Fir Vale School

KS3 (Y7, Y8, Y9)

Get Ready

Revision Pack

Year 8 Pack

Please use this pack to revise for everything you have studied during Term 1-5.

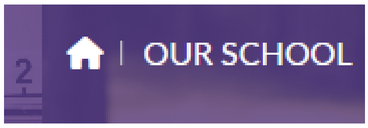
The end of year examinations will take place from Monday 2nd until Friday 13th of June.

If you have any questions regarding this pack come and see Mr.Darazkan or send an email to mdarazkan@firvale.com

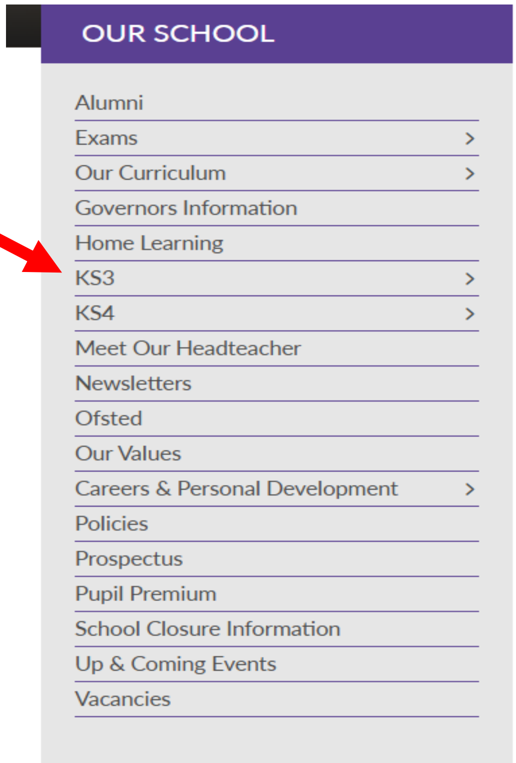
How to find your subjects Knowledge Organisers on Fir Vale School Website

1- Go to https://www.firvale.com/

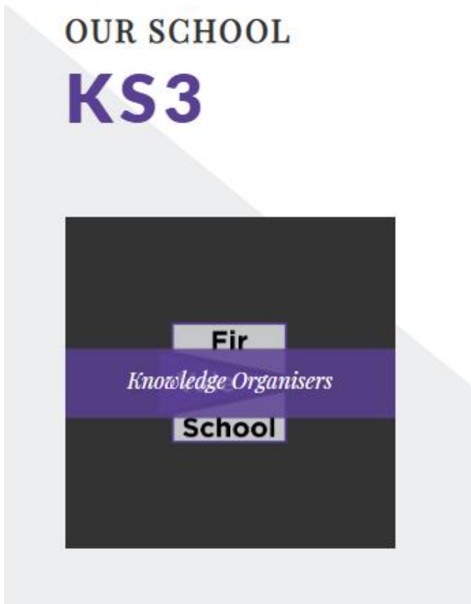
2- Click on the tab 'Our School'.



3- Click on 'KS3' tab



4- Click on 'Knowledge Organisers'.



5- Click on the relevant Knowledge organiser for your year group.

OUR SCHOOL

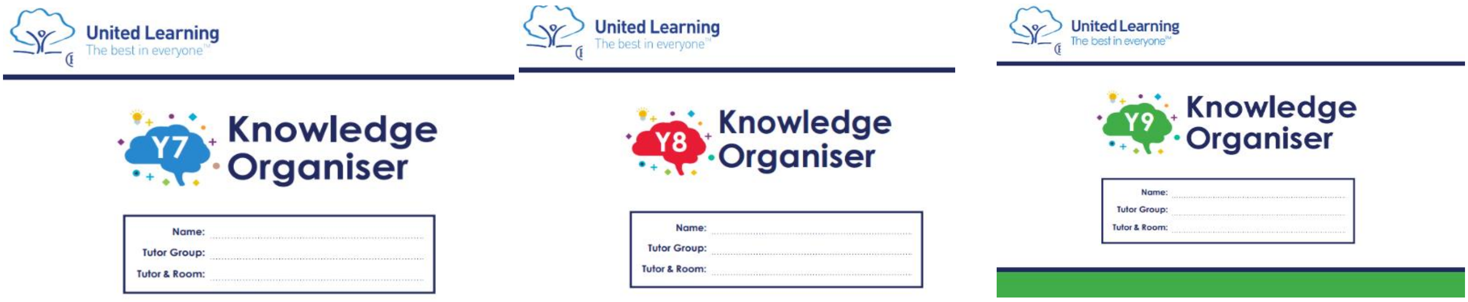
KNOWLEDGE ORGANISERS

UNITED LEARNING KNOWLEDGE ORGANISER YEAR 7

UNITED LEARNING KNOWLEDGE ORGANISER YEAR 8

UNITED LEARNING KNOWLEDGE ORGANISER YEAR 9

6- Once you open the file then you will need to find the subject that you would like to revise for.



7- Find the subjects that you would like to revise for in the content table and then scroll down to find the relevant Knowledge Organiser.

Contents

Maths Year 8 End of Year Assessment Topics		Sparx
Powers and Roots	Use integer powers and associated real roots (square, cube and higher), recognise powers of 2, 3, 4, 5 and distinguish between exact representations of roots and their decimal approximations	M135, M608
Prime Factorisation	Use the concepts and vocabulary of prime numbers, factors (or divisors), common factors, prime factorisation, including using product notation and the unique factorisation property (HCF and LCM with large numbers taught in 9.04)	M322, M823, M108, M365, M227, M698
Rounding	Round numbers and measures to an appropriate degree of accuracy [for example, to a number of decimal places or significant figures]	M111, M431, M994, M131, M878
Fractions	Multiply and divide fractions and mixed numbers	M939, M410, M671, M601, M835, M931, M157, M197, M110, M265
Solving Equations 1	Use algebraic methods to solve linear equations in one variable (including all forms that require rearrangement). Model situations or procedures by translating them into algebraic expressions or formulae and by using graphs	M707, M509, M387, M554, M813, M795, M531, M957
Coordinates and basic graphs	Coordinates and developing algebraic relationships	M618, M622, M797
Units of measurement	Use standard units of mass, length, time, money, and other measures, including with decimal quantities	M892, M627, M515, M772, M530, M761, M728
Angles in parallel lines	Understand and use the relationship between parallel lines and alternate and corresponding angles	M818, M163, M606, M351, M679, M393
Circumference	Calculate and solve problems involving perimeters of 2-D shapes (including circles) and composite shapes	M595, M169
Direct Proportion	Understand that a multiplicative relationship between two quantities can be expressed as a ratio or a fraction	M478, M681
Fractions, decimals, and percentages	Converting between fractions, decimals, and percentages.	M267, M958, M264, M553
Percentage Calculations	Solve problems involving percentage change (calc and non calc), including: percentage increase, decrease, original value problems and simple interest in financial mathematics. Using multipliers. Writing numbers as percentages of other numbers.	M235
Ratio 1	Divide a given quantity into two parts in a given part:part or part:whole ratio; express the division of a quantity into two parts as a ratio	M885, M543, M267, U921, M801, M525
Area of circles and trapezia	Derive and apply formulae to calculate and solve problems involving area of circles (including part circles) and trapezia	M705, M231, M430, M303, M269, M996
Statistics 1 (presenting and interpreting data)	Construct and interpret appropriate tables, charts, and diagrams, including frequency tables, bar charts, pie charts, vertical line (or bar) charts and stem and leaf for ungrouped and grouped numerical data	M945, M460, M738, M140, M183, M574, M165, M648, M210
Averages and Spread	Describe, interpret and compare observed distributions of a single variable through appropriate measures of central tendency (mean, mode, median) and spread (range, consideration of outliers).	M940, M934, M328, M841, M440

How do I revise for my next English assessment?

This sheet will help you understand what kind of questions you will get in your next English test. It will also give you links to on line videos and quizzes you can try at home to help you revise.

The best way to revise for any test is to make sure you are always doing your Sparx Reader homework. It gives you short pieces of a story to read and answer questions on, which is exactly what you will be doing in your next English test!

Punctuation and Grammar- In the test you will be asked to correct sentences using capital letters, commas and full stops in the right place. Use this quiz to test how good you are at punctuation!

Sentence types- In the next test, you will be asked about different types of sentences and how we might use them. Use this link that will show you a video and a quiz on what the different types of sentences are!

This video will guide you through verbs, nouns, adjectives and adverbs. You will need to know these for the test. Use this link to find the video: https://youtu.be/7zRih61HCZs

This video will guide you through similes, metaphors and personification. You will need to know these for the test. Use this link to find the video: https://youtu.be/NegoYIuXoEA

Photosynthesis

Photosynthesis

- Plants make their own food (for energy) in a process called **photosynthesis**.
- Photosynthesis helps keep:
  - levels of oxygen high;
  - levels of carbon dioxide low.

- Photosynthesis takes place in the **chloroplasts.**
- Chloroplasts contain **chlorophyll** which absorbs the energy transferred by light waves for photosynthesis

The equation for photosynthesis is:

carbon dioxide + water → glucose + oxygen

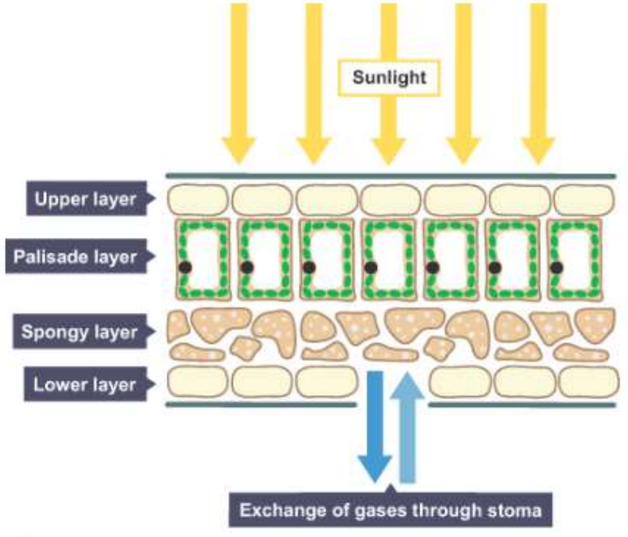
These are the things that plants need for photosynthesis:

- **carbon dioxide** – absorbed through their leaves;
- **Water** - from the ground through their roots;
- **light** (a source of energy) - from the Sun.

These are the things that plants make by photosynthesis:

- **Oxygen** - released into the air from the leaves;
- **Glucose**:
  - turned into **starch** and plant oils, used as an energy store;
  - This energy is released by **respiration**;
  - Used to make **cellulose** for cell walls.

Feature of plant leaf	Function
Thin	Short distance for carbon dioxide to diffuse into the leaf
Waxy Layer	Prevents water loss by **evaporation**
Palisade cells	Contain a lot of **chloroplasts** to absorb light
Chloroplasts contain chlorophyll	Absorbs light
Stomata	Allows carbon dioxide to diffuse into the leaf (and oxygen to diffuse out)
Guard cells	Open/close stomata depending on conditions
Network of tubes (xylem & phloem)	Transports water (xylem) and food (phloem)

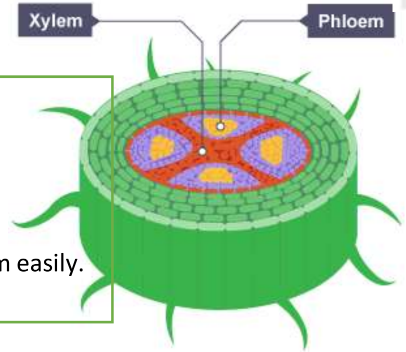


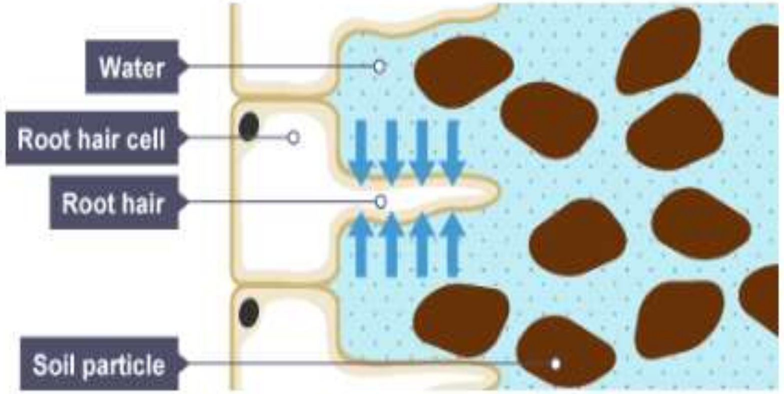
A cross-section through a leaf showing its main parts

Plants and photosynthesis

Water

- Water is absorbed through the roots, by **osmosis**;
- It is transported through tubes (**xylem**) to the leaf;
- The roots contain cells called a **root hair cells:**
  - They increase the **surface area**
  - They have **thin walls to** let water pass into them easily.
  - They **do not** contain chloroplasts.





Water is absorbed into the roots by a process called **osmosis**, which does not use energy.
Minerals are absorbed into the roots by a process called **active transport,** which uses energy.

Respiration v photosynthesis

Photosynthesis:

carbon dioxide + water → glucose + oxygen

Aerobic respiration is:

glucose + oxygen → carbon dioxide + water

The equation for photosynthesis is the <u>**opposite**</u> of the equation for aerobic respiration.

- **Photosynthesis**:
  - **produces** glucose and oxygen;
  - **uses** carbon dioxide and water;
- **Respiration**:
  - **produces** carbon dioxide and water;
  - **uses** glucose and oxygen;

Food security and pollination

- **Pollination** is the transfer of pollen from one plant to another;
- Pollen can be transferred by **insects** or by **wind**;
- Insects that pollinate plants help us produce our food.
- Our food supply depends on plants:
  - Our food made of, and from plants;
  - The animals we eat feed on plants.

Carbon dioxide

- Enters leaf by **diffusion** through the **stomata**.
- **Guard cells** control the size of the stomata
- Stomata closes in **hot**, **windy** or **dry** conditions.
- Spongy layer has gaps between cells;
  - Allows carbon dioxide to **diffuse** to other cells in the leaf;
  - Allows oxygen produced in photosynthesis diffuse out of the leaf.

Digestion and Nutrition

Digestion and Nutrition

The 7 nutrients

Nutrient	Use in the body	Good sources
Carbohydrate	To provide energy	Cereals, bread, pasta, rice and potatoes
Protein	For growth and repair	Fish, meat, eggs, beans, pulses and dairy products
Lipids (fats and oils)	To provide energy. Also to store energy in the body and insulate it against the cold.	Butter, oil and nuts
Minerals	Needed in small amounts to maintain health	Salt, milk (for calcium) and liver (for iron)
Vitamins	Needed in small amounts to maintain health	Fruit, vegetables, dairy foods
Fibre	To provide roughage to help to keep the food moving through the gut	Vegetables, bran
Water	Needed for cells and body fluids	Water, fruit juice, milk

Chemical food tests

Nutrient	Chemical test	Positive result
Starch	Iodine solution	Iodine solution turns from orange/brown→ blue black
Sugar	Benedict's solution & heat	Benedict's solution turns from: blue → green /yellow/brick red
Fat	Ethanol & shake, then water & shake	Ethanol turns cloudy white
Protein	Biuret reagent	Biuret reagent changes from blue to purple

<u>Respiration</u>

A chemical reaction that takes place in all living cells to release the energy in food:

Sugar + oxygen → carbon dioxide + water

Energy released from food is used for things like:
- muscle contraction
- keeping warm
- making new cells

Each person needs a different amount of energy depending on factors such as:
- gender (male or female)
- age
- amount of daily activity

Energy in food is measured in **kilojoules**, kJ.

A **balanced diet** contains the right energy intake **and** the correct amounts of necessary nutrients.
An **imbalanced diet** contains too much or too little of a particular nutrient and/or energy.

<u>Nutrient deficiency diseases:</u>
Mineral deficiency diseases are caused when your diet is lacking in a particular mineral:
- iron deficiency causes anaemia, where there are too few red blood cells;
- iodine deficiency can cause a swelling in the neck called goitre.

Vitamin deficiency diseases are caused when you diet is lacking in a particular vitamin:
- vitamin A deficiency can cause blindness;
- vitamin C deficiency causes scurvy, which makes the gums bleed;
- vitamin D deficiency causes rickets, which makes the legs bow outwards in growing children.

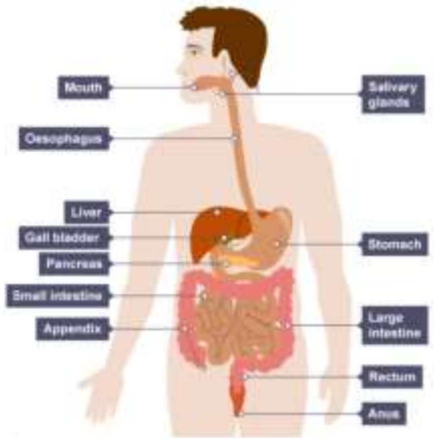
<u>Energy imbalances in diets</u>
If the amount of energy you get from your food is different from the amount of energy you use, your diet will be imbalanced:

- too little food/ energy can make you underweight
- too much food/ energy can make you overweight

Imbalanced energy intake diseases:
Starvation happens if you eat so little food that your body becomes <u>very underweight</u>. This can eventually cause death.

Obesity happens when you eat so much food that your body becomes <u>very overweight</u>. Diseases linked with obesity include heart disease, diabetes, arthritis and stroke.

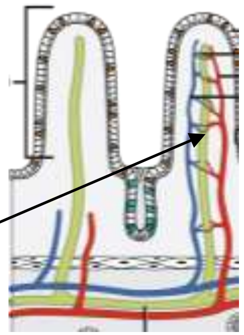
Stages of digestion
- Digestion starts in the **mouth**, where teeth **mechanically digest** food during chewing. **Chemical digestion** begins here when the food mixes with saliva.
- Food is swallowed as passes down the **oesophagus.**
- When food reached the **stomach**, the food continues to be **mechanically digested** when the stomach muscles contract to churn food. **Chemical digestion** also continues when the food mixes with acid and enzymes inside the stomach.
- Most **digestion** happens inside the **small intestine** when the food mixes with **enzymes** and **bile (chemical digestion),** and is moved along the canal by **muscle contractions (mechanical digestion)**
- Digested food is **absorbed** into the bloodstream, by diffusion from the small intestine. Water is reabsorbed into the body in the small intestine
- Undigested food passes out of the anus as faeces.



The role of liver and pancreas
- The liver produces **bile**, which helps the digestion of lipids (fats and oil).
- The pancreas produces biological **catalysts** called digestive **enzymes** which speed up the digestive reactions.

Absorption by diffusion across a surface happens efficiently if:
- the surface is thin;
- its area is large.

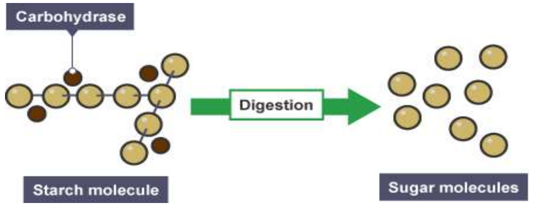
The inner wall of the small intestine is adapted. It has:
- a thin wall, just one cell thick;
- many tiny **villi** to give a really big **surface area.** The villi contain many **capillaries** to carry away the absorbed food molecules.



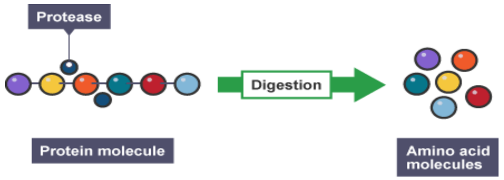
Digestion is when large **insoluble** food particles are broken down into small **soluble** particles so that they can be absorbed into our bloodstream.

This is carried out by **enzymes** - special proteins that can break large molecules into small molecules.

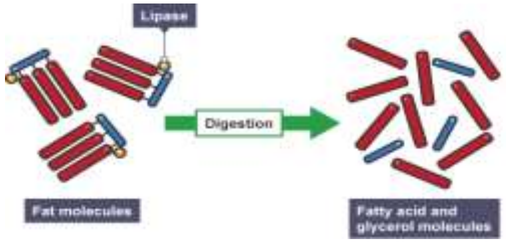
Different enzymes can break down different nutrients:
- **Carbohydrates** (eg starch) are broken down into **sugar** - by **carbohydrase** enzymes



- **Proteins** are broken down into **amino acids** - by **protease** enzymes;



- **Lipids** (ie fats and oils) are broken down into **fatty acids** and **glycerol** - by **lipase** enzymes.



At very high temperatures, these enzymes will be **denatured.**

Digestive enzymes cannot break down dietary fibre, which is why the body cannot absorb it.
Minerals, vitamins and water are not digested, as they are already small enough to be absorbed.

The digestive system contains some good **bacteria** which are important because they:
- can digest certain substances humans cannot digest;
- reduce chance of harmful bacteria multiplying, causing disease;
- produce vitamins that humans need eg vitamins B & K.

Materials and the Earth

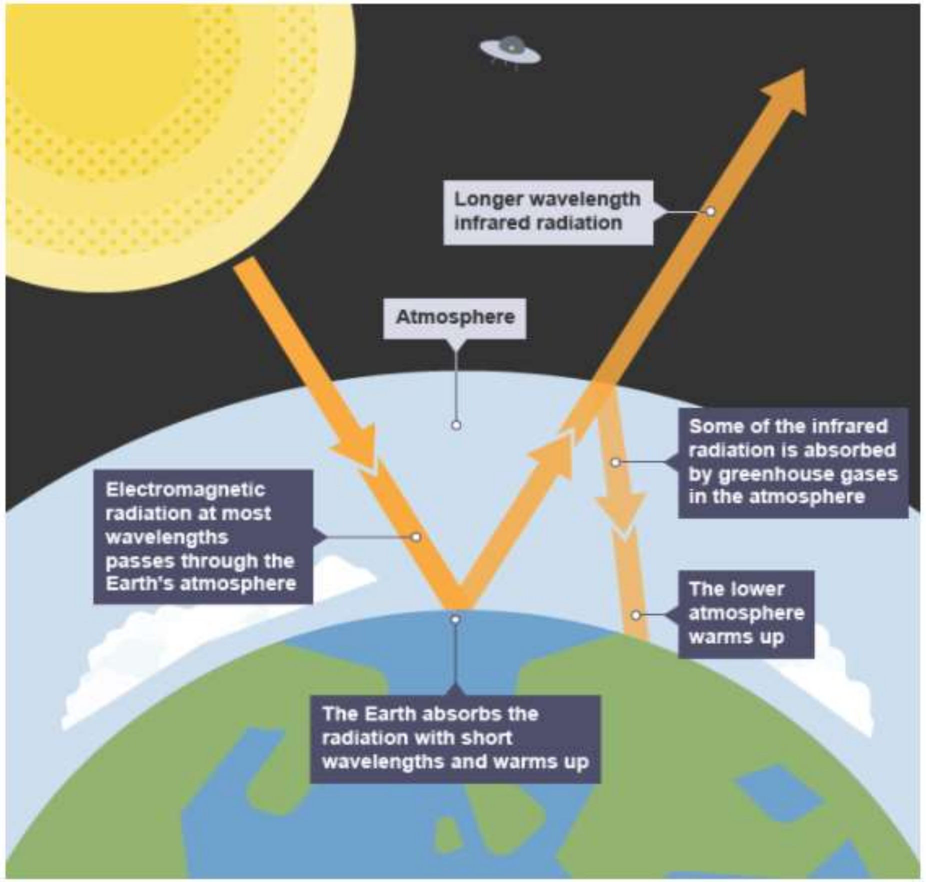
The greenhouse effect

- Thermal energy from the Earth's surface escapes into space;
- If too much thermal energy escaped, the planet would be very cold;
- Greenhouse gases in the atmosphere, trap escaping thermal energy;
- This causes some of the thermal energy to pass back to the surface;
- This is called the greenhouse effect, and it keeps our planet warm;
- Carbon dioxide is an important greenhouse gas.

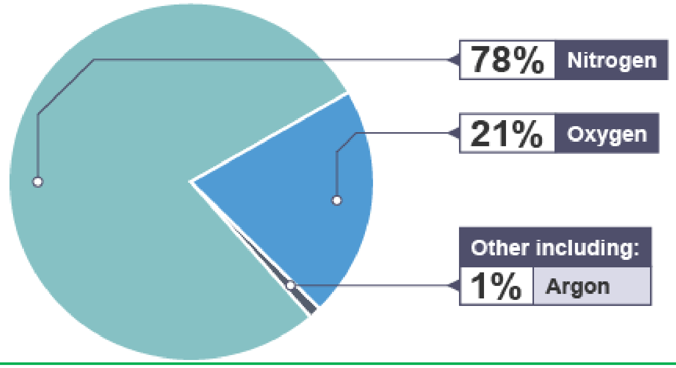
Humans burn fossil fuels which releases carbon dioxide, increasing the greenhouse effect. More thermal energy is trapped by the atmosphere, causing the planet to become warmer than it would be naturally. This increase in the Earth's temperature is called **global warming**.

Climate change and its effects as a result of global warming includes:

- ice melting faster than it can be replaced in the Arctic and Antarctic
- the oceans warming up – their water is expanding and causing sea levels to rise
- changes in where different species of plants and animals can live

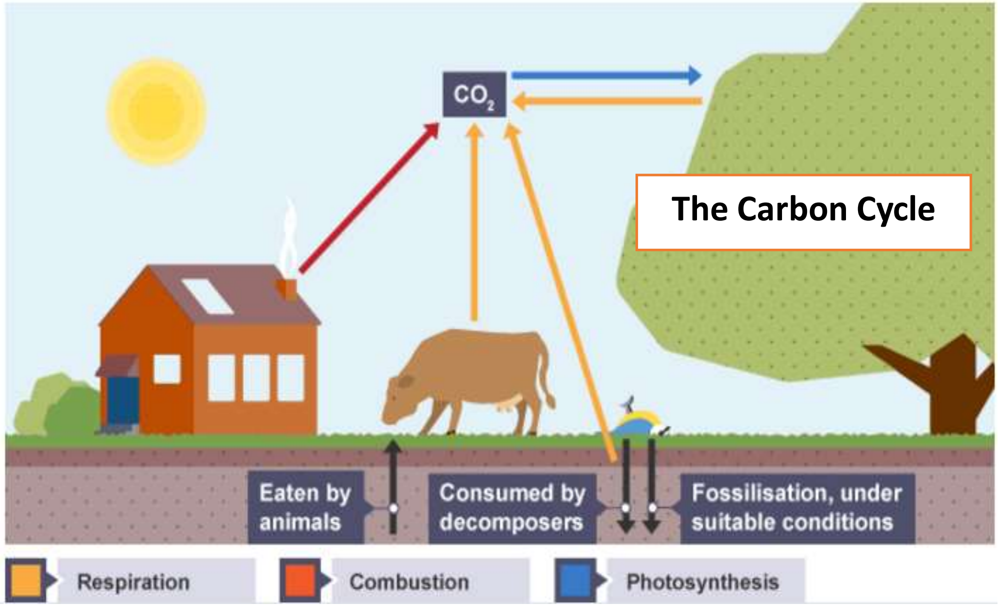


The Earth's atmosphere



Materials and the Earth

The Carbon Cycle



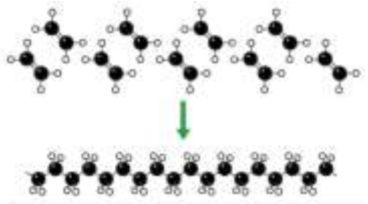
Ceramic materials:

- are solids made by baking a starting material in a very hot oven or kiln
- are hard and tough
- have very many different uses

Brick and pottery are examples of ceramics.

Polymers:

Polymers are made by joining lots of small molecules together to make long molecules.



- The properties of polymers are:
- chemically unreactive
- solids at room temperature
- plastic – they can be moulded into shape
- electrical insulators
- strong and hard-wearing

Polymers are usually chemically unreactive.
Advantage: plastic bottles will not react with their contents.
Disadvantage: they do not rot quickly and they can cause litter problems.

Composites

Composite materials are made from two or more different types of material.
e.g. MDF is made from wood fibres and glue; fibreglass is made from glass fibres and a tough polymer;

Reinforced concrete is a composite material made from steel and concrete. When the concrete sets, the material is:

- strong when stretched (because of the steel)
- strong when squashed (because of the concrete)

8CM Materials and the Earth

Sedimentary rocks
Sedimentary rocks are formed from the broken remains of other rocks that become joined together.

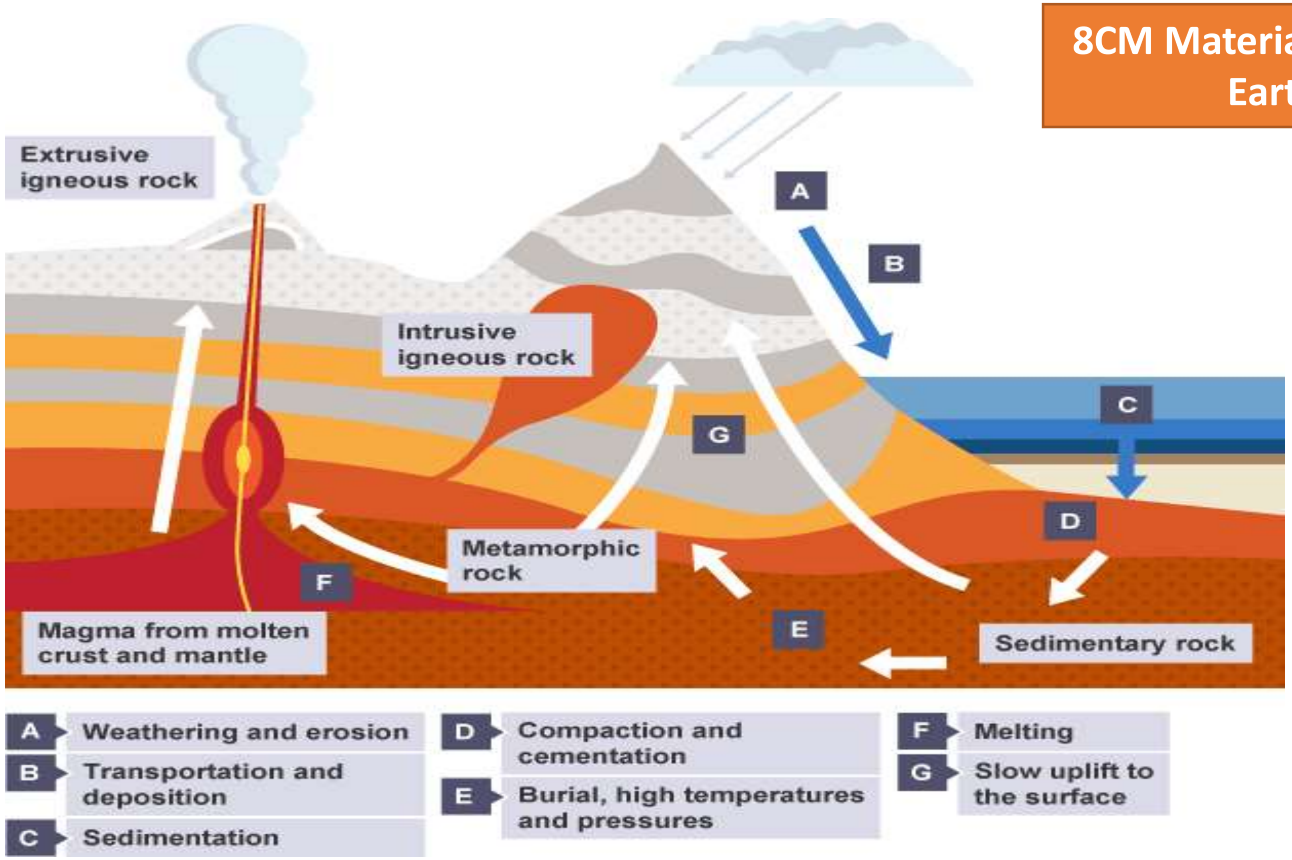
transport → deposition → sedimentation → compaction → cementation

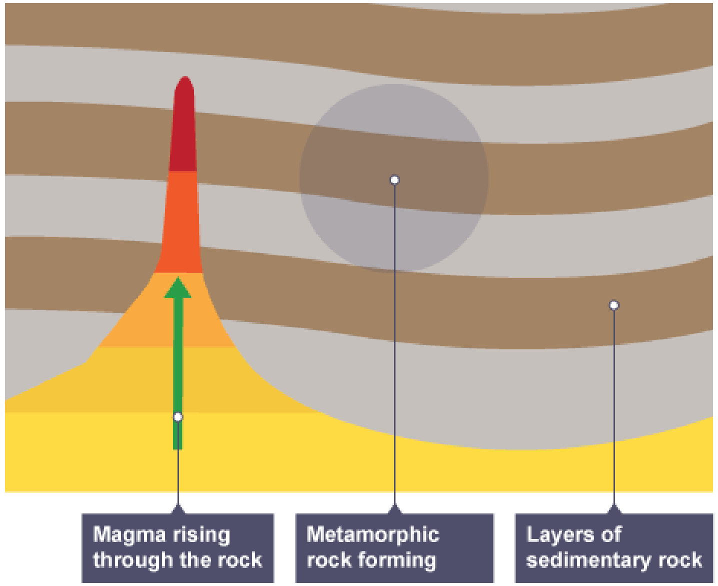
- **Transport**: A river carries pieces of broken rock as it flows along.
- **Deposit**: When the river reaches a lake/sea, it settles at the bottom.
- **Sedimentation**: The deposited rocks build up in layers, called sediments.
- **Compaction**: Weight of sediments on top squashes sediments at bottom.
- **Cementation**: Water is squeezed out from between pieces of rock and crystals of different salts form. The crystals stick the pieces of rock together.

Igneous rocks
Igneous rocks are formed molten rock that has cooled and solidified. Molten (liquid) rock is called magma. If it:
- cools **slowly**, it will form rock with **large** crystals
- cools **quickly**, it will form rock with **small** crystals

	Extrusive	Intrusive
Where the magma cooled	On the surface	Underground
How fast the magma cooled	Quickly	Slowly
Size of crystals	Small	Large
Examples	Obsidian and basalt	Granite and gabbro

Metamorphic rocks
Metamorphic rocks are formed from other rocks that are changed because of heat or pressure.
- Earth movements can cause rocks to be deeply buried or squeezed.
- These rocks are heated and put under great pressure.
- They do not melt, but the minerals they contain are changed chemically, forming metamorphic rocks
- Metamorphic rocks rarely contain fossils. Any that were present in the original sedimentary rock will not normally survive the heat and pressure.





Metamorphic rocks may form from rocks heated by nearby magma

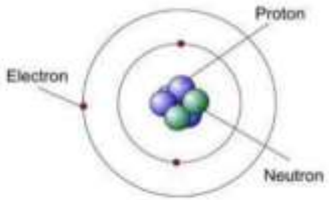
Recycling
The Earth's resources are limited. We can recycle many resources, including:
- **Glass**. It can be melted and remoulded to make new objects. The energy needed is less than the energy needed to make new glass. Must be sorted into different coloured glass ready for recycling, and transported to recycling plants;
- **Metal**. It takes less energy to melt and remould metals than it does to extract new metals from their ores. Aluminium is a metal that melts at a low temperature, so it is attractive for recycling;
- **Paper**. It is broken up into small pieces and reformed to make new sheets of paper. Takes less energy than making new paper from trees. Paper can only be recycled a few times before its fibres become too short to be useful and it is often only good enough for toilet paper or cardboard, or used as a fuel or compost;
- **Plastic**. Many plastics (but not all) can be recycled. For example, some plastic bottles can be recycled to make fleece for clothing. Recycling means that we use less crude oil, the raw material needed for making plastics. They have to be sorted first and this can be difficult, but recycling does stop it ending up in landfill.

Periodic Table

Atoms are tiny particles that everything is made of.

They are made of smaller particles called:

- **Protons** (+ positive)
- **Neutrons** (neutral)
- **Electrons** (- negative)



Metals have properties in common. They are:

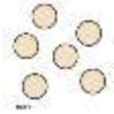
- **shiny**, especially when they are freshly cut
- **good conductors** of heat and electricity
- **malleable** (they can be bent and shaped without breaking)

Elements
There are over a hundred different elements.

Atoms have the same number of protons as each other.

Atoms of differing elements have a different number of protons.

The atoms of some elements do not join together, but instead they stay as separate atoms, eg Helium.



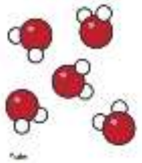
The atoms of other elements join together to make **molecules**, eg oxygen and hydrogen**.**

Most metals also have other properties in common. They are:

- **solid** at room temperature, except mercury;
- **hard** and **strong;**
- they have a **high density;**

Compounds
A compound is contains atoms of **two or more different elements**, and these atoms are **chemically joined together.**

For example, water is a compound of hydrogen and oxygen.



Each of its molecules contains two hydrogen atoms and one oxygen atom.

The elements are arranged in a chart called the periodic table. A Russian scientist, Mendeleev, produced the first periodic table in the 19th century.

The modern periodic table is based closely on the ideas he used:

- the elements are arranged in order of increasing atomic number (number of protons);
- the **horizontal** rows are called **periods;**
- the **vertical** columns are called **groups;**
- elements in the same group have the same number of electrons in their outside shell

Chemical formulae
Remember that 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.**

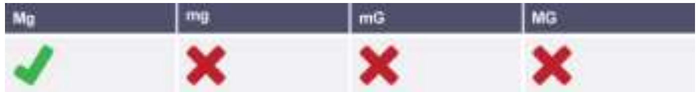
It tells you that each molecule of carbon monoxide is made of one carbon atom joined to one oxygen atom.

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).

Each element is given its own chemical symbol, like **H for hydrogen** or **O for oxygen.**

Chemical symbols are usually one or two letters.

Every chemical symbol **starts with a capital letter, with the second letter written in lower case**.For example, Mg is the correct symbol for magnesium, but mg, mG and MG are wrong.

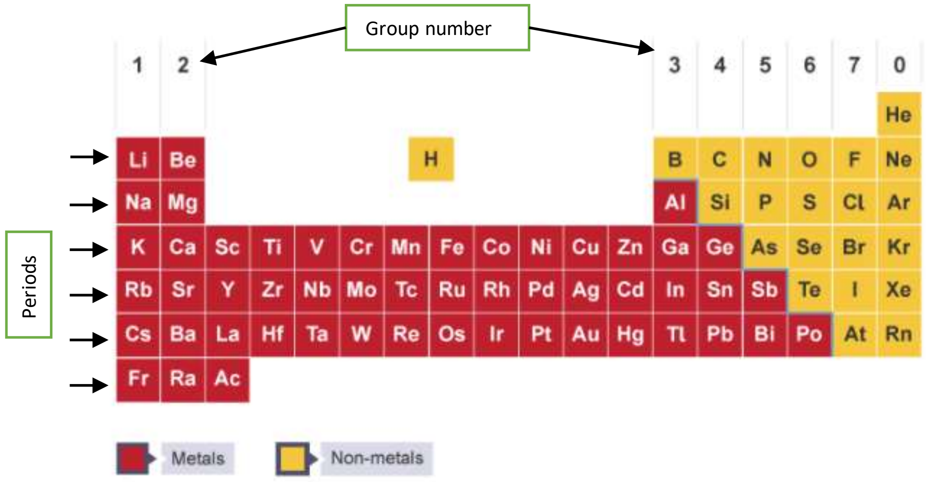


We can use the periodic table to predict the properties of elements in the same group.

Group 7	Melting point	Density	Reactivity
Fluorine	Increases down the group	Increases down the group	Decreases down the group
Chlorine			
Bromine			
Iodine			

Group 1	Melting point	Density	Reactivity
Lithium	Decreases down the group	Increases down the group	Increases down the group
Sodium			
Potassium			
Rubidium			

Periodic Table



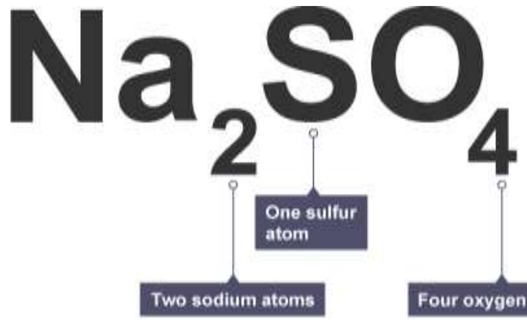
Numbers in formulae
We use numbers to show when a molecule contains more than one atom of an element.

The numbers are written **below** the element symbol. For example, CO_2 is the formula for carbon dioxide.

It tells you that each molecule has **one carbon atom** and **two oxygen atoms**.

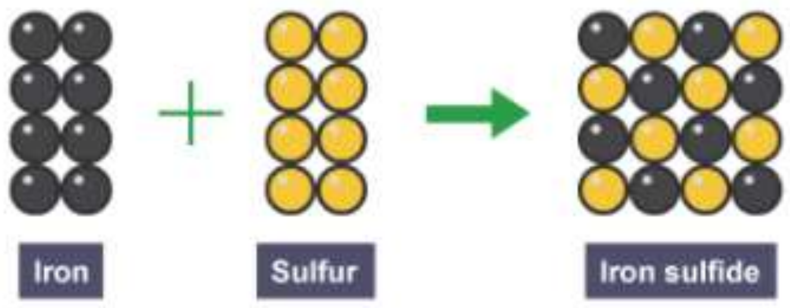
The **small numbers go at the bottom**. For example:

- CO_2 is correct**;**
- CO^2 and CO2 are wrong.



Some formulae are more complicated. For example, the formula for sodium sulfate is Na_2SO_4. It tells you that sodium sulfate contains two sodium atoms (Na x 2), one sulfur atom (S) and four oxygen atoms (O x 4).

Chemical reactions
When chemicals react, the atoms are rearranged. For example, iron reacts with sulfur to make iron sulfide



Iron sulfide, the compound formed in this reaction, has different properties to the elements it is made from.

	Iron	Sulfur	Iron sulfide
Type of substance	Element	Element	Compound
Colour	Silvery grey	Yellow	Black
Is it attracted to a magnet?	Yes	No	No
Reaction with hydrochloric acid	Hydrogen formed	No reaction	Hydrogen sulfide formed, which smells of rotten eggs

- The atoms in a compound are joined together by forces called **bonds**.
- The properties of a compound are different from the elements it contains;
- You can only separate its elements using another chemical reaction;
- Separation methods like filtration and distillation will not do this.

Chemical equations
We summarise chemical reactions using equations:

reactants → products

- **Reactants** are shown on the **left** of the arrow;
- **Products** are shown on the **right** of the arrow.

Do not write an equals sign instead of an arrow.

If there is more than one reactant or product, they are separated by a + sign. For example:

copper + oxygen → copper oxide

Reactants: copper and oxygen
Products: copper oxide

A **word equation** shows the names of each substance involved in a reaction, and **must not include any chemical symbols or formulae**

Periodic Table

Conservation of mass
When atoms are rearranged in a chemical reaction, they are not destroyed or created.

- **Reactants** - the substances that react together;
- **Products** - the substances that are formed in the reaction;
- **Mass is conserved** in a chemical reaction, this means…
- Total mass of the reactants = total mass of the products;

Symbol equations

A balanced **symbol** equation includes the **symbols** and **formulae** of the substances involved. For example:

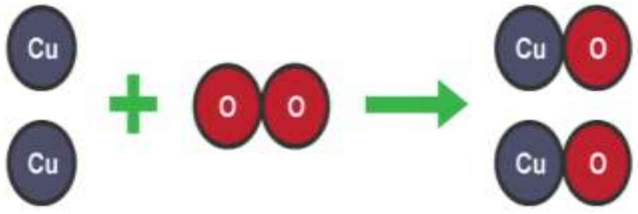
Word equation:
Copper + Oxygen → Copper Oxide

Symbol equation (unbalanced):
$Cu + O_2 \rightarrow CuO$

There is one copper atom on each side of the arrow, but two oxygen atoms on the left and only one on the right. This is **unbalanced.**

A **balanced** equation has the **same number of each type of atom on each side of the arrow.** Here is the balanced symbol equation:

$2Cu + O_2 \rightarrow 2CuO$



Some more examples of balanced symbol equations
- $C + O_2 \rightarrow CO_2$
- $2H_2 + O_2 \rightarrow 2H_2O$
- $2Mg + O_2 \rightarrow 2MgO$
- $CuCO_3 \rightarrow CuO + CO_2$
- $Mg + 2HCl \rightarrow MgCl_2 + H_2$

Take care when writing formula – e.g. for carbon dioxide:
CO_2 NOT CO^2 or Co_2

Matter

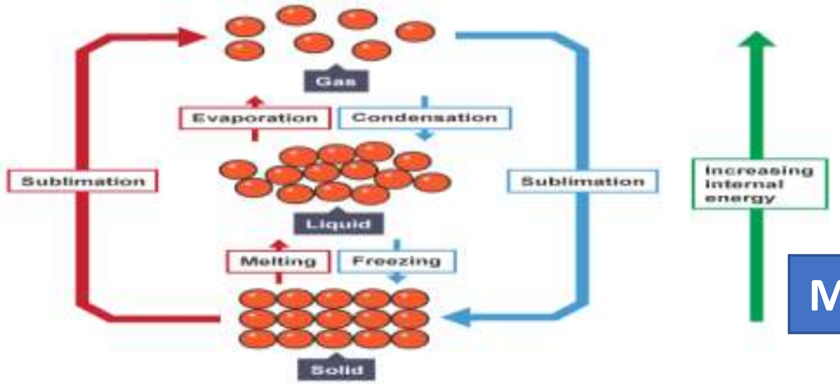
Change of state

- Substances can change state, usually when they are heated or cooled;
- State changes are **reversible** – eg ice can be melted and then frozen again;
- No new elements or compounds are formed.

The closeness, arrangement and motion of the particles in a substance change when it changes state:

	Solid	Liquid	Gas
Closeness	All touching	Mostly touching	Far apart
Arrangement	Ordered	Random	Random
Motion	Vibrate, fixed position	Move freely	Move freely (faster than liquids)
Density	Decreasing density -->		
Internal energy	Increasing internal energy -->		

$$\text{density} = \frac{\text{mass}}{\text{volume}}$$



Matter

Pressure in fluids

- A **fluid** is a liquid or gas.
- All fluids can change shape and flow from place to place.
- Fluids exert pressure at 90° to surfaces – we say that it acts normal to the surface.

Brownian motion

- Gas particles move very quickly;
- Air particles move at 500 m/s on average at room temperature;
- Particles collide with each other very frequently;
- They change direction randomly when they collide;
- Their random motion because of collisions is called **Brownian motion**.

Diffusion

- Diffusion is the **movement of particles from an area of high concentration to an area of low concentration.**
- Diffusion does not happen in solids – only fluids (liquids and gases);
- Particles in a solid can only vibrate and cannot move from place to place.
- Diffusion is driven by differences in concentration;
- No diffusion will take place if there is no difference in concentration from one place to another;
- Diffusion in liquids is slower than diffusion in gases because the particles in a liquid move more slowly.

Explaining diffusion in a smelly gas

- When a perfume is released into in a room, the perfume particles mix with the particles of air;
- The particles of perfume are free to move quickly in all directions;
- They eventually spread through the whole room **from an area of high concentration to an area of low concentration**;
- This continues until the concentration of the perfume is the same throughout the room;
- The particles will still move, even when the perfume is evenly spread out.

Diffusion and temperature

Diffusion is faster if the fluid (gas or liquid) is hotter.

Atmospheric pressure

The atmosphere exerts a pressure on you, and everything around you.

Atmospheric pressure changes with altitude. The higher you go:

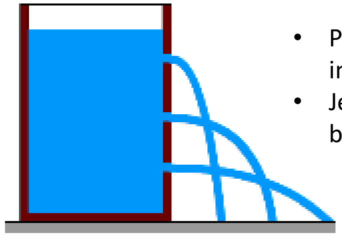
- the lower the weight of the air above you;
- the lower the atmospheric pressure.

Pressure in liquids

Just like the atmosphere, liquids exert pressure on objects.

The pressure in liquids changes with depth. The deeper you go:

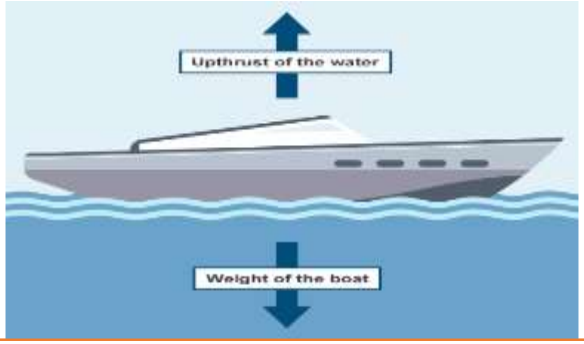
- the greater the weight of liquid above
- the greater the liquid pressure



- Pressure in a liquid increases with depth;
- Jet from the bottom of the bucket travels further.

Floating and sinking

- Liquid pressure is exerted on surfaces of objects in liquids;
- This causes **upthrust**;
- When an object sinks, the pressure increases and so the upthrust increases;
- It will continue to sink if weight is greater than maximum upthrust;
- When and object floats, the upthrust is **equal and opposite** to the object's weight.



- Physics

Forces in Action

• Forces Key Words

Deformation - When an object is changed in shape or size due to a force being applied

Elastic - Describes a property that means an object will return to its original
shape and size after being stretched or squashed

Elastic - The point at which an elastic limit will no longer return to its original
Limit shape and size as too much force has been applied

Extension - How much longer an object gets

Lever - Simple machine consisting of a bar that turns around a fixed pivot

Machine - A device that alters the size of a force or the direction in which it acts

Moment - The turning effect of a force

Pivot - The point around which a lever turns

Proportional - A relationship where when one variable increases by a set amount, another variable increases by a fixed value.

• Forces Key Words

Repeatable - When results are repeated by the same group of people and the same or very similar data is obtained

Reproducible - When different groups of people do the same experiment and get the same data and/or same conclusion

Spring Constant - A number for a spring telling us the size of its extension per unit of force applied

Work done - The energy transferred when a force moves an object

Maths Skills

Turning forces: Moment (Nm) = Force (N) x distance (m)

Stretching or squashing: Force (N) = Spring constant (N/m) x extension (m)

Work done: Work done (J) = Force (N) x distance (m)

Forces in action

Hooke's Law

Hooke’s Law says that **the extension of an elastic object is directly proportional to the force applied**. In other words:

- the extension doubles, if the force is doubled;
- there is no extension, if no force is applied.

You can investigate Hooke’s Law using a spring:

- hang the spring from a stand and clamp;
- measure its length with a ruler;
- hang a mass from the spring and measure the new length of the spring;
- Work out: **extension = new length – original length**;
- keep adding more masses, measuring the new length each time;
- Work out extension for each mass.

You can then plot a force-extension graph:

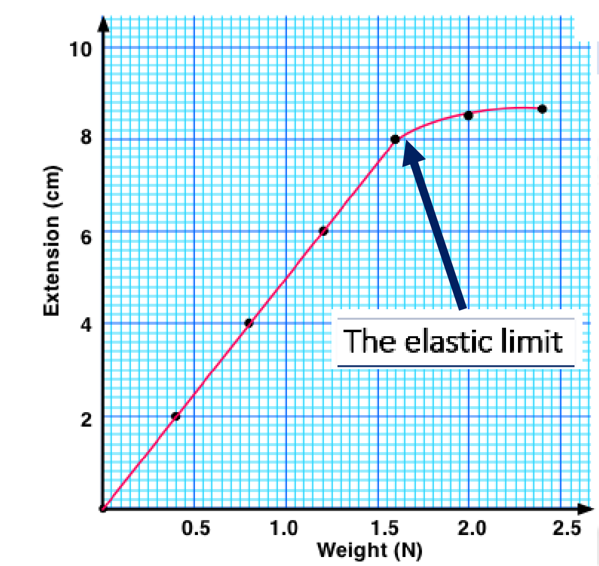
- plot force on the vertical (y) axis
- plot extension on the horizontal (x) axis

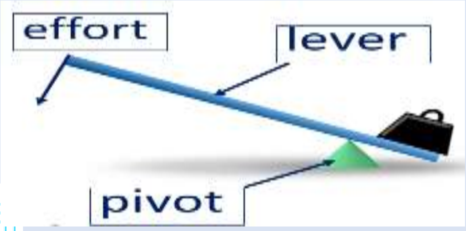
Force Applied (N) = spring constant (N/m) x extension (m)

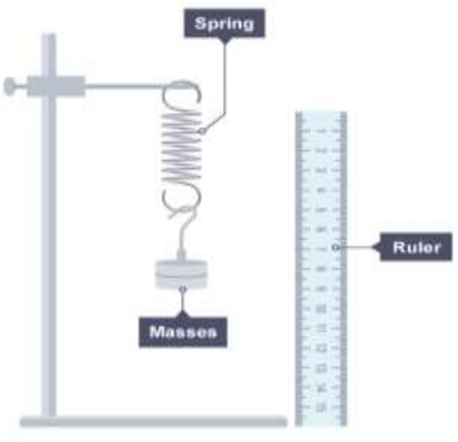
Using Hooke's Law

In a force-extension graph:

- the steeper the line, the stiffer the spring
- the area under the line is the **work done** (energy needed) to stretch the spring.







An experiment to investigate Hooke's Law

Moments

- A **moment** is a turning effect of a force.
- Forces can make objects turn if there is a **pivot**.
- When the turning forces are **balanced** - the moments are **equal and opposite.**

Calculating moments

To calculate a moment, you need to know:

- the distance of the force from the pivot;
- the size of the force.

Moment	=	Force	x	Perpendicular distance
(Nm)		(N)		(m)
(Ncm)				(cm)

Force multipliers

- Increasing the distance will increase the moment for the same force;
- This is why a longer spanner will loosen a tight nut;
- And a crowbar or long lever can be used lift heavy objects.

centimetres – metres: ÷100 / x100

metres – kilometres: ÷1000 / x1000

Work Done (J) = Force (N) x Distance (m)

Deformation

Elastic materials:

- **change shape** when a force is exerted on them;
- **return to their original shape/size** when the force is removed.

Deformation is a change in shape. There are two types of deformation:

- **Stretching** is when the object/material is pulled;
- **Compression** is when the object/material is squashed.

The greater the force exerted, the greater the amount of deformation.

If the force is large enough, the object/material may no longer return to its original size. Until you reach this point, a special case called **Hooke’s Law** applies.

Simple machines

Example of simple machines are **see-saws, wheelbarrows** and **forceps. Simple machines give a bigger force but with a smaller movement**

See –saw

A force is exerted in one place, causing movement and a force at another place in the see-saw. A see saw will **balance** when:

Clockwise moment = Anticlockwise moment

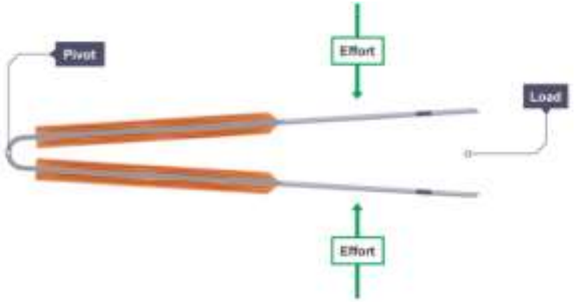
Force (N) x distance (cm) = Force (N) x distance (cm)

Wheelbarrows

Wheelbarrows is a simple machine with the load near the pivot (the wheel) and the effort on the handles far from the pivot.

Forceps

With forceps, fingers provide the effort force, and this is nearer to the pivot than the load (the object you are picking up):



- Some machines give a smaller force but with a bigger movement;

This is the opposite to the see-saw and wheelbarrow, but again if you multiply the force by the distance travelled, you get the same value for the effort and for the load.

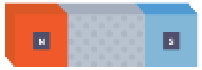
Electricity

8BE Electricity and Magnetism

Bar magnets
Most materials are not magnetic.
A magnetic material can be **magnetised** or will be attracted to a magnet.
Not all metals are magnetic.
These metals are magnetic:
- Iron
- Cobalt
- nickel
- steel (because it contains iron).

A bar magnet is a **permanent magnet -** its magnetism cannot be turned on or off.

A bar magnet has two magnetic poles:
- north pole (or north-seeking pole)
- south pole (or south-seeking pole)

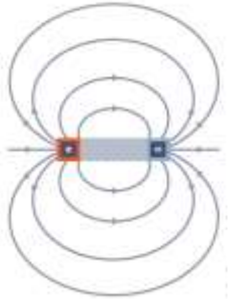


Attract and repel
Opposite poles will attract, and like poles will repel.

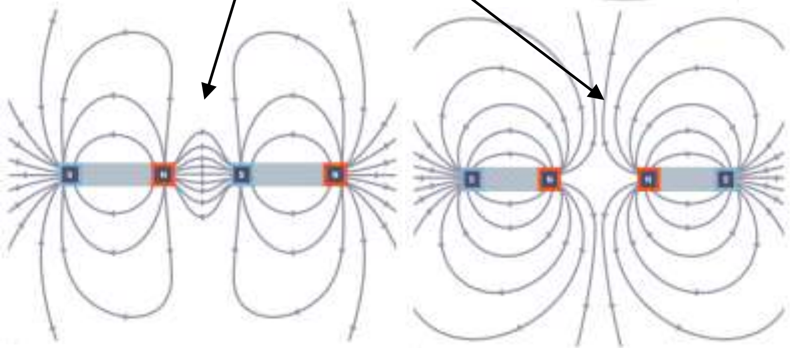
Testing for magnets
You can only show that an object is a magnet if it repels a known magnet.

Magnetic fields
A magnet creates a magnetic field around it (you cannot see a magnetic field)
A **non-contact force** is exerted on a magnetic material brought into a magnetic field. It is **non-contact force** because the magnet and the material do not have to touch each other.

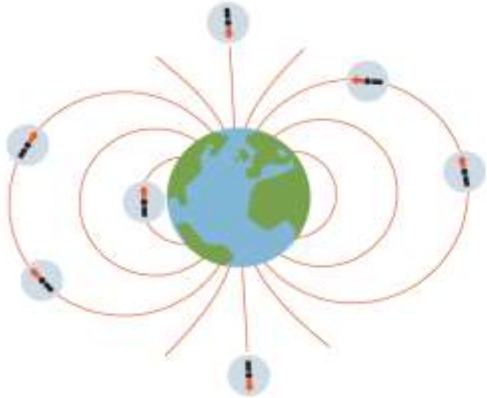
We represent magnetic fields using diagrams
- each field line has an arrow from **north to south**;
- the field lines are more concentrated at the poles;
- the magnetic field is strongest at the poles.



Field lines also show what happens to the magnetic fields of two magnets during attraction or repulsion.



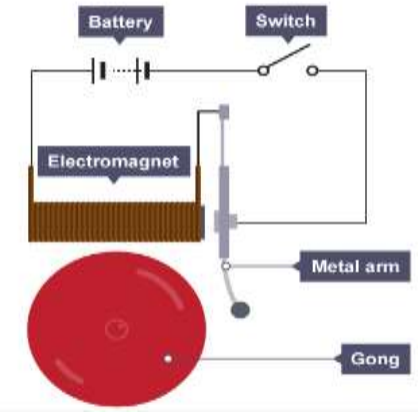
The Earth's magnetism
The Earth behaves as if it contains a giant bar magnet.
Its magnetic field lines are most concentrated at the poles.
This magnetic field can be detected using magnetic materials or magnets.



The compass
A compass comprises:
- a magnetic needle mounted on a pivot (so it can turn freely)
- a dial to show the direction

If the needle points to the N on the dial, you know that the compass is pointing north.

Electric bell
Electric bells like the ones used in most schools also contain an electromagnet.

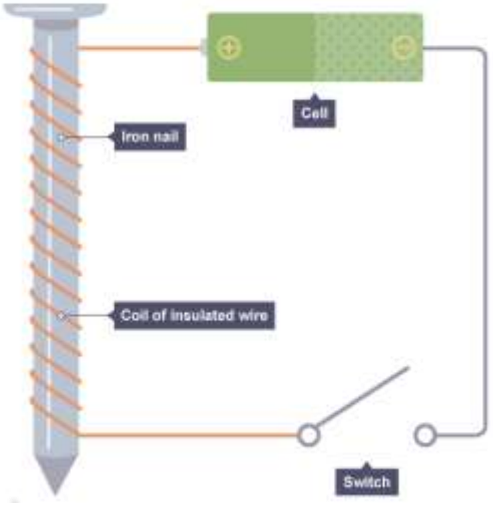


Electromagnets
When an electric current flows in a wire, it creates a magnetic field around the wire.
The magnetic field around an electromagnet is the same as around a bar magnet.

We can make the electromagnet stronger by:
- wrapping the coil around a piece of iron (such as an iron nail)
- adding more turns to the coil
- increasing the current flowing through the coil

Too much current can cause heating.

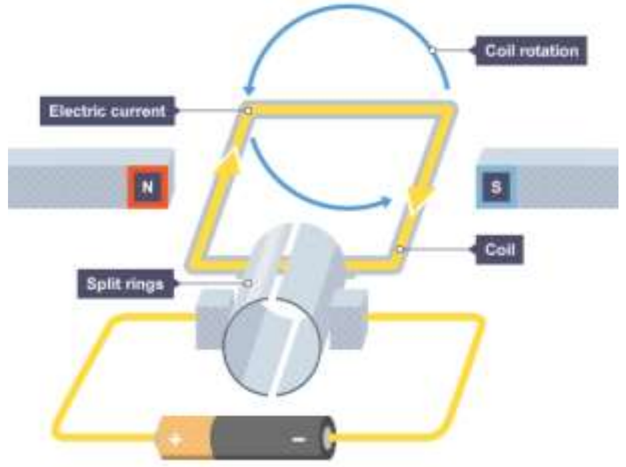
Advantages of electromagnets:
- they can be turned on and off
- the strength of the magnetic field can be varied
- reversing the current (turning the battery around), reverses the direction of the field (swaps the poles)



DC motors
Passing an electric current through a wire in a field will make the wire move.
This is called the **motor effect**.

The diagram shows a simple electric motor:
- there is an electric current in the coil of wire
- this generates a magnetic field;
- which interacts with the fixed magnets;
- this makes the coil rotate

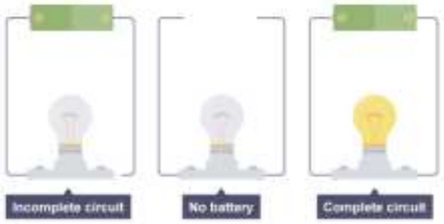
The speed of the motor can be increased by:
- increasing the **strength of the magnetic field**
- **increasing the current** flowing through the coil

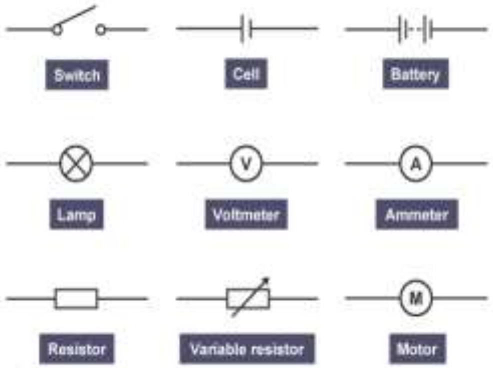


Electric charge
Some particles carry an electric **charge**.
In electric wires these particles are **electrons**.

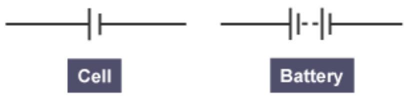
Electric current
An electric current is a flow of charge, and in a wire this will be a flow of electrons.

We need two things for an electric current to flow:
- something to transfer energy to the electrons, such as a battery or power pack
- a complete circuit for the electrons to flow through

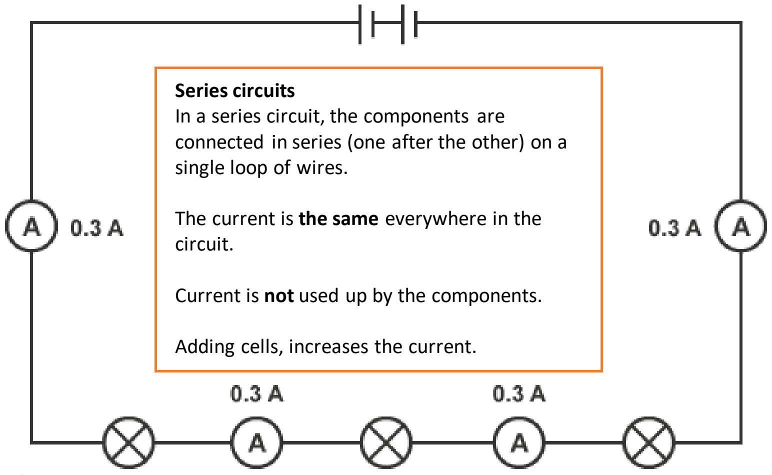




Circuit symbols



Conductors and insulators of electricity
Different materials have different resistances:
- an electrical **conductor** has a **low resistance;**
- an electrical **insulator** has a **high resistance.**

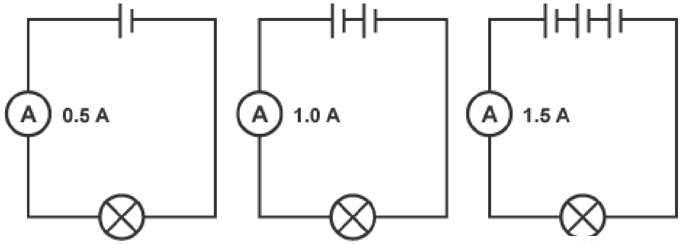


Series circuits
In a series circuit, the components are connected in series (one after the other) on a single loop of wires.

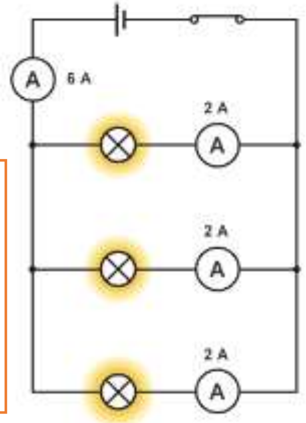
The current is **the same** everywhere in the circuit.

Current is **not** used up by the components.

Adding cells, increases the current.



8BE Electricity and Magnetism



Parallel circuits
In a parallel circuit, the components are connected on different branches of the wire.

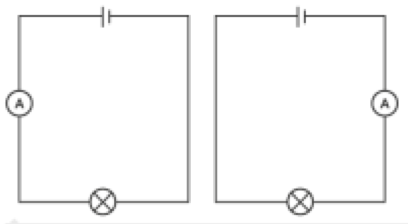
When components are connected in parallel, the current is **shared** between the components.

If a bulb breaks in a parallel circuit, the other bulb will remain lit.

Conductors	Insulators
Metal elements	Most non-metal elements, e.g. sulfur, oxygen
Graphite (a form of carbon, a non-metal element)	Diamond (a form of carbon, a non-metal element)
Mixtures of metals, e.g. brass, solder	Plastic
Salt solution	Wood
Liquid calcium chloride	Rock

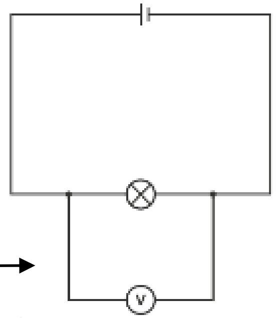
Current
The more charge that flows, the bigger the current.
Current is measured in **amperes (A)**.
This can be shortened to **amps**.

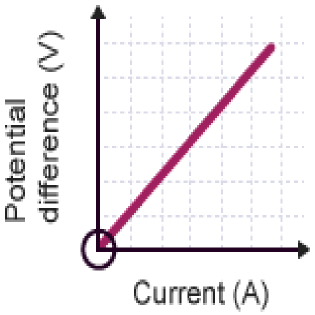
Measuring current
We measure current using an **ammeter**.
It is connected in **series**.



Potential difference
Potential difference is a measure of the difference in energy between two parts of a circuit.
The bigger the difference in energy, the bigger the potential difference.
Potential difference is measured in **volts (V).**
It is sometimes called **voltage**.

Measuring potential difference
Potential difference is measured using a device called a voltmeter.
It is connected in **parallel**.





	Current	Potential difference
Unit	ampere, A	volt, V
Measuring device	Ammeter in series	Voltmeter in parallel
Circuit symbol of measuring device	A	V

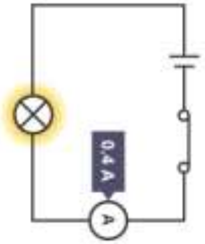
Resistance
Wires and the components in a circuit reduce the flow of charge. This is called **resistance**.
The unit of resistance is the ohm (Ω).

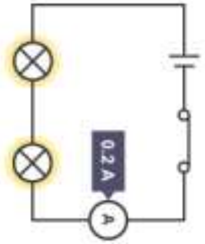
Adding components
The resistance increases when you add more components in series.

Calculating resistance
To find the resistance of a component, you need to measure:
- the potential difference across it;
- the current flowing through it.

The resistance is the ratio of potential difference to current. We use this equation to calculate resistance:

resistance = potential difference ÷ current

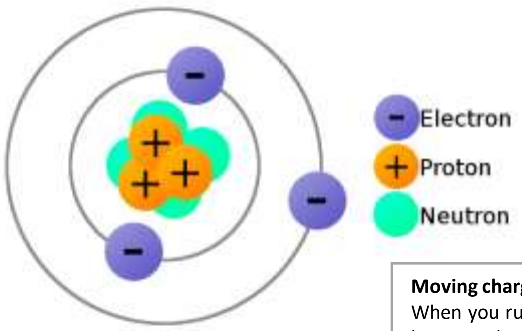


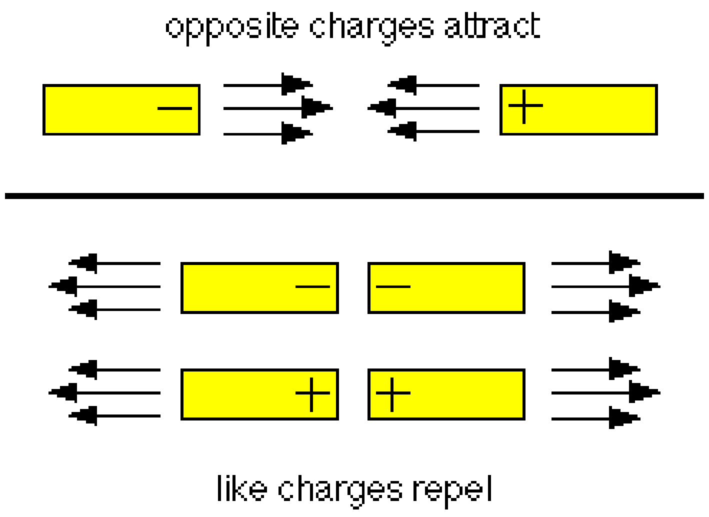


8BE Electricity and Magnetism

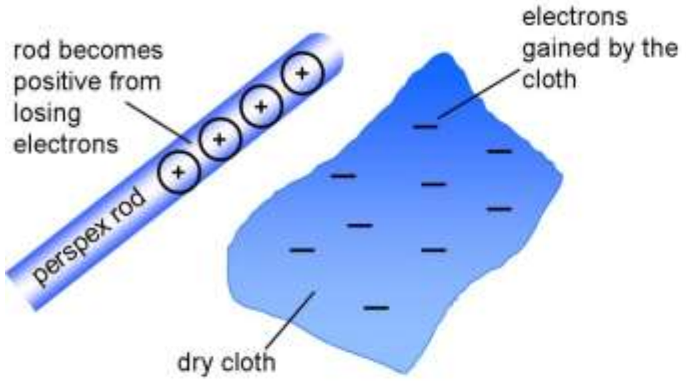
Atoms and electrons
All substances are made of **atoms**.
These are often called **particles**.
An atom has no overall electrical charge (**electrically neutral**);
Each atom contains even smaller particles called **electrons**.
Each electron has a negative charge.
- atom **gains** an electron, it becomes **negatively charged**.
- atom **loses** an electron, it becomes **positively charged.**

Electrons can move from one substance to another when objects are rubbed together.

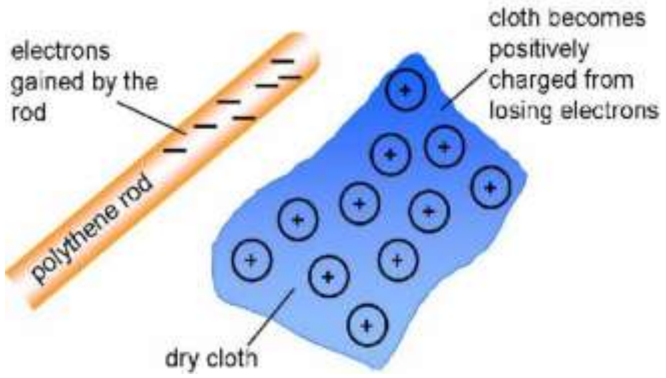




Moving charges
When you rub two different materials against each other, they become electrically charged.
This only works for electrically insulated objects and not with materials like metals, which conduct.
and the duster becomes positively charged



For example, if you rub an perspex plastic rod with a duster:
- electrons move from the rod to the duster
- the duster becomes negatively charged and the rod becomes positively charged



The opposite thing happens with a polythene rod:
- electrons move from the duster to the rod
- the rod becomes negatively charged and the duster becomes positively charged

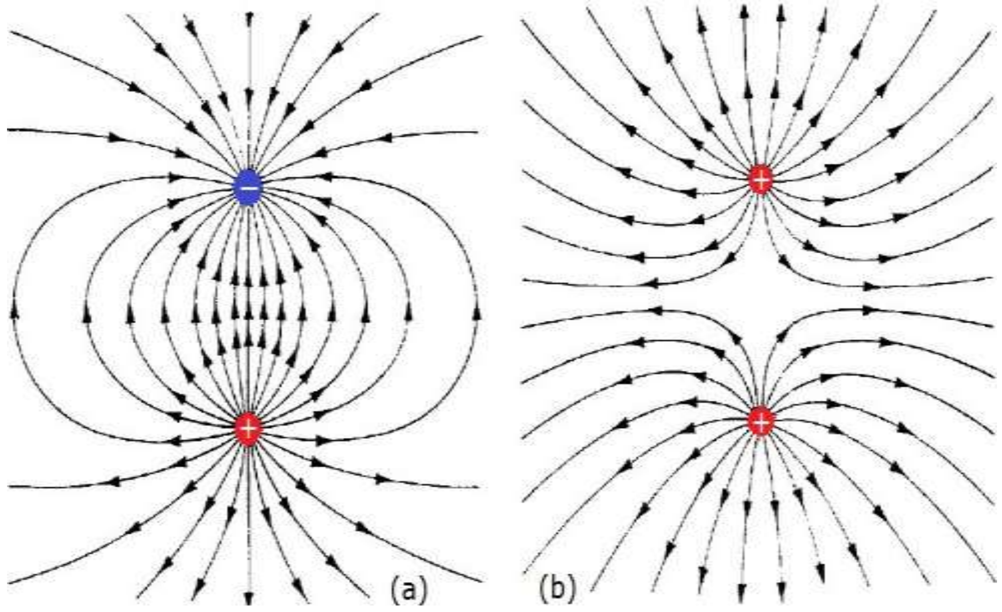
Forces from static electricity
A charged object creates an **electric field** (you cannot see an electric field).
If another charged object is moved into the electric field, a force acts on it.
The force is a non-contact force because the charged objects do not have to touch for the force to be exerted.

Repulsion and attraction
Two charged objects will:
- repel each other if they have like charges (they are both positive or both negative);
- attract each other if they have opposite charges (one is positive and the other is negative).

Attract and repel
Opposite charges will attract, and like charges will repel.

Electric fields
We represent electric fields using diagrams (just like with magnetic fields):
- each field line has an arrow from **positive to negative**;
- the field lines are more concentrated where the field is strongest.

Field lines also show what happens to the electric fields during attraction or repulsion.



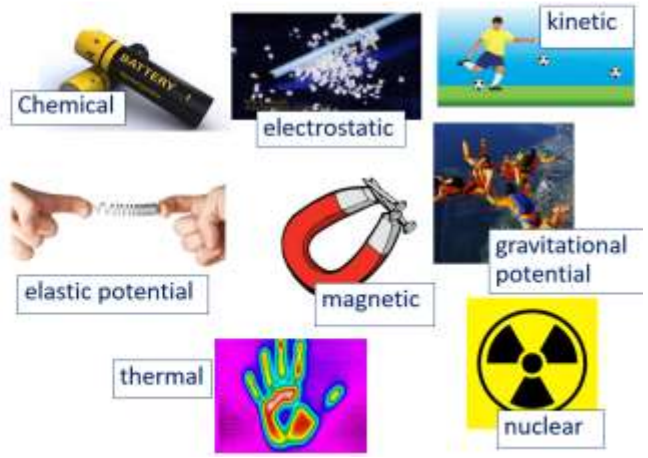
- Physics

Light and Sound

Topic Revision – Light & Sound

<u>There are 8 different energy stores:</u>

- **Chemical –** eg energy store in food or fuels
- **Kinetic –** energy store in moving objects
- **Gravitational potential** - energy store in objects raised above the ground
- **Elastic potential –** energy stored in an object that is stretched or squashed
- **Magnetic –** energy stored between two poles brought close together
- **Electrostatic –** energy store in charges that are separated
- **Thermal –** the energy store in any object above absolute zero
- **Nuclear –** the energy stored in the nucleus of an atom



<u>Pathways for energy transfer</u>

There are 4 main **pathways** by which energy can be transferred:

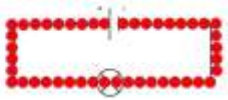
1. **Mechanical** work (a **force** causing an object to move)

For example:

- ❖ **Gravity** can cause energy to be transferred from the **gravitational store** to the **kinetic store** of a falling object. Some energy will also be transferred to the **thermal store** due to **air resistance**.

2. **Electrical** work (when charges move due to a potential difference)

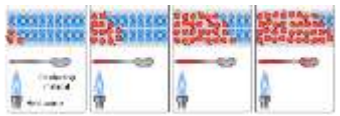
- ❖ Energy can be transferred from the **chemical store** of a battery to the **thermal store** of a bulb by **moving charges**

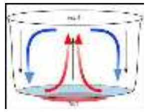


3. By **heating** (due to a difference in temperature)

For example, energy can be transferred between thermal stores of two objects by :

- ❖ conduction (when particles in a solid vibrate more and those vibrations are passed along the solid)
- ❖ convection – when regions of a gas or liquid are heated and become less dense and therefore rise.





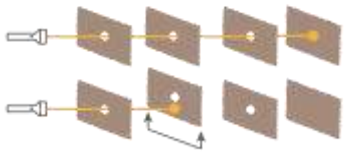
4. By **light or sound**

For example, energy is transferred from the thermal store of a light bulb to the surroundings by lighting (and heating)

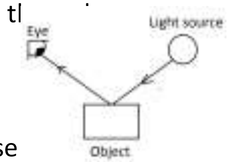
From KS2:

Light is given out by **luminous** objects – eg the sun, lamps and torches

Light travels in straight lines.



Shadows form when light rays reach an object they cannot go tl



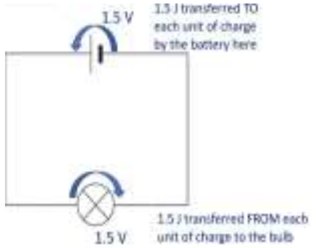
We see objects that are non- luminous because light rays are reflected off them into our eyes

Potential difference

Potential difference is the amount of energy, in joules, transferred, either :

- **to** each 'unit' of charge at the cell/battery or
- **from** each unit of charge at the components

It is measured in volts, using a voltmeter



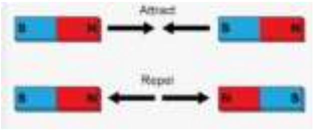
The amount of energy transferred to the charges at the cell is equal to the amount of energy transferred from the charges at the components.

Topic Revision– Light & Sound

<u>Energy stores:</u>

1. Which energy store is found in food or fuels?
2. Which energy store is associated with two poles of a magnet being brought close together?
3. Which energy store is found when like charges repel or unlike charges attract?
4. Which energy store is associated with a moving object?
5. Which energy store is found in all objects above absolute zero?
6. Which is the energy store found in the nucleus of an atom?

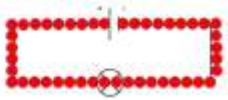
7. Name the energy stores:



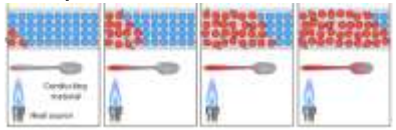
<u>Pathways for energy transfer</u>

1. Name the four pathways by which energy can be transferred.

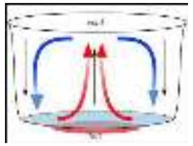
2. When an object falls, which store decreases?
3. What moves when energy is transferred electrically?



4. What are the two ways heat is transferred by particles?



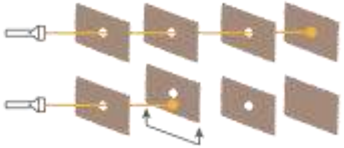
5. Which method of heat transfer happens most in solids?
6. Which one happens because of regions of rising hot air or liquid?



<u>From KS2:</u> Light

1. What doe we call objects that give off their own light?

2. What does this picture show us about how light travels?



3. What is formed here?

4. Why?

5. What has to happen for us to be able to see an object?

<u>Potential difference</u>

1. What is potential difference?

2. Which piece of equipment is used to measure potential difference?

3. What are the units for potential difference?

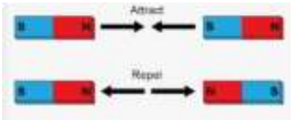
Topic Revision– Light & Sound

Energy stores:

1. Which energy store is found in food or fuels? Chemical
2. Which energy store is associated with two poles of a magnet being brought close together? Magnetic store
3. Which energy store is found when like charges repel or unlike charges attract? Electrostatic store
4. Which energy store is associated with a moving object? kinetic
5. Which energy store is found in all objects above absolute zero? thermal
6. Which is the energy store found in the nucleus of an atom? nuclear

7. Name the energy stores:

electrostatic

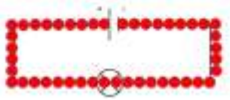


magnetic

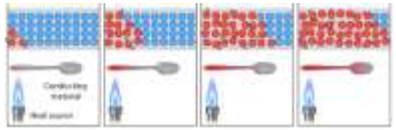
Pathways for energy transfer

1. Name the four pathways by which energy can be transferred. Mechanical / forces, electrically, heating, light/sound

2. When an object falls, which store decreases? Gravitational potential
3. What moves when energy is transferred electrically? charges / electrons

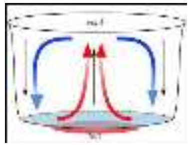


4. What are the two ways heat is transferred by particles? Conduction and convection



5. Which method of heat transfer happens most in solids?

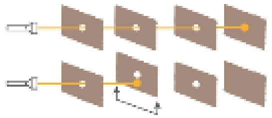
conduction



6. Which one happens because of regions of rising hot air or liquid? convection

From KS2: Light

1. What doe we call objects that give off their own light? luminous



2. What does this picture show us about how light travels? Straight lines

3. What is formed here? shadow

4. Why? Light can't travel through or around the hand

5. What has to happen for us to be able to see an object? Light has to come from a source and reflect off the object into our eye

Potential difference

1. What is potential difference?
The energy transferred to each unit of charge / from each unit of charge

2. Which piece of equipment is used to measure potential difference? voltmeter

3. What are the units for potential difference? Volts (V)

- Physics

Light and Sound

Reflection

A ray diagram shows how light travels, including what happens when it reaches a surface. In a ray diagram, you draw each ray as:

- a straight line;
- with an arrowhead pointing in the direction that the light travels;
- always use a ruler and a sharp pencil.

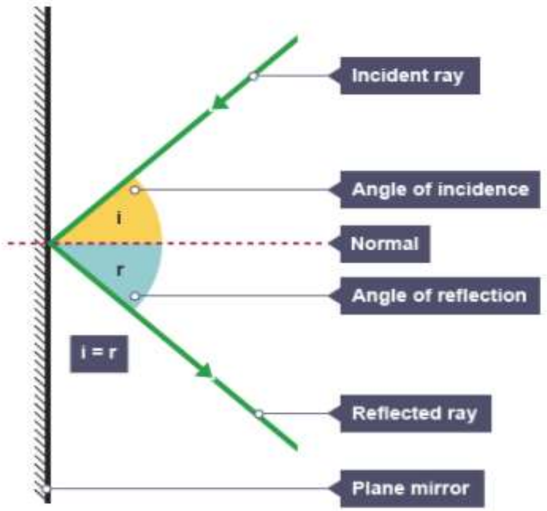
The law of reflection

When light reaches a mirror, it reflects off the surface of the mirror:

- **incident ray** is the light going **towards the mirror;**
- **reflected ray** is the light coming **away from the mirror.**

The law of reflection states:

- **the angle of incidence = the angle of reflection, i = r.**



Diffuse scattering

- If light meets a rough surface, each ray obeys the law of reflection;
- Different parts of the rough surface point in different directions;
- So the light is not all reflected in the same direction;
- The light is reflected in all directions.
- This is called **diffuse scattering.**

In the ray diagram:

- the hatched vertical line on the right represents the mirror;
- the dashed line is the normal, drawn 90° to the surface of the mirror;
- the angle of incidence, i, is the angle between the normal and incident ray;
- the angle of reflection, r, is the angle between the normal and reflected ray;
- The reflection of light from a flat surface such as a mirror is called **specular reflection** – light meeting the surface in one direction is all reflected in one direction.

Light and Space

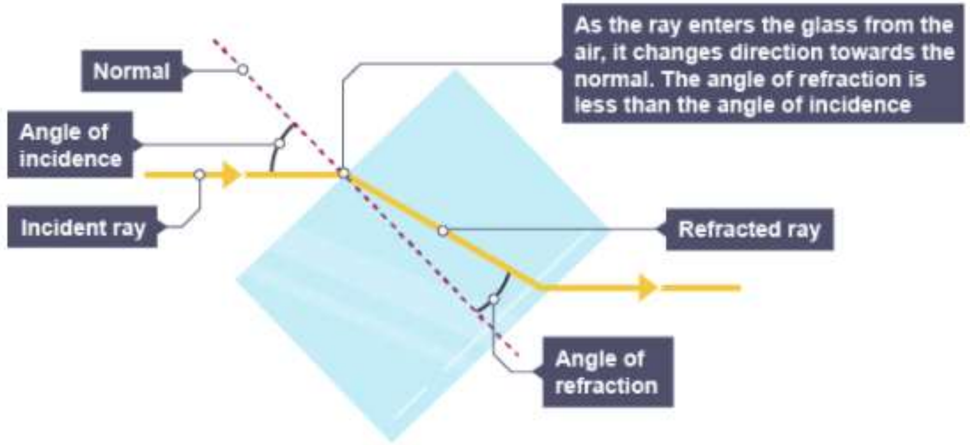
Refraction

When light waves pass across a boundary between two substances with a different density, eg air and glass. They:

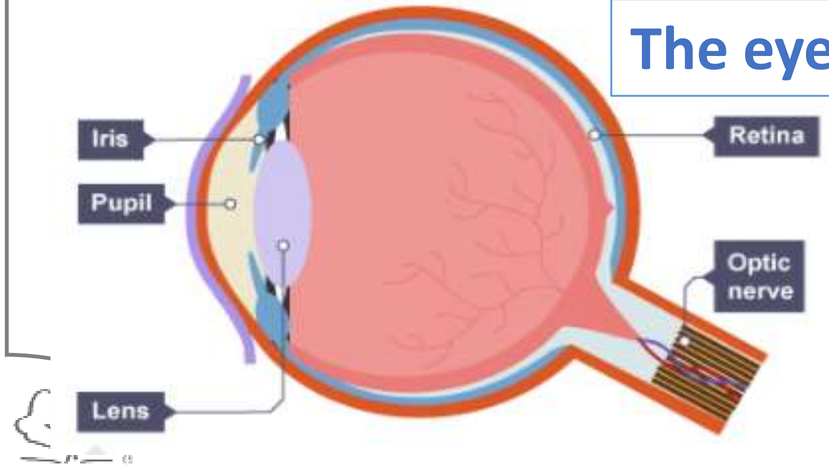
- change speed;
- causing them to change direction;
- This is called refraction.

At the boundary between two transparent substances:

- the light slows down going into a denser substance, and the ray bends towards the normal;
- the light speeds up going into a less dense substance, and the ray bends away from the normal.



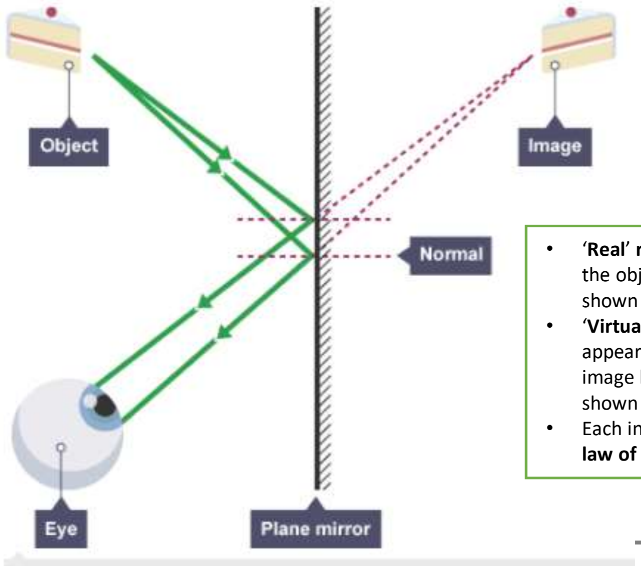
The eye



Imaging in mirrors

- A plane mirror is a flat mirror.
- When you look into a plane mirror, you see a reflected image of yourself. This image:
  - appears to be behind the mirror
  - is the right way up
  - is 'laterally inverted' (letters and words look as if they have been written backwards)

- 'Real' rays, the ones leaving the object and the mirror, are shown as solid lines.
- 'Virtual' rays, the ones that appear to come from the image behind the mirror, are shown as dashed lines.
- Each incident ray will obey the law of reflection.



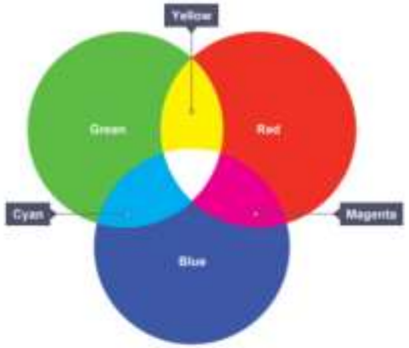
- **'Real' rays**, the ones leaving the object and the mirror, are shown as solid lines.
- **'Virtual' rays**, the ones that appear to come from the image behind the mirror, are shown as dashed lines.
- Each incident ray will obey the **law of reflection**.

Light and Space

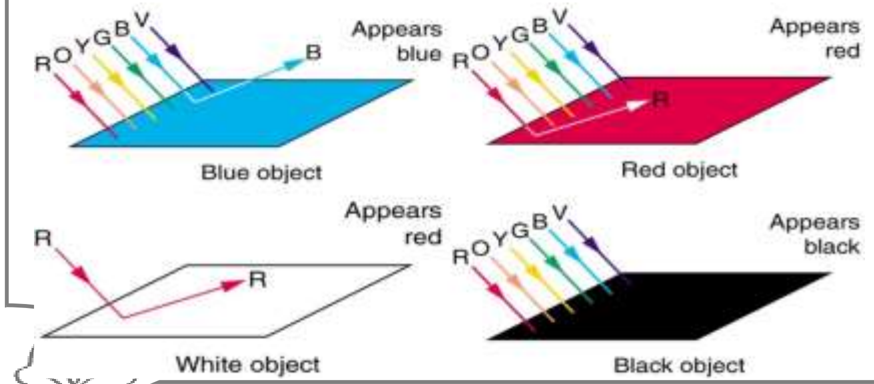
Colour
- White light is a mixture of many different colours;
- Each colour has a different frequency;
- White light can be split up into a **spectrum** using a prism, a triangular block of glass or Perspex;
- Light is refracted when it enters the prism;
- Each colour is refracted by a different amount;
- Light leaving the prism is spread out into different colours;
- This is called **dispersion**.

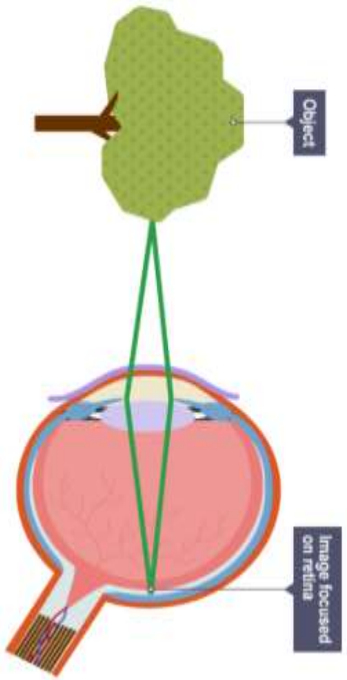
The spectrum
The seven colours of the spectrum listed in order of their frequency, from the lowest frequency (fewest waves per second) to the highest frequency (most waves per second):
- **R**ed
- **O**range
- yellow
- green
- blue
- indigo
- Violet

'**R**ichard **O**f **Y**ork **G**ave **B**attle **I**n **V**ain'.



Coloured light
- There are three primary colours in light: red, green and blue.
- Light in these colours can be added together to make the secondary colours magenta, cyan and yellow.
- All three primary colours add together make white light;
- When light hits a surface, some of it is absorbed and some of it is reflected.
- The colour of an object is the colour of light it reflects;
- All other colours are absorbed.

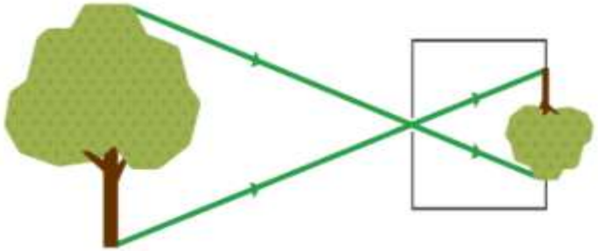


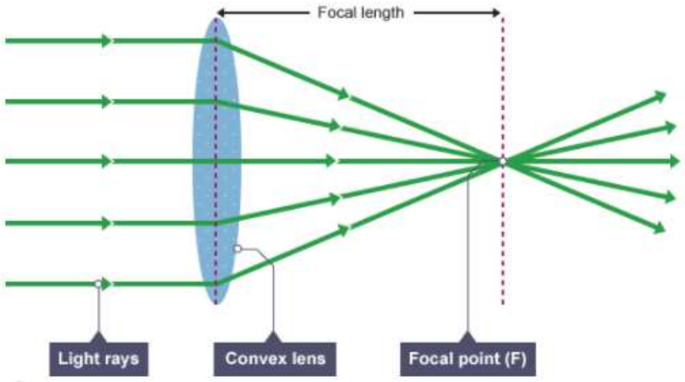


The eye
The eye is like the camera:
- The eye focuses light from an object;
- Onto the photo-sensitive **retina**;
- The retina contains cells sensitive to light;
- They produce electrical impulses when they absorb light;
- These impulses are passed along the **optic nerve** to the **brain**;
- Which interprets them as vision.

Focusing
- Light rays can be focused so that they meet at a single point;
- Focusing is important for getting clear images in our eye;
- Images that are not focused appear blurred.

The pinhole camera
A pinhole camera consists:
- of a box with a **translucent screen** at one end;
- a tiny hole (the pinhole) in the other end;
- light enters the box through the pinhole;
- It is focused by the pinhole onto the screen;
- The image is inverted (upside down) and smaller than the object.





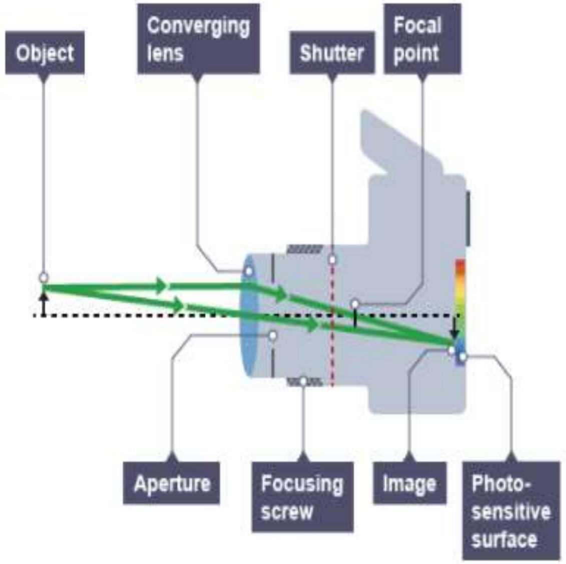
The convex lens
- A convex lens is made from a transparent material that bulges outwards in the middle on both sides.
- It can focus light so that appears to meet at a single point, called the focal point.
- Light is refracted as it passes into, then out of, the lens.
- Convex lenses are found in:
  - **magnifying glasses**;
  - **spectacles** for people with long-sight (who can see distant objects clearly but not nearby ones);
  - **telescopes**.

Detecting light
Cameras and eyes detect light. They both have:
- a material that is sensitive to light
- a change that happens when this material absorbs light

The camera
Cameras focus light onto a photo-sensitive material using a lens.

In old cameras, the photo-sensitive material was camera film;
- The film absorbs light;
- A chemical change produces an image, called the 'negative'.
- This was used to produce a photograph on photo-sensitive paper.

In a modern camera or the camera in a mobile phone:
- The photo-sensitive material produces electrical impulses;
- Which are used to produce an image file;
- This can be viewed on the screen.



Light and Space

Gravity

Gravity is a force that attracts objects towards each other.

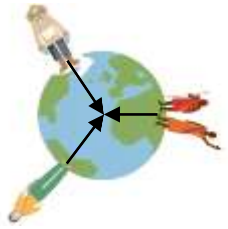
The greater the mass, the greater its force of gravity:

- gravity between Earth and Moon keeps Moon in orbit around Earth;
- gravity between Sun and Earth keeps Earth in orbit around Sun.

Gravity only becomes noticeable when there is a really massive object like a moon, planet or star.

We are pulled down towards the ground because of gravity.

The gravitational force pulls in the direction towards the centre of any object.



Stars and galaxies

- Our Sun is a star.
- It seems much bigger than other stars in the sky because it is much closer to Earth;
- Stars form immense groups called **galaxies**.
- A galaxy can contain **many millions of stars**, held together by gravity.
- Our Sun is in a spiral galaxy called the **Milky Way**.

The light year is the distance travelled by light in one year.

Mass, weight and gravitational forces

Mass

- The mass of an object is **the amount of matter** or 'stuff' it contains.
- Mass is measured in kilograms, **kg**.
- An object's mass stays the same wherever it is. So a 5 kg mass on Earth has a 5 kg mass on the Moon.

Weight

- The weight is **a force that acts upon a mass.**
- Weight is measured in newtons, **N**.
- The weight of an object is the gravitational force between the object and the Earth.
- The weight of an object depends upon its mass and the gravitational field strength.

Gravitational field strength

Gravitational field strength is given the symbol g.
(Do not confuse this with g for grams).

You can use this equation to calculate the weight of an object:
weight in N = mass in kg × gravitational field strength in N/kg

On Earth, g is about 10 N/kg. This means that a 2 kg object on the Earth's surface has a weight of 20 N (2 kg × 10 N/kg = 20 N).

Mass and weight

The mass of an object stays the same wherever it is, but its weight can change if the object goes where the gravitational field strength is different from the gravitational field strength on Earth, eg into space or another planet.

The Moon is smaller and has less mass than the Earth, so its gravitational field strength is only about one-sixth of the Earth's. So, for example, a 120 kg astronaut weighs 1200 N on Earth but only 200 N on the Moon.

Remember that their mass would still be 120 kg.

Years and seasons

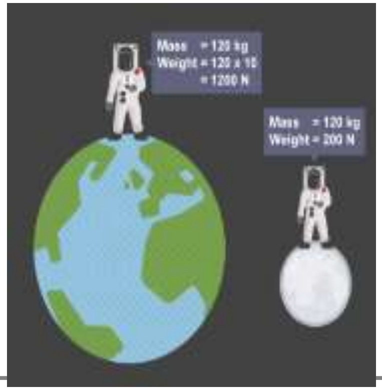
- A year is the time it takes to make **one complete orbit around the Sun;**
- The Earth goes once round the Sun in one Earth year, which takes 365 Earth days;
- The further a planet is from the sun, the longer its year.

Seasons

The Earth's axis is tilted slightly (23.4° from vertical).

We get different seasons because the Earth's axis is tilted:

- it is summer in the UK when the Northern Hemisphere is tilted towards the Sun
- it is winter in the UK when the northern hemisphere is tilted away from the Sun



The speed of light

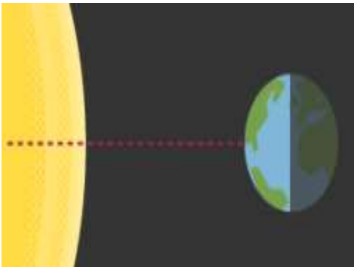
- Light travels extremely quickly.
- Its maximum speed is 300,000,000 m/s ($3x10^8$ m/) when it travels through a vacuum.

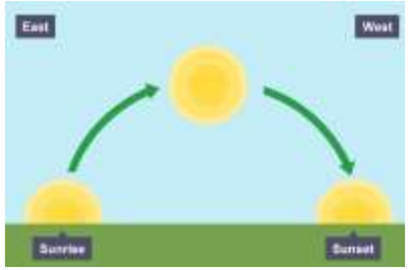
The speed of light is much faster than the speed of sound in air (343 m/s). This explains why you:

- see lightning before you hear it;
- see a firework explode before you hear it.

Days and nights

- A planet spins on its axis as it orbits the Sun.
- A day is the time it takes for a planet to turn once on its axis.
- An Earth day is 24 hours long;
- The Sun lights up one half of the Earth, and the other half is in shadow;



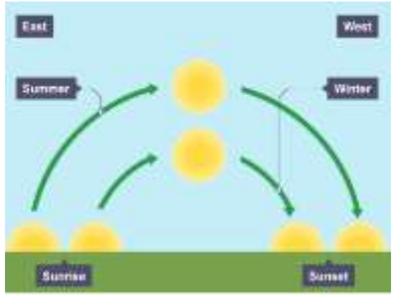


Path of the Sun

- During the day, the Sun appears to move through the sky;
- This happens because the Earth is spinning on its axis;
- The Sun appears to move from east to west. This is because the Earth turns from west to east.
- The Sun appears to:
  - rise in the east;
  - set in the west;
  - be due south at midday;
- One way to remember which way the Earth turns is
  - 'we spin'….**<u>we</u>** (the Earth) spins from <u>w</u>est to <u>e</u>ast.

Path of the Sun at different times of the year

- The length of the day changes during the year (unless you are on the equator);
- Daytime is longest in the summer and shortest in the winter.
- In winter, the Sun still rises in the east and sets in the west, but it does not climb so high in the sky as it does in the summer.



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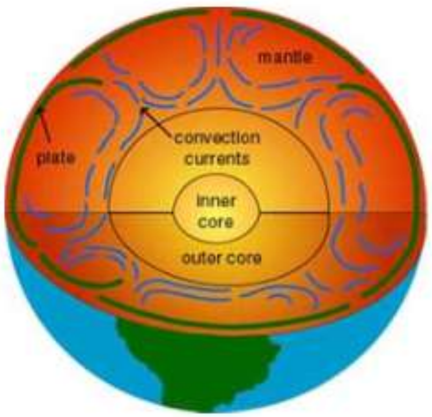
Year 8 Tectonics – subject summary

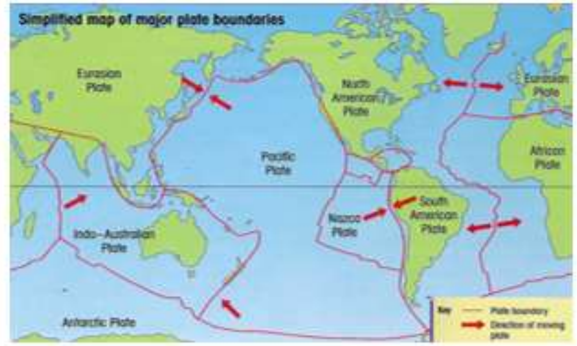
KPI 8.2.1

Layers of the Earth



1. **Inner Core:** centre of the Earth; solid; 5500°C.
2. **Outer Core:** 2000km thick, second hottest, liquid metal.
3. **Mantle:** middle layer of the earth, between the crust and the core, approx. 2900km thick.
4. **Crust:** rocky outer layer; broken into <u>oceanic crust</u> (approx. 5km thick, holds the Earth's oceans, can be destroyed) and the <u>continental crust</u> (approx. 35 to 50km thick, holds the Earth's continents, cannot be destroyed).

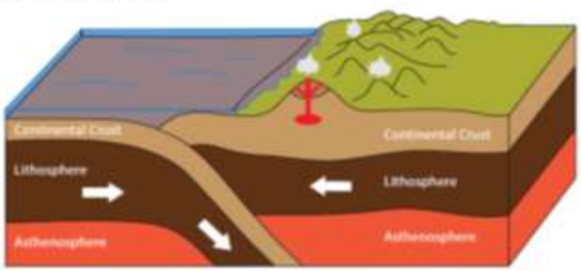
<u>Convection currents</u> are found in the mantle. The core heats the magma, which rises towards the crust, cools, spreads, sinks and the process repeats. Without these currents tectonic activity would not occur.



1. This map shows the major tectonic plates and the movement at their boundaries. This movement occurs due to the **convection currents**.
2. At the edges of plate boundaries, the majority of tectonic events will occur such as volcanoes and earthquakes.
3. Tectonic events do not happen "randomly", however there are a few anomalies to this general rule, e.g. the "hotspots" around Hawaii in the middle of the Pacific Ocean.

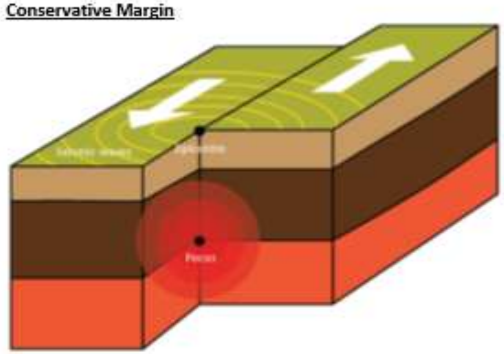
KPI 8.2.2 - Explain how the movement at constructive, destructive, collision and conservative margins creates different tectonic events and landforms.

Destructive Margin



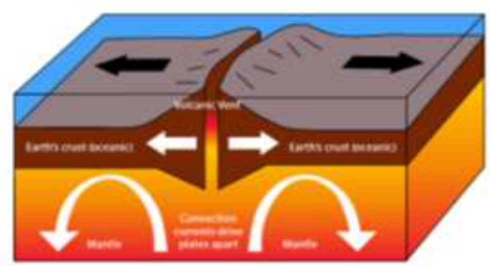
1. A **destructive margin** occurs due to **convection currents** moving the plates **towards** each other;
2. **Oceanic crust** moves towards the **continental crust.** The oceanic is forced down as continental cannot be destroyed;
3. As it is forced down it enters the **subduction zone,** earthquakes happen and the oceanic crust melts in the **magma chamber**;
4. **Pressure builds up** and an eruption takes place producing sticky lava and **composite volcanoes**.

Conservative Margin



1. Conservative margins occur due to **convection currents** causing plates to **slide past** each other, sometimes they will **stick**, causing **pressure to build up** and **friction**;
2. The **convection currents** keep trying to move the plates until they **slip past** each other causing an **earthquake**;
3. **Seismic waves** now rush from the earthquake's **focus.**

Constructive Margin



1. **Convection currents** move the plates away from each other;
2. **Tremors** will be felt, and a **gap** will be created;
3. Fast flowing **lava** seeps out creating **shield volcanoes** and **new land** e.g. Iceland;
4. The **Mid-Atlantic Ridge** is a famous constructive margin creating 3 cm of new land each year.

Year 8 Tectonics – subject summary

KPI 8.2.3

Why do people live near volcanoes?

1. Creates **tourism** (e.g. Vesuvius in Italy);
2. They form **new land** (e.g. Surtsey, Iceland);
3. **Precious stones** can be found nearby;
4. **Geothermal** power plants can locate near volcanoes;
5. The ash makes the **land fertile** meaning jobs for farmers;
6. **Friends and family** may live nearby;
7. Some people **take the risk** as it has not erupted in so long;
8. **Some people cannot afford to live elsewhere**.

Predicting volcanic eruptions

1. The **shape** may change (measured by **tilt-meters**);
2. Measure **gas emissions** (e.g. sulphur);
3. Monitor **tremors**;
4. **Smoke** coming out the top;
5. Nearby **water temperatures** rising;

Preparing for volcanic eruptions

1. **Evacuation and exclusion zones** around the volcano;
2. Train the **emergency services**;
3. **Reinforce roofs** of buildings so they are not affected by falling ash;
4. Ensure **medical, food and water supplies** are stocked;
5. **Diversion channels** for lava flows can be created.

Why do people live in and around seismic areas?

1. Industry and jobs in that area;
2. **Friends and family** may live here;
3. People place faith in earthquake prediction and/or prevention methods;
4. Some people **take the risk** as it has not happened for so long;
5. **Some people cannot afford to live elsewhere.**

Predicting earthquakes

1. Monitor using **seismographs** for irregularities in tremors and plate movements;
2. Monitor **local animal behaviour**, they will sense minor earthquakes and tremors;
3. Measure **radon gas**, this will increase as cracks appear in the rocks;
4. Measure **underground water levels**, these will rise as the plates lock;
5. NB: earthquakes cannot be effectively predicted.

Preparing for earthquakes

1. Retro-fit existing buildings with earthquake proof measures (e.g. cross-bracings, springs, etc.);
2. Ensure new buildings are built to withstand or absorb seismic activity;
3. Practice earthquake drills;
4. Train the emergency services;
5. Prepare earthquake kits at home;
6. Ensure streets are as wide as possible (e.g. San Francisco) so emergency services can gain access.

Other important information

Two ways to measure earthquakes:

1. The **Richter scale** – uses a **seismograph** which measures the size (magnitude) of the **seismic waves**. Measured on a logarithmic scale (e.g. an "8" on the scale is 10x stronger than a "7", and 100x stronger than a "6", and so on).
2. The **Mercalli Scale** – visual scale, giving a ranked score of 1 (least) to 12 (most) for the **damage caused**.

Case Study 1 HIC – *Japan 2011*

Background

- Occurred off the coast of Japan in the Pacific Ocean.

Cause

1. Japan is in one of the most active earthquake zones in the world.
2. A **destructive plate boundary**, where the **Pacific Plate** is subducting underneath the **North American Plate.**
3. The epicentre was **130km** east of the city of **Sendai** and the focus was at a depth of **30km**. It happened on the **11th March at 14:46 pm** and measured 9.0 on the Richter scale.

Effect

1. **16,000 people died,** mainly from the tsunami caused by the underwater earthquake.
2. **6,000** people were injured from falling buildings and debris and the Fukushima nuclear power plant was damaged causing three of its reactors to suffer a meltdown.
3. **230,000** people became homeless and the damage totalled $235 billion to rebuild.

Response

1. **Rescue workers and soldiers** were sent into worst affected areas immediately and other countries sent aid to support Japan.
2. Tsunami barriers were **12m high** but unfortunately the tsunami waves reached over **30m in places**.
3. Areas rebuilt at huge costs, this could be considered unsustainable as it may happen again, meaning money is potentially being wasted.

KPI 8.2.4

Case Study 2 LIC - *Haiti 2010*

Background

- Located in the **Caribbean**, shares island with Dominican Republic.

Cause

1. **Conservative boundary**, **North American plate** and **Caribbean plate** moving in different directions.
2. 7 on the Richter scale; epicentre close to capital Port au Prince.

Effect

1. **250,000 dead** due to poorly built buildings collapsing, many injured could not be treated as hospitals were overwhelmed.
2. **1.5 million homeless**, many had to live in shanty settlements.
3. Outbreaks of **cholera** due to the lack of clean water available.
4. The local jail collapsed, **4000 inmates** escaped.
5. The **destroyed port** also led to the **economy** suffering as trade could not take place, causing **people to lose jobs.**

Response

1. This was made difficult as the **port was destroyed** meaning aid could not get in.
2. People responded by building houses on the edge of the city, these were poor quality and lacked toilets and running water, this lead to the **spread of cholera.**
3. **USA** sent troops into the country to restore order, by stopping looting and organising search and rescue.
4. **The Red Cross** raised **$7million in 24hrs**, sending **food, water and medicine** across from the USA.

United Learning
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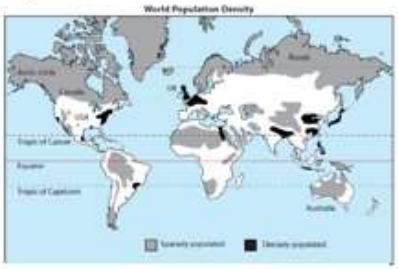
Year 8 Population – subject summary

KPI 8.2.1

Population distribution:



Sparsely Populated – Places which contain few people per km sq.
Densely populated – Places which contain many people per km sq.
Population density – The number of people per km sq.

The world population distribution map shows that the world's population is **not evenly distributed**. Some areas, such as **western Europe** are **densely** populated, whilst other areas such as **central Australia** are **sparsely** populated. **Population density** is influenced by both **human** and **physical factors**, as can be seen from the table below.

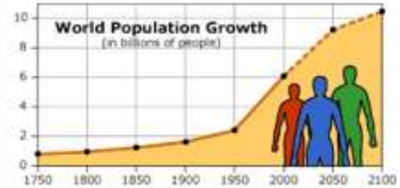
Densely populated areas (positive factors)	Sparsely populated areas (negative factors)
• Pleasant climate • Flat or gently sloping land • Good fertile soil • Good food supply • Good water supply • Money available for investment • Good communication links • Natural resources for industry • Industry and jobs	• Too hot or cold • Too wet or dry • Steep slopes • Poor soils • Dense forest • Poor water supply • Few natural resources • Poor transport links • Little industry • Lack of investment

Can you develop / explain the above points?

Red = Physical **Black = Human**

KPI 8.2.2

Population growth



The graph shows that the world population is rapidly increasing. In the past this has been referred to as an **explosion,** which started in **1950** and is predicted to peak by **2100**.

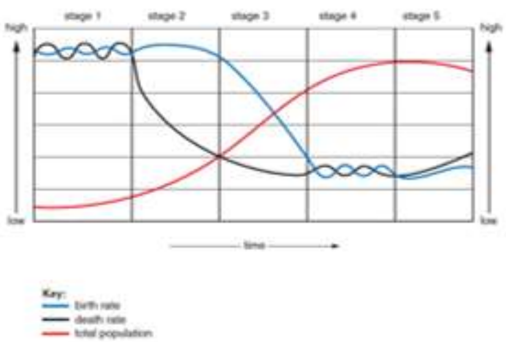
It is happening as **birth rates** are greater than **death rates** causing a **natural increase** in population.

Birth rates - number of births per 1000.

Death rates – number of deaths per 1000.

Infant mortality – the number of babies that die before their first birthday per 1000.

The demographic transition model:



1. The **demographic transition model** shows what happens to a country's population overtime.
2. In **stage one** the country is not developed so has a **high birth and death rate**, so a small population.
3. As the country moves to **stage two** medicines and hygiene improve, the **death rate falls**, but the **birth rate** remains **high**, leading to a rapid **population growth e.g.** in many developing countries.
4. By **stage three** the death rate continues to fall, and the **birth rate starts to fall.** This is because contraception is introduced and females begin to attend school and work, this means the population is **growing**, but more slowly e.g. in many emerging countries.
5. By **stage four, birth** and **death rates are low**, so the population growth **stabilizes**, but the overall population is high, such as in developed countries like the **UK**.
6. By **stage 5** the birth rate could fall below the death rate, leading to **population decline**, as has been seen in Japan.

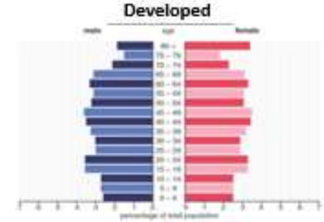
Population pyramids - changing with time!

Factors which could cause a low birth rate	Factors which could cause a high birth rate
• More women have careers • Sex education widely available • Contraception • Later marriage • Children perceived as expensive e.g. childcare costs • Low infant mortality	• Children needed for work e.g. farming • Children needed to look after their parents when they are older • Sex education not widely available • Marriage happens at a younger age • High infant mortality

Population structure (population pyramids):

Developing

Developed



Population structure means the number / proportion of people in **each age range**, for each **gender**. Population pyramids show the population structure of the country they represent.

There are three groups on a population pyramid:

1. **Economically active** – 16-65 age group, working age and can provide taxes.
2. **Young dependents** – 0-15 age range, rely on the working age for support via taxes.
3. **Elderly dependents** – 65+ age range, rely on the working age for support via taxes.

Features of population pyramids:

As can be seen from the graphs the pyramids are very different. For example:

1. Many **developing countries** have pyramids with **a wide base** this shows a **high birth rate**, however the **top is narrow** showing a **lower life expectancy**. The general shape is a pyramid.
2. Many **developed countries** have pyramids with a **narrow base** this shows a **low birth rate**, whereas the **top is much wider**, showing a **long life expectancy**.

These pyramids also link to the **demographic transition model**. Countries in **Stage 3** will have pyramids like the **'developing'** pyramid above.

Countries in **stage 4** will have pyramids that look like the **'developed'** pyramid.

Life expectancy – The **average age** you are expected to live to in a **country.**

KPI 8.2.2

The UK's population problem.

In the UK the population is **ageing**. This means there are **more elderly dependents** than ever before. The main reasons for this are...

1. **Better health care** so illnesses are treated with some success.
2. **Better diet** means heart attacks and diseases related to unhealthy eating are on the decline.
3. **Fitness;** the elderly are looking after themselves better than ever before, e.g. attending the gym etc.

The consequences of an ageing population.

<u>Suggested negatives:</u>

1. **2/3s of hospital beds** taken by those over the age of 65, this can increase **waiting times,** putting pressure on the NHS.
2. Treating the elderly can be expensive, this means **less taxes** for other things such as education.
3. They receive a **state pension** causing a significant cost for the government.
4. **Carers needed**, which requires taxes, which could be spent on other things.
5. **Housing pressure,** as houses are not passed on to the next generation, meaning house **prices increase.**

<u>Suggested positives:</u>

1. Many elderly people have more **disposable cash** as they have paid off their mortgages and their children have left home. This means shops and restaurants can make more money as they have a larger population who are willing to spend. This can increase employment opportunities.
2. Industries such as **seaside resorts stay busy** throughout the year, keeping people in such areas employed throughout the year, meaning more local tax revenue.
3. The elderly often **look after grandchildren**, this means that parents do not have to pay **expensive childcare costs,** so parents have more disposable cash.

What happens to countries where migrants migrate from, also known as the source country?

<u>Positive impact:</u>

1. **Money** can be **sent back home**, improving the quality of life for locals e.g. they can spend money on medicines, home improvements etc.
2. Less people meaning **less population pressure** on food and water, as well as services such as doctors.
3. **Trade links** set up, **creating jobs** in the local area.

KPI 8.2.4

<u>Negative impact:</u>

1. **Families split up**; this can result in male role models not being about.
2. **No men left** to do jobs such as farming, building etc.
3. **Local businesses** forced to **close** as half the population / customer base has left.
4. **Less taxes,** as the workforce is outside of the country, meaning the government cannot invest in large scale infrastructure projects.

KPI 8.2.3

Migration is the movement of people, from one place to another.

International migration is when people move from **one country (the source)** to **another country (the host).**

People migrate due to **push** and **pull factors**:

A **<u>push factor</u>** is something which is **not good** in your country and **forces you to leave**, for example: a **lack of medical care** meaning illnesses go untreated; **no clean running water** leading to diseases; **low wages** due to poor employment opportunities causing people to have little money for food and medicines; **poor schools** leading to poor education standards and little chance of getting a job.

A **<u>pull factor</u>** is something which **attracts people** to another country. It is basically the push factors reversed. For example, a pull factor could be that a country has **excellent medical services**, so people move there as they know illnesses and diseases can be treated, improving life expectancy.

<u>Migration to the UK (a host country)</u>

<u>Effect (suggested benefits)</u>

1. Workers are hardworking, so **more profit** for businesses who employ them.
2. **Workers pay tax** this improves schools and hospitals.
3. **New shops and restaurants**, leading to more jobs and taxes. New businesses have opened e.g. supermarkets.
4. The migrants **work in jobs that English people are not choosing to fill** e.g. working on farms. Without the migrants some businesses would struggle to operate effectively.

<u>Problems (suggested negatives – evidence proves otherwise)</u>

1. Some people have been concerned that migration could put **pressure on the NHS**, this could cause waiting times to increase (however evidence does not support this).
2. It has been suggested that some schools now have many languages, this **<u>may require</u>** more support staff.
3. *Some locals say* that **jobs are harder to get**, this is because migrants work for less. It has been *<u>suggested</u>* that this could cause **unemployment for locals** (however evidence does not support this).

Y8 History

Topic	This is what we learned in lessons - the list below is not ALL you need to learn – please use your exercise book too.	Revision Completed
Henry VIII, religion and The Reformation	1. Martin Luther and the European Reformation 2. What were the differences between Catholicism and Protestantism in England? 3. Why did Henry VIII want to break from Rome? a. Religious b. Succession c. Financial	
Elizabethan England	1. How did Edward VI change the church? 2. Does Mary deserve the nickname 'Bloody Mary'? 3. How far was Elizabeth threatened by the Catholics?	
The English Civil War	1. What were the long term causes of the English Civil War (Catholic threat, 11-years tyranny, puritan challenges). 2. What were the short term causes of the ECW? (War and taxation). 3. Who fought who in the English Civil War?	
The Transatlantic Slave Trade	1. What was the role of the British Empire in the Slave Trade? 2. How did the triangular slave trade work? 3. How was the slave Trade abolished? a. White middle-class campaigns b. Black rebellions and campaigners	
The Industrial Revolution	1. What was the Industrial Revolution? 2. How did transport change? 3. What was the impact of key people? 4. Did everyone view the Industrial Revolution as progress? 5. What were the roles of women and children during the Industrial Revolution?	

This QR code will send you **DIRECTLY** to BBC Bitesize where there are podcasts, videos and all sorts of resources to help you.

Music

KS3 Music	Topic	Revision Completed
Notation & Theory	1.1 Note names and duration	
	1.2 The 8 elements of music	
Film Music	2.1 Orchestral instruments	
	2.2 Creating a character theme	
Keyboard Skills	3.1 Keyboard note names (letters)	
	3.2 Score reading (key terms & symbols)	
World Music	4.1 World instruments	
	4.2 World rhythms	
The Guitar/Bass	5.1 Hooks & riffs	
	5.2 The evolution of strings	
Music technology	6.1 Music technology through time	
	6.2 Popular effects	

You will be given knowledge organisers for these topics. Please collect these from your music teacher.

Y7 (plus 8 and 9 groups 3 and 4)

- Unit 1 – The basics (name and age; nationality and languages; birthdays; free time activities)
- Unit 2 – My family (family and ages; physical description; personality; free time activities; opinions; animals)
- Unit 3 – School (subjects and teachers; opinions with reasons; rooms in school; activities in the future)

Y8 (groups 1 and 2 only)

- Unit 5 – Holidays (past holidays and activities; usual holidays and opinions; future plans)
- Unit 6 – Going out and staying in (free time activities in present, past and future; clothes and food in a party; tv and films; music)
- Unit 7 – Daily routine, health and fitness (daily routine in present and past; healthy life; health and fitness advice; illness and advice)

Y9 (groups 1 and 2)

- Unit 9 - Relationships (physical and personality descriptions; relationships; free time activities; ideal partner and friend; future plans; past activities)
- Unit 10 – Festivals and celebrations (food and times; opinions; festivals and celebrations; a festival in the past; what festival you would like to visit)
- Unit 11 – City or region in a Spanish-speaking country (my city and region now and in the past; a city in Spain now and in the past; comparisons; a shopping trip in the past; what country you would like to visit in the future)

RELIGIOUS STUDIES:

Y7: CHRISTIANITY	
• The Nativity	
• Jesus' ministry	
• Sermon on the Mount	
• The Resurrection	
• Original Sin	

Y8: PHILOSOPHY	
• Ways to describe God (Omni- words)	
• William Paley's Design Argument	
• Criticisms of William Paley's Design Argument	
• Thomas Aquinas' Cosmological Argument	
• Theodicies	

Y9: ISSUES OF LIFE AND DEATH	
• Different views on life – sanctity and quality	
• Thomas Aquinas' Natural Law Theory	
• Joseph Fletcher's Situation Ethics Theory	
• Abortion	
• Euthanasia	

Y8 Drama Revision

A3 Assessment:
Performing a Piece of Devised Drama

The Assessment

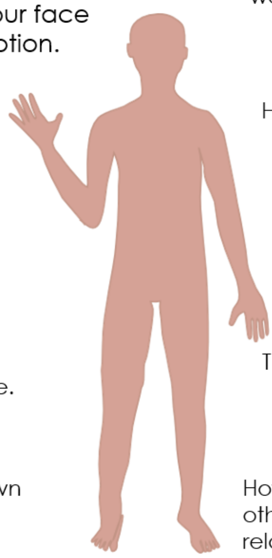
The assessment will be to **perform** a devised piece of drama. You will try to achieve the following **I Can** statements;

- I can perform a range of vocal skills in a performance
- I can perform a range of physical skills in a performance
- I can perform for an agreed time or an agreed piece of script

Checklist

To revise for this assessment you should check that you understand the vocabulary that will be used.

- Performance
- Character
- Range of skills
- Vocal acting skills
- Physical acting skills

Glossary	
Performance	To present a play to an audience. To act out the storyline.
Character	A **character** is a person in a play or a film. We will perform characters who are different to our real self. We should try to show how these characters are different by using our physical and vocal acting skills.
Range of skills	To show a **variety of different** skills.
Vocal acting skills	**Vocal Skills** Ways you can control your **voice**. Remember! **Accent** To denote where the character comes from or where they live. **Tone** The emotion you are showing in your voice. **Pace** How fast or how slow you speak.  **Emphasis** Words or phrases which you stress more than others when speaking. **Pause** When there is a break in your flow of speech. **Pitch** How high or low you speak. **Clarity** How clear or unclear you speak. **Volume** How loud or how quiet you speak.
Physical acting skills	**Physical Skills** Ways you can control your **body**. Remember! **Facial expression** How we hold our face to show emotion. **Body language** Umbrella term used to explain how we communicate meaning with our body. **Eye contact** Where or who we are looking at. **Posture** How we stand or hold our body to communicate emotion.  **Gesture** Usually hand signals with meaning. **Stillness or Movement** How quickly or slowly we move around the stage. **Mannerisms** The physical habits a character has like biting their nails. **Spatial awareness** How we use the stage space. **Levels** How high up or low down we are compared to others. **Proxemics** How close or far apart they stand to other characters to show their relationship.