properties.



Solids are rigid, have a fixed shape and fixed volume because particles are held together by strong bonds and arranged regularly.

Liquids are not rigid and have no fixed shape, meaning they can flow to fill their container. This is because the bonds are weaker, so the particles can move. However, there is a fixed volume because the particles are still close together.

Gases are not rigid, have no fixed shape or fixed volume because there is so much empty space between particles and the bonds holding them together are broken.

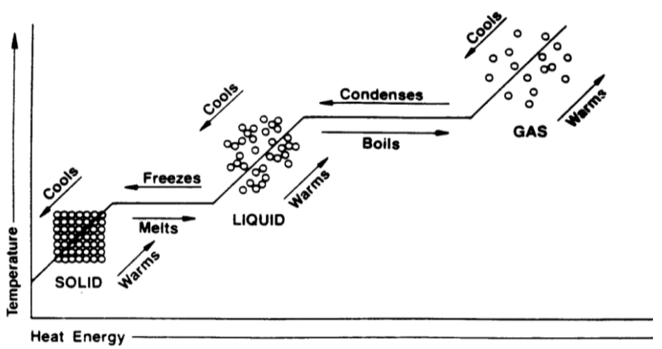
Year 7 Chemistry Knowledge Organiser – Pg 2
Topic 1: Particles

Interpreting the Energy-Temperature Graph

The E-T graph shows how the temperature of a substance changes as heat is applied.

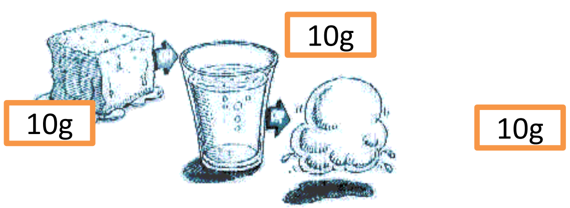
- When the line is sloped, the temperature of the substance is increasing.
- When the line is flat, the temperature stays the same even though heat is being applied. This is because the heat is going into making the particles change state.

During the change of state, the temperature will stay the same until the change of state is complete e.g. all liquid has turned into gas.



Conservation of Mass

The Law of Conservation of Mass states that mass cannot be created or destroyed during a state change.
Therefore, mass stays the same before and after a change of state.
For example, 10 g of ice melts into 10 g of water and 10 g of water evaporates into 10 g of water vapour. The same applies to other substances.



Key Terms	Definitions
diffusion	Movement of particles from a higher concentration to a lower concentration
rate	How fast an event e.g. diffusion, is happening
concentration	The number of particles in a known volume
particles	A tiny piece of matter, which can be modelled as a tiny, hard sphere

Diffusion and Factors Affecting Diffusion

Diffusion is the movement of particles from a higher concentration to a lower concentration.
Diffusion will stop when particles spread themselves evenly.
Diffusion occurs in liquids and gases but not in solids, because particles in a solid are not free to move.

Examples of diffusion include:

1. Oxygen diffusing into cells.
2. Carbon dioxide diffusing out of cells.

Diffusion

There are 2 factors affecting the rate of diffusion:

1. Temperature: When temperature increases, particles gain more energy. They can then move and spread out at a higher rate.
2. Concentration: When concentration increases, the rate of diffusion increases because there are more particles.

Year 7 Physics Knowledge Organiser – Pg 3
Topic 2: Motion

Speed
The speed of an object is a compound measure, which shows the rate of change in distance with respect to a unit for time.

The standard unit for speed is m/s (metres per second).

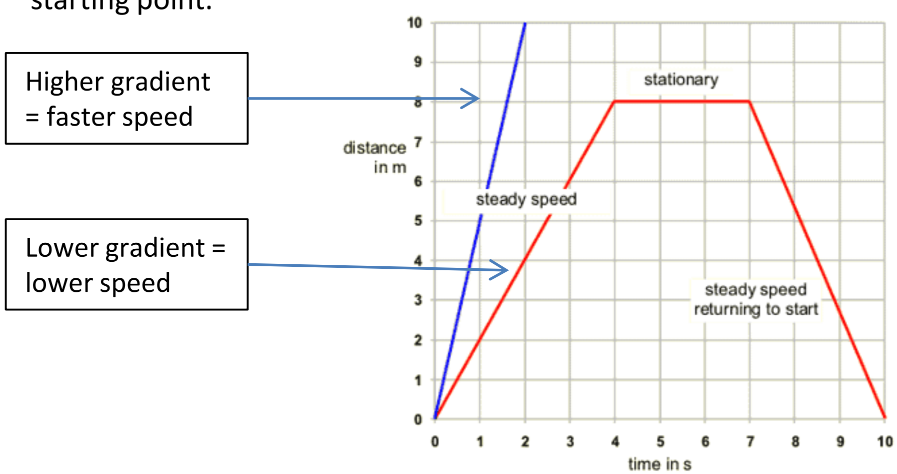
Miles per hour and kilometres per hour are also commonly used.

Speed is calculated by dividing distance by the time (see equation in the box).
The distance and time can be read from a distance-time graph.

If the speed of an object is increasing, then it is accelerating. If the speed is decreasing it is decelerating.

Distance-Time Graphs
A distance time graph shows the time on the horizontal axis and the distance on the vertical axis.

- If an object is stationary (not moving) the line will be horizontal.
- If the line has a diagonal slope the object is moving at a constant speed. The steepness (gradient) of the line shows the speed.
- If the line is going back towards the horizontal axis it is returning to its starting point.

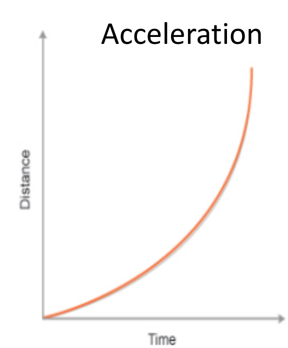


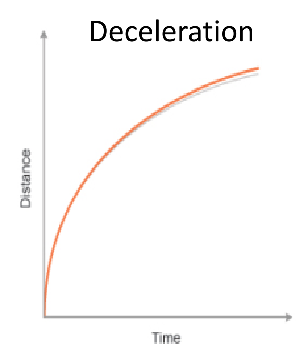
Key terms	Definitions
speed	The rate of change in distance with respect to time
gradient	How steep the line on a graph is; gradient represents the change in the y-variable with respect to the x-variable
stationary	Not moving
constant speed	A speed that is not changing, so the same distance is covered every second
axes	The horizontal and vertical lines used when plotting a graph
acceleration	The measure of how rapidly the speed of an object is changing
deceleration	The measure of how rapidly an object is slowing down

Speed	Acceleration
$speed = \frac{distance}{time}$	$acceleration = \frac{change\ in\ speed}{time}$

Acceleration and Deceleration

- When an object is accelerating, the line on a distance time graph will curve upwards, because the gradient gets steeper.
- When an object is slowing down the line will curve towards the horizontal, because the gradient gets less steep.





Year 7 Physics Knowledge Organiser – Pg 4
Topic 3: Energy

Energy Stores

Energy is a quantity measured in joules (J). It is NOT a material or 'thing'.
Examples of how energy is stored:

- Energy is stored in fuels as chemical potential energy
- Energy is stored in anything elastic when it is stretched, as elastic potential energy
- Energy is stored in any object that has been lifted up from the ground, because the object stores gravitational potential energy
- Energy is stored in moving objects as kinetic energy
- Energy is stored in any object as thermal energy, also known as *heat energy*. The higher its temperature, the more thermal energy it stores.

Energy Transfer

An energy transfer is when energy changes from one store to another. VERY IMPORTANTLY, the total amount of energy does not change. Energy cannot be created or destroyed. All that can be changed is how it is stored. This idea is called the law of conservation of energy.

Energy is transferred, so it changes store, in loads of situations. Examples to know:

- When a fuel is burned, the chemical potential energy in the fuel ends up stored as thermal energy in the surroundings;
- When an object falls off a shelf, the gravitational potential energy it stores is transferred (changed) to kinetic energy while it is falling.
- When the object hits the floor, all the gravitational potential energy it had to start with ends up stored as thermal energy in the surroundings.
- When a spring that's been stretched is released, the elastic potential energy it stored is transferred to kinetic energy then to thermal energy.

Key Terms	Definitions
energy	Energy is a quantity that is stored in all objects. Anything storing energy can do work.
work	Work is done when energy changes from one store to another.
potential energy	Potential energy is energy stored in objects thanks to their position.
chemical potential energy	Energy stored in fuels (like wood, or the gas we run Bunsen burners on) is called chemical potential energy.
elastic potential energy	Elastic objects, like springs or rubber bands, store elastic potential energy when they are stretched.
gravitational potential energy	Any object that is not on the ground has gravitational potential energy. This is because they are lifted up in a gravitational field, and could fall down!
kinetic energy	Movement energy. Any moving object stores kinetic energy. This includes the movement of particles.
thermal energy	Also known as heat energy. All objects store some thermal energy, because the particles are moving.
conservation of energy	The law that says energy cannot be created or destroyed. It can only change how it is stored.
energy transfer	A process where energy changes how it is stored.

Temperature and Thermal Energy

Temperature and thermal energy are linked, but are not the same thing.

- The thermal energy of a material depends on the potential energy of the particles AND the kinetic energy of the particles is it made from.
- Temperature only depends on the kinetic energy of the particle. The more the particles are moving, the higher the temperature.
- The mass of a material does NOT affect its temperature. However, the larger the mass, the more thermal energy it stores because it is made from more particles.

Year 7 Physics Knowledge Organiser – Pg 5
Topic 3: Energy

Thermal energy transfer

Thermal energy will always be transferred from hotter objects/areas to cooler objects/areas. This includes hot objects transferring thermal energy to the surroundings (the air, nearby surfaces and so on). Thermal energy transfer continues until thermal equilibrium is reached (the temperature is equal).
You can reduce the amount of thermal energy transferred using insulation.

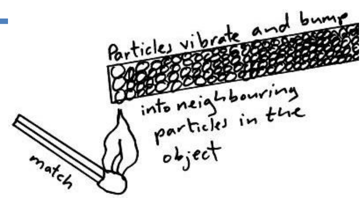
Thermal energy transfer by infra red radiation

All objects give out some infra red radiation, but the hotter they are the more radiation they give out. All objects can also absorb infra red radiation: when they do, they heat up. Radiation can travel through empty space – so this is how the Sun heats up the Earth.
The colour of the surface of an object affects how rapidly it emits and absorbs infrared radiation. Black, matt surfaces are the best absorbers and emitters. Shiny, silver surfaces are the worst absorbers and emitters.

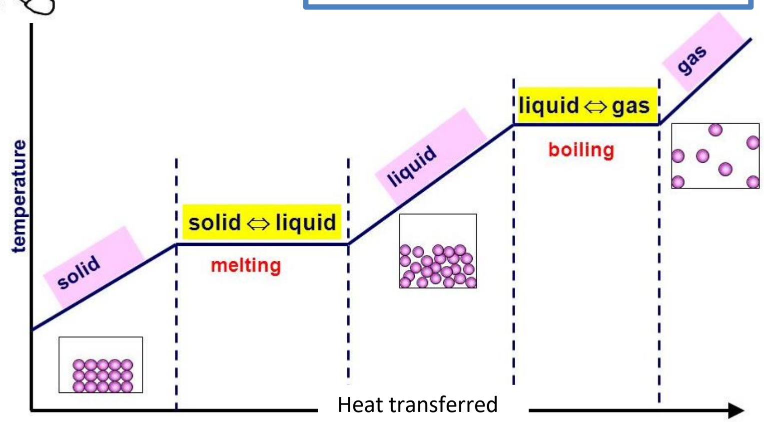
Key Terms	Definitions
temperature	The measure of the average amount of kinetic energy of all the particles in a substance.
temperature gradient	A difference in temperature between two places. Thermal energy always moves from hotter to colder places or materials.
thermal equilibrium	A situation where the temperature in two places is equal.
heat	The energy stored in substances thanks to the energy of their particles. Also called thermal energy.
conduction	One way that thermal energy can be transferred. Objects that are touching can transfer thermal energy, from the hotter object to the cooler one.
radiation	Another way that thermal energy can be transferred. All objects give out infrared radiation. Hotter objects give out (emit) infrared radiation that is absorbed by cooler objects.
emit	To give out
absorb	To take in

Thermal energy transfer by conduction

Thermal energy can be transferred between materials that are touching. Thermal energy is still transferred from the hotter object/area to the cooler object/area. This is called conduction of thermal energy. As the diagram shows, the particles in the area at a higher temperature vibrate more: their kinetic energy increases. They collide with neighbouring particles and pass on (transfer) thermal energy.



You can see that temperature does not change while changes of state are happening.



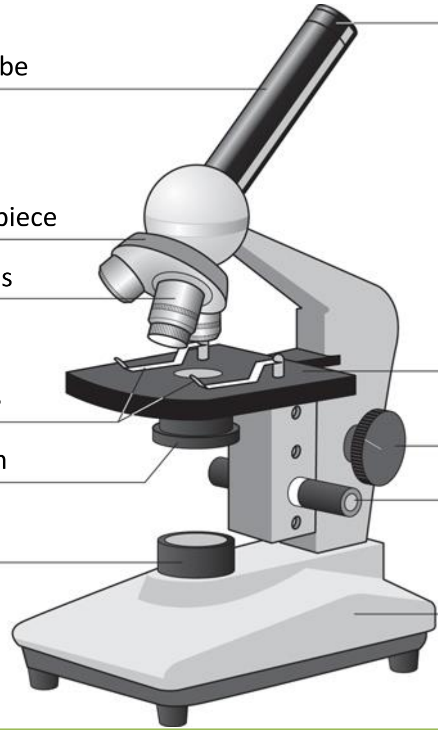
Energy when increasing temperature and when changing state

When heating a substance (solid, liquid or gas) and it doesn't change state, its temperature rises. This is because the particles move around more: their kinetic energy increases.

When heating a substance and causing it to change state, its temperature does NOT change during the state change. However, energy cannot disappear. The heat transferred to the substance increases the potential energy of the substance: it moves the particles it is made from apart until the substance has melted or boiled.

Year 7 Biology Knowledge Organiser – Pg 6
Topic 4: Cells

Parts of a microscope



Key Terms	Function
stage	Area where specimen is placed
clamps	Hold the specimen still whilst it is being viewed
light source	Illuminates the specimen
objective lens	Magnifies the image of the specimen
eyepiece lens	Magnifies the image of the specimen
course/fine focus	Used to focus the specimen so it can be seen clearly
revolving nosepiece	Holds 2 or more objective lenses

Magnification

We can use the following equation to calculate the magnification of an object viewed through a microscope:

$$magnification = \frac{image\ size}{actual\ size}$$

Using a microscope

To view an object down the microscope we can use the following steps:

1. Plug in the microscope and turn on the power
2. Rotate the objectives and select the lowest power (shortest) one
3. Place the specimen to be viewed on the stage and clamp in place
4. Adjust the course focus until the specimen comes into view
5. Adjust the fine focus until the specimen becomes clear
6. To view the specimen in more detail repeat the process using a higher power objective

Preparing a microscope slide

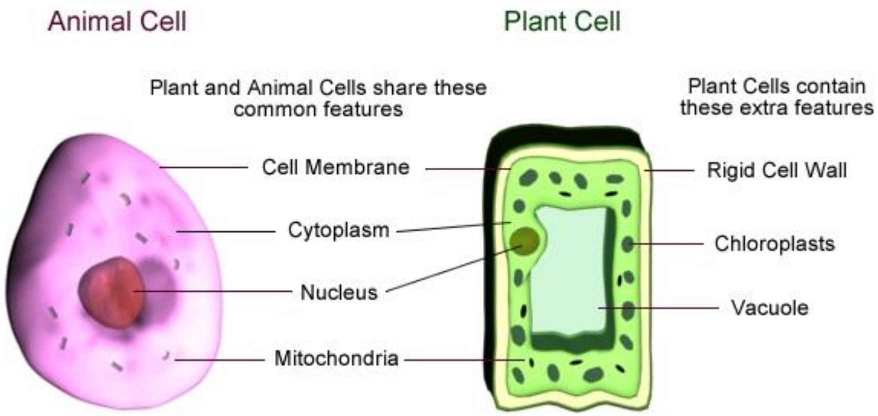
To prepare a slide to view onion cells we can use the following steps:

1. cut open an onion
2. use forceps to peel a thin layer from the inside
3. spread out the layer on a microscope slide
4. add a drop of iodine solution to the layer
5. carefully place a cover slip over the layer

Year 7 Biology Knowledge Organiser – Pg 7
Topic 4: Cells

Cells

Cells are the building blocks of all living organisms

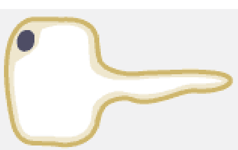
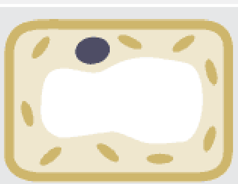


Plant and animal cells

Key Terms	Definition
cell wall	Made of cellulose, which strengthens the cell
cell membrane	Controls movement of substances into and out of the cell
cytoplasm	Jelly-like substance, where chemical reactions happen
nucleus	Contains genetic information and controls what happens inside the cell
vacuole	Contains a liquid called cell sap, which keeps the cell firm
mitochondria	Where respiration happens (glucose + oxygen → carbon dioxide + water)
chloroplast	Where photosynthesis happens (carbon dioxide + water → glucose + oxygen)

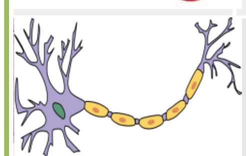
Specialised plant cells

Specialised cells are found in multicellular organisms. Each specialised cell has a particular function within the organism.

Type of cell		Function	Special features
	Root hair cell	To absorb water and minerals	• Large surface area
	Leaf cell	To absorb sunlight for photosynthesis	• Large surface area • Lots of chloroplasts

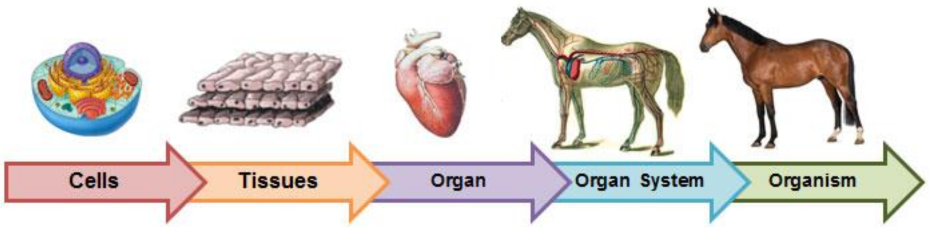
Specialised animal cells

Specialised cells are found in multicellular organisms. Each specialised cell has a particular function within the organism.

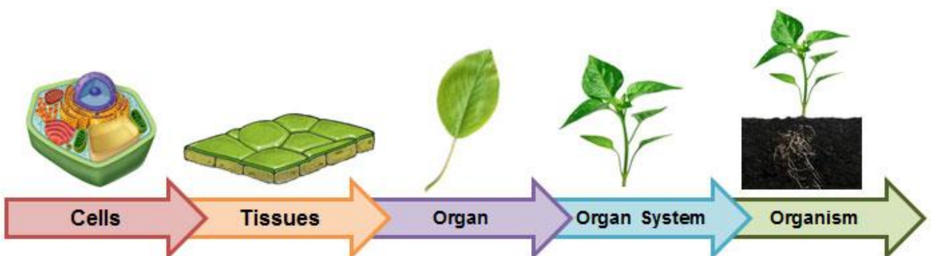
Type of cell		Function	Special features
	Red blood cells	To carry oxygen	• Large surface area, for oxygen to pass through • Contains haemoglobin, which joins with oxygen • Contains no nucleus
	Nerve cells	To carry nerve impulses to different parts of the body	• Long • Connections at each end • Can carry electrical signals
	Male reproductive cell (sperm cell)	To reach female cell, and join with it	• Long tail for swimming • Head for getting into the female cell

Year 7 Biology Knowledge Organiser – Pg 8
Topic 5: Structure and function

Hierarchical organisation
Cells are the building blocks of life. In multicellular organisms, cells rarely work alone.



Muscle cells | Muscle tissue | Heart | Circulatory system | Horse



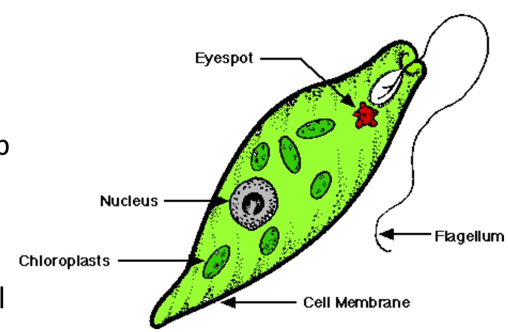
Palisade cells | Mesophyll tissue | Leaf | Shoot system | Rose

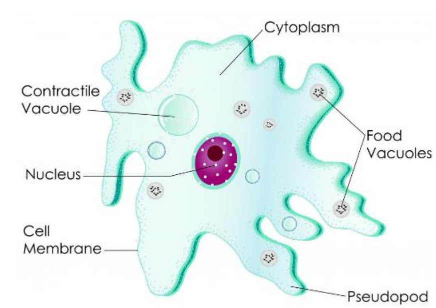
Key Terms	Definitions
cell	The building block of life and the smallest structural unit of an organism
tissue	A group of specialised cells working together to perform a particular function
organ	A group of tissues working together to perform a particular function
organ system	A group of organs working together to perform a particular function
organism	An individual life form, can be multicellular or unicellular
multicellular	Consisting of many cells
unicellular	Consisting of just one cell
diffusion	The random movement of particles from a high concentration to a lower concentration

Unicellular Organisms
Unicellular organisms are made up of just one cell. There are no tissues, organs or organ systems. Unicellular organisms have structural adaptations to help them survive.

Euglena are a unicellular organism. They have a flagellum (tail) to help them move and chloroplasts so they can make their own food.

Amoeba are also unicellular organisms. They form pseudopods (false feet) that let them move about and can surround food so that the cell can take it in.





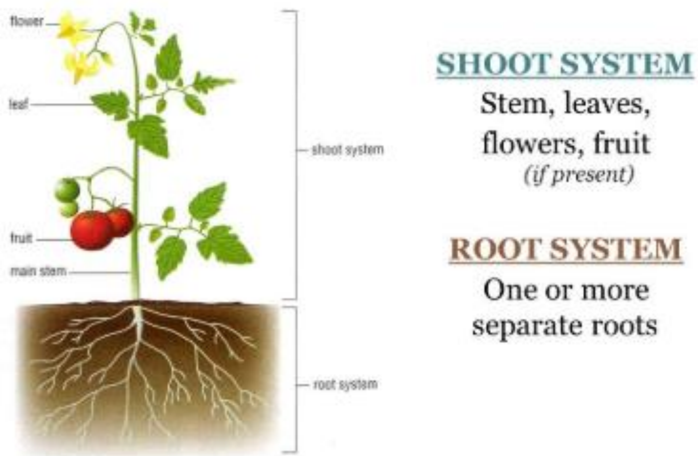
Year 7 Biology Knowledge Organiser – Pg 9
Topic 5: Structure and function

Plant structures

There are three main plant tissues:

1. Dermal tissue – the outer covering of the plant
2. Vascular tissue – used for transport in the plant
3. Ground tissue – for photosynthesis, storage and support

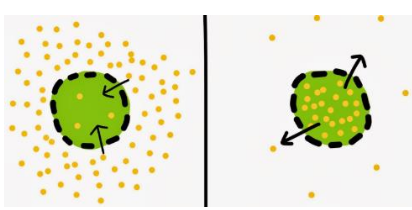
These tissues work together in the organs (roots, stems, leaves and flowers) and the organs work together in two organ systems.



Diffusion across membranes

Diffusion is the movement of particles from an area of higher concentration to an area of lower concentration.

In organisms diffusion has to happen to ensure useful substances are transferred into cells and waste substances are removed.

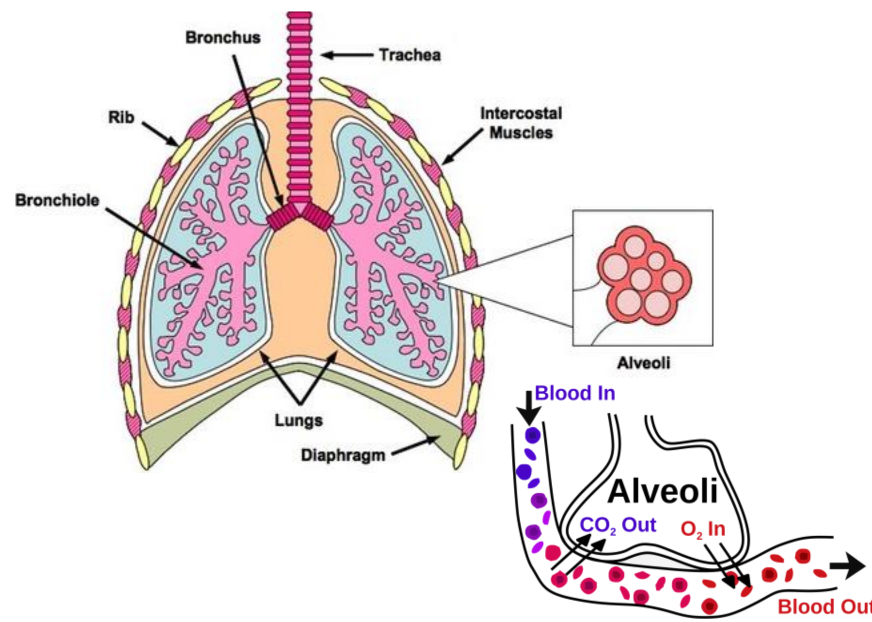


The respiratory system

The respiratory system is responsible for taking in oxygen and expelling carbon dioxide. The lungs are the organ where this gas exchange occurs. They are made up of many fine air tubes called bronchioles, which terminate in alveoli. Here oxygen diffuses into the bloodstream and carbon dioxide diffuses out.

Lungs are adapted for the diffusion of gases as they have:

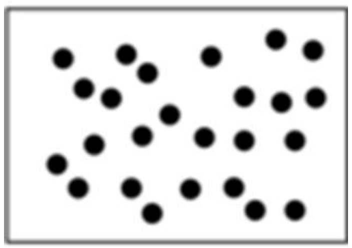
1. Lots of alveoli to provide a huge surface area
2. Lots of capillaries to provide a rich blood supply
3. Moist alveoli walls as gases diffuse in solution
4. Thin alveoli walls are so the gases do not have far to diffuse.

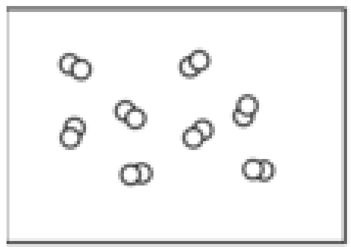


Year 7 Chemistry Knowledge Organiser – Pg 10
Topic 6: Fundamental Chemistry

Elements

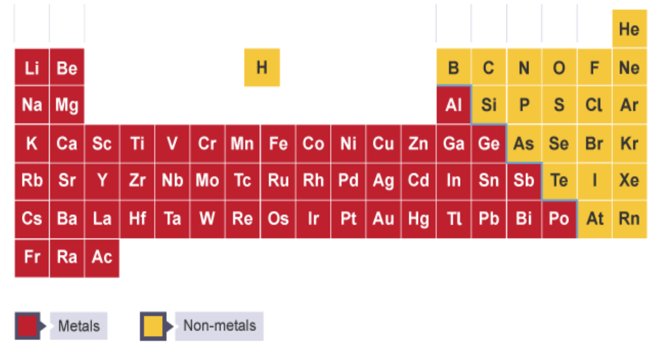
- Elements are substances made up of one type of atom.
- All 118 elements are found listed in the Periodic Table.
- The atoms in an element can either be found individually or in pairs.
- Elements that form pairs are called diatomic elements.





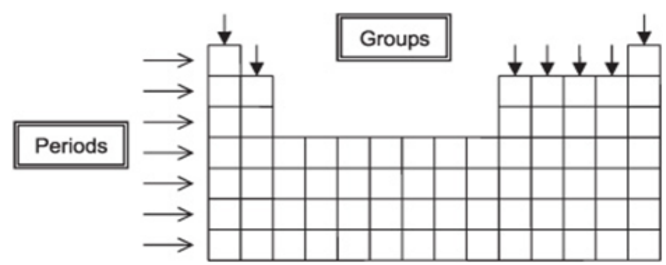
The Periodic Table

All the different elements are listed in the Periodic Table. The elements are arranged in order of increasing atomic number.
On the Periodic Table, the metal elements are on the left and non metal elements are on the right, with the exception of hydrogen.



Groups and Periods

Elements are arranged on the periodic table in groups and periods. Horizontal rows are called periods and vertical columns are called groups.



Group Number – tells us the number of electrons on the outer shell. Period Number – tells us the number of shells an atom has.

Groups are labelled 1-7 from left to right, with last group being called either group 8 or 0. Elements in the same group have similar properties.

Chemical formulae

We use chemical symbols to stand for the elements.

For example, **C stands for carbon**, **S stands for sulfur** and **Na stands for sodium.**

For a molecule, we use the chemical symbols of all the atoms it contains to write down its formula. For example, the formula for **carbon monoxide is CO.**

It tells you that each molecule of carbon monoxide is made of one carbon atom joined to one oxygen atom.

Be careful about when to use capital letters. For example, **CO** means a molecule of carbon monoxide but **Co is the symbol for cobalt** (an element).

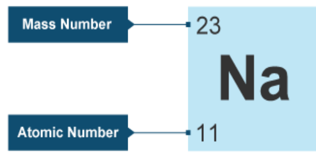
Year 7 Chemistry Knowledge Organiser – Pg 11
Topic 6: Fundamental Chemistry

Atomic Number and Mass Number

Sodium

This is the total of protons + neutrons

This is the number of protons



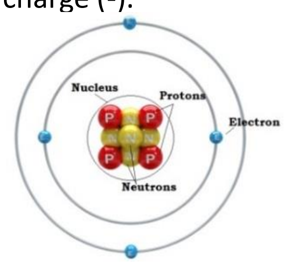
Electrons are not included in the mass number because they have hardly any mass.

To find the number of:

- Protons – look at the atomic number e.g. Na has 11 protons
- Electrons – are equal to the number of protons in an atom e.g. Na has 11 electrons
- Neutrons – take away the atomic number from the mass number e.g. Na has 12 neutrons

Structure of the Atom

- An atom is made up of three subatomic particles: protons, electrons and neutrons.
- Protons are in the nucleus and have a positive charge (+).
- Neutrons are in the nucleus and have no charge.
- Electrons are in the shells and have a negative charge (-).
- Protons and neutrons are the same mass, where electrons have hardly any mass.
- Atoms have no charge overall because they contain equal numbers of protons (+) and electrons (-).



Key Terms	Definitions
atom	smallest particle of an element
atomic number	The number of protons in an atom
mass number	The total number of protons + neutrons in the nucleus

Electron Configuration/Electronic Structure

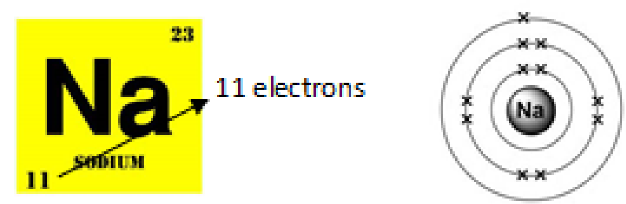
There are very strict rules about how electron fill up the electron shells, the inner shell is always filled first. Each shell has a maximum number of electrons it can take.

Shell 1: maximum 2 electrons

Shell 2: maximum 8 electrons

Shell 3: maximum 8 electrons

Example:



The electronic configuration of Sodium (Na) can also be written like this:

Na (2,8,1)

This shows there are 2 electrons in the 1st shell, 8 electrons in the second shell and 1 electron in the 3rd shell.

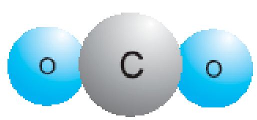
Year 7 Chemistry Knowledge Organiser – Pg 12
Topic 6: Fundamental Chemistry

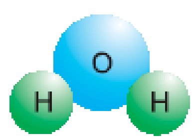
Compounds

- Compounds are substances made up of different elements which are chemically bonded.
- Compounds are formed by chemically reacting elements together e.g.:

Magnesium + oxygen → magnesium oxide
(Element) (Element) (Compound)

- Often, the compound formed has different properties to the elements that make it e.g. magnesium is a shiny metal, oxygen is a colourless gas and magnesium oxide is a white powder
- In order to separate the elements in a compound you would need to carry out another chemical reaction.
- Compounds are still pure because although they contain different atoms those atoms are bonded to make one particle
- Examples of compounds are:
  - Carbon dioxide (CO_2)
  - Water (H_20)
  - Anything else that has more than one element

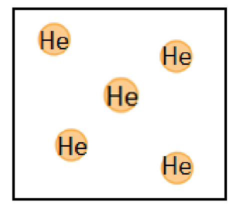


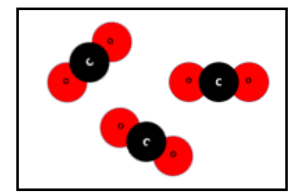


Key Terms	Definitions
pure	A substance that contains only one type of atom or molecule
impure	A substance that contains more than one type of atom or molecule
element	A substance made up of just one type of atom
compound	A chemical substance made of 2 or more different elements chemically bonded together
molecule	A particle made from a few atoms chemically bonded together

Pure Substances

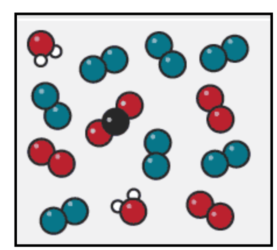
A pure substance is made up of only one type of atom or molecule with nothing else mixed in e.g. just helium atoms or just carbon dioxide molecules.





Impure Substances

Impure substances are mixtures of different atoms or molecules e.g. air as it contains oxygen, water, nitrogen and carbon dioxide amongst other substances.

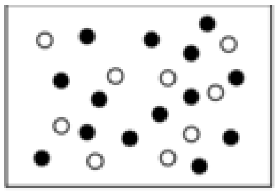


Year 7 Chemistry Knowledge Organiser – Pg 13
Topic 7: Separation

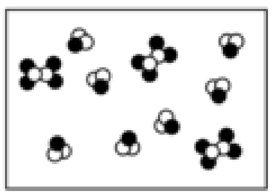
Mixtures

A mixture contains different elements or compounds that are not chemically joined to each other. There are three types of mixture:

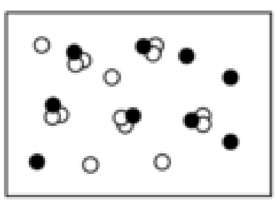
1. A mixture of elements:



2. A mixture of compounds:



3. A mixture of elements and compounds:

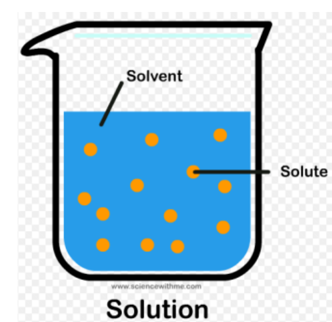


- Mixtures contain more than one substance, so they are impure.
- Mixtures can be easily separated because the substances are not bonded together and therefore a chemical reaction is not required.

Key Terms	Definitions
mixture	A substance made up of different elements or compounds that are not chemically bonded to each other
solute	The substance that dissolves into the solvent
solvent	The liquid that the solute dissolves into
solution	The substance formed when a solute dissolves into a solvent
solubility	The measure of how easily a substance dissolves
soluble	Able to dissolve in a solvent
insoluble	Not able to dissolve in a solvent

Solutions

- A solution is made up of a liquid in which a substance is dissolved.
- The liquid part of the solution is called the solvent. Water is the most common solvent as it is readily available.
- The substance that has dissolved into the solvent is called the solute e.g. salt
- When the solute dissolves into the solvent, a solution is made e.g. salt water
- Salt is described as soluble, because it dissolves into the solvent
- A substance that will not dissolve into a solvent is described as insoluble e.g. sand

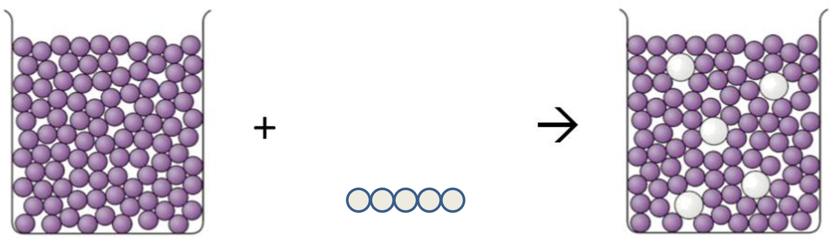


Year 7 Chemistry Knowledge Organiser – Pg 14
Topic 7: Separation

Key Terms	Definitions
dissolving	When solvent particles surround solute particles, so they are spread out
saturated solution	A solution in which no more solute can dissolve
evaporation	A method for separating a dissolved substance from the liquid
filtration	A method for separating an insoluble solid from a liquid

Dissolving

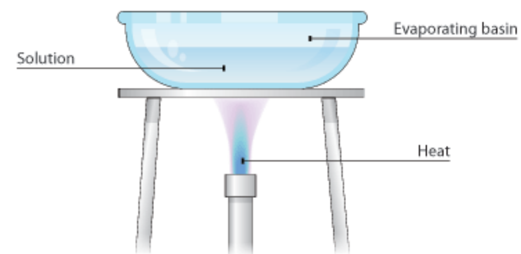
- During dissolving, the solvent particles surround the solute particles and move them apart, so they are spread out in the solvent.
- This is how a solution is made.



Solvent Solute Solution

Evaporation

- If you have a solution in which a solute is dissolved, for example salt water, the water can be evaporated to leave you with pure salt.
- This is done by using a Bunsen Burner to heat the solution inside an evaporating basin.

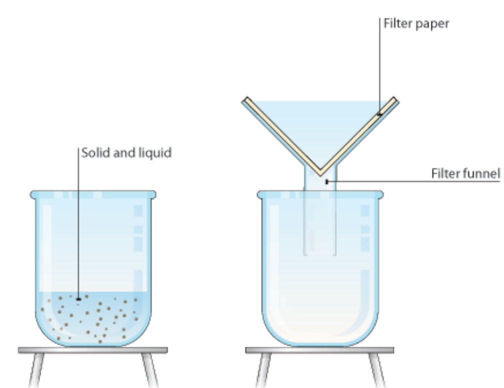


Saturated solutions

- When no more solute can dissolve in a solvent, we say the solution is saturated.
- However, more solute will be able to dissolve if the solvent is heated. This is because solubility increases with a higher temperature.
- This happens because the solvent particles are moving slightly faster, as they have more energy. This means there is more space for solute particles to fit in.
- Different solvents have different solubilities.
- Mass is always conserved. For example if 5 grams of solute are dissolved in 100 grams of solvent, the mass of the solution will be 100 + 5= 105 grams.

Filtration

- This is a good method of separation for when an insoluble solid is mixed with water e.g. sand and water.
- The mixture is poured through folded filter paper inside a funnel.
- The insoluble solid is trapped in the filter paper and the liquid passes through into the beaker.



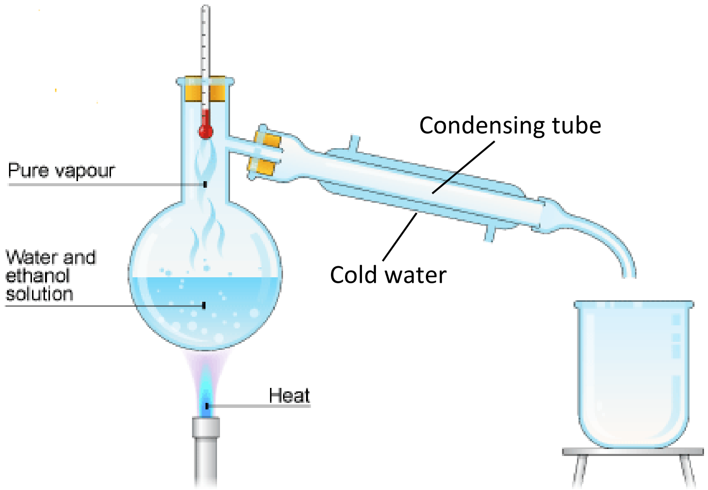
Year 7 Chemistry Knowledge Organiser – Pg 15
Topic 7: Separation

Key Terms	Definitions
distillation	A method for separating the parts of a liquid solution according to their boiling point.
chromatography	A method for separating mixtures of compounds according to their solubilities in a solvent.

Distillation

- This is used for separating a mixture of liquids, e.g. ethanol and water
- Different liquids have different boiling points e.g. ethanol has a lower boiling point than water
- Distillation separates liquids according to their boiling points:

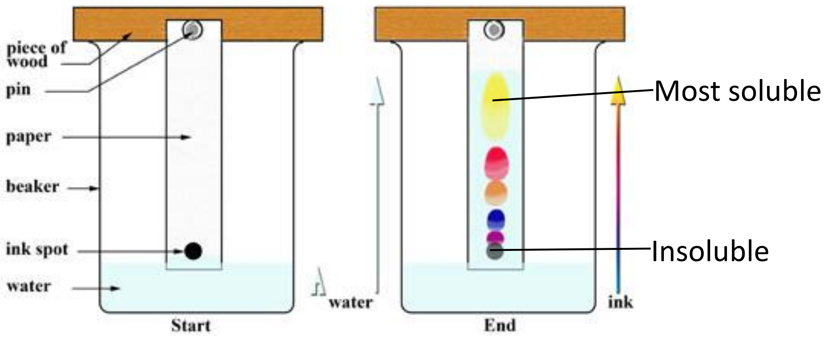
1. The mixture of liquids is heated in the round flask
2. The liquid with the lower boiling point (ethanol in this example) will evaporate first, turning into a gas
3. It passes through the condensing tube which is surrounded by cold water, so the gas condenses back into liquid form
4. It drips into the beaker
5. The liquid with the higher boiling point (water in this example) is left in the round flask because it is not hot enough yet to evaporate.



Chromatography

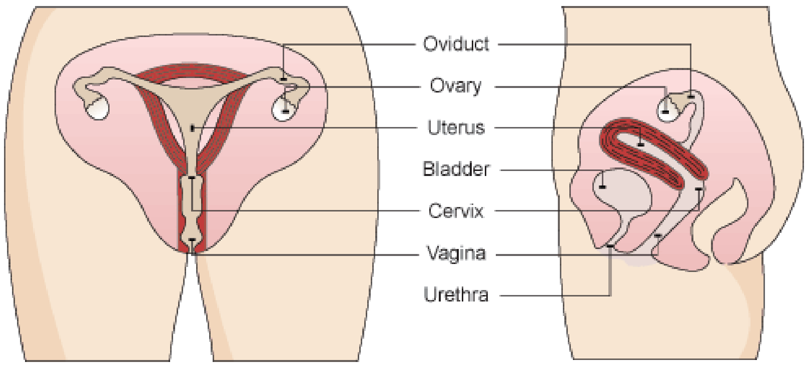
- Chromatography is used to separate the compounds in a mixture according to how soluble they are in a solvent
- It uses chromatography paper dipped in the solvent as follows:

1. A spot of the mixture, for example ink, is placed near the bottom of the paper
2. The paper is dipped in the solvent e.g. water, so that the spot is just above the water level. If the spot goes in the water, it will run.
3. The compounds that are most soluble travel with the solvent up the paper.
4. The compounds that are insoluble will stay in the same place.
5. In this way, the compounds are separated according to their solubility in the solvent



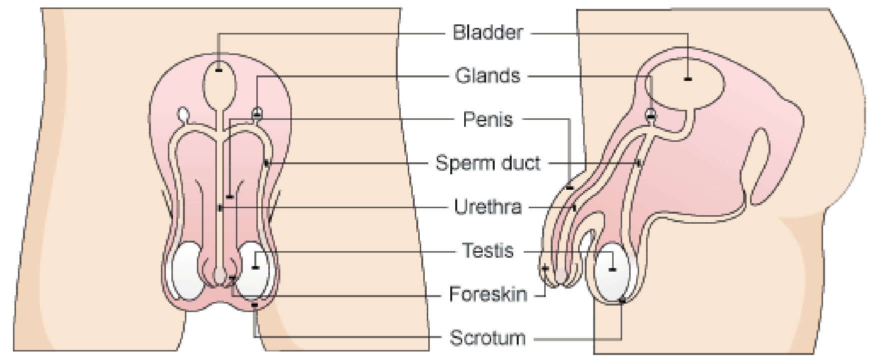
Year 7 Biology Knowledge Organiser – Pg 16
Topic 8: Reproduction

Female reproductive system



Parts of Female Reproductive System	Functions of the part
Ovary	The organ where eggs (ova) are produced and where they mature ready for release each month
Oviduct	The small tube leading from each ovary to the uterus – the egg travels along here and fertilisation happens here. Also known as fallopian tube.
Uterus	The organ where an embryo grows into a foetus and eventually a baby
Uterus lining	Inside wall of the uterus where the fertilised egg implants
Cervix	A ring of tissue between the uterus and vagina; this helps keep a foetus in place in the uterus during pregnancy and dilates during labour
Vagina	The organ that is entered by the penis during sexual intercourse; this is also part of the birth canal

Male reproductive system



Parts of Male Reproductive System	Functions of the part
Testes	The organ where sperm cells are made
Scrotum	The skin that holds the testes
Sperm ducts	The tubes that carry sperm from the testes to the urethra
Glands	These add liquids, including nutrients for the sperm, to the sperm cells from the testes to make semen
Urethra	The tube that carries either urine or semen out of the body through the penis
Penis	The organ that enters the vagina during sexual intercourse
Foreskin	The skin that protects the end of the penis

Year 7 Biology Knowledge Organiser – Pg 17
Topic 8: Reproduction

The menstrual cycle

The menstrual cycle prepares the female body for pregnancy by causing eggs (ova) to mature and be released. It lasts on average for 28 days.

Days 1-5
- ‘period’ happens (menstruation), where uterus lining breaks down.

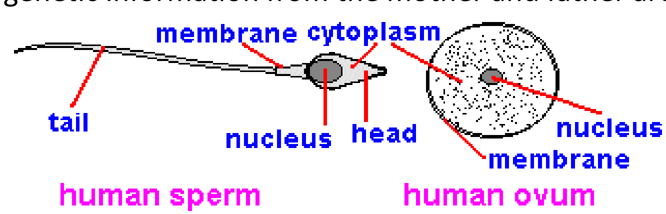
Days 6-13
- Uterus lining builds up (thickens) to prepare for pregnancy. The egg (ovum) matures in the ovary

Day 14
- Egg (ovum) released from the ovary and travels down the oviduct

Days 15-28
- Uterus lining stays thick, in case the egg is fertilised

Fertilisation

Ejaculation is when many sperm cells are released into the female reproductive system during sexual intercourse. The sperm will move towards the ovum in the oviduct. The head of one sperm cell will break through the cell membrane of the ovum and the nuclei of the sperm and ovum fuse – this is fertilisation – and an embryo is formed. The genetic information from the mother and father are combined.



Key Terms	Definition
fertilisation	When the nuclei of the sperm and the ovum fuse
gestation	The time it takes for the baby to develop in the womb. This is 40 weeks in humans.
birth	When the baby leaves the womb.
menstrual cycle	A series of events that prepares the female body for pregnancy.
menstruation	When the lining of the uterus is removed from the body. Also known as the period.
foetus	The name given to the baby developing in the uterus.

Gestation

After fertilisation of an ovum a woman is pregnant. The embryo grows as cells divide and ciliated cells in the oviduct help it to move to the uterus.
The embryo implants into the uterus wall, where is gets oxygen and nutrients from the mother’s blood. As it grows bigger and cells become specialised, we call it a foetus. It grows a placenta and umbilical cord.
At the placenta, the foetus gets oxygen and nutrients from the mother’s blood (but their blood does NOT mix). The foetus gets rid of waste like carbon dioxide into the mother’s blood too. The placenta also acts as a barrier to some microbes & drugs

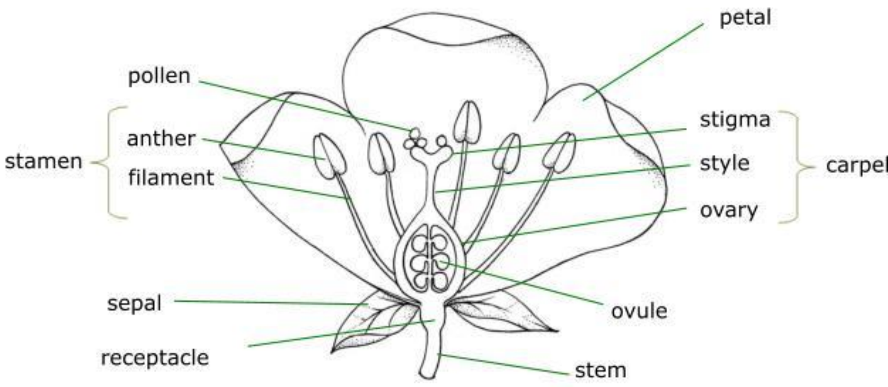
Stages of birth

1. The muscles in the wall of the uterus contract (contractions). These contractions get stronger and faster this is labour
2. After some time of labour, the amniotic sac breaks, which releases the fluid (the waters break)
3. Contractions push the baby headfirst through the birth canal – through the cervix and out through the vagina
4. After the baby is born the placenta will detach from the uterus and leave the body through the vagina (the afterbirth)

Year 7 Biology Knowledge Organiser – Pg 18
Topic 8: Reproduction

Plant reproductive system

In flowering plants there are several structures that allow reproduction to happen effectively:



Parts of plant Reproductive System	Functions of the part
Pollen	The male gamete (sex cell)
Stigma	Structure that the pollen sticks to
Style	Connects the stigma to the ovary
Ovary	Produces and stores ovules
Ovule	The female gamete (sex cell)
Anther	Produces the pollen
Filament	Holds the anther to the edge of the flower

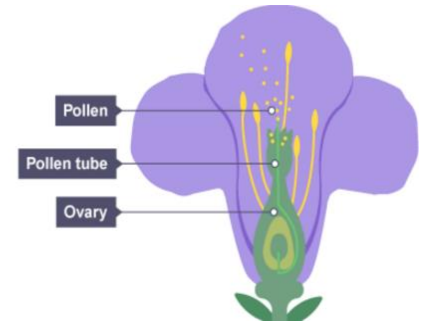
Pollination

Pollination is the transfer of pollen from the anthers of one flower to the stigma of another flower (of the same species).

- In wind pollination, the wind carries the pollen from the anthers of one flower to the stigma of another
- In insect pollination, insects carry the pollen from anthers to stigmas. They go to flowers to get nectar for food (e.g. bees), and the pollen sticks to them so they carry it onwards.

Fertilisation

After pollination the pollen makes a pollen tube down the style to the ovary. The nucleus of the pollen cell travels down the tube to get to the ovum (egg cell) – when the cells join, this is fertilisation. The cell made when the pollen and ovum fuse will become a seed, which can become a new plant. Plants then form fruits, often from the ovary walls.



Seed dispersal

The plant spreads the seeds out – this is called seed dispersal – so their offspring don't compete with them for light or soil nutrients. Seeds can be dispersed in many ways:

- Animals – they eat the fruit and release the seeds in their waste e.g tomatoes or they stick to an animals fur e.g burdock
- Wind – for example sycamore seeds
- Water – for example coconuts, sea beans

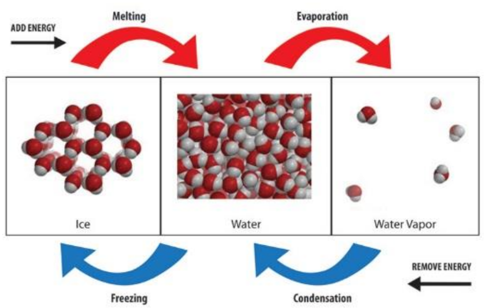
Year 7 Chemistry Knowledge Organiser - Pg 19
Topic 9: Chemical Reactions

Key terms	Definition
physical change	A change in the arrangement of the particles but not in their atomic structure (the electrons do not move). No new chemicals are formed.
chemical change	A change in the atomic structure (electrons move). New chemicals are formed.
conservation of mass	The total mass of the products in a reaction is equal to the total mass of the reactants. The total number of each atom is the same before and after the reaction.

Physical Change

In a physical change there is no change to atomic structure of the atoms (the electrons do not move) but there is a change in the arrangement of the particles. The matter's physical appearance is different after a physical change.

For example, when water is heated from solid ice to liquid water to gaseous steam the appearance is changed but ice, water and steam all have the chemical formula - H_2O.



Chemical Change

A chemical change involves the formation of one or more new substances due to a change in atomic structure. Different elements or compounds are present at the end of the chemical change.

We can observe reactions to see whether or not a chemical change has taken place, signs of chemical changes could be:

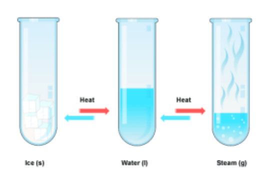
1. A colour change
2. Gas being made
3. An apparent increase or decrease in mass
4. Formation of a new solid

Conservation of Mass

In both chemical and physical changes, mass is conserved. This means that the mass we start with must be the same as the mass that we end with. You cannot make or destroy atoms.

Example of a physical change.

If you start with 10 grams of ice, this will melt to make 10 grams of water which would evaporate to make 10 grams of steam:



10g 10g 10g

Example of a chemical change:

For example if you start with 2 grams of hydrogen and 16 grams of oxygen, you will make 2 + 16 = 18 grams of water

Hydrogen + Oxygen → Water

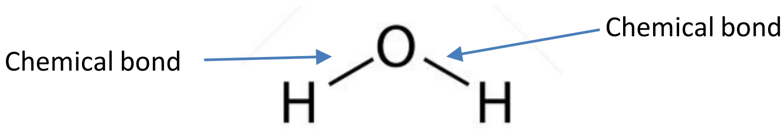
2 g 16 g 18 g

Year 7 Chemistry Knowledge Organiser – Pg 20
Topic 9: Chemical Reactions

Key terms	Definition
chemical bond	A chemical bond is a strong attraction between atoms.

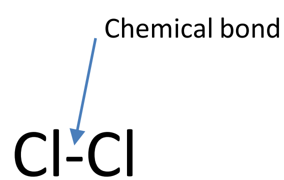
Chemical bonds

A chemical bond is a strong attraction between atoms. Chemical bonds can only be broken in chemical reactions. Below shows a diagram of the bonding in water:



In water we say there is a chemical bond between the hydrogen and oxygen atom. Chemical bonds are strong and to break them requires energy.

Chemical bonds can also exist between atoms of the same element. For example a chlorine atom is always bonded to another chlorine atom.



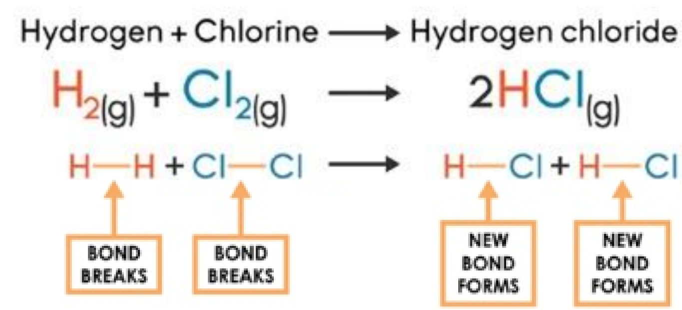
Word and Symbol equations

To represent chemical reactions we use word and symbol equations. These equations always have the reactants on the left and the products on the right:

Reactants → Products
Hydrogen + Oxygen → Water
$H_2 + O_2 \rightarrow H_2O$

Chemical reactions

The chemicals that you start with in a reaction are called the reactants. The chemicals that you end with in a reaction are called the products. In a chemical reaction chemical bonds in the reactant particles are broken and new bonds in the products are made.



Chemical Formulae

To show how many atoms are bonded together in an element or a compound, scientists use chemical formulae.

A small number after an element symbol, tells you how many of that type of atom are in the substance.

For example: Cl_2 This means that there are 2 chlorine atoms chemically bonded together.

For example: H_2O This means there are 2 hydrogen atoms and 1 oxygen atom, chemically bonded together.

For example Fe_2O_3 This means that there are 2 Iron and 3 oxygen atoms, chemically bonded together.

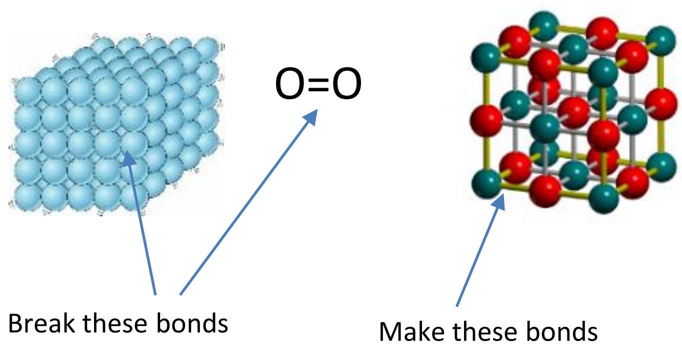
Year 7 Chemistry Knowledge Organiser – Pg 21
Topic 9: Chemical Reactions

Key terms	Definition
metal oxide	A compound where a metal is bonded to an oxygen.
oxidation	A reaction where one of the reactants forms a bond with an oxygen atom
decomposition	A reaction where one substance breaks down into 2 or more substances

The reaction of metals with oxygen

Metals react with oxygen to make metal oxides. For example magnesium reacts with oxygen to make magnesium oxide. This can also be written as a word equation:

Magnesium + Oxygen → Magnesium Oxide



In this reaction the bonds between the magnesium atoms and the oxygen atoms are broken. Bonds are then formed between the magnesium and the oxygen atoms.

We call these chemical reactions oxidation reactions, as the magnesium has gained oxygen.

A combustion reaction where we burn fuels in oxygen is also an oxidation reaction.

Fossil fuel + oxygen → carbon dioxide + water

E.g. methane + oxygen → carbon dioxide + water

Decomposition Reactions

In some chemical reactions one substance can break down to form two new substances. We call these reactions decomposition reactions.

An example of a decomposition reaction is when hydrogen peroxide (formula H_2O_2) breaks down into water and oxygen.

Hydrogen peroxide→ Water +Oxygen

H-O-O-H → H-O-H + O=O

Break these bonds   Make these bonds

<u>Using state symbols in chemical equations</u>

When looking at reactions we also need to include state symbols to explain what is happening to the elements involved in the reaction.

(s) – shows that the element or compound is a solid

(l) – shows that the element or compound is a liquid

(g)- shows that the element or compound is a gas

(aq)- shows that the element or compound is aqueous. This means dissolved in water.

An example of how we show the state symbols is,

Sodium***(s)*** + Water***(l)*** → Sodium Hydroxide***(aq)*** + Hydrogen***(g)***

Year 7 Physics Knowledge Organiser – Pg 22
Topic 10: Forces

Forces

A force can be a push or a pull. You can not see forces, you can only see the changes to objects that they cause.

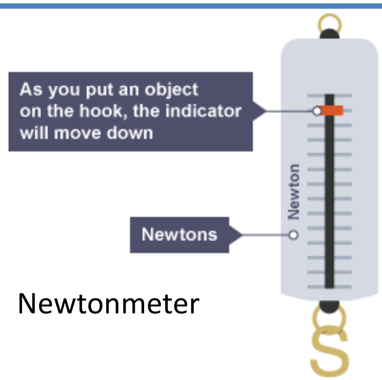
When a force is applied to an object it can lead to:

- A change in speed (acceleration)
- A change in the object's direction of movement
- A change in the object's shape (squash or stretch the object).

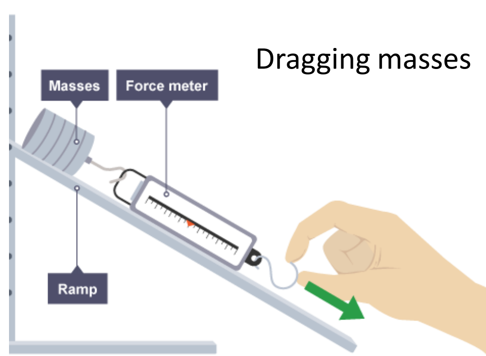
Forces can also be divided into 2 types, contact forces and non contact forces.

1. Contact forces act between objects that are touching. Examples: friction, normal contact force, thrust, upthrust, air resistance (drag). Friction acts whenever an object is moving through a fluid (a fluid is a liquid or gas), or when one solid surface is moving along another solid surface.
2. Non-contact forces act between objects even if they are NOT touching. Examples: gravity, weight, magnetic force.

The unit of force is the newton (N). This is named after Sir Isaac Newton, who developed a theory of gravity and showed how forces affect objects.



Newtonmeter



Dragging masses

Key Terms	Definitions
force	An interaction between two objects that pulls the objects together or pushes them apart.
newton	The unit for force
newtonmeter	A piece of equipment that can be used to measure the size of the force
contact force	A force acting between objects that are physically touching
non-contact force	A force acting between objects that are NOT physically touching
weight	The force pulling an object towards the centre of the Earth, due to gravity.
gravity	The force between any two objects. We only notice gravity's pull if the objects are very large, like the Earth.
upthrust	The upwards force produced by objects pushing down on fluids (liquids and gases).
normal contact force	The push force produced on objects when they push on something solid. Also called 'reaction'.

Measuring the size of forces

The laboratory equipment for measuring forces is also named after Sir Isaac Newton: the newtonmeter (see diagram).

To measure the size of frictional forces on different surfaces you can drag masses along the different surfaces and record how much force is required. For this experiment :

- Independent variable: Type of surface
- Dependent variable: Force
- Control variable: Mass

Year 7 Physics Knowledge Organiser – Pg 23
Topic 10: Forces

Force Arrows

Forces have a size and a direction. This means we show forces with arrows.
- The length of the arrows shows how large the force is.
- The direction the arrow points shows the direction the force pushes or pulls.

Diagrams that show the forces acting on objects, using arrows, are called free body force diagrams.

Resultant force

The resultant force acting on an object is the single force *resulting* from all the separate forces acting on it. In other words, the resultant force is the single overall force.

To find resultant force:
- Add up forces acting in the same direction
- Subtract forces acting in opposite directions.

If the forces are equal in size and opposite in direction, the forces are balanced and the resultant force is 0 N. In all the free body force diagrams to the right, the forces are balanced. If the forces are not equal in size, they are unbalanced and the resultant force is NOT 0 N.

Resultant forces cause the changes to objects described on the last page.

We will focus on changes to speed:
1. If the resultant force on an object is 0 N, the object's speed does not change. This means it is stationary (still) OR keeps going at a constant speed.
2. If there is a resultant force on an object, its speed will change. It will accelerate or decelerate.
3. Knowing the resultant force does not tell you which way an object is moving. It just tells you that the speed will change.
4. A LARGER resultant force is needed to accelerate an object at a higher acceleration. Also, a larger resultant force is needed to accelerate heavier objects.

Newton's second law

Point 4. above is shown in Newton's second law: this equation –

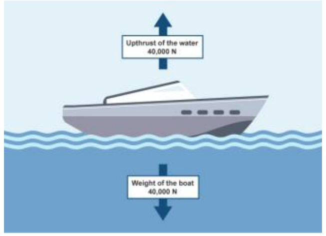
$$F_R = m \times a$$

Where F_R is the resultant force measured in newtons,
m is the mass of the object measured in kilograms,
a is the acceleration of the object measured in metres per second per second (m/s/s).

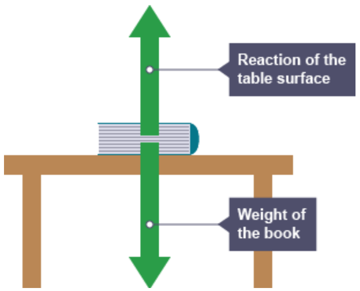
Free Body Force Diagrams

Learn the forces and their directions for each force on these free body force diagrams:

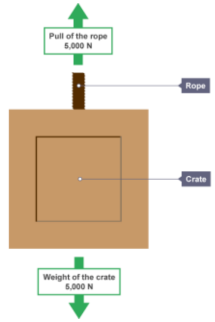
A boat floating



A book on a desk



A crate held up by a rope



Forces and Energy

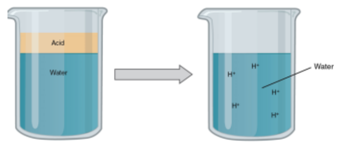
When forces are acting on an object, it causes a transfer in the store of energy.

Example to know: when a push force is applied to a moving object, the energy changes store from kinetic energy to thermal energy. This is because the push force is working against friction, and friction causes objects to warm up.

Year 7 Chemistry Knowledge Organiser – Pg 24
Topic 11: Acids and Bases

Acids

- Acids are a family of chemicals. Examples are lemon juice, vinegar, Coca Cola and hydrochloric acid in our stomachs.
- Acids contain H^+ ions, when dissolved in water. H^+ ions are formed from hydrogen atoms which have lost an electron.



- Strong acids like hydrochloric acid are very corrosive. This means they destroy skin cells and cause burns.
- Weak acids like vinegar are safe to eat but are still irritant to sensitive parts of the body.

Bases and Alkalis

- Bases are a family of chemicals which neutralise acids (more on neutralisation on the next page)
- Alkalis are a type of base. Therefore all alkalis are bases.
- Alkalis dissolve in water and contain hydroxide ions.
- An example of an insoluble base and a base which is an alkali are summarised below:

	Copper oxide	Sodium hydroxide
Can it neutralise acids?	Yes	Yes
Is it a base?	Yes	Yes
Can it dissolve in water?	No	Yes
Is it an alkali?	No	Yes

Indicators

- Indicators are chemicals that show, using colours, whether a substance is an acid or an alkali
- There are many examples of indicators: for example, litmus paper and universal indicator
- There are also natural indicators like red cabbage

Key Terms	Definitions
acid	A substance which forms H^+ ions when dissolved
alkali	A soluble base that contains hydroxide ions when dissolved
base	A substance that will neutralise an acid
the pH scale	A scale which measure how acidic a substance is
indicator	A chemical which will change colour depending on the acidity of the substance

Safety

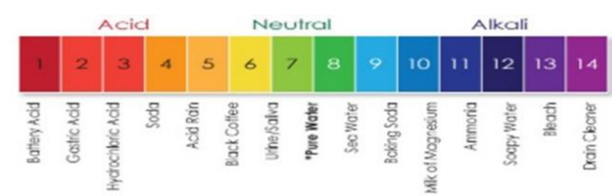
- When handling acids and alkalis in the lab we need to take many safety precautions for example wearing goggles.
- Acids can be irritants and cause redness or blistering of the skin.
- Some acids are corrosive and will destroy skin cells.


Hazard Symbol for irritant


Hazard Symbol for Corrosive

The pH Scale

- The pH scale measures how strong an acid or alkali is by measuring the concentration of H^+ ions. The *lower* the number the higher the concentration of H^+ ions.
- The pH scale runs from 0-14
- Acids have a pH between 0 and 7. Strong acids have a pH from 0-3; weak acids from 3-7.
- Alkalis have a pH between 7 and 14. Weak alkalis have a pH between 7 and 10, strong alkalis are pH 10 to 14.
- Anything with a pH of exactly 7 is neutral. For example: water.



Year 7 Chemistry Knowledge Organiser – Pg 2555
Topic 11: Acids and Bases

Neutralisation
- When an acid reacts with a base a neutralisation reaction occurs, making products with a pH of 7.
- When a neutralisation reaction happens the products are a salt and water. (See below for how to name a salt)
- There are many examples of neutralisation reactions, for example a wasp sting is alkali so we add vinegar (an acid) to it to neutralise it.
- Farmers also spread alkalis onto fields to neutralise the acid in the soil.
- Another example is indigestion when there is too much acid in our stomach, we neutralise this with alkali tablets

Salts
- When a neutralisation reaction happens a salt is produced
- Salts are compounds with a metal part and a non-metal part. The metal part is from the base and the non-metal part depends on the acid used.
- Hydrochloric acid makes chloride salts
- Nitric acid make nitrate salts
- Sulphuric acid makes sulphate salts

Base Used	Acid Used	Salt Produced
Calcium hydroxide	Hydrochloric acid	Calcium Chloride
Magnesium oxide	Nitric acid	Magnesium Nitrate
Calcium carbonate	Sulphuric acid	Calcium Sulphate
Aluminium hydroxide	Nitric acid	Aluminum Nitrate
Potassium hydroxide	Sulphuric acid	Potassium Sulphate

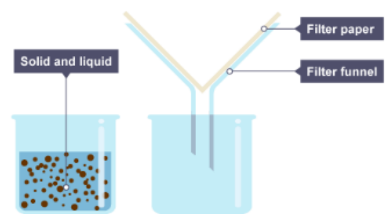
Key Terms	Definitions
neutralisation	A reaction in which an acid and an alkali make a salt and water
reactant	Chemical at the start of a chemical reaction
product	Chemical made in a chemical reaction
soluble	Will dissolve in water
insoluble	Does not dissolve in water

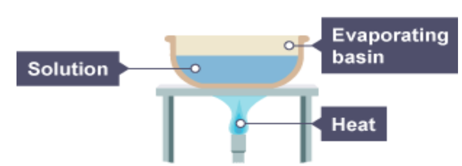
Chemical Reactions in General
- In chemical reactions, what we start with is know as the reactants and what we make is known as the products.
- We can show reactants and products in a word equation

Acid +Alkali → Salt + Water

Reactants Products

Soluble and Insoluble Salts
- Salts made in a neutralisation reaction may be soluble or insoluble.
- Insoluble salts can be separated using filtration
- Soluble salts dissolve in water and can be separated using evaporation





Three types of neutralisation reaction	
Reactants	**General equation**
acid and alkali	acid + alkali → salt + water
acid and metal carbonate	acid + metal carbonate→ salt + water + carbon dioxide
acid and metal oxide	acid + metal oxide → salt + water

Year 7 Biology Knowledge Organiser – Pg 26
Topic 12: Variation

Variation

- Differences between living things of the same species are called variation. It can be caused by environmental or genetic factors, or both

	Plant examples	Animal examples
Inherited variation	Length of anthers	Eye colour
Environmental variation	Hydrangeas produce blue flowers in acidic soil and pink in alkaline soil	Muscle strength due to training
Variation caused by a **combination** of genes and environment	Height is the result of genes **and** nutrition	Skin colour is the result of genes **and** weather

Key Terms	Definition
variation	Differences in the form, function or behaviour between organisms of the same species
inherited variation	Differences which are controlled by an organism's genes (they are inherited from the parents), e.g. eye colour
environmental variation	Differences which are controlled by an organism's environment, e.g. flower colour in hydrangeas
adaptations	Characteristics which help organisms to survive in their environment
prevalent	Occurs frequently (is common)
advantageous	Will make the individual more likely to survive in their environment
migration	Moving from place to place – usually for reasons of climate or breeding
camouflage	Patterns or colouring which make an animal blend in with its surroundings
habitat	Where an organism lives

Adaptation

- Some organisms are born with advantageous characteristics. These characteristics are called adaptations. Individuals with adaptations will survive and the adaptations will become more prevalent.

Some examples of adaptations in plants:

The Venus flytrap has leaves which are stimulated to close when insects land on them. They release enzymes which digest the trapped insect and absorb its nutrients.

Cacti have long, shallow roots, so that they can collect as much water as possible, as soon as it rains in their dry, desert habitat.

Some examples of adaptations in animals:

The arctic tern is a bird which migrates from the Arctic in the summer, to the Antarctic in the winter. They do this for breeding, and because of differences in temperature.

Phylliidae (leaf-insects) have evolved to look exactly like leaves. This camouflage protects them from predators.

Year 7 Biology Knowledge Organiser – Pg 27
Topic 12: Variation

Key Terms	Definition
continuous variation	Differences which can take any value, e.g. height
discontinuous variation	Differences which can only take particular values, e.g. blood groups

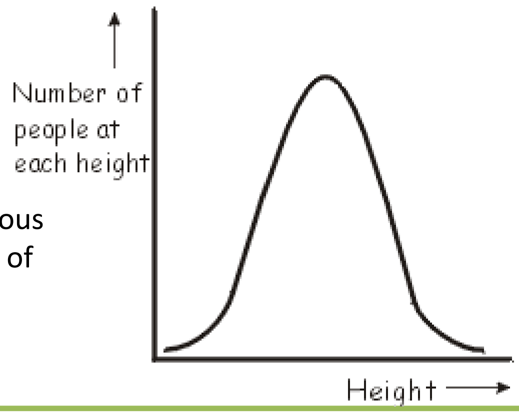
Continuous variation

- Variation which can take any value within a range
- Usually continuous variation is due to a combination of environmental and inherited variation
- Examples are as follows:

Plant examples	Animal examples
Height Size of leaves	Height Skin colour/fur colour Size of horns

Line graphs

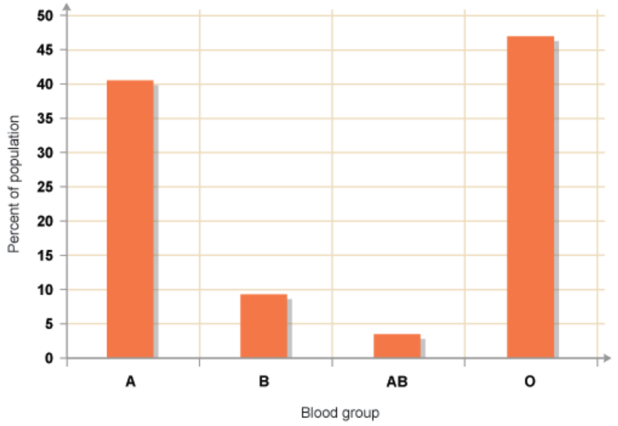
- Because it falls on a continuous spectrum (is uninterrupted), continuous variation is represented using line graphs, such as this one for height
- This graph shows that middle heights are most prevalent
- This is called a bell curve because of its shape. Most continuous variation has this shape of distribution



Discontinuous variation
- Variation with discrete (separate) categories
- Physical, discontinuous variation is usually inherited
- Examples are as follows:

Plant examples	Animal examples
Flower colour e.g. pea plants have either white or red flowers	Eye colour Blood group Lobed or lobe-less ears

Bar graphs
- Because of its discrete categories, discontinuous variation is represented using bar graphs, such as this one for blood group
- The taller the bar, the more prevalent the characteristic
- This bar graph shows that blood group O is the most prevalent



Year 7 Physics Knowledge Organiser – Pg 28
Topic 13: Power and Resources

Energy and power

Energy can be stored in objects or transferred between them. The speed, or rate, at which energy is transferred is called the power. Divide the amount of energy transferred by the time it took to transfer it to find the power (see equation).

This means that if the same amount of energy is transferred in half the time, the power is twice as much.

Fuels as Energy Resources

Fuels store chemical potential energy. Many fuels are used a great deal by humans, including fossil fuels:

- Oil – used to make petrol/diesel/aircraft fuel especially
- Coal – burned in power stations to generate electricity
- Natural gas – used as a fuel for heating homes and for cooking.

These are all very useful fuels, but the problem is that they are non-renewable and when they are burned, carbon dioxide is produced. Carbon dioxide contributes to climate change because it is a greenhouse gas.

Other Energy Resources

We don't have to use fossil fuels for the uses given above. There are many other energy resources on Earth, including many renewable resources. E.g.

- Sunlight, which we can use to generate electricity with solar cells
- Wind, which can be used to generate electricity using wind turbines
- The tides, which can be used to generate electricity
- Waves in the sea, which can be used to generate electricity.

Key Terms	Definitions
power	Power is the **rate** (or speed) of energy transfer. $power(W) = \frac{energy\ transferred\ (J)}{time\ (s)}$
joule (J)	The unit for energy
watt (W)	The unit for power
kilowatt (kW)	1000 watts
renewable	Renewable resources are replenished (replaced) as they are used.
non-renewable	Non-renewable resources, like fossil fuels, are NOT replenished (replaced) as they are used.
environmental impact	The effects of something on the environment.

Choosing energy resources

Many things should be considered to choose an energy resource:

- The reliability of the energy resource
- The usefulness of the energy resource
- How long the resource lasts, and if it is renewable
- The environmental impact of the energy resource.

For example:
Tidal energy is very reliable, as there are two tides per day. Tidal energy is useful for generating electricity, but you couldn't use it to run your car! Tidal energy is renewable, which is an advantage, because it cannot be used up. Using tidal energy does not produce polluting gases like carbon dioxide, but building the generators in the sea can damage the habitats of wildlife near the coast.

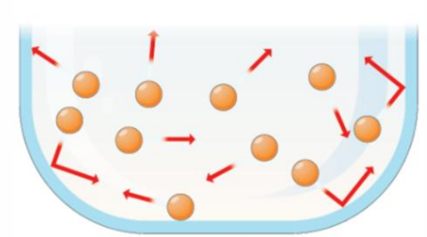
Year 7 Physics Knowledge Organiser – Pg 29
Topic 14: Pressure

Key Terms	Definitions
pressure	The force exerted over a given area
fluids	A substance that can flow
pascal	The unit for pressure which can also be written as (N/m^2)

Equation	Meanings of terms in equation
$P = \dfrac{F}{A}$	*P = Pressure (Pa)* *F = Force (N)* *A = Area (m^2)*

Gas Pressure

Gas pressure is caused by gas particles colliding with the walls of the container. A container also experiences pressure on the outside. Air particles on the outside collide with the outside wall.



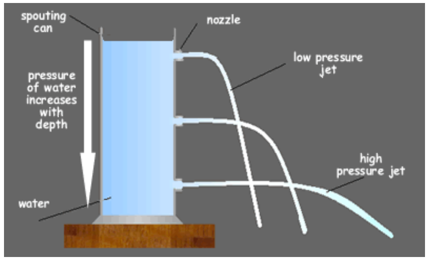
Gas particles hit the walls of their container and cause pressure

There are 3 factors affecting gas pressure:

1. Number of particles:
The more gas particles inside the container, the more often collisions will occur, creating a higher pressure.
2. Temperature:
If gas particles are heated up, they move with a higher speed and collide more often with the walls of the container, causing a higher pressure.
3. Volume:
If the same amount of gas particles are put into a container of a smaller volume, pressure will increase because particles will collide more frequently with the walls when they have less space.

Pressure in fluids

Fluids (liquids or gases) exert pressure at 90˚ to the surface. Particles are constantly colliding with objects, this exerts pressure. In a liquid like water, the deeper you go, the higher the pressure.



Pressure on surfaces

Objects exert pressure on the surface that they are on. The size of the pressure depends on the force applied by the object and area over which the force acts.
Pressure is calculated by dividing force by area.
Some objects function by increasing pressure, for example drawing pins have a very low area over which the force acts so exert a high pressure.
Snowshoes have a very large area over which the force acts so exert a very low pressure, stopping people sinking into the snow.