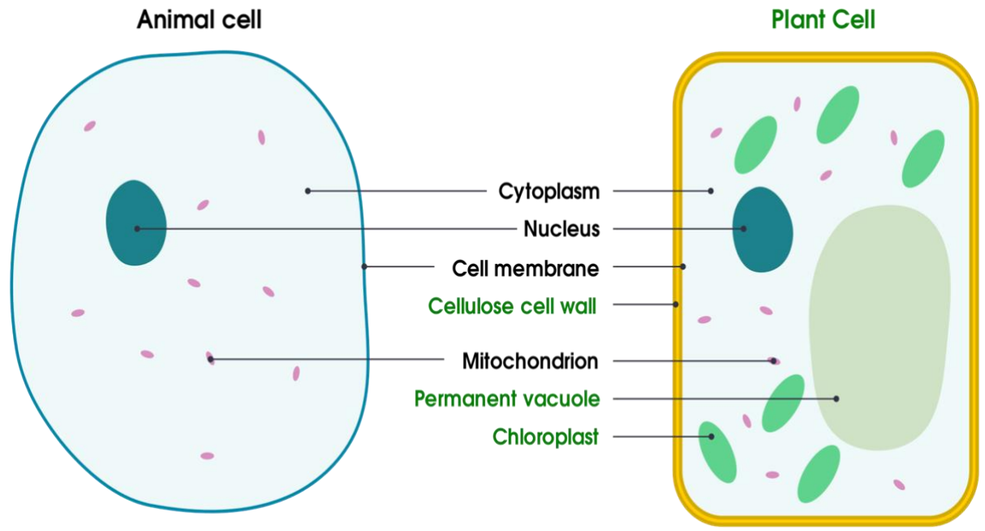
Year 7 biology knowledge organiser

Composite title	Essential knowledge	Keywords
What are living things made of?	All living organisms are made up of cells. Animal Cell structure include: • Nucleus • Membrane • Cytoplasm • Ribosome • Mitochondria Plant cell structure include organelles above plus: • Cell wall • Chloroplast • Vacuole Function of the cell structures. • Cytoplasm - Chemical reactions occur here • Nucleus - Contains the genetic information. Controls the cells activity • Cell membrane - Controls what enters or leaves the cell • Mitochondria - Carry out respiration to release energy • Chloroplast - Photosynthesis occurs here. • Vacuole - Contain cell sap to keep cell swollen. • Cell Wall - Provides structure and support.	Organelle Nucleus Cytoplasm Cell wall Cell membrane Chloroplast Vacuole Cell



Year 7 biology knowledge organiser

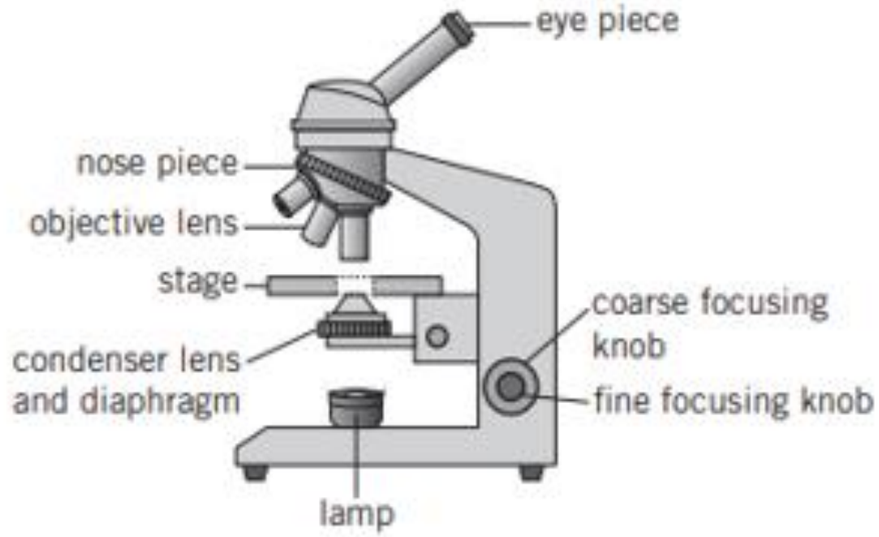
Using a microscope

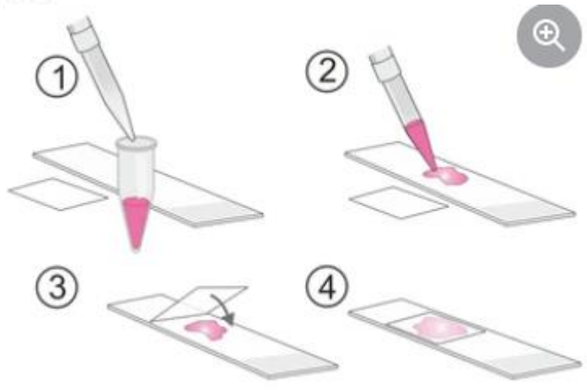
Parts of a microscope:

- Stage
- Eyepiece lens
- Objective lens
- Focusing knob

Preparation of cheek cell with stain method:

1. Using a cotton wool bud, rub the inside of your cheek to collect the cells.
2. Streak the cotton wool bud onto a microscope slide.
3. Place two to three drops of methylene blue solution onto the streak (stains make the cell parts easer to see)
4. Carefully place the cover slip onto the slide.
5. Observe under the microscope using low power before moving to a higher power.





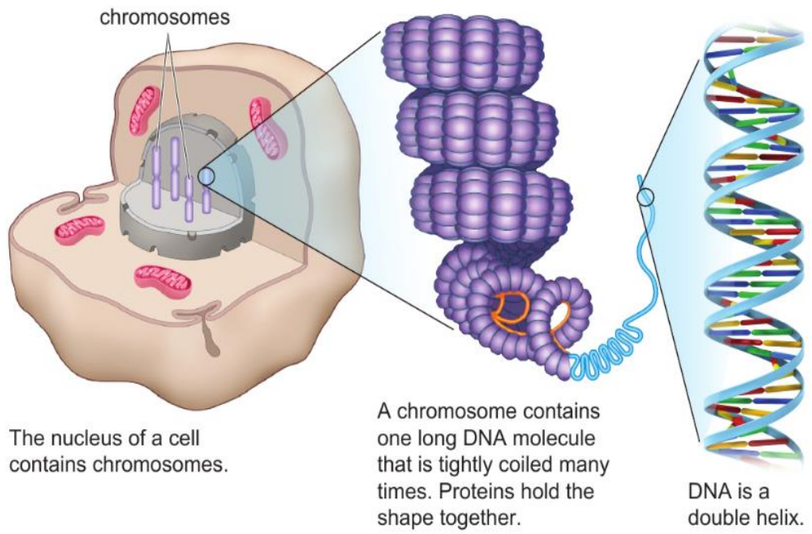
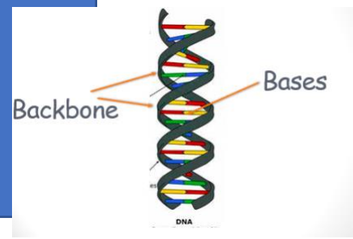
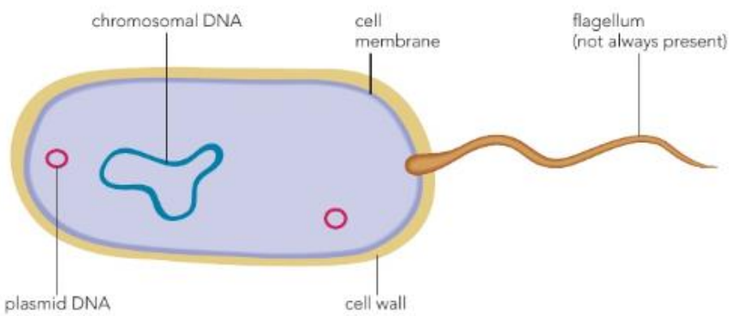
To calculate overall magnification:

Eyepiece lens x objective lens

Magnification is how many times bigger and image is compared to its original size.
Resolution is the ability to distinguish between two separate points on an image (how detailed it is)

Microscope
Magnification
Focus
Resolution
Lens

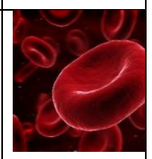
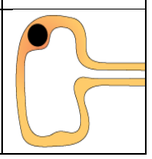
Year 7 biology knowledge organiser

What is DNA?	 DNA has a double helix shape. DNA consists of a backbone and bases. The complimentary base pairs are: A and T G and C 	DNA Chromosome Double Helix Base
Other types of cell	Structure of bacterium: • Unicellular (one cell) • NO nucleus • Cell wall • Chromosomal DNA • Plasmid DNA • Some have flagella  Bacteria are **microorganisms** (very small living things) Not all bacteria are bad. Many are useful to humans. Other microorganisms include: Fungi and viruses.	Unicellular Multicellular Bacterium/ (bacteria as plural) Plasmid Chromosomal DNA Flagellum Specialised cell Differentiated

Year 7 biology knowledge organiser

Roles of differentiated/ specialised cells in multicellular organisms including:

- Egg
- Sperm
- red blood cell
- root hair

Cell	Function	Adaptations	Image
Red blood cell	To carry oxygen around the body	Large surface area to carry oxygen. Haemoglobin to carry oxygen. No nucleus for plenty of space for haemoglobin.	
Sperm cell	To reach female egg cell and fertilise it (fuse with it)	Tail for swimming. Acrosome with digestive enzymes to help break through egg cell. Mitochondria to provide energy.	
Egg cell	To be fertilised by a sperm cell	Only allows one sperm cell through membrane. Contains yolk which provides a large store of nutrients	
Root hair cell	to absorb water from the soil for the plant.	Thin membrane and a large surface area to speed up the rate of diffusion.	

Multicellular organisms consist of many cells.

Specialised cells are cells that have a specific function. They are well adapted to carry out their function in a number of different ways.

Eukaryotic cells contain a nucleus

Prokaryotic cells do not contain a nucleus

How can we see bacteria?

Practical investigation

Aim 1- To create plates using an ***aseptic technique*** to test what is living on your skin.

Aim 2 – To investigate whether washing your hands has an impact on what's living on your skin

Method (aseptic technique):

1. Wipe down the surface you are going to work on using antiseptic and blue roll.
2. Put the blue roll in the bucket provided – not the bin
3. Place a piece of foil on the desk
4. Set up a Bunsen burner and leave this on the blue flame near where you are working
5. Collect an agar plate, draw a line across the bottom and write your initials on it.
6. Your partner can take the lid off whilst you carefully rub your finger across the agar – do not push too hard.
7. Place the lid back on the plate and tape shut with a cross shape – do not completely seal the agar plate!
8. Turn off the Bunsen burner, and return the foil
9. Wipe down the area you have been working on with blue roll and place this in the bucket.

Aseptic technique means using practices and procedures to prevent contamination

Aseptic technique
Sterile
Agar plate
Petri dish
Microorganism

Year 7 biology knowledge organiser

How can we use microorganisms ?

All living organisms can do the 7 following life processes:

Movement
Respiration
Sensitivity

Growth
Reproduction
Excretion
Nutrition

MRS GREN

<u>Uses of fungi (yeast):</u>
Making bread - Carbon dioxide released in respiration causes the bread to rise.
Making beer – through fermentation, air is kept out of the mixture so the yeast can aerobically respire.

<u>Uses of bacteria:</u>
Making yogurt. Method:

1. Heat 100cm^3 milk to 85˚C in a beaker on a tripod and gauze.
2. Cool milk to 43˚C, continue stirring
3. Add 1 teaspoon of starter (natural yogurt with bacteria in)
4. Put in plastic cup an cover in cling film with your name on.
5. These will be incubated.

Bacteria are also found in our digestive system – these help us digest our food.

Aerobic respiration word equation:

Glucose + Oxygen → Carbon dioxide + Water

Anaerobic respiration in <u>yeast</u>:

Glucose → Carbon dioxide + ethanol (an alcohol)

Fermentation
Fungi
Yeast
Egestion
Reactants
Products
Reaction

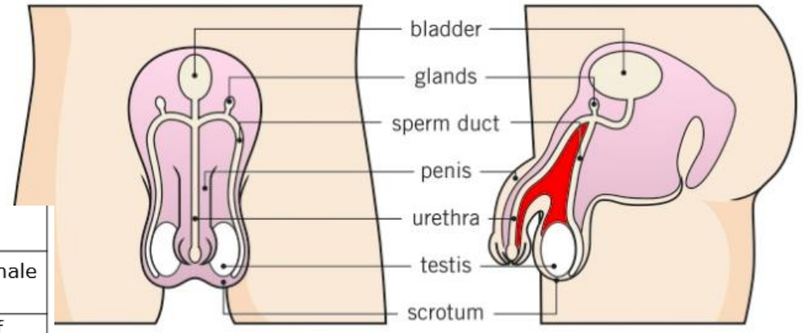
Year 7 biology knowledge organiser

Reproductive organs

Male structure names and function to include:

- Penis
- Testis
- Sperm duct
- Scrotum
- Urethra

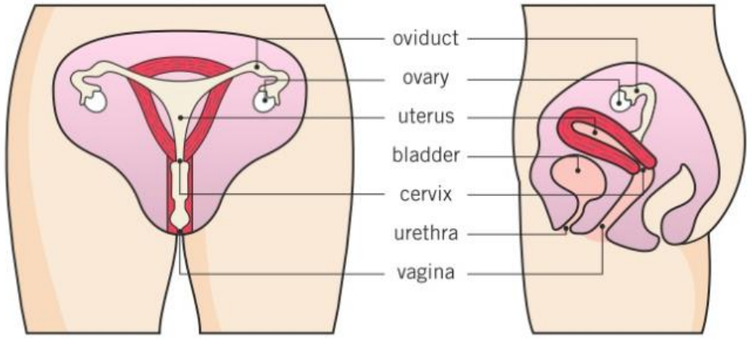
Male reproductive structure	Description of structure	Function
Testes	oval organs in the scrotum	produce sperm and the male sex hormones
Scrotum	bag of skin containing the testes	keeps the temperature of the testes slightly lower than the rest of the body
Glands	small structures near the urethra	add fluid to the sperm to keep them alive
Sperm duct	muscular ducts about 30 cm long	carry sperm from the testes to the penis
Urethra	tube in penis	carries urine or sperm out through the penis
Penis	sex organ, cylindrical in shape	inserts sperm into the female



Female structure names and function

- Uterus
- Ovaries
- Vagina
- Cervix
- Oviduct

Female reproductive structure	Description of structure	Function
Ovaries	pair of small, oval-shaped glands, either side of the uterus	store and release eggs
Oviduct	tube connecting ovary and the uterus	carries the egg to the uterus
Uterus	hollow, pear-shaped organ, with a thick lining	where a fetus/baby develops until birth
Cervix	ring of muscle at the entrance to the uterus	keeps the fetus/baby in place
Vagina	muscular canal ending at the cervix	receives the sperm during sexual intercourse
Urethra	tube from bladder	carries urine out of the body



Penis
Vagina
Genitals
Sperm
Egg
Testis
Sperm Duct
Semen
Glands
Scrotum
Ovary
Oviduct
Uterus
Cervix

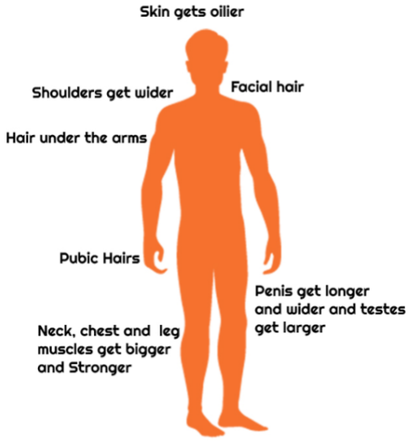
Year 7 biology knowledge organiser

How do our bodies change?

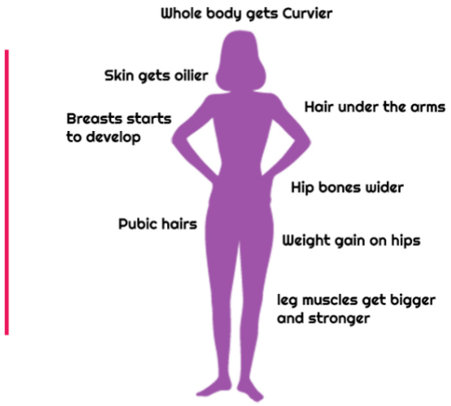
Changes during puberty- to include:

- pubic hair
- changes in body shape
- voice deepening
- causes of acne, body odour linked to need for hygiene

Hormones controlling these changes (Oestrogen and Progesterone in females and testosterone in males.)



MALE

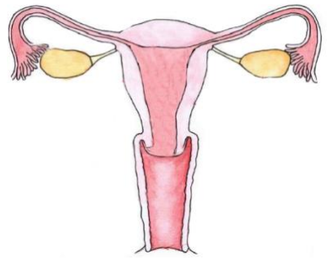


FEMALE

The menstrual cycle:

An important part of puberty for girls is the beginning of their monthly cycle. This is known as the **menstrual cycle**.
The menstrual cycle involves the preparation of the uterus lining so that it is able to receive a fertilised egg.
If an egg is fertilised, it can implant itself in the prepared uterus lining.
If it is not fertilised, the lining of the uterus breaks down and is lost from the body. This is called **menstruation** or a period.

- Day 1-7 - Uterus wall breaks down, the woman bleeds, this is a period.
- Day 7-13 - Around day 7 the blood flow stops. Uterus wall builds up again. An egg matures in the ovaries
- Day 14 - On the 14th day, the egg is released from the ovary (ovulation)
- Day 14-17 - Egg travels down the oviduct, It can last for around 3 days. If it meets a sperm in the duct, it becomes fertilised
- Day 18-28 - If the egg is not fertilised, the uterus wall breaks down and the cycle starts again.



Hormone
Puberty
Adolescence
Menstrual Cycle
Menopause
Oestrogen
Progesterone
Testosterone

What is fertilisation?

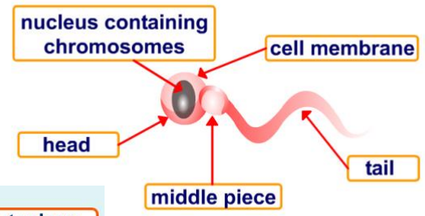
In the female, one of the ovaries produces an egg every
28 days. This is called **ovulation**.
During sexual intercourse millions of sperm are **ejaculated** into the vagina during sexual intercourse.
If a sperm meets the egg, the sperm's nucleus can join with the egg's nucleus.
This fusing of the nuclei is called **fertilisation**.

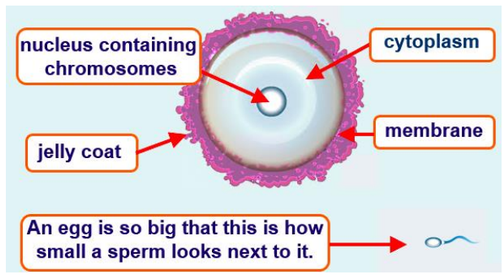
Fertilisation-

- Haploid gametes (sperm and egg) fuse to form a diploid zygote
- The acrosome in the sperm breaks down jelly coat/ membrane in the egg.
- Eggs coat hardens to prevent double fertilisation.
- Zygote starts to divide to form an embryo.

Haploid cells – contain half the number of normal chromosomes

Diploid cells - contain the full number of chromosomes.





Fertilisation
Haploid
Diploid
Gamete
Zygote
Sexual intercourse
Ovulation
Ejaculation

Year 7 biology knowledge organiser

How do plants reproduce?

Plants can reproduce with either **sexual** or **asexual** reproduction

- **ASEXUAL REPRODUCTION** means that the organism makes an exact copy of itself (a clone**)**
- **FLOWERING PLANTS** reproduce sexually. Sex cells (gametes) fuse together (fertilisation)

Flower structure to include the:

- Stigma and stamen
- Stamen
- Ovary
- Anther and filament
- Petals and sepals

Pollination is the transfer of pollen from anthers to stigmas.
This must occur before a male sex cell can fuse with a female sex cell. Methods of pollination:

- Bees/ insects
- Wind/ water
- Artificial

Fertilisation

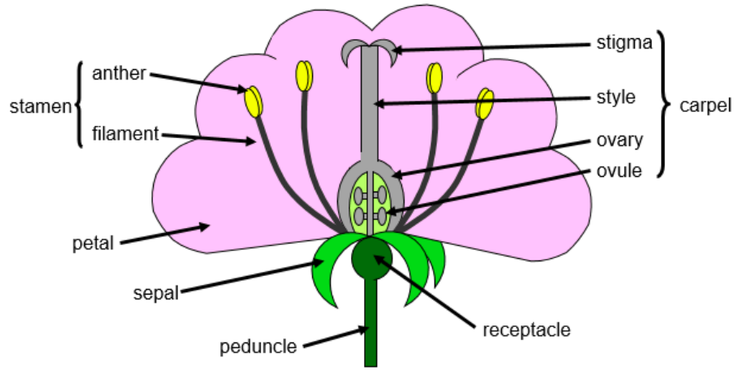
- Once pollen has landed on the stigma.
- The male gamete travels down the style towards the ovary
- The gametes fuse in the ovary – fertilisation!

Seed formation

After fertilisation the fertilised ovule divides into many cells to form a seed.
The seed develops a thick tough outer coat for protection.

Seeds can be dispersed by:

- Wind
- Animals
- Water
- Self-dispersal



Structure	Function
Petals	Large, brightly coloured to attract insects (small, green or brown if plant is wind pollinated)
Sepals	Small, green, leaf-like structures to protect flower in bud
Stamens	Male parts of the flower
Anther	Produces lots of small pollen grains – contain male gametes
Filament	Attaches the anther to the flower
Carpel	Female part of the flower
Stigma	Where pollen lands during pollination
Style	Transports the male sex cell to the ovary
Ovary	Produces small number of large **ovules** – female gametes. Ovary often forms the fruit once ovules are fertilised.

Dispersal of seeds

Method	Description of seeds
Wind Dispersal	Light – blown and spread by the wind
Animal dispersal	Either eaten by animals and egested in droppings Or have hooks to cling to fur of animals
Water dispersal	Contain air spaces to help them float
Self-dispersal	Fruit walls of plants simply dry out and burst. Split ovary scatters seeds explosively.

Stigma
Stamen
Style
Ovary
Pollen tube
Sexual
Asexual
Anther
Pollen
Pollination

Year 7 biology knowledge organiser

Why are living things different?

Variation – differences in characteristics. These differences can be environmental or genetic/inherited.

Continuous vs discontinuous variation
Continuous variation are those which can have any value within a range e.g. height and mass
Discontinuous variation are those which have distinct groups e.g. hair colour, eye colour, blood group

Inherited Variation	Environmental Variation	A Mixture of Both
Eye colour	Hair length	Weight
Ear lobes	Sun tan	Intelligence
Blood group	Tattoo	Height
Inherited diseases	Ear piercing	Speed at running

Inherited characteristics never change.

Environmental
Genetic
Continuous
Discontinuous
Variation
Genes
Inherit
Mutation
Characteristic

How are living things classified?

All organisms can be placed into groups based on their characteristics
This is called classification.

Hierarchy of taxonomy:

- Kingdom (5 kingdoms – plants, animals, prokaryotes, fungi, protists).
- Phylum
- Class
- Order
- Family
- Genus
- Species

Hierarchical classification system example

Kingdom : Animalia
Phylum : Chordata (vertebrates)
Class : Mammals
Order: Primates
Family : Hominidae
Genus : Homo
Species: *Homo sapiens*

Members of the same **species** can breed together to produce fertile offspring.

Classes of vertebrate and main distinguishing features:

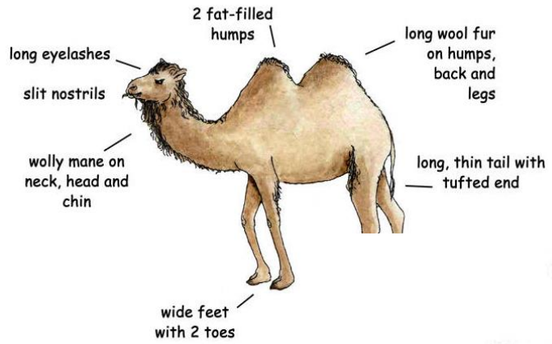
- Mammals- live young (viviparous), lungs, fur, constant body temperature)
- Birds- feathers, eggs (oviparous), lungs, constant body temperature.
- Reptiles- scales, eggs (on land-hard shell), lungs, body temperature depends on surroundings.
- Amphibians- eggs (in water-soft), lungs and gills, body temperature depends on surroundings.
- Fish- scales, eggs (in water- soft), gills, body temperature depends on surroundings.

Vertebrates – organisms with a backbone

Invertebrate – organisms with no backbone

Classification
Kingdom
Species
Vertebrate
Invertebrate
Viviparous
Oviparous

Year 7 biology knowledge organiser

How are living things suited to their environment?	**Adaptation** as a feature of an organism which allows in to thrive/ survive in its habitat. Common features in a certain habitat including: • Hot desert- large SA for cooling, water storage, plant defences. • Polar- small SA- large size, fat, fur or similar. Adaptations of a typical: • Predator- forward facing eyes, speed, claws or talons, sharp beak or teeth. • Prey- eyes on side of head, camouflage, behaviour eg burrowing.  	Adaptation Habitat Environment Camouflage Competition Predator Prey
Where do living things live?	The effects of Biotic and Abiotic factors on an ecosystem and its community. Biotic factors are the living organisms in an ecosystem Examples of Biotic factors: • New predator/ prey • Disease • Human activity Abiotic factors are the non-living factors that affect an ecosystem. Examples of Abiotic factors: • Light intensity/ day length • Temperature/ climate • Availability of water • Terrain • pH of soil/water The biotic and abiotic factors can affect which organisms live in a particular area (ecosystem)	Biotic Abiotic Intensity pH Temperature

Year 7 biology knowledge organiser

How do living things interact?

Organisms in an ecosystem are affected by competition for resources including:

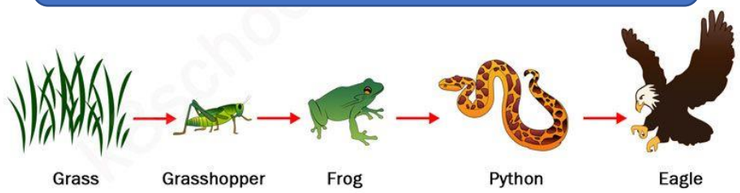
- Food/ prey
- Water
- Shelter
- Territory
- Mates

That this competition is both inter- (between) and intra- (within) specific (a species).

Food chains show how organism rely on other organism for food.

- Producer
- Primary consumer (herbivore)
- Secondary consumer (carnivore)
- Tertiary consumer (top/ apex carnivore/predator)

The eagle eats pythons. Pythons eat frogs. Frogs eat grasshoppers. Grasshoppers eat grass.



Arrows in a food chain show the direction of energy transfer

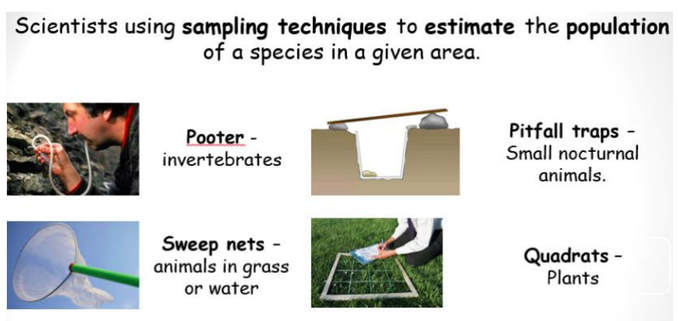
producer	=	an organism that produces its own food
omnivore	=	an organism that eats both consumers and producers
herbivore	=	an organism that only eats producers
consumer	=	an organism that cannot make its own food
carnivore	=	an organism that only eats other consumers

Energy
Transfer
Relationship
Food chain
Omnivore
Herbivore
Carnivore
Producer
Primary/ Secondary/ Tertiary
Consumer

How can we study an ecosystem?

Identify and describe how to use simple equipment systematically to monitor the organisms in an ecosystem. To include:

- Quadrat
- Transect
- Others e.g. pitfall traps



Quadrat
Transect
Sample
Ecosystem
Population
Estimation

Year 7 biology knowledge organiser

Using quadrats to estimate population size for a chosen organism e.g. daisies on a field

Method:

1. Calculate the area of the field *(area = length x width).*
2. Calculate the area of the quadrat *(area = length x width)*.
3. Calculate how many quadrats fit in the field *(area of field ÷ area of quadrat).*
4. Count and record the number of daisies in one random throw of the quadrat.
5. Repeat stage 4 for a further 9 throws of the quadrat.
6. Calculate the mean number of daisies in one throw of the quadrat (sum of the daisies in the 10 throws ÷ 10).
7. Estimate the number of daisies in the field *(mean number of daises in one throw x how many daises fit in the field).*

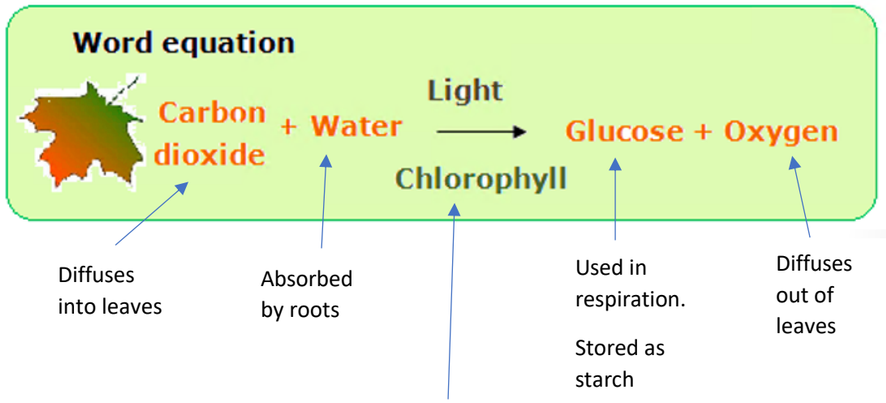
Other observation methods include hides, drones and cameras

Why don't plants eat?

Autotrophs – produce their own food e.g. plants
Heterotrophs – cannot produce their own food.
They need to eat e.g. us!

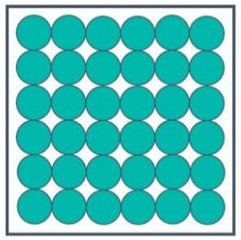
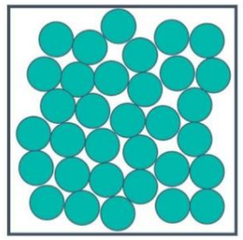
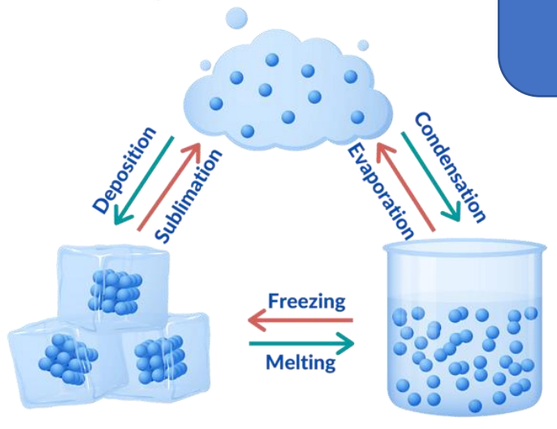
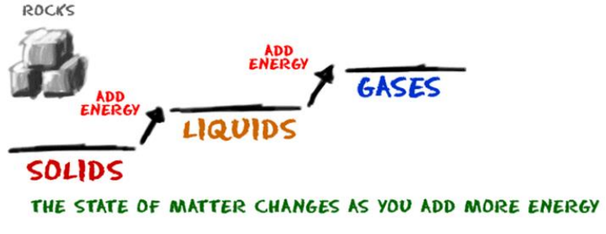
Photosynthesis is a chemical reaction that happen in the chloroplasts of plant cells.
Plants need light in order to photosynthesise

Photosynthesis is the chemical reaction that plants use to make glucose (their food).



Autotroph
Heterotroph
Photosynthesis
Glucose
Starch

Year 7 chemistry knowledge organiser

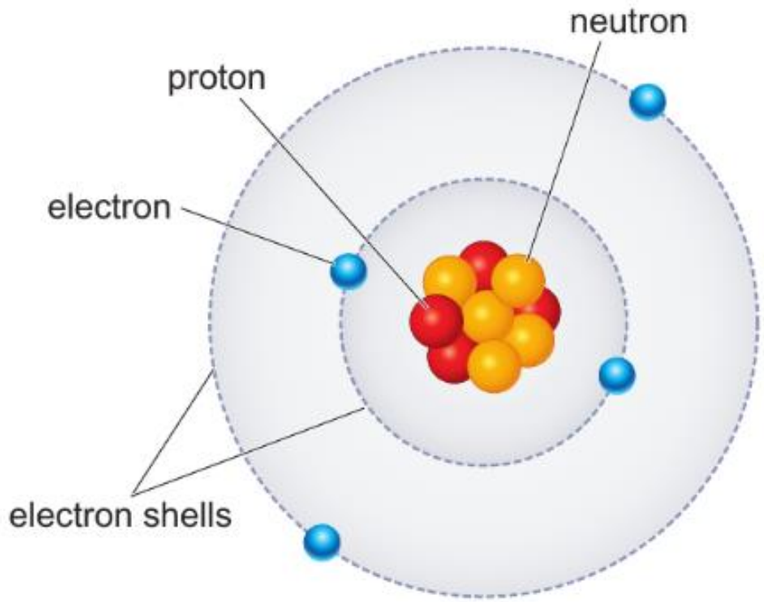
Composite title	Essential knowledge	Key words
What are the states of matter?	Matter is the material from which everything is made. It can exist as three states: Solid, liquid and gas Particle diagrams:  Solid Particles in solids vibrate  Liquid Particles in liquids can move over one another  Gas Particles in gases are spaced out. They move quickly and randomly  State changes are **physical changes**. They can be **reversed.** **Properties of solids, liquids and gases:** | Property	Solid	Liquid	Gas | |---|---|---|---| | **Is the shape fixed or can it change?** | Fixed | Shape of the container | Shape of the container | | **Does it flow?** | Cannot flow | Can flow | Can flow | | **Is it easy to squash?** | No | No | Yes | | **Can you change its volume?** | Fixed Volume | Fixed Volume | No Fixed Volume | | **Does it feel heavy or light?** | Heavy | Heavy | Light | **State changes:**   	State Matter Particles Energy Physical Change Solids Liquids Gases Evaporation Condensation Melting Freezing Sublimation Deposition Vibrate

Year 7 chemistry knowledge organiser

What is the universe made of?

All matter is made up of very very small atoms (these cannot be seen with the eye)

Atomic structure:



Atoms are made up of 3 **subatomic** particles.

Protons and neutrons are found in the centre and make up the **nucleus.**

Electrons orbit the nucleus on shells.

Masses and charges of the subatomic particles:

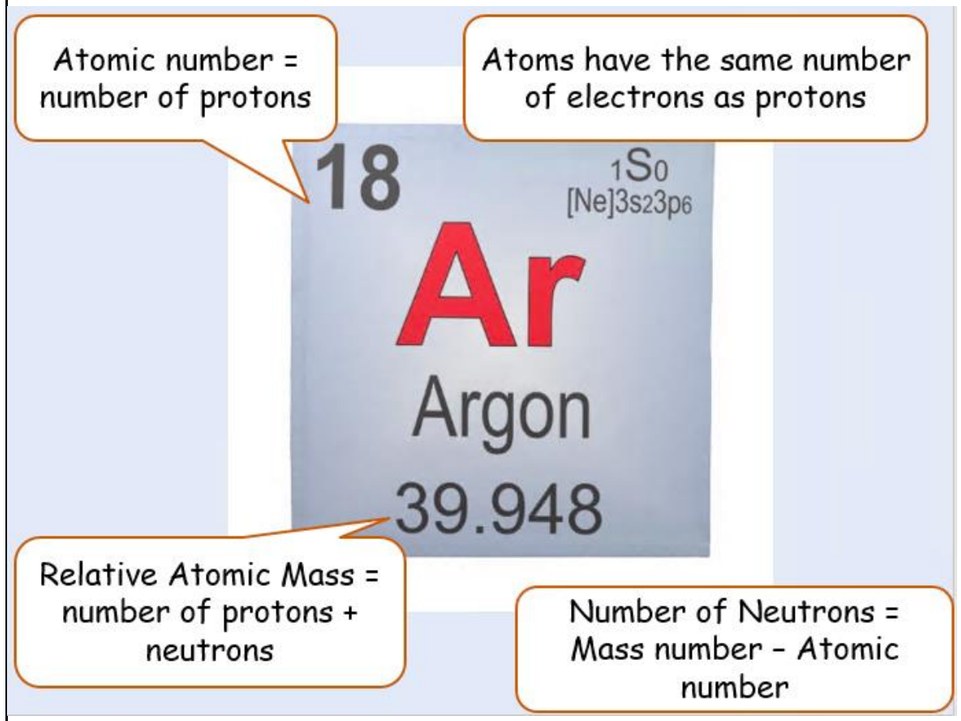
Subatomic particle	Relative charge	Relative mass
proton	+1 (positive)	1
electron	−1 (negative)	1/1835 (negligible)
neutron	0 (no charge)	1

B relative masses and relative charges of subatomic particles

Atom
Nucleus
Proton
Electron
Neutron
Electron Shell
Atomic Number
Atomic Mass
Electron configuration

Year 7 chemistry knowledge organiser

Different atoms have different numbers of protons neutrons and electrons. We can use the periodic table to find out how many protons neutrons and electrons are in different atoms.

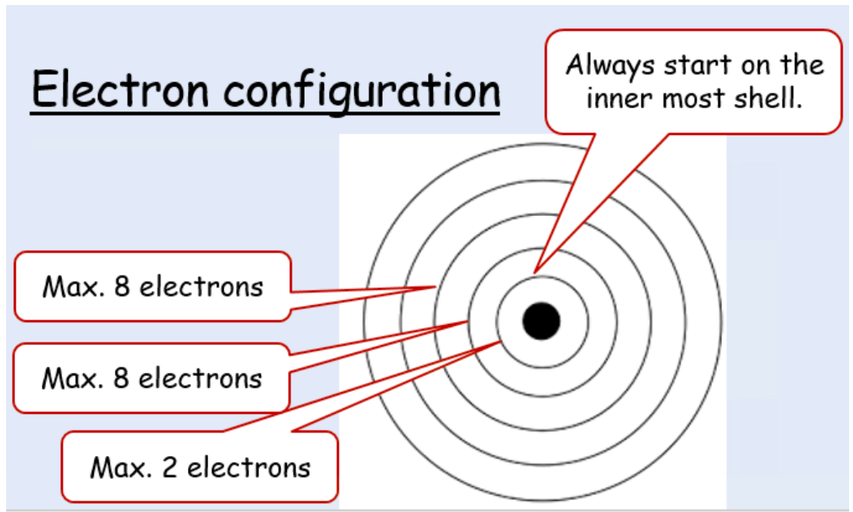


The **atomic number** is the smaller number and the **relative atomic mass** is the bigger number

Electron configuration shows how many electrons are in each shell.

Argon has 18 electrons. It will have 2 electrons on the first shell, 8 on the second shell and 8 on the third shell.

Its electron configuration is 2,8,8



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What is an element?

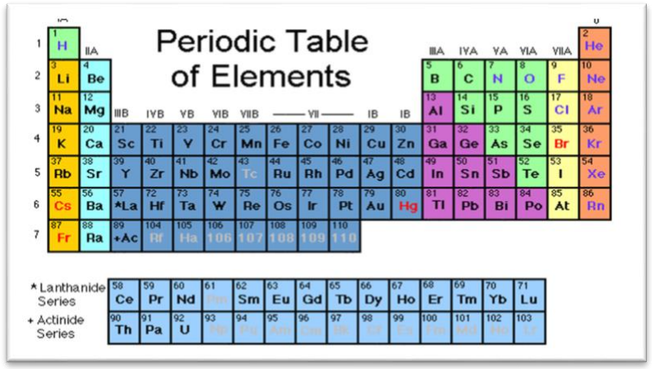
Elements are substances that are made up of **<u>one type of atom</u>**. For example, pure copper will only contain copper atoms.

The different elements we have discovered on earth are found on the periodic table.
Each element is represented by a symbol on the periodic table.

Some elements consistent of one atom. Some go around in pairs e.g. O_2, H_2, some consist of thousands of atoms but they are all elements because they contain one type of atom.

Properties of elements can be investigated such as:

- Conductivity (electrical)
- Conductivity (thermal)
- Boiling point
- Melting point
- State at room temperature
- Appearance
- Metal or non-metal
- Magnetic

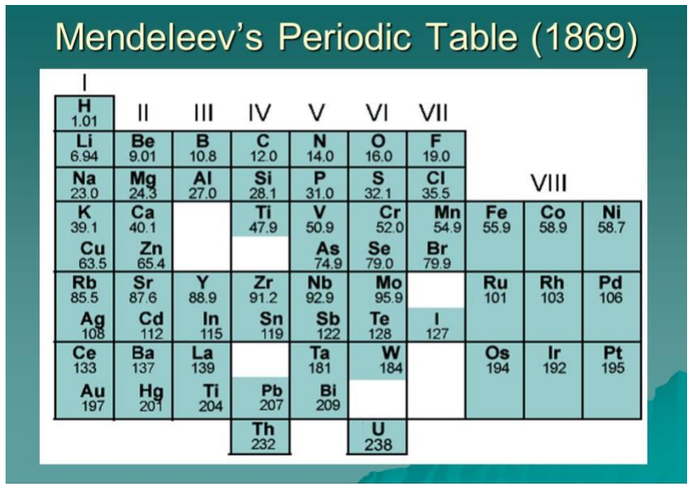


Element
Periodic table
Properties

How do we arrange elements?

Many scientists were involved in organising elements. A scientist called Dmitri Mendeleev was the first to successfully organise elements into groups where elements with similar properties into groups.

Mendeleev's periodic table:



Mendeleev's periodic table had had elements ordered by **atomic mass**.

He also left **gaps for future discoveries**. Because elements were grouped by elements with similar properties he could make predictions about undiscovered elements

Periodic table
Elements
Groups
Periods
Metals
Non-metals

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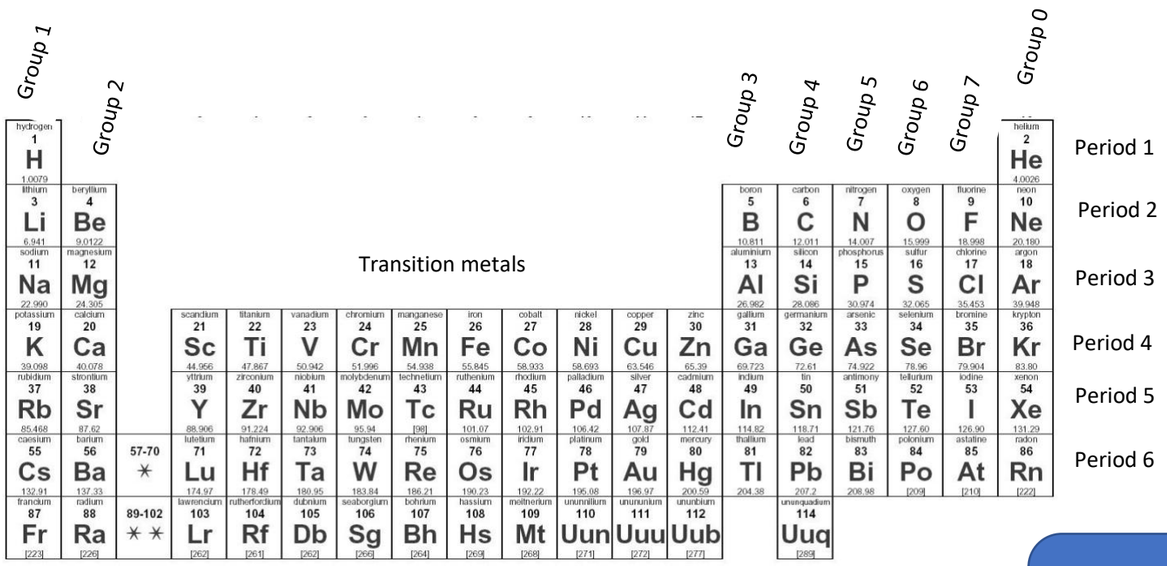
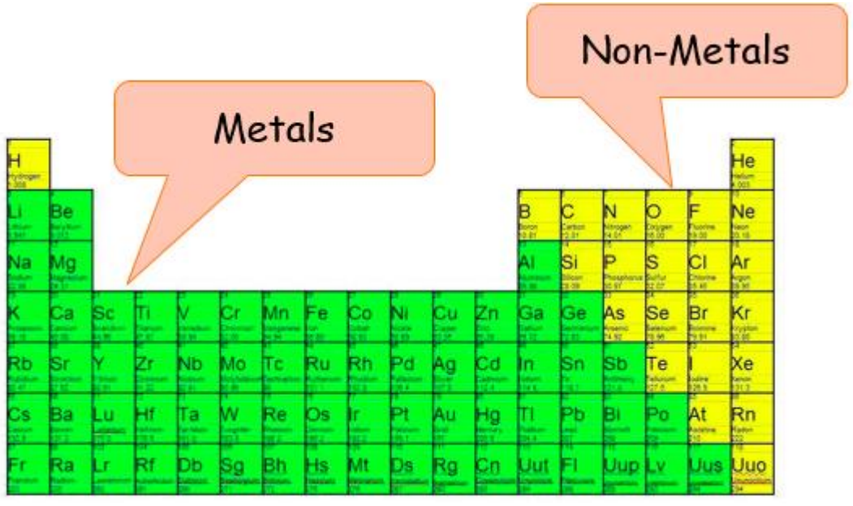
Modern periodic table:



Elements in the same group have similar chemical properties.

The vertical columns are called groups.
The horizontal rows are called periods.
Metals are on the left of the periodic table. Non-metals are on the right.



Comparison of Mendeleev's periodic table and the modern periodic table

Similarities	Differences
Arranged in order of atomic mass *(some exceptions)*	Atomic number also stated.
Elements with similar properties arranged in vertical columns	Metals and non-metals are now separate.
Vertical columns are called groups.	Gaps left for elements still to be discovered. *Discoveries took time.*

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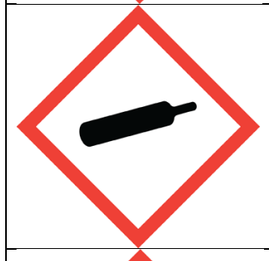
Hazards and everyday uses

Many chemicals in the lab and in every day life can be hazardous. Hazard symbols inform us of the hazards.

Hazard symbol	What it means	How to reduce risk of harm.
	**Explosive** May explode if exposed to fire, heat, shock, friction.	Avoid ignition sources (sparks, flames, heat) Keep your distance Wear protective clothing
	**Flammable** Flammable if exposed to ignition sources, sparks, heat. Some substances with this symbol may give off flammable gases in contact with water.	Avoid ignition sources (sparks, flames, heat) Keep your distance Wear protective clothing
	**Oxidising Agent** Can burn even without air, or can intensify fire in combustible materials.	Avoid ignition sources (sparks, flames, heat) Keep your distance Wear protective clothing
	**Gas under pressure** Contains gas under pressure. Gas released may be very cold. Gas container may explode if heated.	Do not heat containers Avoid contact with skin and eyes
	**Corrosive** Corrosive material which may cause skin burns and permanent eye damage.	Avoid contact with skin and eyes Do not breathe vapours or sprays Wear protective clothing

Irritant
Corrosive
Harmful
Toxic
Flammable
Explosive
Pressure

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	**Toxic** Toxic material which may cause life threatening effects even in small amounts and with short exposure.	Do not swallow the material, allow it to come into contact with skin or breathe it
	**Health problems** May cause serious and prolonged health effects on short or long term exposure.	Do not swallow the material, allow it to come into contact with skin or breathe it.
	**Irritant** May cause irritation (redness, rash) or less serious toxicity.	Keep away from skin and eyes
	**Toxic to the environment** Toxic to aquatic organisms and may cause long lasting effects in the environment.	Avoid release to the environment

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Chemical Reactions

For a chemical reaction to have occurred a new substance has to have been formed.

For a chemical reaction to have occurred a new substance has to have been formed.

Reactants → Products
(Starting chemicals) (New chemicals)

The arrow shows a **chemical reaction has happened**, but an equals sign shows the items before and after are the same.

There are three main ways to tell that a chemical reaction has occurred.

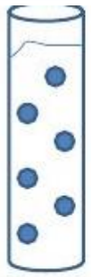
1. A colour change
2. A gas is released (effervescence)
3. There is an energy change (e.g. changing temperature)

Chemical reactions usually cannot be reversed (irreversible)

Remember: A physical change is a change in state. Physical changes can be reversed.

#1: A new color appears

#2: Heat, light, or sound is given off (or absorbed).



#3: Bubbles of gas are formed. A new odour may be noticed

Writing chemical equations:

When magnesium is burned in oxygen , magnesium oxide is made.
Magnesium + oxygen → magnesium oxide

When water is added to copper sulphate, hydrated copper sulphate is made.
Copper sulphate + water → hydrated copper sulphate

When magnesium is added to hydrochloric acid, hydrogen is made along with magnesium chloride.
Magnesium + hydrochloric acid(g) → magnesium chloride + hydrogen

Reactants: The chemicals which are present at the start of the reaction

Products: The chemicals made in a chemical reaction

Reaction
Reversible
Irreversible
Reactant
Product
Effervescence

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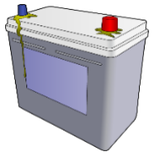
What is an acid?

Weak acids: Some acids are found in everyday items such as food and drink, and skincare products.It is safe to handle these acids, and in some cases even to taste them e.g. orange juice, vinegar, lemon.

Strong acids: Some acids, like those found in the laboratory or a car battery, are too dangerous to taste or touch. These acids are said to be corrosive as they can damage other materials by wearing them away
e.g. hydrochloric acid, sulfuric acid, battery acid.



Neutral substances: are neither acidic nor alkaline e.g. pure water

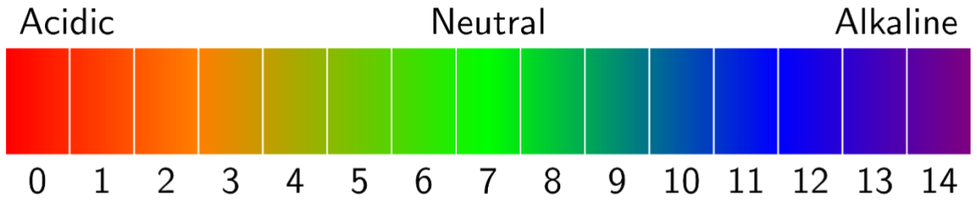
Alkalis are soluble bases

Weak bases/alkalis: Alkalis are substances that are chemically the opposite of acids. Weak alkalis are found in soaps and other cleaning materials. They are also used in antacids to treat indigestion.

Strong bases/alkalis: Some alkalis, like those used in laboratories, or in cleaning materials such as bleach, are too dangerous to touch. These alkalis are said to be caustic because they can burn skin, and damage other materials.

Indicators are used to identify whether a substance is acid, alkali/basic or neutral.

Universal indicator and the pH scale used to identify acids and bases. Universal indicator changes colour when added to a substance, this colour is then compared to the pH scale



pH scale

pH 0-6 = acidic

pH 7 = neutral

pH 8-14 = basic/alkaline

Acid
Alkali
Base
Neutral
Indicator
pH scale

Year 7 chemistry knowledge organiser

What is an indicator?

pH indicators identify if a substance is acidic or basic.

Litmus paper as an example of a pH indicator. Colour changes of red, blue and yellow litmus paper in acids and bases.

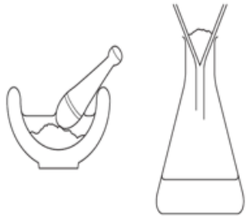
Type of Litmus	Colour in acid	Colour in alkali
Red	No change	Blue
Blue	Red	No change
Yellow	Red	Blue

Making and using red cabbage indicator!

Part 1: Making the indicator

Apparatus

- mortar and pestle
- boiling tube or conical flask
- filter paper and a filter funnel
- hot water
- red cabbage leaves



Method

A Put some red cabbage leaves into the mortar.

B Add a little hot water.

C Grind up the leaves so that you get as much of the colour out as possible.

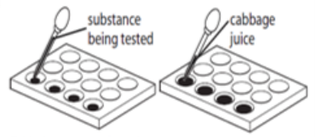
D Filter the mixture and collect the liquid in a tube or flask.

Part 2: Using your indicator

Apparatus

- red cabbage juice
- spotting tile
- dropping pipette
- substances to test

Wear eye protection. Nothing should be tasted, not even food and drink.



Method

A Put one of the substances into a circle on the spotting tile. Write the name of the substance in a table.

B Add a few drops of your cabbage juice.

C Write the colour in your table.

D Do this again with another substance.

Indicator
Litmus paper
Filter

Types of reaction

Identification of different reactions including:

Reaction 1: Metals and acids
General equation: Metal + acid --> Salt + hydrogen

Reaction of **metal** (calcium) and **acid** (hydrochloric acid)

General equation

metal + **acid** → **salt** + **Hydrogen**

Example:

Calcium + **Hydrochloric acid** → **Calcium Chloride** + **Hydrogen**

Naming salts

The first part of the name comes from the metal.

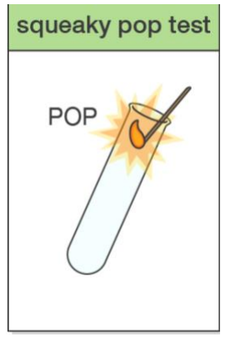
The second part comes from the acid:

Hydrochloric acid makes **chlorides**

Nitric acid makes **nitrates**

Sulphuric acids make **sulphates**

Test for hydrogen: Squeaky pop test! Place a lit splint over the gas. If there's a squeaky pop sound it is hydrogen



Reaction
Reactants
Products
Combustion

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Reaction 2: Metal carbonates and acid

General equation: Metal carbonate + acid --> salt + carbon dioxide + water

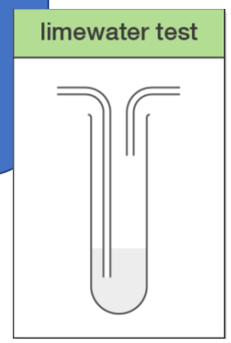
metal carbonate + **acid** → **salt** + **Carbon dioxide** + **water**

For example the reaction between hydrochloric acid and calcium carbonate (marble).

Calcium carbonate + **Hydrochloric acid** → **Calcium Chloride** + **Carbon dioxide** + **water**

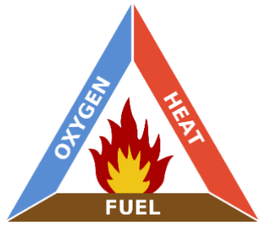
Test for carbon dioxide:

Bubble gas through limewater. If the limewater turns from colourless to a cloudy/milky colour. The gas is carbon dioxide.



Reaction 3: Combustion
General equation: Fuel + oxygen --> Water + carbon dioxide

Fuel + Oxygen → Water + Carbon Dioxide



Reaction 4: Metals and oxygen
Metal + Oxygen --> Metal oxide

Metal + Oxygen → Metal oxide

Metals react with oxygen to form metal oxides.

Fireworks are really big combustion reactions. In a combustion reaction a fuel reacts with oxygen from the air.

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Reaction 5: Neutralisation reactions

Acid + Base --> Salt + water

Alkalis are soluble bases. When they react with acid they form water and a salt.

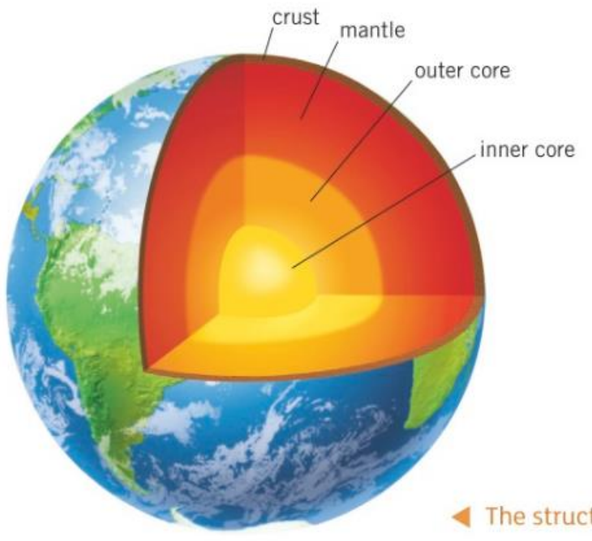
Alkali + acid → salt + water

Sodium hydroxide + Hydrochloric acid → Sodium Chloride + water

Acid + Metal Carbonate → Salt + Water + Carbon dioxide

Structure of the earth

Structure of the Earth to includes the: Inner core, outer core, crust, mantle.



The structur

Crust	This is the outer layer, it is between 8km and 40km thick.
Mantle	This is made mostly of solid rock, but it can flow. Hotter rock rises and cooler rock sinks.
Outer core	This consists of mainly iron and nickel. It is liquid
Inner core	This consists of mainly iron and nickel. It is solid

Crust
Mantle
Tectonic
Destructive
Constructive
Magma
Molten

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Plate tectonics

The Earth's surface is made up of large plates (like pieces of a jigsaw).
These plates are constantly travelling at a few centimetres per year.
The ocean floors are spreading from the centre and sinking at the edges.

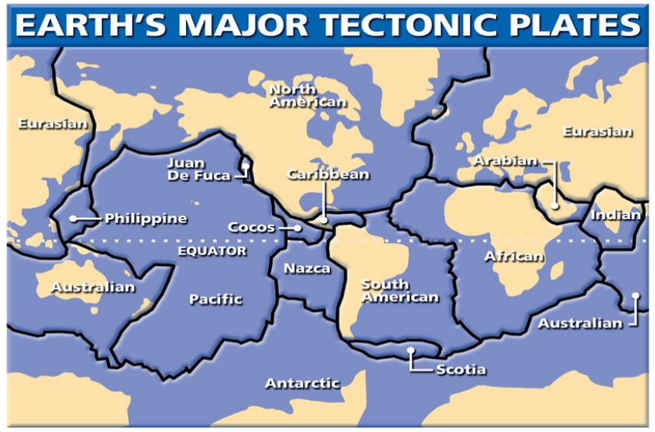


Plate movements can be:

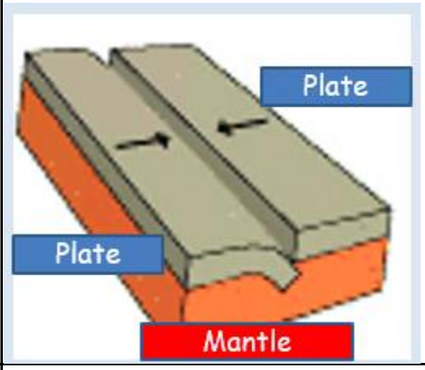
Destructive - A destructive plate boundary is where two plates push against each other causing violent earthquakes, volcanoes and mountain ranges to be formed.

Constructive - Two plates move away from each other.

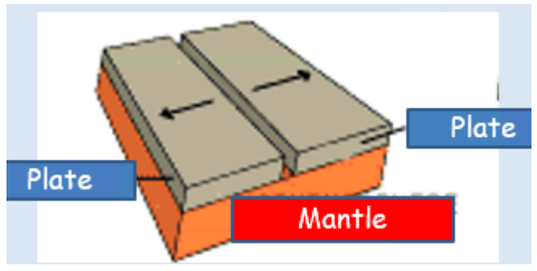
Molten rock (magma) rises from the mantle to fill the gap between the two plates.
Causes volcanoes and earthquakes but also forms mid-ocean ridges that develop into islands.

Conservative - two move along side each other
Causes earthquakes, which can be fairly violent and frequent.
Two plates slide past each other, without creating or destroying any land.
As they move past each other they often get stuck, building up great pressure until finally they jolt past each other. This sudden movement is what causes earthquakes.

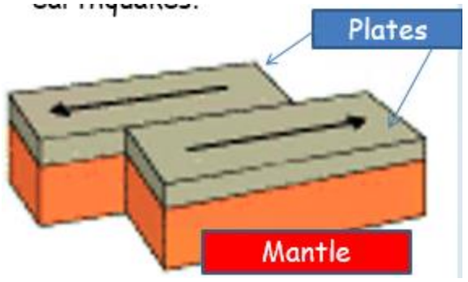
Destructive



constructive



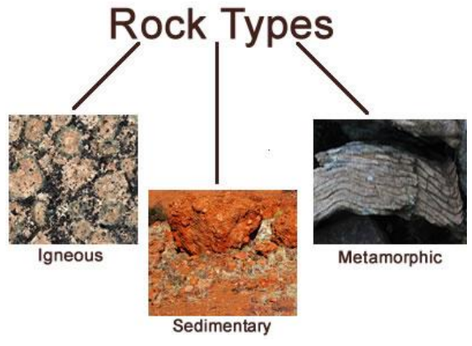
Conservative



Rocks

Rocks can be identified by their grains, size, shape, crystals, texture, minerals, permeability, whether they are porous or not.

Types of rocks include:
Igneous – formed from hot lava or magma cooling
Sedimentary – formed from layers of sediment
Metamorphic – formed from igneous or sedimentary rocks under high temperature and pressure.



Sedimentary
Metamorphic
Igneous
Permeable
Porous
Crystals
Lava

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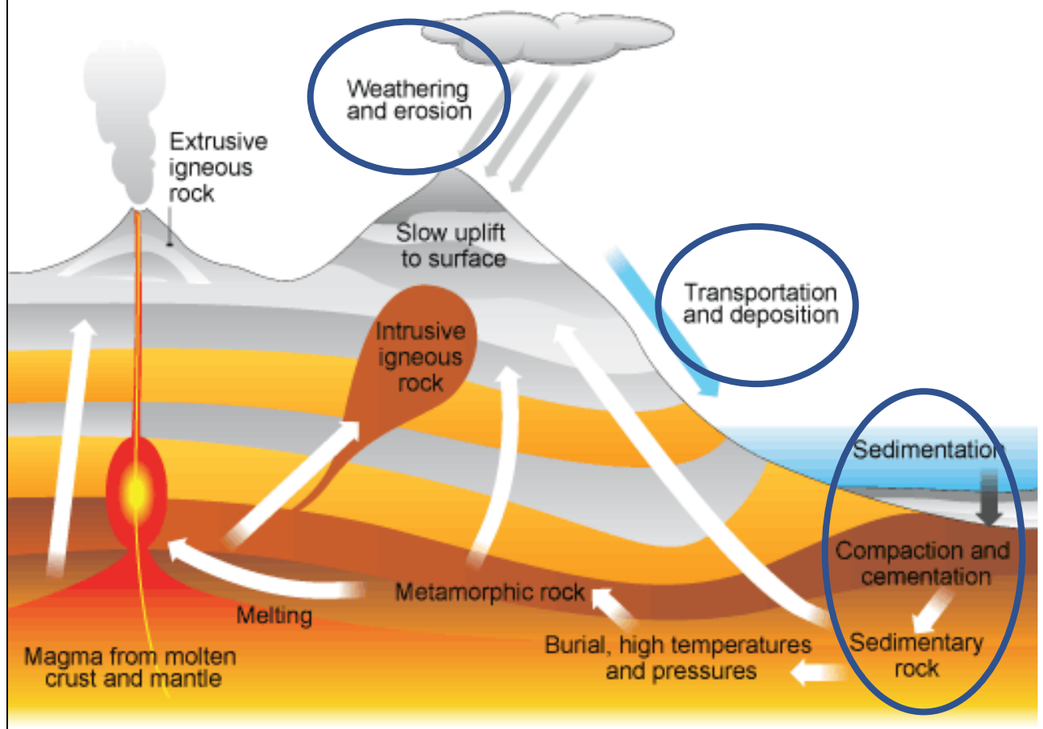
What is a fossil?

Sedimentary rock formation:



Weathering and erosion – bits of rock are broken off. This can be through chemical, physical or biological weathering.

Transportation and deposition – small parts of rocks (sediment) are transported away and deposited into the ocean

Sedimentation – sediment settles to the bottom of the ocean

Compaction and cementation – over many years the sediment gets compacted under the high pressure.

Transportation
Deposition
Sedimentation
Fossil

Fossils as the 'remains of once living animals or plants.' They are found in sedimentary rocks

Two main types of fossil:
Body fossil - fossilised remains of a plant or animal e.g. a bones, shell, leaves.

Trace fossil - record an activity of an animal e.g. footprints, trackways, coprolites.

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Body fossils show us what a plant or animal looked like. They are the fossilised remains of an animal or plant, like bones, shells and leaves.

The fossilised dinosaur skeletons and big bones we see, petrified wood and whole body fossils (mammoths caught in ice or insects trapped in amber) are all body fossils.

Fossils can give information about how long ago a plant/animal lived.

Fossil records can show how an organism has evolved over time

The fossil record is not complete!

People who study fossils are called palaeontologists.

Trace fossils record the activity of an animal. These include footprints, trackways, and coprolites (fossil poo!).

What are fossil fuels?

The three fossil fuels are crude oil, coal and natural gas.

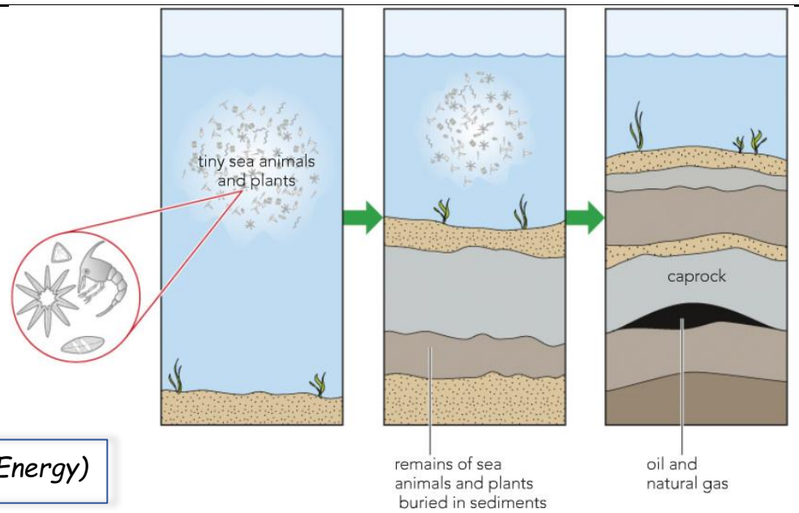
Fossil fuels are non-renewable because they are being used quicker than they are being replaced. This means they are running out.

Crude oil formation: Formed from ancient dead animals and plants which have been buried in sediment and compressed over many years.

Uses of fossil fuels:
Crude oil can be used in cooking, to fuel cars, to fuel ships and even to make tarmac.

Energy is released when we burn fossil fuels (combustion)

Fuel (hydrocarbon) + Oxygen → Carbon Dioxide + Water (+ Energy)



Crude oil
Fuel
Energy
Global Warming

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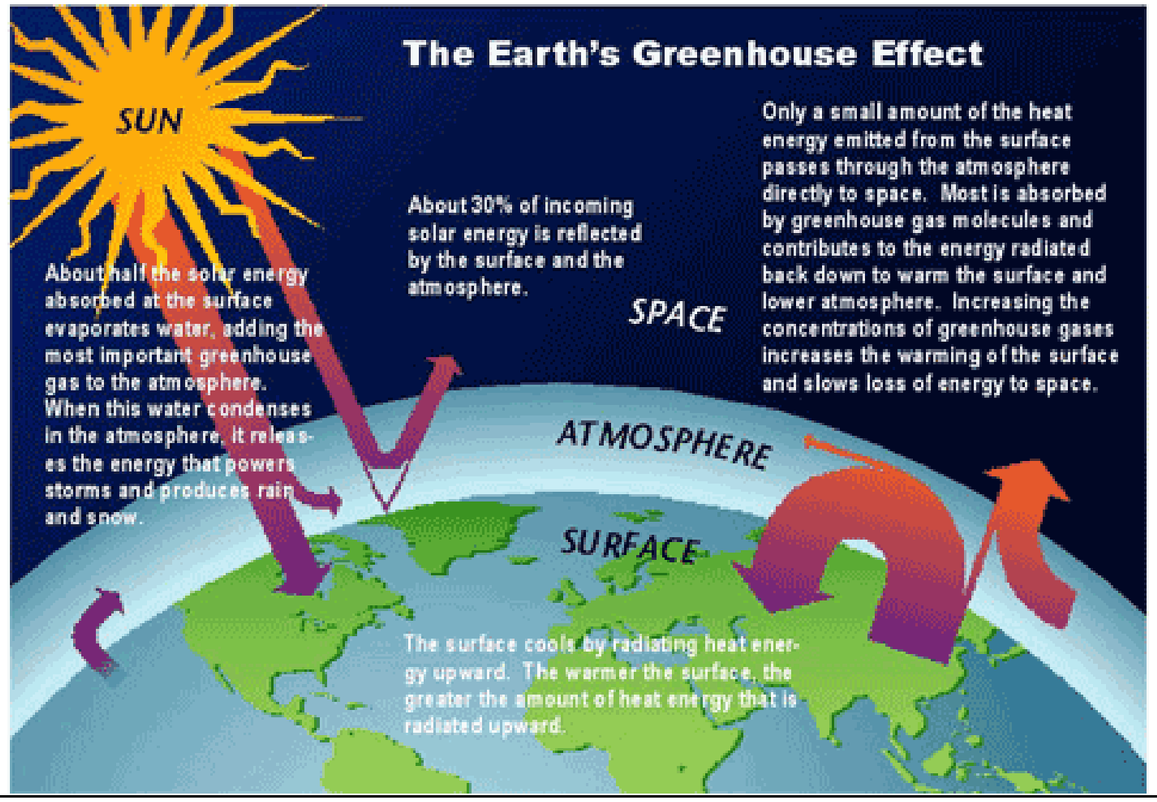
Problems with burning fossil fuels including the release of carbon dioxide (a greenhouse can) that contributes to global warming.



Burning fossil fuels also produces acid rain. This causes lakes and soil to become more acidic. Crops can fail to grow and aquatic organisms can die.

Global warming can lead to ice caps melting, sea levels rising, more extreme weather, loss of land and habitats.

Finite resources and recycling

Finite resources are substances that can only be used once and are in limited supply. e.g. oil, metals, rocks

There are a number of reasons why recycling is so important:

At home we can recycle:

- Glass
- Metals
- Paper
- Card
- Plastic

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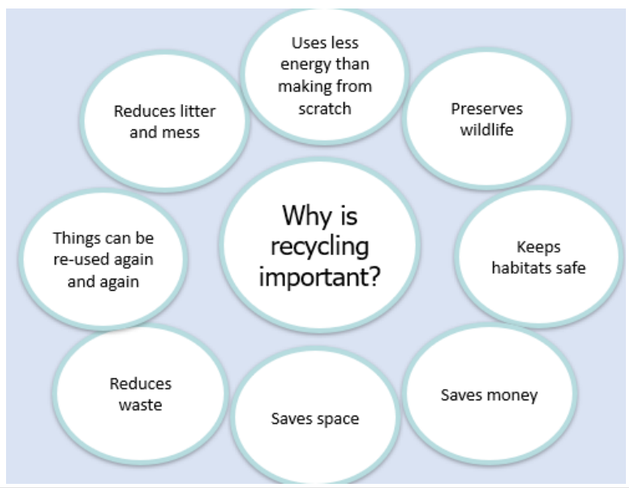


Finite = Can only be used once and is in limited supply

Infinite = Can be used more than once or is in unlimited supply

Sustainable = Able to be maintained at a certain rate or level

Renewable = Will not run out in the foreseeable future

Finite
Infinite
Renewable
Non-renewable
Recycling

Year 7 chemistry knowledge organiser

Recycling methods:

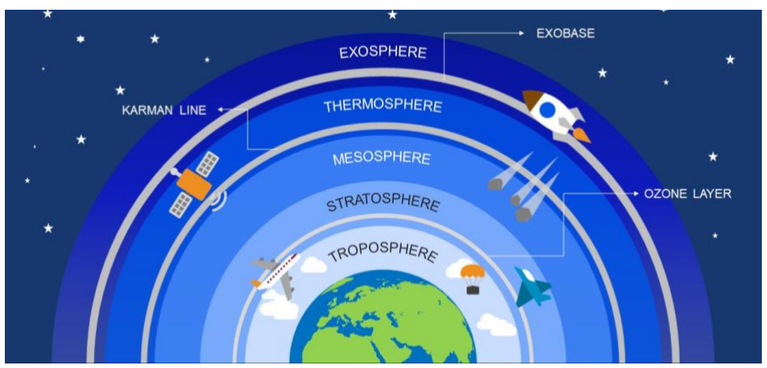
Resource	How?	Advantages	Disadvantages
Glass	It can be melted, remoulded and reused	The energy needed to do this is less than the energy needed to make new glass from raw materials	Need to sort different coloured glass ready for recycling and transport to the plant.
Metal	It can be melted, remoulded and reused	The energy needed to do this is less than the energy needed to extract new metal from ores	Melting down metals uses energy, producing pollution
Paper	It can be broken up into small pieces and reformed to make new sheets of paper	This takes less energy than making new paper from trees. Less need to cut down trees	Paper can only be recycled a few times before its fibres become too short to be useful
Plastic	It can be melted, remoulded and reused	We use less crude oil and recycling prevents plastic ending up in landfill sites	Different types of plastics have to be sorted

Earth and the atmosphere

The atmosphere is the layer of gas which surrounds a Planet!
The layers of the atmosphere to include:

- Troposphere
- Mesosphere
- Thermosphere
- Ionosphere
- Exosphere

Ionosphere isn't always included in diagrams because it overlaps with many layers.



The troposphere is the first layer! (The layer we live in)

The air in the troposphere consists of…

78% Nitrogen

21% Oxygen

1% Argon

0.04% Carbon dioxide

Troposphere
Mesosphere
Ionosphere
Exosphere
Atmosphere
Composition

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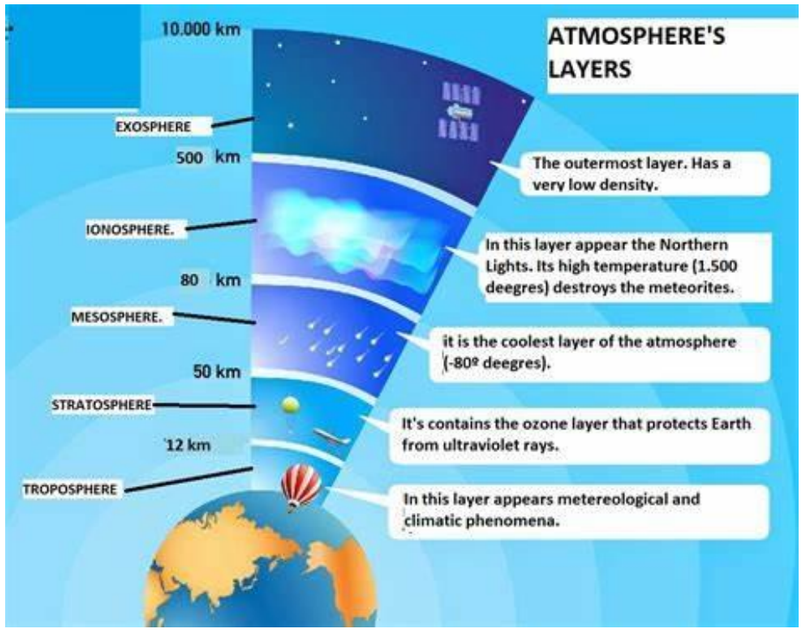
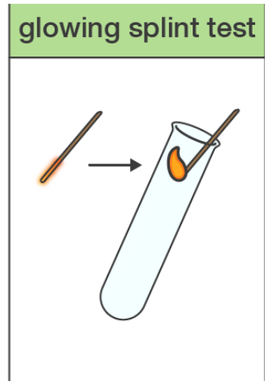


Test for oxygen gas:

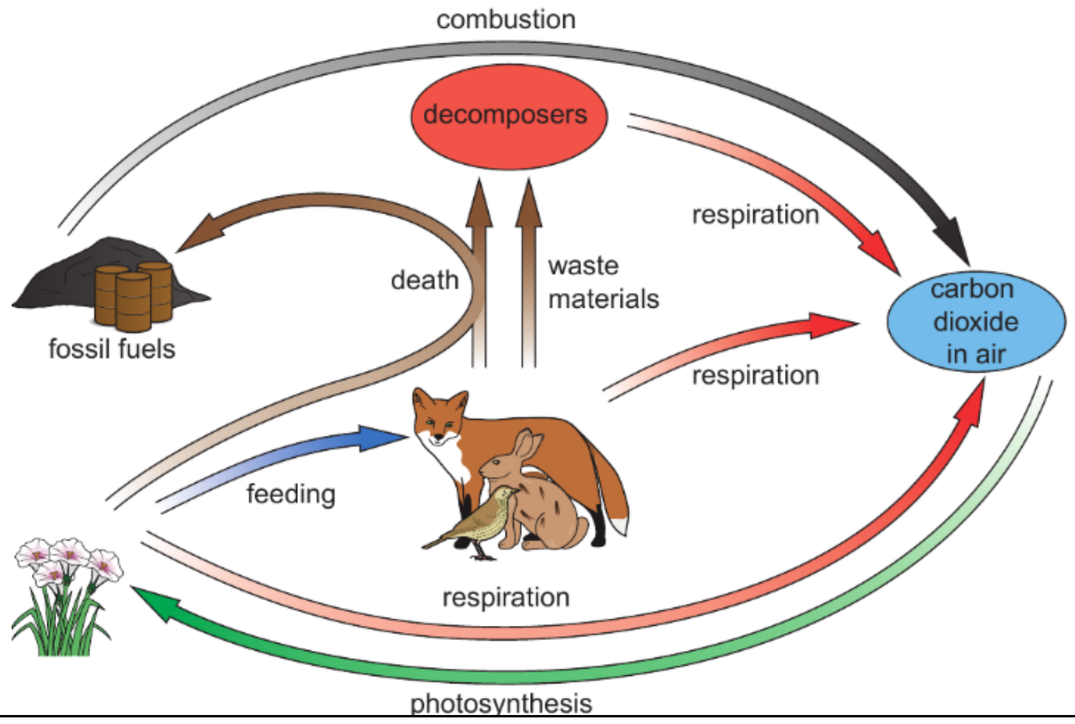
Place a glowing splint over the gas. If it relights the split it is oxygen!



The Carbon Cycle

The carbon cycle involves the following processes:

- Photosynthesis - a chemical reaction uses carbon dioxide from the atmosphere.
- Combustion - a chemical reaction which reacts carbon (in fuels) with oxygen and releases it as carbon dioxide into the atmosphere.
- Respiration - a chemical reaction which releases carbon dioxide into the atmosphere
- Decomposition – when an organism is broken down by microorgamisms
- Feeding – when one organism eats another
- Fossilisation – turning into a fossil over thousands of years.

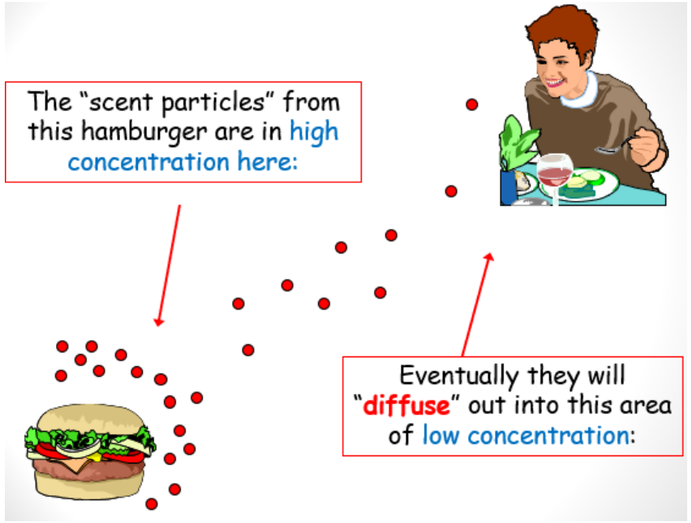


Photosynthesis
Respiration
Decomposition
Decomposers
Carbon Cycle
Interactions

Year 7 chemistry knowledge organiser

Fluids

Diffusion is 'the movement of particles from an area of high concentration to an area of low concentration'.
Diffusion is a passive process, it does not require energy. Tt happens naturally.



Temperature can affect the rate (speed) of diffusion.

At higher temperatures substances diffuse quicker.

Liquids **and** gases are both fluids. They can flow.

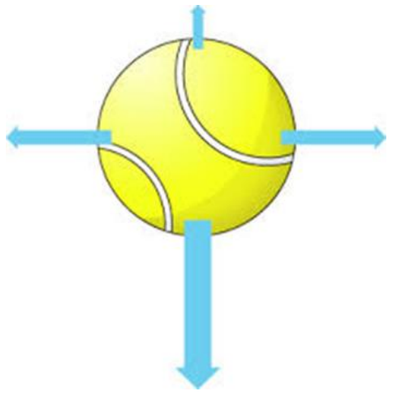
How do the particles know which way to move?!

They don't!! Particles in fluids (gases and liquids) move RANDOMLY

This is called **Brownian motion** (named after Robert brown who observed pollen grains moving randomly in water in 1827)

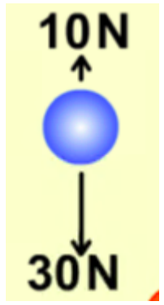
Fluid
Diffusion
Brownian motion

Year 7 physics knowledge organiser

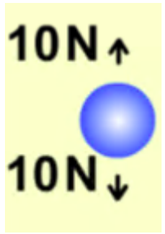
Composite title	Essential knowledge	Key words
What is a force?	Forces are a **push** or **pull** which can change the speed, direction or shape of an object. All forces are measured in **Newtons (N)** We cannot see forces so we need to use diagrams to represent them. **FREE BODY DIAGRAMS** show the forces acting on an isolated object. Free body diagram:  **Free body diagrams…** • Use arrows to represent forces. • The direction of the arrow shows the direction of the force. • The size of the arrow represents the size of the force.  Forces are measured in **NEWTONS** using a **FORCE METER**. Objects can be hung from the hook at the bottom of the force meter the scale will show the strength of the force in Newtons. 	Force Free-body diagram Newton meter
What is the overall force?	Forces can be contact or non-contact. Examples of contact forces include: Air resistance, up-thrust, friction, push, pull, normal contact force. Non-contact forces include: Static, magnetism, gravitational force. Forces acting on a single object can be **balanced** or **unbalanced**. If forces are **balanced** the motion of an object will not change – the object will be **stationary** (still) or will be travelling at a **constant speed**. **Unbalanced** forces cause the objects motion to change e.g. accelerate or decelerate.	If there are equal forces pulling on both the force meters they will not move. This is because the forces are **BALANCED**.  If one of the forces is larger there will be movement. This is because the forces are **UNBALANCED**.  	Balanced Unbalanced Resultant

Year 7 physics knowledge organiser

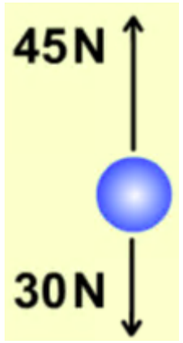
Calculating **resultant** forces:
The resultant force is the overall effect of the forces acting on an object.



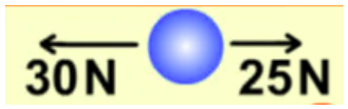
Resultant force = 20N down



Resultant force = 0N



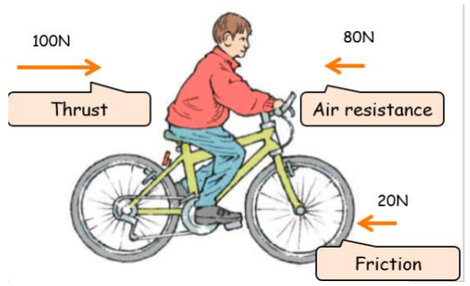
Resultant force = 15N up



Resultant force = 5N Left

If forces are acting in opposite directions you subtract the numbers.

If the forces are acting in the same direction you add them together.



Resultant force = 0N

How can I make my own Newton meter?

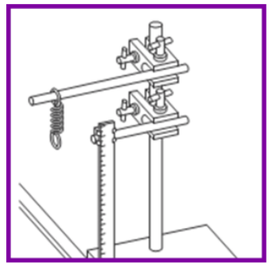
Aim: to make a Newton meter and find the weight of an unknown object.

Method:

1. Attach 100g mass to the end of the spring.
2. Record the extension of the spring.
3. Repeat with more masses.

Mass (g)	Weight (N)	Extension of Spring (cm)
100		
200		
300		
400		
500		

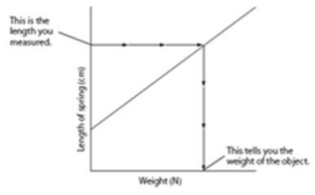
You will need:
- Stand
- 2 Clamps
- Spring
- Meter Ruler
- Set of Masses



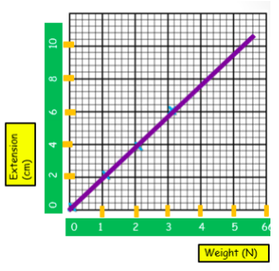
Create a graph with spring extension on the Y axis and weight on the x axis. Example:

You can use your graph to tell the weight of a mystery object.
Attach the object to the spring and measure the extension.

Read this off of the graph to find the weight of the object.



Weight (N)	Extension (cm)
0	0
1	2
2	4
3	6
4	7



Meter
Newton
Calibrate
Measure
Unit

Year 7 physics knowledge organiser

How fast?

SPEED is the measure of how much distance an object moves in a set time.

Speed = distance/time

Different units can be used for speed, distance and time.
In science we usually use the following:
Speed – m/s (meters per second)
Distance – m (meters)
Time – s (seconds)

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\text{Distance} = \text{Speed} \times \text{Time}$$

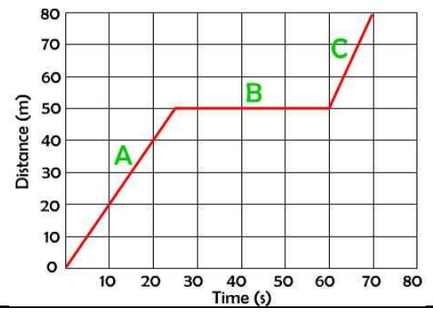
$$\text{Time Taken} = \frac{\text{Distance}}{\text{Speed}}$$

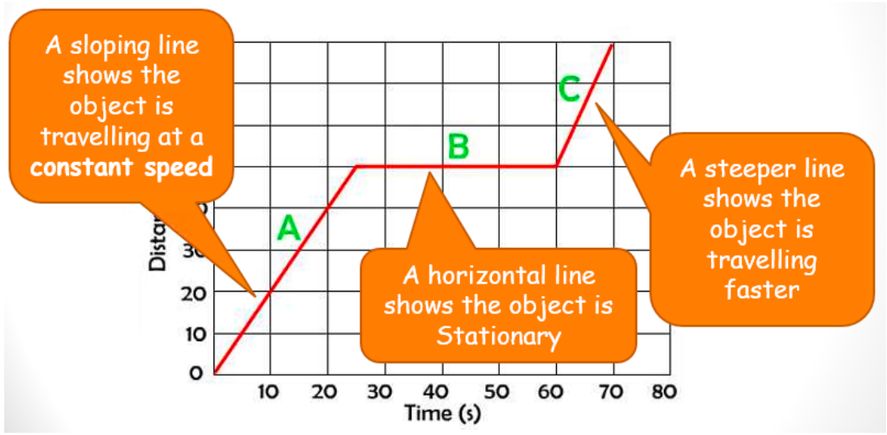
Speed
Distance
time

How can we show a journey?

Distance/Time graphs can be used to show a journey..

Example distance time graph. The distance travelled is plotted against the time it took to travel the distance





Distance-time graph

How to go faster?

Air resistance and **friction** are both forces which oppose motion (they act in the opposite direction to the movement of an object)

Lubrication is a substance that can reduce friction (like oil or grease). For example using oil to reduce the friction in car gears.

Many vehicles are designed to reduce the effects of air resistance. They are known as being aerodynamic as they have shapes designed to 'cut' through the air particles.

Friction can be felt when you rub your hands together. Heat is transferred as you rub your hands together as a result of friction

If you get your hands wet and then rub them together. You will not experience as much heat transfer. The water acts as a lubricant between your hands.

Runners and cyclists wear Lycra. Lycra is smooth so reduces friction. It is also skin tight so reduces air resistance. This helps the runner or cyclist go faster.

Friction
Air resistance
Lubrication
Oppose
Aerodynamic

Year 7 physics knowledge organiser

How does a wave travel?

A wave is the transfer of with no overall transfer transfer of matter

There are 2 different types of wave.
1. Transverse waves

In transverse waves particles vibrate up and down. The direction of the wave is from left to right. Therefore, transverse waves are defined as 'a wave where particles travel at a right angle to the direction of the wave.'

Examples of transverse waves include:
Light waves, water ripples, x-rays, radio waves, microwaves.

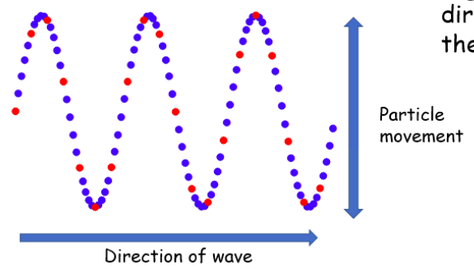
2. Longitudinal waves

In longitudinal waves particles vibrate back and forth, the direction of the wave goes from left to right. Therefore, longitudinal waves are defined as 'a wave where particles move parallel to the direction of the wave.'

Examples of longitudinal waves
Sound waves, seismic waves (shock waves from earthquakes)

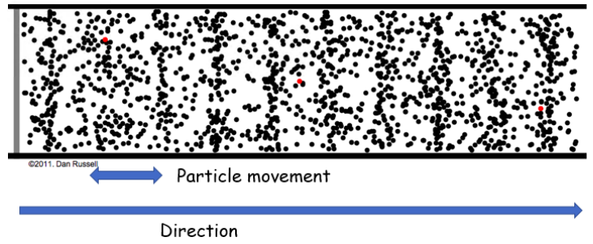
Transverse waves…

.. Particles move at a right angle to the direction of the wave.

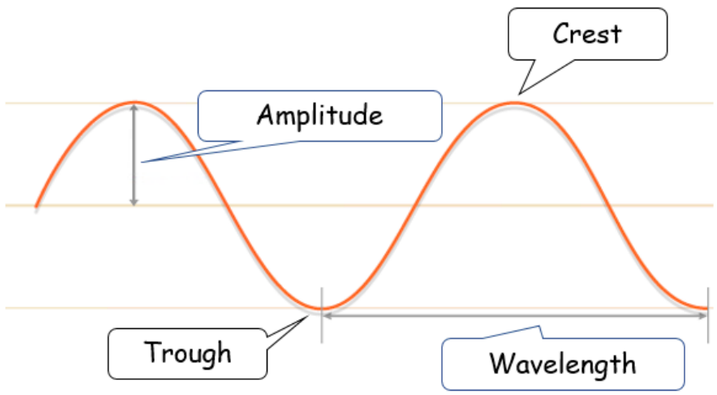


Longitudinal waves

.. Particles move parallel to the direction of the wave.



Labelling a transverse wave:



Crest – highest point in a wave

Trough – lowest point in a wave

Amplitude – distance from the centre line to a crest or trough (measured in metres)

Wavelength – length of one full wave (easiest to measure from one peak to the next. Or from one trough to the next (measured in meters).

Frequency is the number of complete waves per second. Frequency is measured in hertz (Hz).

Longitudinal
Transverse
Amplitude
Wavelength
Crest
Trough
Transfer
Matter

Year 7 physics knowledge organiser

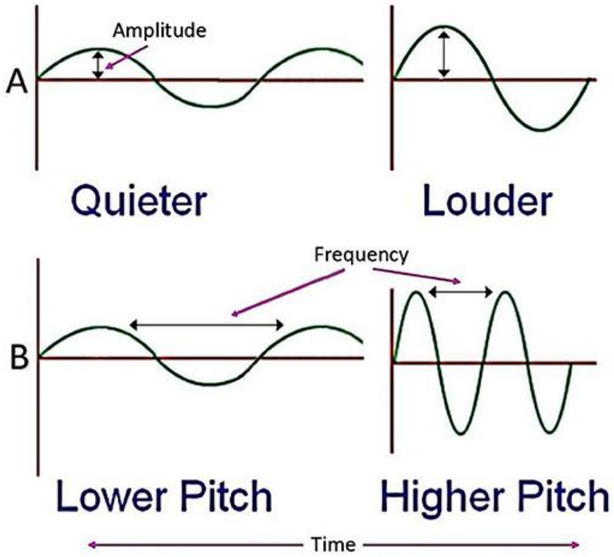
How does sound travel?

Sounds are made by something **vibrating**.
The vibrations push the air particles, these particles then collide with (bump into) neighbouring particles, passing along the sound wave.

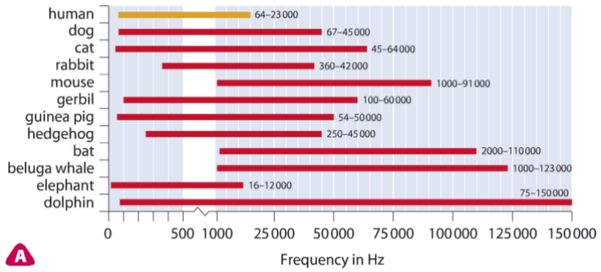
Examples:

- When you speak, vocal cords vibrate.
- When you play a guitar, the strings vibrate.
- When a tuning fork is tapped, the prongs vibrate to make a note.

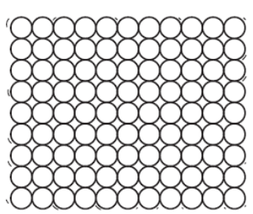
Amplitude (m) – shows the intensity (loudness) of the sound.
The bigger the amplitude, the louder the sound.
Wavelength (m) – shows the pitch of the sound.
The shorter the wavelength the higher the pitch of the sound.



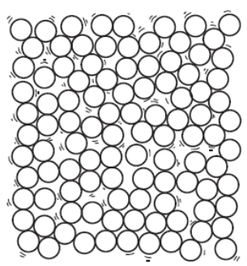
Different animals can hear different frequencies of sound. Humans have a hearing range between 20Hz to 20,000Hz (although this can vary between individuals)



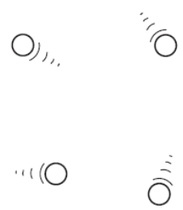
The speed of sound in air 340 m/s
Sound travels at different speeds through different types of material. Sound travels fastest in solids as the particles are close together so particles can easily collide and pass on the vibrations. Sound travels slowest in gases because the particles are very spread out.



*Particles in a **solid** are very close together. They are held together with strong bonds. Sound vibrations can move very quickly through solids because the particles are close to each other and bump into each other often. It is easy for the vibrations to be passed on.*



*Particles in a **liquid** are close together. They are able to move about. Sound vibrations move more slowly than in a solid because the particles are a bit further apart and do not bump into each other quite as often.*



*In a **gas** the particles are very far apart. They can move easily in all directions. The particles do not bump into each other very often, so it is more difficult for vibrations to be passed on. Sound vibrations travel more slowly in a gas than they do in solids and liquids.*

Remember sound waves are longitudinal waves.

Volume
Pitch
Frequency
Vibrations
Collisions

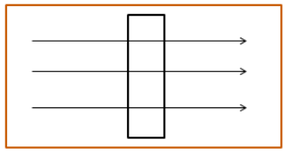
Year 7 physics knowledge organiser

What is light?

Luminous sources are objects that give off light. **Non-luminous** objects do not give off light.

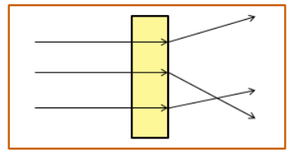
Light travels in rays. Light travels from the luminous objects to a persons eye.

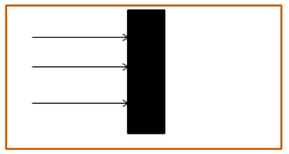
Objects can be **transparent, translucent** or **opaque.**



Transparent – these are materials which let all of the light straight through.

Translucent – these materials let light through but it is randomly scattered.



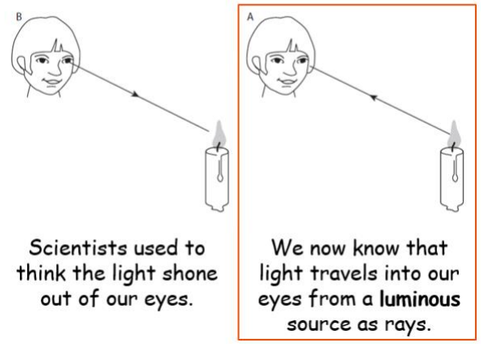


Opaque – these materials let no light through.

Examples:

Transparent	Translucent	Opaque
Clear glass	Frosted glass	Wood
Wine glass	Tracing paper	Book
Air	Cling film	Brick
Clean water	Marble	Steel
		Pencil

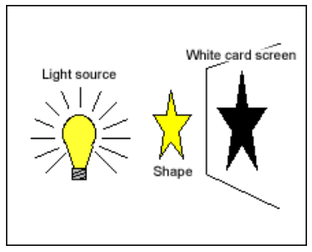
The Direction of Light



Arrows are always needed on light rays to show the direction light is travelling

Shadows form behind opaque objects because light cannot travel through them. **Light travels in a straight line** so cannot bend around them.

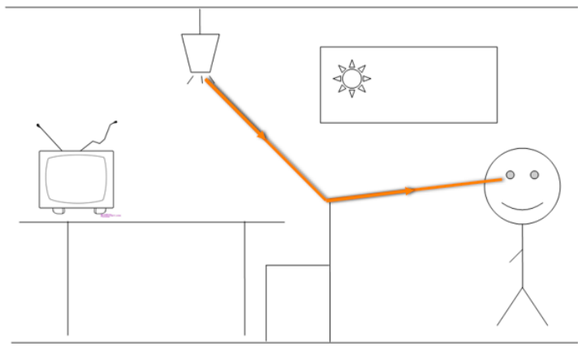
Shadows are the absence of light.



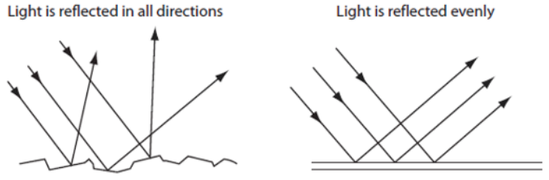
Light travels at approximately 300,000,000m/s!

Remember light is a transverse wave.

Light from luminous sources bounces off (reflects off) opaque objects. Meaning we can see them:



Light scatters in different directions when it reflects off rough surfaces. A mirror has a very smooth surface so it reflects light evenly.



Source
Opaque
Translucent
Transparent
Luminous
Reflection
Scattering
Shadow

Year 7 physics knowledge organiser

What is energy?

Energy is defined as “something that is needed to make things happen or change”
Energy is always measured in **Joules (J)**

Energy stores include:

- Chemical (e.g. stored in fuels, foods, batteries)
- Kinetic (stored in anything that is moving)
- Thermal (stored in anything that has heat)
- Strain/Elastic potential (stored in stretched springs, or stretched elastic objects)
- Gravitational potential (stored in anything above ground level)
- Nuclear (stored in the nucleus of atoms)

Energy transfers include:

- Mechanical (transferred when a force makes something move(
- Heating (transferred via conduction, convection and radiation – see next lesson)
- Light (Transferred by anything giving off light)
- Sound (Transferred by anything giving off sound)
- Electrical (Transferred where there is electricity e.g. around a circuit)

The law of conservation of energy:

Energy cannot be created or destroyed it can only be stored or transferred.

Energy transfer diagrams

When processes happen energy can be transferred from one form to another.

This can be shown on an energy transfer diagram.

Chemical → Electrical → Light

Energy
Store
Transfer
Potential

How is heat transferred?

Heat can transfer by **conduction, convection** or **radiation**.

1. **Conduction**

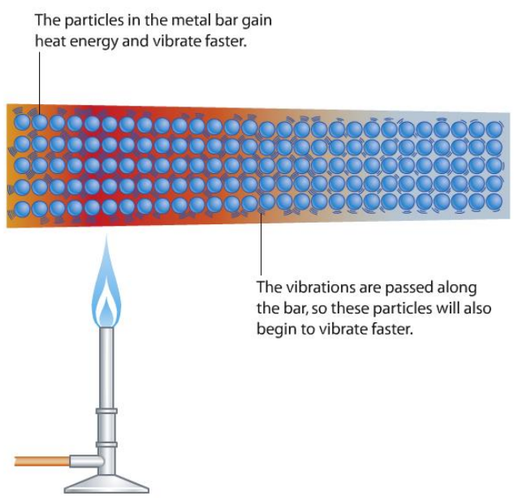
An object that easily allows heat to pass through is known as a good **thermal conductor** e.g. copper, aluminium (and other metals)
An object that does not easily allow heat to pass through is known as a **thermal insulator** e.g. plastic, wood, rubber.

Heat energy is also known as thermal energy.

Heat transfers by conduction through solid conductors. When particles in solid conductors are heated the energy transferred causes the particles to vibrate faster (gain kinetic energy).

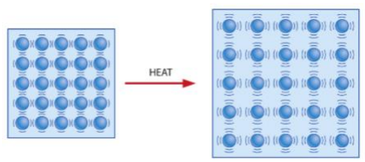
As the particles vibrate they collide into the particles next to them, causing the energy to pass through the solid.

Air is a poor conductor because particles in gas are spread out.
Therefore, it’s hard for the particles to collide and pass on the vibrations.



Metals also expand when they are heated..

As the particles vibrate more, they need more space to move around in and so the solid will expand. When a solid expands it has the same mass but is takes up more space. Its density will decrease.



Conduction
Convection
Radiation
Particles
Vibrate
Collide
Heat
Thermal

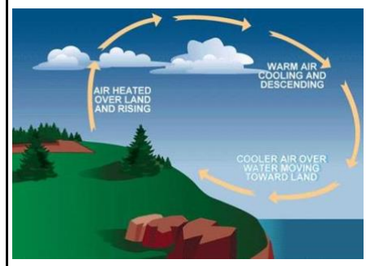
Year 7 physics knowledge organiser

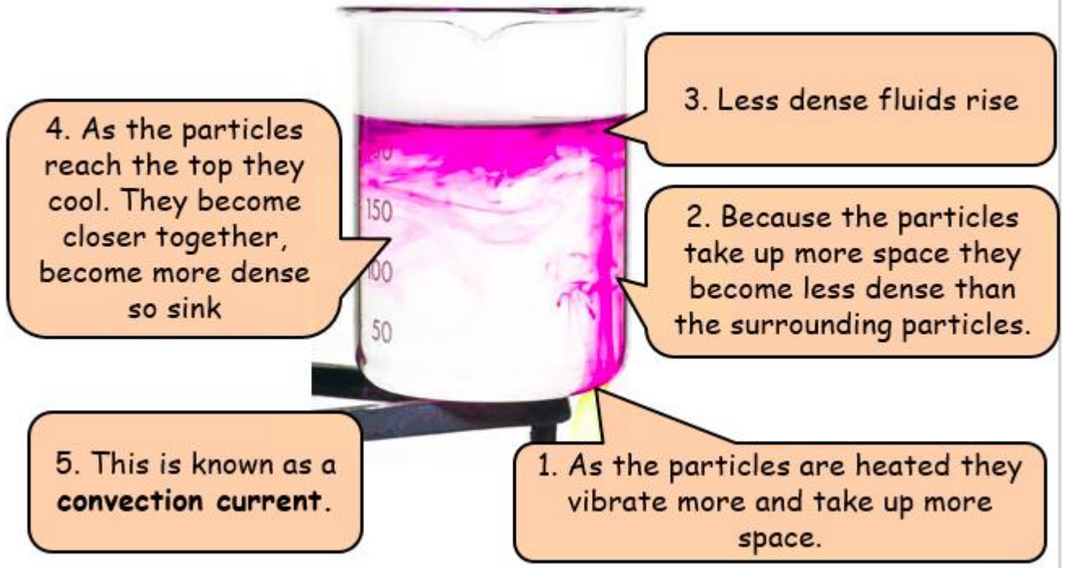
2. Convection

Heat cannot travel by conduction well through fluids (liquids and gases).

Heat transfers through fluids by **convection**.

Example:



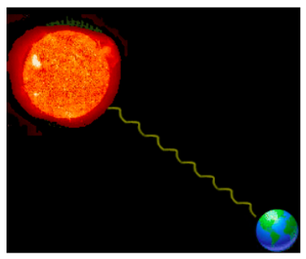


3. Radiation

Thermal radiation does not require particles, it transfers heat via a wave (**infrared**). We can't see infrared only feel it as heat.

All hot objects emit infrared radiation – including us!

Special infrared cameras can sense this infrared energy, and produce a picture for us to see.



- There are no particles in space (it is a vacuum) so conduction and convection won't work
- Heat from the sun travels via infrared radiation

When radiation hits something, it can be absorbed or reflected.
Light coloured, shiny materials reflect the most radiation.
Dull, dark, matt objects absorb the most radiation

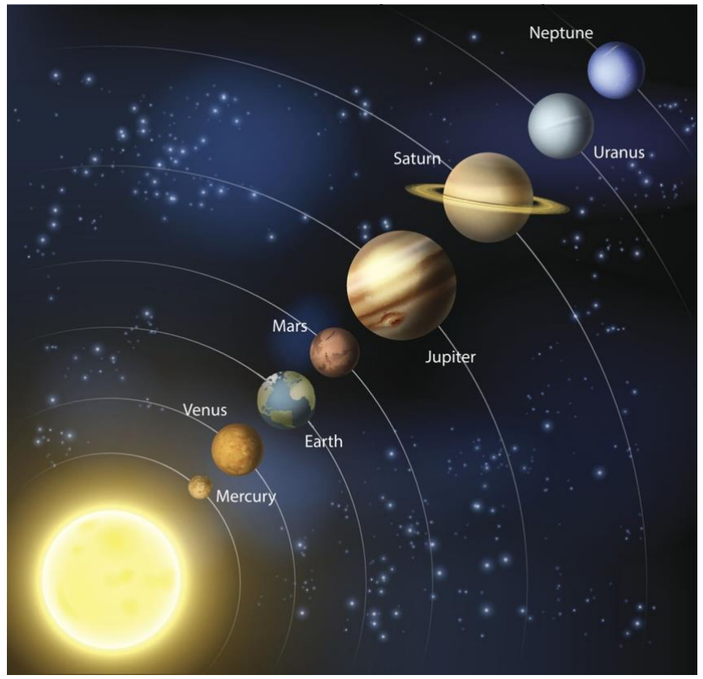
Year 7 physics knowledge organiser

Our solar system

Our solar system consists of the sun (a star) and 8 planets (plus dwarf planets, comets, asteroids and many other things)

The order of the planets from the sun are:

Mercury, **V**enus, **E**arth, **M**ars, **J**upiter, **S**aturn, **U**ranus, **N**eptune



This image is flawed because planets are not equal distances apart!

Its also very hard to comprehend the distances between these planets

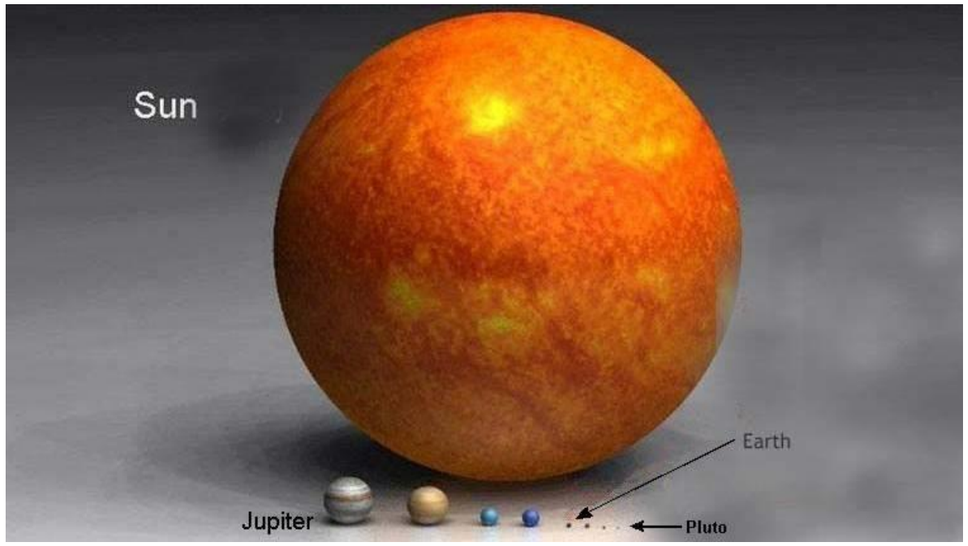
Many mnemonics can be used to help remember the order of planets including:

My **V**ery **E**asy **M**ethod **J**ust **S**peeds **U**p **N**aming (planets)

Pluto:

- Pluto was discovered in 1930 and identified as a planet. It was then was reclassified in 2006 from a planet to a dwarf planet after so many others were found!
- A planet is a rocky or gaseous spherical celestial body that orbits the sun and does not emit its own light.
- A dwarf planet is smaller than 3031 miles in diameter and is not big enough to have a distinct orbital path

Size of the planets compared to the sun:



Solar system
Planet
Dwarf planet
Sun

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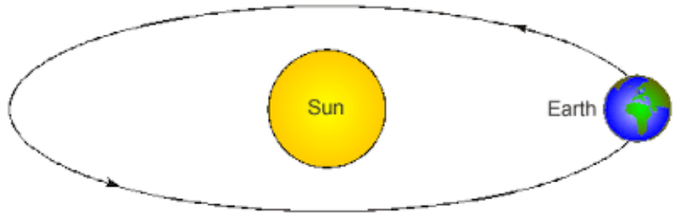
What is a day, month, year, season?

Day and night:
The Earth spins on its axis, a day is the amount of time that it takes for it to make on complete spin.
On Earth this takes 24 hours. The tilt is 23.4 degrees.

The side of the Earth facing towards the sun will have daylight
The side of the Earth facing away from the Sun will have no sunlight therefore it will be night.

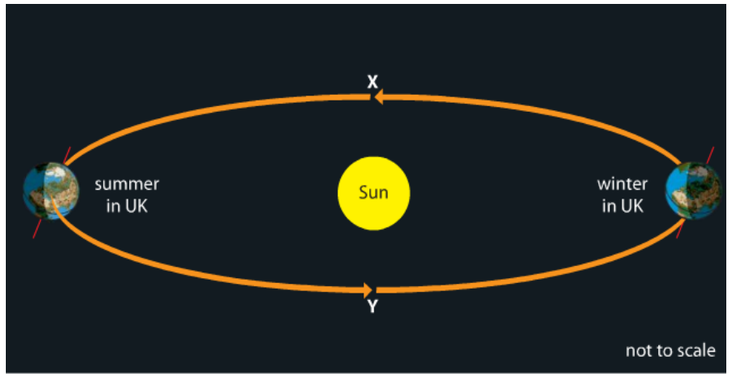
A year:

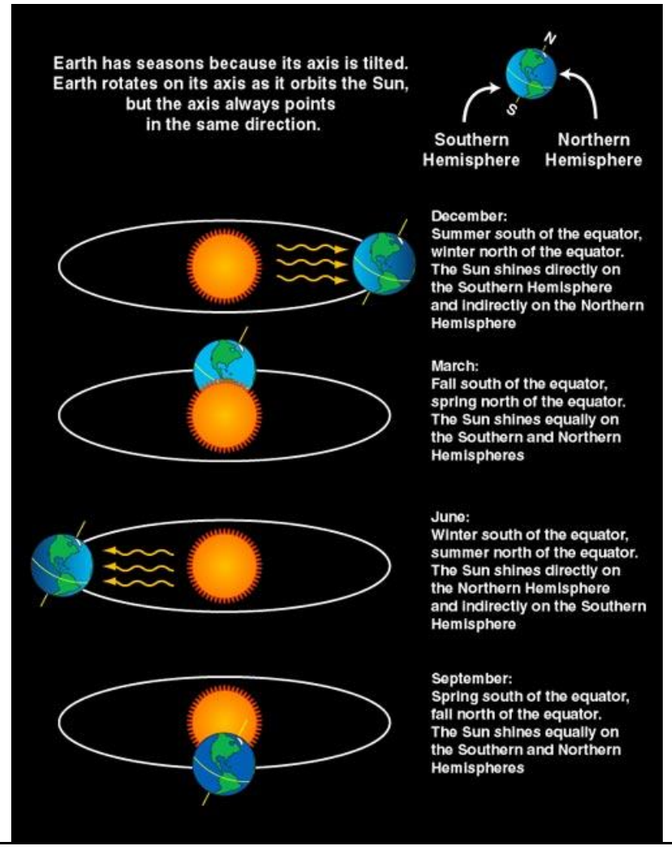
The time that it takes to travel around the sun once is called a year.
An Earth year is 365.25 days (every 4 years we have an extra day – this is known as a leap year)
The orbit is shaped like an ellipse (oval shaped)



A season:

We experience seasons because the Earth is tilted on its axis. When a hemisphere is tilted towards the sun this means it's closer so it will be warmer, this hemisphere will experience summer.
When a hemisphere is tilted away from the sun it will experience winter.





- Day
- Year
- Orbit
- Ellipse
- Axis
- Season
- Hemisphere

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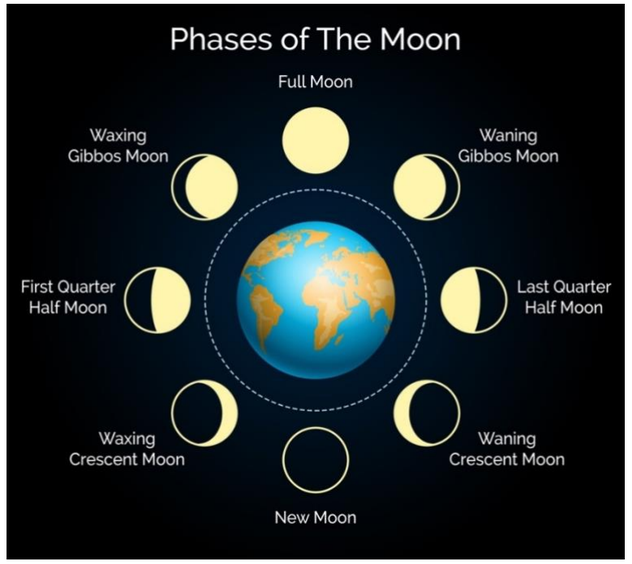
The moon orbits the earth

- The month is based on the lunar cycle
- The moon goes through 8 phases during the 28 days that make up the length of a month

How does the moons gravity affect water?

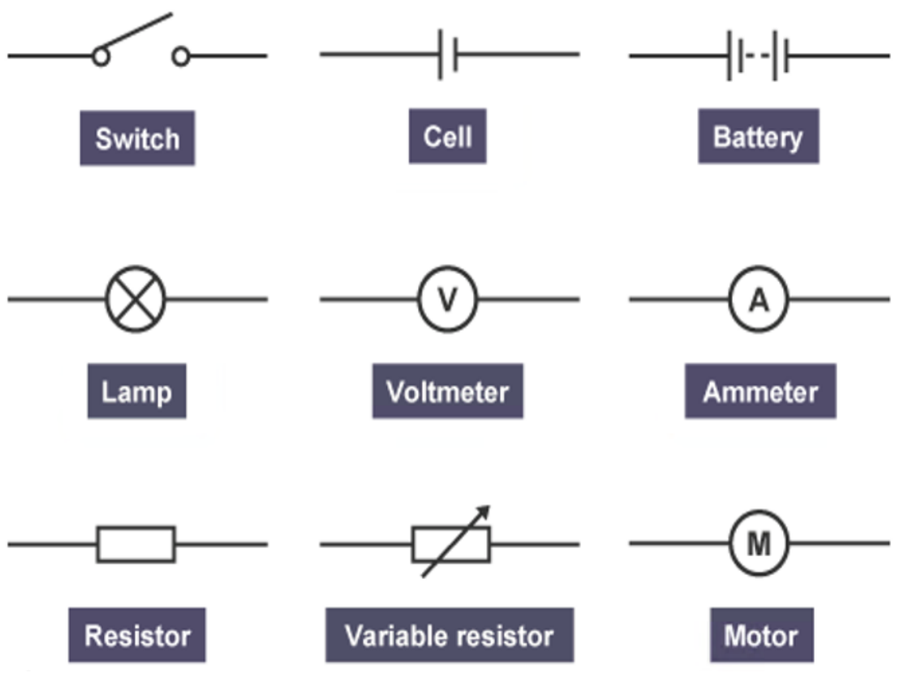
- At full moon and new moon tides are at the extremes, high tides are very high and low tides are very low
- At quarter moons the tides are at the least extreme, but there is still a tidal bulge
- Waxing gibbous and waning crescent increase in size until reaching maximum during spring tides
- Waning gibbous and waxing crescent, therefore the tidal bulge decreases



How can I build a circuit?

Electrical energy is transferred around circuits. The most basic circuits consist of a power source, wires and other components (like a bulb)

To make it easier for us to draw circuits we use circuit symbols. Some are shown below:



In physics a cell is a single unit that stores chemical energy – what we would normally call an individual 'battery.' Two or more cells is known as a battery.

Electricity
Conductor
Insulator
Battery
Circuit

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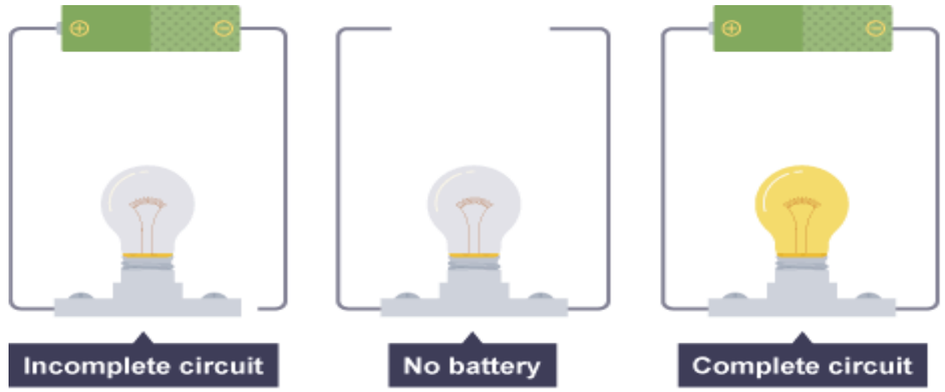
Three basics things are needed for a circuit:

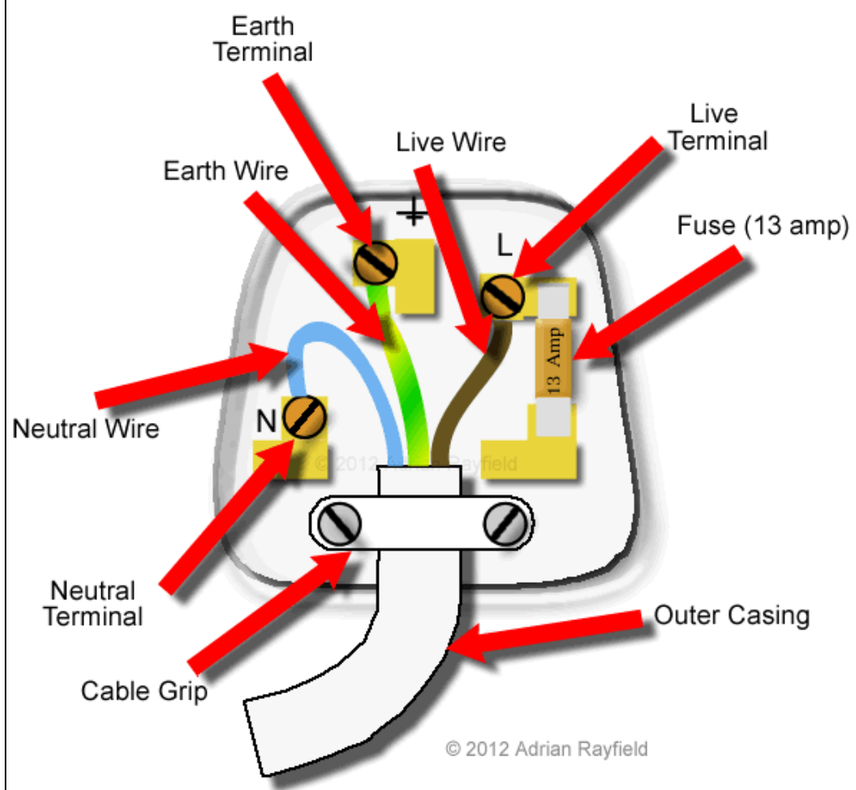
1. Power source
2. No gaps – complete circuit
3. Conductors



How can I use electricity safely?

Electricity enters our home by mains electricity.

If we look inside a plus there are lots of safety features to protect us from harm.
Inside a plug:



The Earth wire is a safety wire. It connects an appliance to the ground. If there's a fault in the plug the electricity will flow into the ground and prevent us from electrocution.

A fuse contains a thin piece of wire. If there's a surge in electricity it will break the wire in the fuse (blow the fuse). This breaks the circuit and stops the appliance working. This prevents appliances from catching fire.

Plugs are also in plastic cases because plastic is a poor electrical conductor.

Mains electricity
Plug
Fuse

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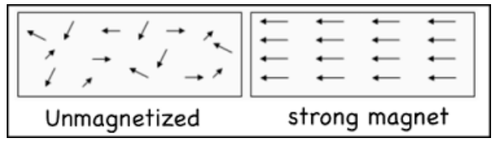
What is magnetism?

Magnetism: an invisible force that pushes or pulls magnetic materials.

Magnetic materials are materials that are attracted to a magnet, but do not attract or repel each other.

There are only three magnetic elements, they are: Iron, Nickel and Cobalt

Non-magnetic materials are not affected by magnets this includes metals such as gold, aluminium, silver and copper.



Magnets contain tiny particles called 'domains.' If the domains are pointing in the same direction – the object is magnetised. If they are pointing in random directions the object is not magnetised.

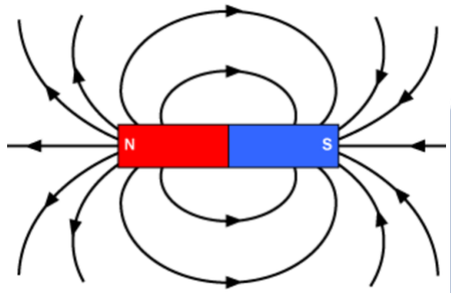
A magnet has two poles.

Pole – part of the magnet with strongest magnetic force.

The poles are called North pole and South pole

Magnets have a magnetic field around them.

This is the area where they can attract or repel a magnetic material. These can be shown on a diagram using field lines



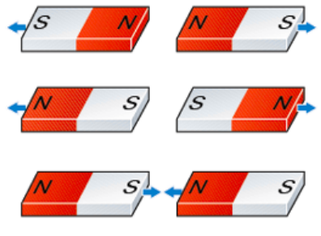
Field lines always go out of the North pole and into the South. This is shown by arrows.

Law of magnets

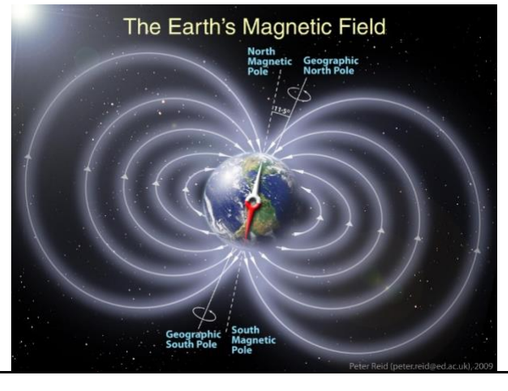
If you bring 2 bar magnets close together...

TWO OPPOSITE POLES
ATTRACT

TWO LIKE POLES
REPEL



The Earth has its own magnetic field which we can use for navigation (compasses always point towards the north pole)



Magnet
Domain
Attract
Repel
Permanent
Field
Compass
Pole