

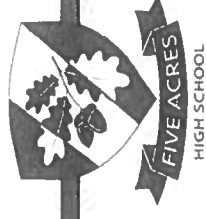
Year 9

Knowledge Organiser

September – December 2025

AMBITION, CONFIDENCE, CREATIVITY,
RESPECT, DETERMINATION

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LEARNING TRUST



Why do we have knowledge organisers?

Knowledge organisers are a collation of the basic essential knowledge for success in each subject area that will underpin your learning for the term.

They are designed to provide the information you will need to be committing to your long term memory through recall exercises in Low Stakes Quizzing.

How do we use knowledge organisers?

You should be using these KOs to create your homework quizzes so that you are practising retrieving information.

1. You can do this by testing yourself on the definition of key terms (both recalling the key term and then swapping to recall the definition), practice labelling diagrams, retrieves reasons and justifications for the main learning points.
2. They can also be used for 'memory dumps' where you try to recall as much of the information about a topic as possible and then use the KP to fill in the gaps.
3. They can also be used in class to assist with retrieval of the core knowledge needed for each subject.

You should have these with you at all times in school and out on your desk in all lessons.

If you lose your KO or it becomes too dishevelled, please purchase a new one from the Head of Year or the School Office.

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Key Vocabulary

- **Futility** Pointless (Latin – futilis – leaky, futile)
- **Brutality** Savage physical violence (Latin – brutus – heavy, dull, stupid, insensible, unreasonable)
- **Nationalism** Devotion to your country (French – nation – peculiar or common to the whole people of a country)
- **Insubordination** Defiance of authority (French – insubordine in – not subordinate – submitting to authority)
- **Subvert** To undermine or overturn (Latin – subvertere – to turn upside down)
- **Invert** To reverse the position (Latin – invertere – turn about, upset, reverse)
- **Neuralgia** Pain caused by the nerves (Greek – neuron – nerve algia – pain)
- **Claustrophobic** Feeling of fear linked to being in a confined place (Latin – cloister – to close phobia – fear)
- **Vernacular** The language or dialect spoken by the ordinary people of a region (Latin – vernaculus – domestic, native, indigenous)
- **Poignant** Evoking a keen sense of sadness or regret (French – poignant – sharp, pointed)
- **Futility** Pointless (Latin – futilis – leaky, futile)
- **Brutality** Savage physical violence (Latin – brutus – heavy, dull, stupid, insensible, unreasonable)

Context about the playwright Sheriff

Journey's End was based on his real experiences as an army officer fighting in WW1. Educated at Kingstons grammar school, he served as an officer in the 9th Battalion of the East Sussex Regiment. He was severely wounded at Passchendale, near Ypres.

Year 9 Autumn Term Conflict

Context and key terms

World War One: 1914-1918. Considered one of the most brutal and bloodiest

conflicts in history.

Propaganda: Convinced young soldiers to sign up- that fighting in WWI was noble. Also presented Germans as evil monsters.

Vimy Ridge: A horrific battle whereby commanding officers ordered their soldiers to run at German machine guns.

The play: Set in the vicious trench warfare of World War One.

The action begins on the evening of Monday 18 March 1918 and continues over three days.

Shell Shock: Nowadays known as 'post-traumatic stress disorder'. Soldiers were effectively paralysed with fear.

Superior officers: Soldiers were expected to follow the command of their superior officer, regardless of how daft the order was. Any refusal (also known as insubordination) would result in being court-martialled and shot.

The Boche: Germans, especially German soldiers, considered collectively;

from the French word for rascal.

Minnies: Large mortar shells, named for the German

Minnywerfer: short range German shell mortars

Trenches: Long, narrow ditches dug by troops to provide shelter from enemy fire; also shorthand for the battlefields of France and Belgium in WWI.

Jerry: Slang term for Germans

No Man's Land: Disputed land between the front lines or trenches of two opposing armies.

Poisoned gas: chemical warfare including tear gas, chlorine (which

characteristically smelt like pepper and pineapple) and

phosgene which smelt like musty hay. The latter were highly toxic.

Kaiserschlacht: German spring offensive in March 1918, part of their 'final push' on the Western Front.

Symbolism and Motifs

Time: There are constant references to time and 'waiting' throughout the play- to reflect the boredom of life in the trenches and reality of the front.

Light: Through the play, the light in the trenches becomes increasingly dim- to reflect either the darkening mood or increasing lack of hope. After Osborne's death, artificial light (the dugouts is 'festively lit with candles') to symbolise the artificial 'happiness' of Stanhope.

Osborne's Pipe: Osborne has to leave his pipe, unfinished and whilst it still has a 'glow' on it, to go on the raid- which is symbolic for how his and other soldiers' lives were cut short.

Earwigs: If you dip an earwig in whiskey it will go faster- just like a soldier.

Uniforms: Used to reflect the characters' mental states. Stanhope's is tidy but 'war-stained', whilst Raleigh's is 'fresh'. However, after the Raid his too has become war-stained. This is symbolic for the minds of the soldiers.

Ramshackle furniture: used by Sheriff to symbolise the ill equipment of poor treatment of the serving soldiers by the Government.

Social class: Sheriff comments on social class presenting the officers as middle and upper class whilst the orderly (Mason) is clearly working class. The exception to this is Trotter, who is treated poorly.

Well made play : majority of the action takes place before the play begins. The play consists of 3 acts, the ending is often ambiguous. This was an accepted dramatic form of the late 19th and early 20th century.

Key vocabulary and terminology

Assonance – repetition of a vowel sound of emphasis
Atmosphere- mood or feeling
Couplet – 2 lines of rhyming poetry
Caesura- punctuation in the middle of a line for emphasis
Dramatic monologue- narrative told only from the narrator's viewpoint
Enjambement- overlapping sentence into the following the line.
Extended metaphor – metaphor running through the poem rather than singular reference
Form- the shape of a poem
Free verse- poem that does not have a regular rhyme structure
Half rhyme- partial rhyme scheme
Iambic pentameter – 10 syllables with 5 stressed syllables
Narrative- account of events
Oxymoron – contradictory placement of words – eg bitter sweet
Prose- any writing not in verse form
Rhyme scheme – pattern of rhyming eg ABAB
Simile – comparison to enhance understanding using like or as
Sonnet form- 14 lines in iambic pentameter. Either **Italian/Petrarchan** or **English/Shakespearean**
Octet – 8 lined stanza (posing the problem or question in a Petrarchan sonnet.
Sestet –(6 lines stanza, often presenting the answer or question to the octet)
Cinquain/quintet – 5 line stanza
Quatrain/quartet – 4 line stanza
Tercet- 3 line stanza
Volta- turning point of a sonnet between the octet and the sestet (Line 9)
Natural imagery – imagery inspired by nature

Yr 9 KO Autumn Term Conflict Poetry

Evaluative Verbs

Satirises – using satire (a way of criticising people or ideas in a funny way) to show that people or ideas have bad qualities and are wrong - usually political.

Presents – introduces an idea.

Demonstrates – provides a clear explanation or example.

Amplifies – emphasises using extra impact and returning to the same idea/point. It makes this idea/point seem very important.

Conveys- carries or presents

Contrasts – presents ideas in opposition

Insinuates – hints at, implies.

Alludes to- references or suggests

Language of comparison:

- Similarly, likewise, additionally, also.
- However, although, conversely, contrastingly.

Phrases to show writer's purpose:

- The writer is inviting the reader...
- The writer is perhaps suggesting...
- The writer indicates that...
- The writer has used this to...
- Phrase to show comparison of effect on the reader:
- Similarly, this also makes the reader...
- Conversely, the reader then feels...

The poems :

Dulce et Decorum Est – Wilfred Owen

A damning, realistic and brutal portrayal of life in the trenches during WW1

Exposure – Wilfred Owen

Another presentation of the harsh realities of existing in the trenches during WW1

The War Photographers – Frank Ormsby

A visual representation of the destruction caused by war

War Photographer

Carol Ann Duffy Duffy's poem was inspired by a photo journalist and the fine line between observing and involvement.

What every soldier should know Brian Turner

He fought in the Iraqi war. Often autobiographical, his poems portray terror, compassion and loneliness of armed conflict.

A Dead Boche Robert Graves

Graves served three times in the first world war, discharged after his third wounding. He known for his damning accounts of the Western Front.

Mametz Wood Owen Shears

Portrays a fierce WW1 battle in the Somme between the Germans and a Welsh infantry division. The Welshmen were never truly acknowledged for their sacrifice

The Manhunt Simon Armitage

Armitage writes this poem after researching accounts of war and survival and reading about Eddie (a soldier who witnessed the Srebrenica massacre) and Laura, his wife.

AB Negative Brian Turner

The poem is in 3rd person and describes a field surgeon's effort to save a female soldier.

Fractions, decimals and percentages

Topics

- Converting between fractions, decimals and percentages (U888)
- Ordering fractions, decimals and percentages (U594)
- Finding fractions of amounts without a calculator (U881)
- Finding fractions of amounts with a calculator (U916)
- Finding percentages of amounts without a calculator (U554)
- Finding percentages of amounts with a calculator (U349)

Building Blocks

- Finding equivalent fractions (U704)
- Ordering fractions (U746)
- Multiplying fractions (U475)

Keywords

Multiplier - a decimal you multiply by to increase/decrease a number by a percentage.
Numerator - top number in a fraction.
Denominator - bottom number in a fraction.

Percentage change

Topics

- Percentage change without a calculator (U773)
- Percentage change with a calculator (U671)
- Finding original values in percentage calculations (U286)
- Finding the percentage an amount has been changed by (U278)
- Simple interest calculations (U533)

Building Blocks

- Finding percentages of amounts without a calculator (U554)
- Finding percentages of amounts with a calculator (U349)

Keywords

Interest - amount of money paid to you by a bank when you invest savings with them.
Growth - amount increases/goes up.
Decay - amount decreases/ goes down.

Probability

Topics

- Expected results from repeated experiments (U166)
- Calculating experimental probabilities (U580)
- Frequency trees (U280)

Building Blocks

- Writing probabilities as fractions, decimals and percentages (U510)
- Probabilities of mutually exclusive events (U683)
- Finding fractions of amounts (U881, U916)
- Finding percentages of amounts (U554, U349)

Keywords

Probability - likelihood of an event happening, given as fractions or decimals.
Frequency - the number of times something is happening. This is an integer.
Frequency tree diagram - visual way of representing frequencies after being broken down.

Standard form

Topics

- Multiplying and dividing numbers in standard form (U264)
- Adding and subtracting numbers in standard form (U290)
- Standard form with a calculator (U161)

Building Blocks

- Using standard form with positive indices (U330)
- Using standard form with negative indices (U534)
- Index rules with positive indices (U235)
- Index rules with negative indices (U694)
- Using a calculator (U926)

Keywords

Indices -the superscript that appears after a number or letter indicating that the base number has been multiplied by itself this many times

Ordinary form - number in whole number or decimal form.

Standard form - number between 1 and 10 multiplied by a power of 10 with index form.

Inequalities

Topics

- Solving inequalities with the unknown on both sides (U738)
- Solving double inequalities (U145)
- Constructing and solving inequalities (U337)

Building Blocks

- Reading and drawing inequalities on number lines (U509)
- Solving single inequalities (U759)

Keywords

Inequality - statement showing two quantities that are less than, more than or equal to one another.

Coefficient - number in front of the variable including the + or - symbol.

Quadratic equations

Topics

- Factorising quadratic equations of the form x^2+bx+c (U178)
- Factorising the difference of two squares (U963)
- Factorising to solve quadratic equations of the form $x^2+bx+c=0$ (U228)

Building Blocks

- Expanding double brackets (U768)
- Factorising into one bracket (U365)

Keywords

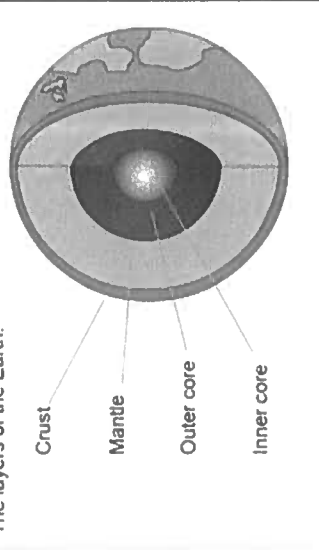
Quadratic - algebraic expression where the highest power of the variable is 2

Factorise - identify the highest common factor from an algebraic expression, place outside brackets and make it equivalent to the original expression.

Formulae Topics • Changing the subjects of formulae (U556) Building Blocks • Solving equations with two or more steps (U325) • Solving equations with the variable on both sides (U870) • Solving equations with the variable in the denominator (U505) Keywords <u>Formulae</u> - A formula is a statement linking two or more variables. <u>Subject</u> - variable that needs to stand by itself after rearranging a formula	Constructions Topics • Constructing bisectors of angles (U787) • Constructing perpendicular bisectors and lines (U245) Building Blocks • Using a rule r(M985) • Using a pair of compasses (M196) Keywords <u>Bisector</u> - a line halving a line or angle in size <u>Perpendicular</u> - lines meeting in a 90 degree/right angle	Circles and cylinders Topics • Finding the arc length of sectors (U221) • Finding the area of sectors (U373) • Finding the surface area of cylinders (U464) • Finding the volume of cylinders (U915) Building Blocks • Identifying parts of circles (U767) • Finding the circumference of circles (U604) • Finding the area of circles (U950) • Finding the surface area of prisms (U259) • Finding the volume of prisms (U174) • Using a calculator (U926) Keywords <u>Arc</u> - part of the circumference of a circle <u>Circumference</u> - perimeter of a circle <u>Sector</u> - part of the area of a circle restricted by two radii and an arc <u>Cylinder</u> - 3D shape that is a prism with a cross-section of a circle <u>Surface area</u> - the total area of the surface of a 3D shape. <u>Volume</u> - space inside of a 3D shape
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Box 1 – The structure of the Earth

The layers of the Earth:



Crust – Made up of rock split into tectonic plates

Mantle – Made of solid rock which can slowly flow like a liquid.

Core – Made up of iron and nickel, the outer core is liquid, and the inner core is solid.

Box 2 – Gases in the atmosphere

The air around is called the atmosphere, it is made up of a mixture of gases.

Gas	% of volume
Nitrogen (N ₂)	78
Oxygen (O ₂)	21
Argon (Ar)	1
Carbon dioxide (CO ₂)	0.04

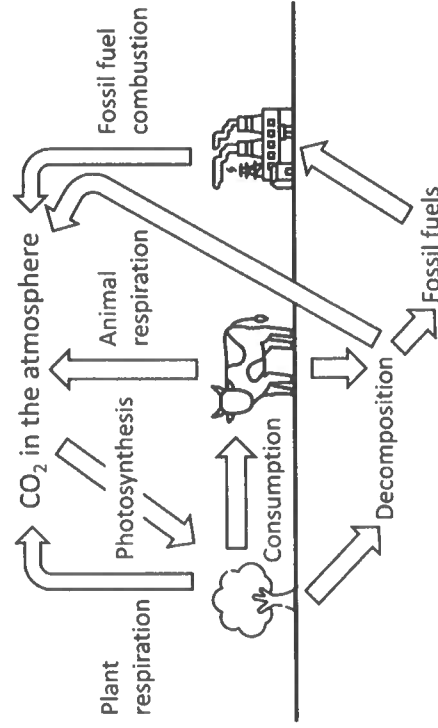
Box 3 - The carbon cycle

Living and decomposing organisms are made up of compounds that contain the element carbon. These are recycled between stores within the atmosphere, ecosystems and the Earth's Crust.

Key processes

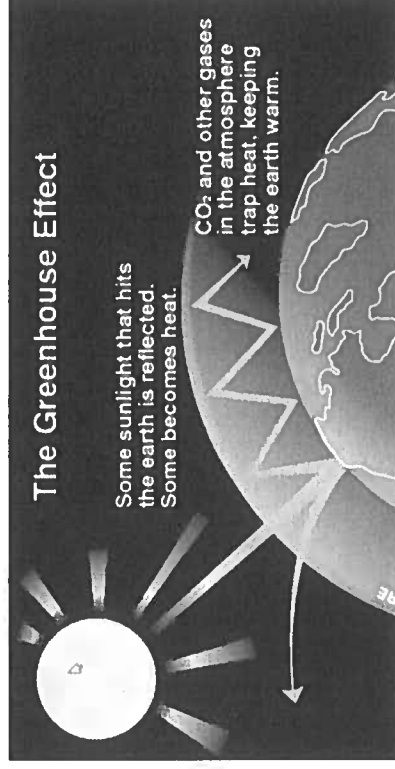
Photosynthesis removes carbon dioxide from the atmosphere and stores it within producers (plants) as glucose (biomass)

Cellular respiration in plants, animals and bacteria releases carbon dioxide out into the atmosphere



Human activities such as **combusting (burning) fossil fuels** release carbon dioxide into the atmosphere, increasing the level of carbon dioxide in the atmosphere

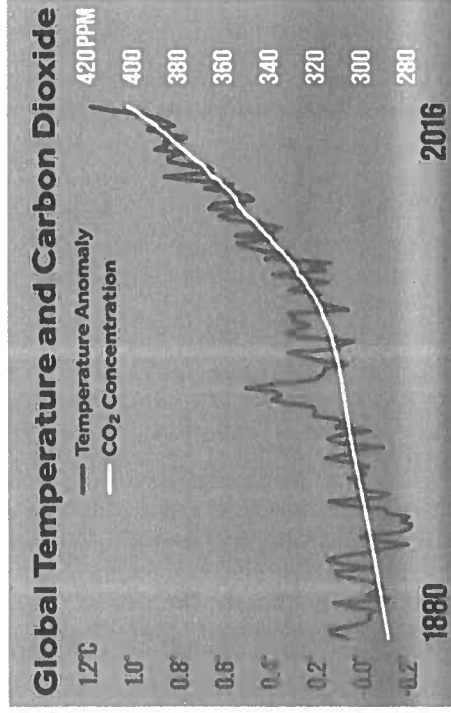
Box 4 – The Greenhouse Effect



Life can exist on Earth because energy transferred from the surface of the Earth forms a thermal energy store within the molecules of gas in the atmosphere – this is known as the greenhouse effect.

Carbon dioxide and methane stores a greater amount of energy compared to molecules of oxygen and nitrogen. Carbon dioxide is a greenhouse gas, as it has a higher thermal energy store. Without this effect the atmosphere would be too cold for life to exist.

Box 5 Global Warming and Climate Change



Human activities such as burning fossil fuels have increased the amount of carbon dioxide in the atmosphere, this has increased the average global temperature causing global warming.

Other activities which release carbon dioxide include

- Cutting down and burning large areas of forest to make space for crops and cattle.
- Growing rice and farming cattle, this releases methane another greenhouse gas.

Reducing the amount of fossil fuels used for electricity generation, heating and transport alongside reducing the amount of cattle farmed would slow down the increase in the global temperature.

Scientists have evaluated huge amounts of evidence to link human activities to global warming.

The impacts of global warming are called **climate change**. As a result, glaciers and polar ice are melting, this causes a sea level rise leading to flooding of low-lying land. Weather patterns are disrupted with increases in rain fall in some areas with other areas suffering droughts and heat waves.

Box 6 – Reduce, Reuse and Recycle

Material that make everything come from the Earth's crust, the atmosphere or the oceans. These resources will not last forever, and the faster we use them the sooner they will run out. To make these resources last longer we could reduce the amount of raw materials that we use to make products. Ensuring that products are reused in some way would also help to reserve important resources.

Recycling means collecting and processing materials that have been used so that they can be used again.

The following materials are often recycled – paper, plastic, metals and glass.

Glass is recycled by sorting the glass into different colours, heating the glass to a high temperature and then forming a new glass product in a new shape.

Advantages of recycling

Natural resources will last longer

Recycling materials transfers less energy than processing materials

Recycling reduces the amount of waste going into land fill.

Disadvantages of recycling

The recycling process uses a lot of energy

Waste needs to be sorted before it is processed.

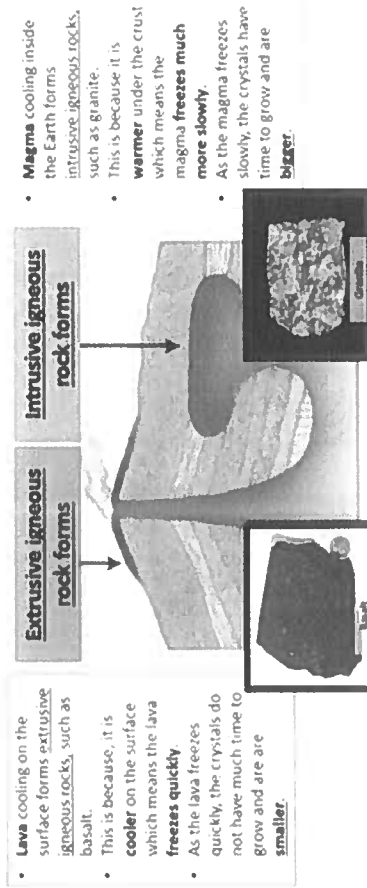


Box 7 – Types of Rock and the rock cycle

- Rocks are mixtures of minerals found in the Earth's crust.
- A **mineral** is a solid chemical compound. For example, the **rock** limestone contains the **mineral** calcium carbonate (CaCO_3) along with silica, clay, silt and sand.

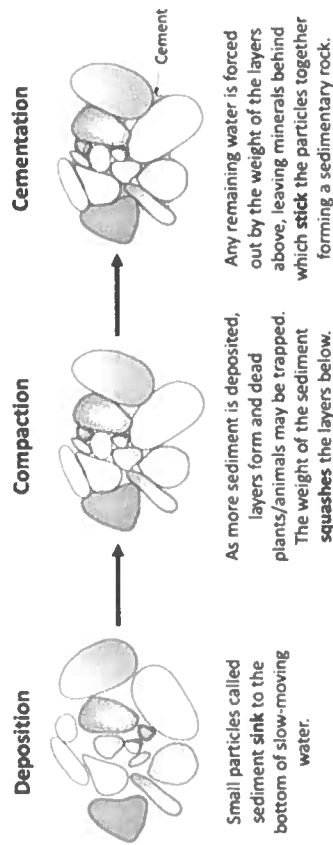
Igneous rocks

- Examples of igneous rock include basalt, granite and obsidian.
- Igneous rocks are made of interlocking **crystals** which makes them **hard and non-porous** (don't absorb water). Igneous rocks never contain layers or fossils.
- Igneous rocks are formed when molten rock (called magma or lava) **freezes** from a liquid into a solid.



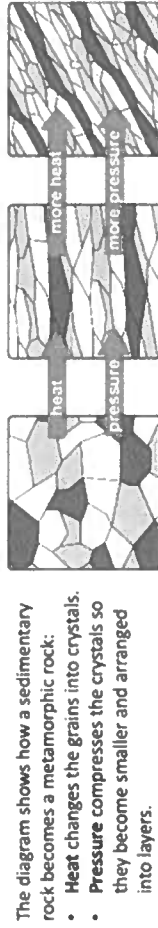
Sedimentary rocks

- Examples of sedimentary rock include limestone, sandstone and chalk.
- Sedimentary rocks are made of **grains** which makes them **soft and porous** (can absorb water). Sedimentary rocks may contain **strata (layers)** and / or **fossils**. A **fossil** is the preserved remains of a living thing from thousands or millions of years ago.
- Sedimentary rocks are formed when small particles of other rocks sink to the bottom of slow moving water and then get squashed and glued together.



Metamorphic rocks

- Examples of metamorphic rocks include marble, slate and gneiss (pronounced 'nice').
- Metamorphic rocks are made of interlocking **crystals** which makes them **hard** and **non-porous** (don't absorb water). Due to the way metamorphic rocks are formed, they may contain layers and / or distorted fossils.
- Metamorphic rocks are formed from **existing** rocks which have been exposed to **heat and pressure** over long periods of time.

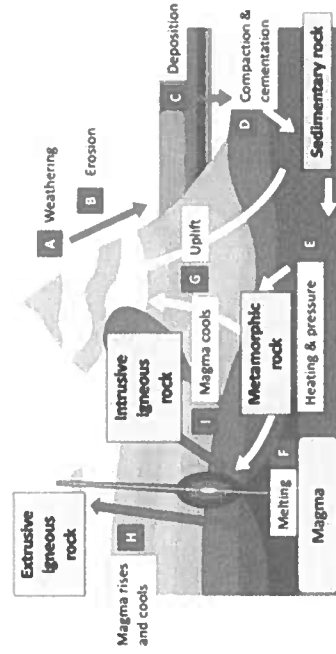


Weathering and erosion

- **Weathering** is the **breaking down** of large pieces of rock into smaller pieces of rock.
- There are three types of weathering:
 - **Biological weathering** is caused by **living organisms**, for example tree roots can cause rocks to break into smaller pieces.
 - **Chemical weathering** wears rocks away. It is caused by **chemical reactions between rain and rocks containing calcium carbonate** such as chalk, limestone and marble. Rainwater is naturally acidic and causes weathering. However, this process is sped up when pollution causes acid rain to form.
 - **Physical weathering** uses mechanical processes to break rocks down, for example waves can slowly wear away at cliffs. Changes of temperature can also cause physical weathering to take place through processes known as freeze-thaw and onion-skin weathering.
- **Erosion** is the **movement** of rock by water, wind or ice. The rocks are broken down into even smaller pieces by erosion, becoming rounder and smoother in the process.

The rock cycle

- The rock cycle links together all the ideas in this topic as it describes how different rocks are made and changed over time:

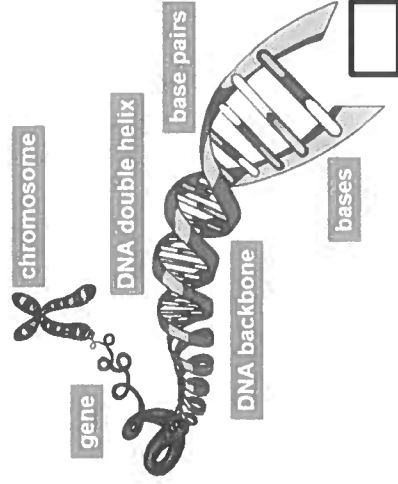


Year 9 Biology Knowledge Organiser – Genetics page 1

Box 1 - The Gene

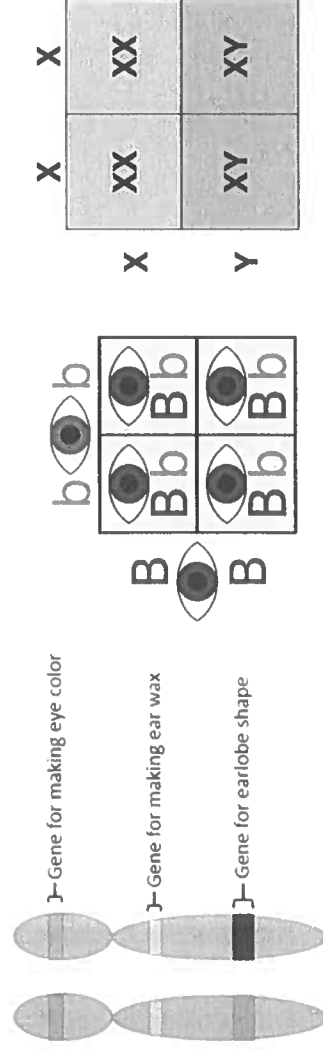
DNA controls many characteristics of organisms.

The genetic material in the nucleus of a cell is composed of a chemical called DNA. DNA is made of two strands forming a double helix. DNA has a series of bases which are read as triplets. DNA is contained in structures called chromosomes. A gene is a small section of DNA on a chromosome. Each gene codes for a particular sequence of amino acids. A sequence of amino acids makes a protein. Proteins are the building blocks of cells. Proteins determine certain characteristics.



Box 2 - Inheritance

Genes occur in pairs, one of each is inherited from each parent. Some characteristics are controlled by a single gene. Most characteristics are a result of multiple genes interacting rather than a single one. Each gene can have different forms called alleles. Genetic crosses can be completed for those characteristics that are controlled by a single gene, and give a percentage chance of each characteristic being seen in the offspring. A punnett square diagram can be completed for sex determination. Of the 23 pairs of chromosomes in a human nucleus, 22 determine characteristics but only one carries the genes that determine sex. In females the sex chromosomes are the same, XX. In males the chromosomes are XY. Each egg cell holds an X chromosome. Sperm cells contain either an X or a Y chromosome. A punnett square diagram will show there is a 50% chance of each child being either a boy or a girl.



Key Terms	Definitions
DNA	Genetic material in the nucleus of a cell
Gene	A small section of DNA on a chromosome
Chromosome	Structures that contain DNA
Amino acid	Coded for by a gene; building blocks of protein
Dominant	A gene or characteristic that will always be expressed in the offspring
Recessive	A gene or characteristics that will only be expressed in the offspring if the other gene is also recessive
Allele	A form of a gene (e.g. for brown eyes or blue eyes)
Genotype	Genes that are present, e.g. HH, Rr
Phenotype	Characteristics that are present
Homozygous	If the two alleles present are the same, e.g. MM, qq
Heterozygous	If the two alleles present are different, e.g. Mm, Qq
Selective breeding	The process by which humans breed plants and animals for particular genetic characteristics
Clone	An individual that has been produced asexually or artificially and is genetically identical to the parent
Embryo cloning	Process used to clone animals
Evolution	The theory that suggests there has been a development of more complex organisms over millions of years
Natural selection	The survival and successful breeding of organisms most suited to their environment
Fossils	Prints or remains of organisms that have been preserved in rock through a process of mineralisation
Extinction	There are no remaining individuals of a species still alive

Year 9 Biology Knowledge Organiser – Genetics page 2

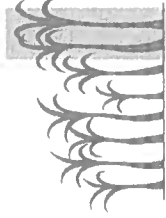
Box 3 - Selective Breeding

Selective breeding, or artificial selection, is the process by which humans breed plants and animals for particular genetic characteristics. Desired characteristics can include resistance from disease, animals with a high yield of milk or meat, domestic dogs with a gentle nature, large or unusual flowers. Selective breeding can result in "inbreeding" where some breeds are particularly prone to disease from inherited defects.

Selective breeding involves:

1. Breeding individuals who have the desired characteristic
2. From the offspring those with the desired characteristic are bred together
3. Repeating over many generations until all the offspring show the desired characteristic

Population 1



Population 2



Box 4 - Fossils and Extinction

Fossils provide evidence of evolution. Fossils are the prints or remains of organisms that have been preserved in rock through a process of mineralisation. Fossil records are often incomplete but allow scientists to understand changes in species over time. Fossils allow us to identify organisms that are now extinct. Extinction occurs when there are no remaining individuals of a species still alive. Human behaviours have increased the rate of extinction as species are unable to adapt rapidly enough to the changes brought about by humans.



Box 5 - Darwin's Discoveries

All organisms have evolved from simple single celled organisms over millions of years.

Evolution has occurred due to variation within a species. Variation can either be continuous or discontinuous, and is a result of either genetics, environment or both.

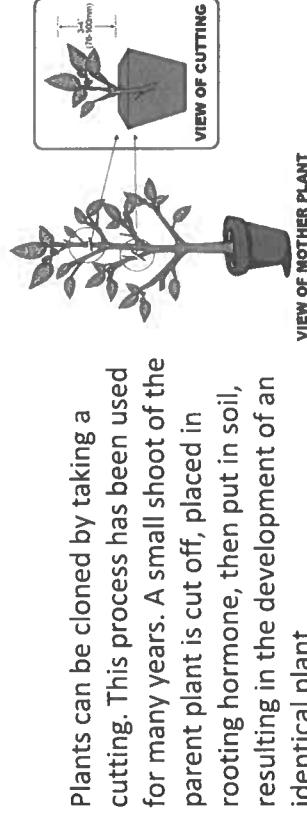
Darwin found evidence of evolution in the 1830s during his round-the-world journey. Darwin coined the term "survival of the fittest" to explain his theory of natural selection:

- Individual organisms within a particular species show a wide range of variation for a characteristic.
- Individuals with characteristics most suited to the environment are more likely to survive to breed successfully.
- The characteristics that have enabled these individuals to survive are then passed on to the next generation.

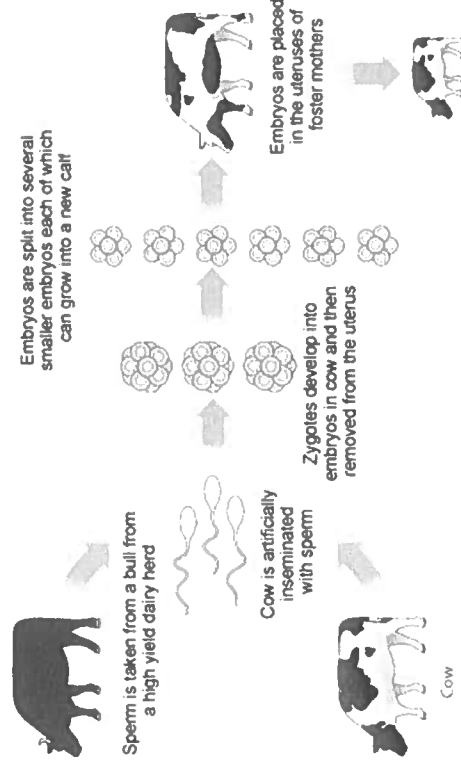
Darwin published his ideas in *On the Origin of the Species* but his ideas were initially rejected by other academics due to existing religious beliefs and a lack of explanation. The idea of natural selection is now widely accepted, since the discovery of the gene provided further evidence.

Box 6 - Cloning

A clone is an individual that has been produced asexually or artificially and is genetically identical to the parent. Cloning is usually used if a plant or animal has particularly desirable characteristics.



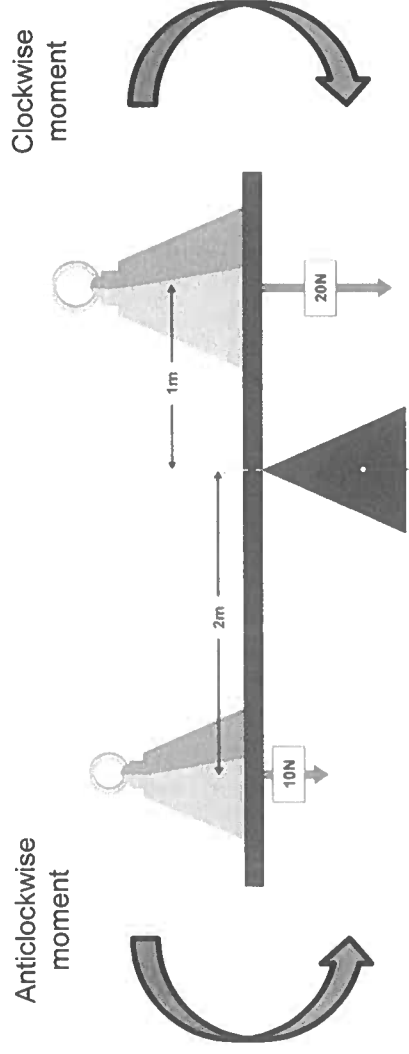
Animals can be cloned using embryo cloning. Fertilisation takes place between the egg and sperm from the parents with desirable characteristics. The resulting cluster of cells, which haven't yet specialised, are split apart and transplanted into surrogate mothers, where they will each grow into a clone of the original cow and bull. Some people have ethical issues with cloning.



Year 9 Physics Knowledge Organiser Forces 3 page 1

Box 1 - Moment

- A **moment** is a turning force
- Forces can make an object turn if there is a **pivot**
- To calculate the size of a moment you need to know 2 things. The size of the force and the distance from the pivot.
- Take the example of the see saw below:



The turning force on the left of the pivot (the anticlockwise moment) is

$$10 \times 2 = 20 \text{ Nm}$$

The turning force on the right of the pivot (the clockwise moment) is

$$20 \times 1 = 20 \text{ Nm}$$

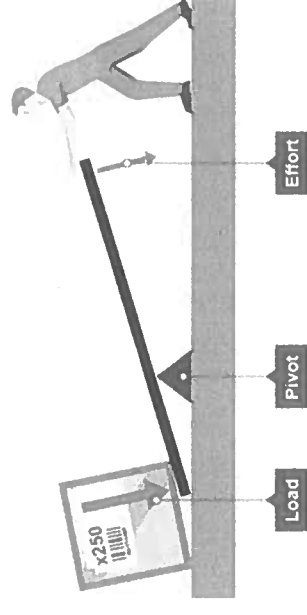
The units for turning force are Newton metres (Nm).

- We can say that the see saw above is in **equilibrium** this is because the moments that are trying to rotate the see saw anti clockwise are the same as the moments trying to turn the see saw clockwise.
- In other words **the clockwise moments = the anticlockwise moments**
- The seesaw above is therefore **not rotating**.

Key terms	Definitions
Pivot	A point around which something can rotate
Moment	A turning force
Equilibrium	When an object is not rotating due to balanced forces
Newtonmetre	The unit for turning force.
Equation to calculate the moment of a force	
$moment = force \times \text{perpendicular distance from pivot}$	
Forces are measured in newtons (N)	
Distances are usually measured in metres (m)	
Moments are measured in a compound measure using the units for force and distance, newtonmetres (Nm).	

Box 2 - Levers

- Levers involve turning, or rotation. Levers allow forces applied to be **multiplied** (made larger). This can make it easier for us to move heavy objects
- Levers have a **pivot**: a fixed centre of rotation
- The moment of a force can be **increased** by:
 1. Increasing the size of the force
 2. Increasing the perpendicular distance from the pivot



Year 9 Physics Knowledge Organiser Forces 3 page 2

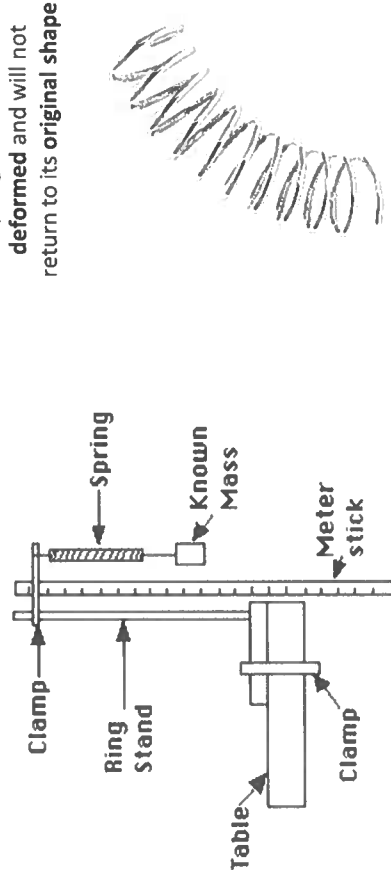
Box 3 - Work done by a force

- Applying a force to get an object to move is one way to transfer energy between stores. Transferring energy is also known as '**doing work**'.
- To calculate work done:
 $\text{work done} = \text{force} \times \text{distance moved in the direction of the force}$
- Work is done (energy is transferred) when elastic objects are extended/compressed.
- The amount of work done = the amount of elastic potential energy stored in the elastic object.

Box 4 - Hooke's Law

- Hooke's law applies to all elastic materials/objects. An elastic object is one which will return to its original shape when compressed or stretched
- Hooke's law says: **the extension/compression of an elastic object is directly proportional to the force applied.**
- When an elastic object is extended/compressed, it stores **elastic potential energy**.
- If too much force is applied to the elastic object, it reaches its **elastic limit**. After this elastic limit, the object no longer returns to its original shape once the force is removed.
- To investigate Hooke's law you can use a spring, ruler and mass hanger to apply the force. In this experiment the independent variable would be the force and the dependent variable would be the extension of the spring.

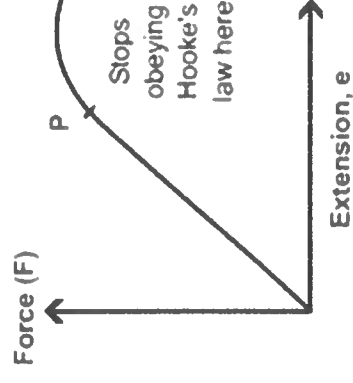
Apparatus for Hooke's Law Lab



Key terms	Definitions
deformation	Changing the shape of a material/object by applying forces.
extension	The measure of how much an elastic object has been stretched.
elastic	Describes materials that can be extended or compressed by forces, and return to their original shape when the forces are removed.
inelastic	Describes materials that don't go back to their original shape after they've been deformed.
direct proportion	Describes a mathematical relationship between variables where: when the independent variable doubles, the dependent variable doubles too.
elastic potential energy	The store of energy in extended/compressed elastic objects.
Equation	Meanings of terms in equation
$\text{Force} = \text{spring constant} \times \text{extension}$	$F = \text{force (N)}$ $k = \text{spring constant (N/m)}$ $e = \text{extension (m)}$

Box 5 - Results from Hooke's Law Experiment

- Force and extension have a **directly proportional relationship**. This means if you double the force the extension of the spring also doubles.
- Hooke's Law is no longer obeyed beyond the elastic limit (marked P on the graph)



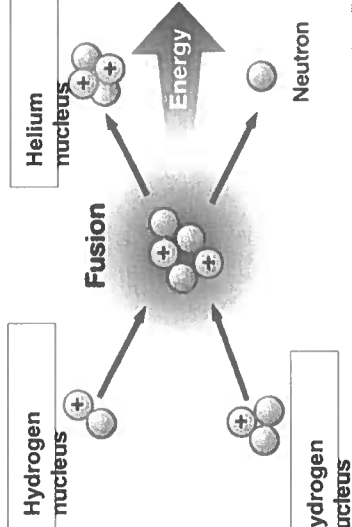
Year 9 Physics Knowledge Organiser – Cosmology page 1

Box 1 - Nuclear fusion

Nuclear fusion is a process that occurs in stars and results in a huge release of energy. This is why stars shine.

During nuclear fusion, two nuclei fuse (join together) to make a bigger nucleus and energy.

In stars, the two nuclei are usually hydrogen when they join together they make a single helium nucleus and release a lot of energy.



Box 2 - Life cycle of a star

Stars are huge balls of gas in space. They are so large and last so long they can seem to last forever. This is not the case: stars go through a life-cycle with identifiable stages. Stars can be divided into two categories based on their size: small stars, of a similar size to our Sun, and massive stars, which are much larger than our Sun. The size of a star affects its life-cycle.

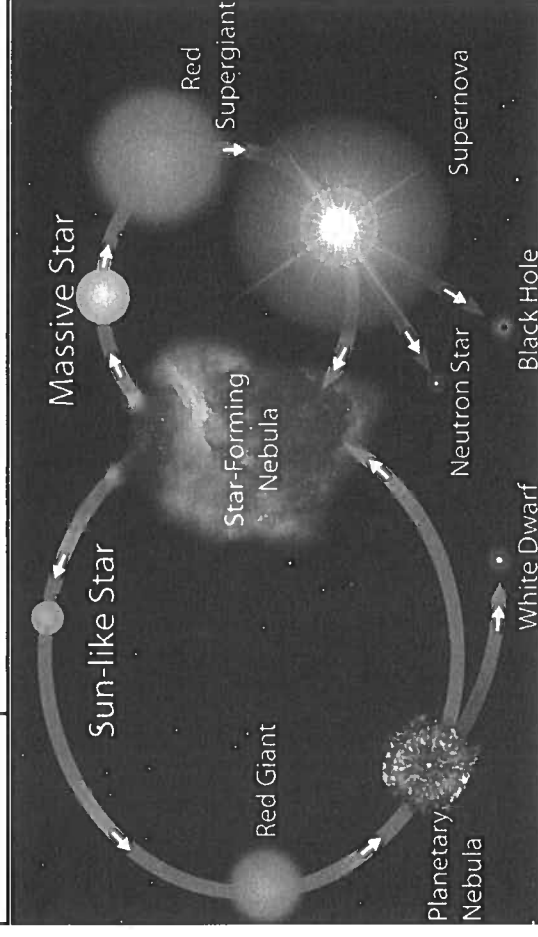
A star the size of our Sun has a life-cycle over five stages: nebula, main sequence, red giant, white dwarf

1. The life-cycle of a star starts when the force of gravity draws particles of gas (hydrogen and helium) in a **nebula** together.
2. The **main sequence** of a star is the main stage of its life-cycle; during this time the star appears white. This is because of the nuclear fusion process, which releases a lot of light and heat. During the main sequence the nuclear fusion uses hydrogen atoms.
3. When most of the hydrogen has fused to form helium the star cools and expands, forming a **red giant**. Massive stars form **red supergiants**.

The end of a star's life-cycle depends on if it is small (Sun-like) or massive

- If the star is small, the outer layers of the red giant star are lost. The outer layers form a **planetary nebula** and what remains is a small, very hot, **white dwarf**.
- If the star is massive, the red supergiant will explode in a **supernova**. What remains normally forms a **neutron star**. The most massive stars form **black holes** after a supernova.

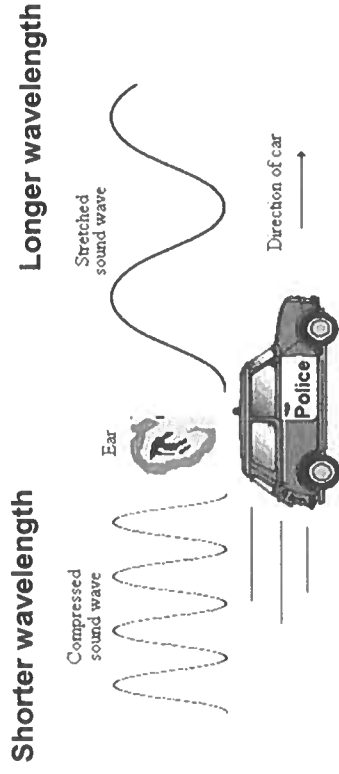
Key term	Definition
Nebula	A giant cloud of dust and gas (hydrogen and helium) in space
Sun-like star	A star with a similar mass to the sun Over the life of the star nuclear fusion occurs: two hydrogen atoms come together making one helium atom, releasing a lot of energy (light and heat)
Red giant	The part of a star's life-cycle when the hydrogen has run out – the star now appears red Red giant stars mainly fuse helium
Planetary nebula	A ring-shaped nebula round an ageing star
Massive star	A star with a mass much larger than the sun's mass
Supernova	The explosion of a massive star when it is a red supergiant
Neutron star	A small, very dense star consisting mainly of closely packed neutrons
Black-hole	Formed after very massive stars collapse Black holes can continue to grow by absorbing the mass of other stars



Year 9 Physics Knowledge Organiser – Cosmology page 2

Box 3 - Doppler effect

The wavelength of a wave (the distance between two points) from a moving object is *shifted*. This is known as the Doppler effect.
 If the object is moving away, the wavelength is shifted to be longer.
 If the object is moving towards you, the wavelength is shifted to be shorter.
 This effect can be heard when a police car, with a siren passes you.

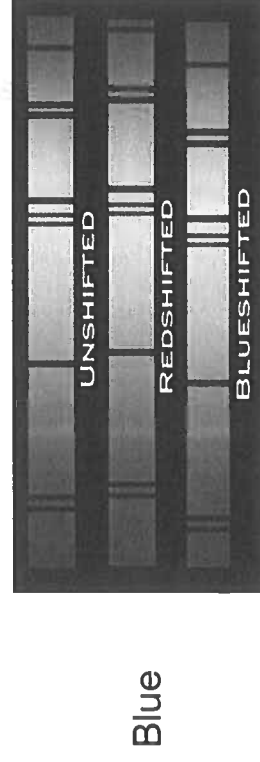


When a car with sirens travels towards you the sound is high-pitched (high frequency wave, the wavelength is shorter); as the sirens move away from you the sound becomes low-pitched (low frequency wave, the wavelength is longer).

Box 4 - Red-shift and blue-shift

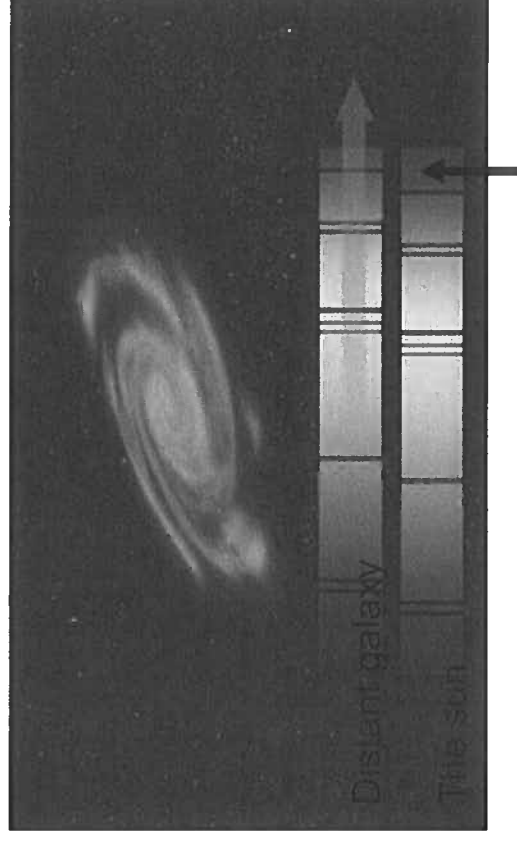
Red-shift and blue-shift are examples of Doppler effect for light.

- Red light has the longest wavelength of visible light and blue light has the shortest.
 - When an object is moving towards you the wavelength of the light is shifted to be shorter (Blue-shift).
 - When an object is moving away from you the wavelength of the light is shifted to be longer (Red-shift).
- Objects have to move extremely fast for the difference to be observable; this effect can be observed with distant stars and galaxies.



Box 5 - Cosmological Red-shift

When other galaxies in the universe are observed, they are all red-shifted. This means they are all moving away from our galaxy. This can be seen by comparing absorption spectra from our local star (the sun) with a distance galaxy. The patterns in the absorption spectra show red-shift.



This is strong evidence for the universe expanding as all galaxies are red-shifted and therefore moving away from each other.

Box 6 - The Big Bang

Red-shift and Cosmic Microwave background Radiation (CMBR) are evidence for a theory called the Big Bang.

The Big Bang theory proposes that the universe was created 13.7 billion years ago at a single point. The universe expanded from this point and continues to expand.

There was an alternative theory before the Big Bang theory called Steady State theory. In this theory, there was not a single creation event and the Universe is continually expanding - matter is continually created alongside the expansion.

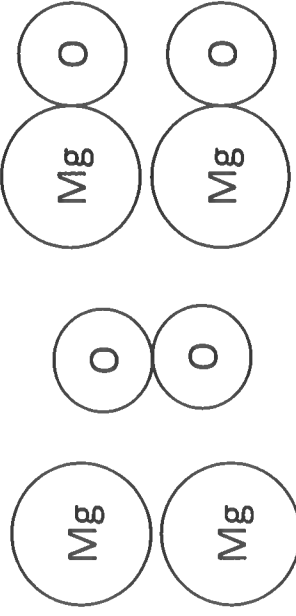
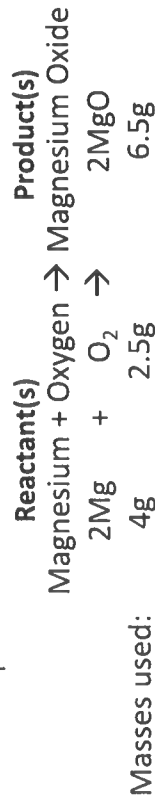
Red-shift supports both theories, CMBR supports only the Big Bang theory.

Year 9 Chemistry Knowledge Quantitative Chemistry page 1

Box 1 - Conservation of mass

Atoms are the basic units of matter that take part in chemical reactions. Atoms cannot be created or destroyed – during chemical reactions the atoms that make up the reactants rearrange to make the products.

→ This means the mass of the reactants always equals the mass of the products.
For example:



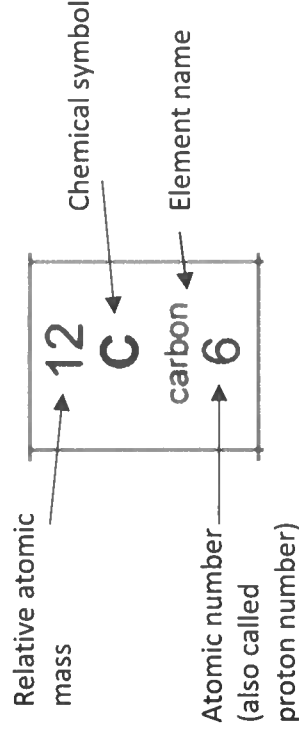
Box 2 - Representing Elements and Compounds using Symbols

- All the elements are given a chemical symbol. Symbols are unique to each element and consist of a single capital letter, often with a second lower case letter. For example, carbon and cobalt both begin with “c”, so are distinguished by giving carbon the symbol “C” and cobalt the symbol “Co” (not CO or co).
- All the chemical symbols for all the elements that exist are found in the Periodic Table of Elements, which exists in its current form based on the work of Dmitri Mendeleev.
- The variety of substances that exist are not accounted for by the elements. New substances called compounds are made when elements react together. The chemical formulae of compounds are based on the type of elements and the number of atoms for each element they contain.
- For example: carbon dioxide is made of one carbon atom (C) and two oxygen atoms (O). The chemical formula is CO₂ – the subscript (small) 2 means there are two oxygen atoms.

Key Terms	Definitions
Conservation	When things are kept the same, or maintained.
Mass	The physical substance of an object.
Element	Substances made of one type of atom. All the substances in the periodic table are different types of element.
Compound	A substance made of two or more different elements chemically bonded together in fixed proportions.
Chemical formula	A combination of element symbols and numbers used to describe the variety of atoms in a compound. For example, carbon dioxide is CO ₂

Box 3 - Relative Atomic Mass, Ar

- This is the combined mass of the protons and neutrons in the nucleus. All elements have a unique combination of protons and neutrons, and this means they have a unique mass.
- The mass of each element is known as its relative atomic mass because the numbers used are a comparison to the masses of the other elements.



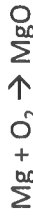
- For example: the Ar of oxygen is 16, the Ar of silicon is 28, and the Ar of chlorine is 35.5.

Year 9 Chemistry Knowledge Quantitative Chemistry page 2

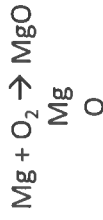
Box 4 - Balancing chemical equations

The conservation of mass in chemical reactions leads to the need to balance chemical equations. The mass of the products needs to equal the mass of the reactants.

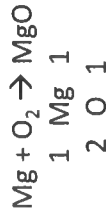
Step 1 – write out the chemical formula in its unbalanced form.



Step 2 – write out the symbols for the different elements present in the reaction.

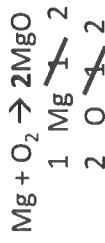


Step 3 – count how many atoms of each element are present:

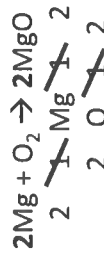


This equation is unbalanced as the number of oxygen atoms is fewer in the products.

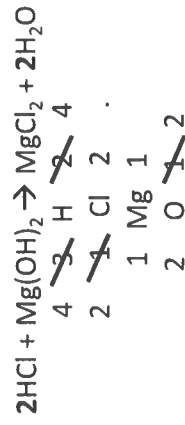
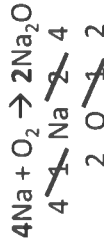
Step 4 – add large numbers in front of the chemicals in the reaction, this means you have added in another atom or molecule of that substance, then adjust the totals:



Step 5 – keep on adjusting the number of chemicals until the number of atoms of each element is the same:



Examples:



Box 5 - Relative Formula Mass, Mr

- The mass of each molecule is known as its relative formula mass and is calculated by adding together the relative atomic mass of all the atoms present.

- All molecules and compounds have a unique combination of atoms, and this means they have a unique mass.

- For example CaCO_3 contains the following elements:

1 calcium atom – Ar 40 for each atom, so $40 \times 1 = 40$

1 carbon atom – Ar 12 for each atom, so $12 \times 1 = 12$

3 oxygen atoms – Ar 16 for each atom, so $16 \times 3 = 48$

$$40 + 12 + 48 = 100$$

Box 6 - Moles

- Moles are quantities given to substances that relate to how many atoms or molecules are present in a sample.

- One mole is equal to 6.022×10^{23} particles of a substance. This number is known as Avogadro's constant.

- Scientists can perform calculations to work out how many moles are present, or how much mass is needed or made in a reaction, linked together by the relative molecular mass.

- The formula used is:

$$\text{moles} = \frac{\text{mass (g)}}{\text{relative molecular mass (Mr)}}$$

For example:

A sample of sodium chloride (NaCl) has a mass of 4.75g.

First, calculate the Mr of NaCl

$$\text{Na: } 23 \times 1 = 23$$

$$\text{Cl: } 35.5 \times 1 = 35.5$$

$$23 + 35.5 = 58.5$$

$$\begin{array}{l} \text{moles} = \frac{4.75\text{g}}{58.5} \\ \text{moles} = 0.0812 \end{array}$$

Y9 Chemistry Knowledge Organiser - Chemical Analysis

Box 1 - Pure and Impure Substances

- In everyday life, a pure substance is something that has nothing added to it, so it is unadulterated – e.g. pure milk, pure honey. In terms of chemistry, these are mixtures.
- In chemistry, pure substance contains only one type of element or compound.
- An impure substance is a mixture.

Box 2 - Melting Point and Boiling point

- A chemically pure substance will melt or boil at a very specific temperature.
- Impurities decrease the melting point and increase the range of temperatures over which a substance will melt.
- Impurities increase the boiling point of a substance and increase the range of temperatures over which a substance will boil.

Box 3 - Formulations

- Formulations are mixtures that are designed as useful products. They are often complex mixtures with lots of different components (parts).
- Formulations are made by mixing the components in carefully measured quantities so the product has the correct properties.
- Examples of formulations include paint, fuels, cleaning agents, medicines, alloys, fertilisers, food.

Box 4 - Gas Tests

Hydrogen - Place a lit splint into the gas and there is a squeaky pop.

Oxygen – Place a glowing splint in to the gas and the splint relights.

Chlorine – Place damp litmus paper into the gas and the litmus paper bleaches.

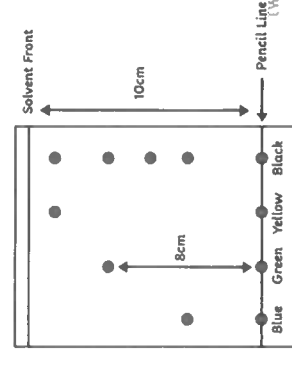
Carbon dioxide – Bubble the gas through limewater and the limewater turns cloudy.

Key Terms	Definitions
Pure substance (chemistry)	A substance made of a single element or compound and not mixed with any other substance.
Melting point	The temperature at which a substance melts or freezes/solidifies.
Boiling point	The temperature at which a substance boils or condenses
Formulations	Complex mixtures that are designed as useful products.
Chromatography	A technique where mixtures can be separated based on their solubility.
Stationary phase	The phase that doesn't move (i.e. the filter paper)
Mobile phase	The solvent (normally water) which moves up through the stationary phase.
Rf value	The ratio between the distance travelled by the substance and the distance travelled by the solvent.

Box 6 - Chromatography and Rf values

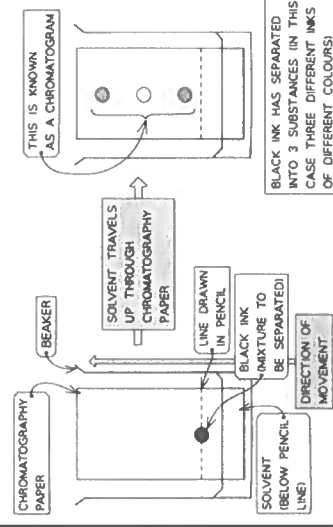
- Chromatography can be used to separate mixtures and can be used to identify substances.
- Chromatography involve two phases:
 - stationary phase where particles can't move (the filter paper in most cases).
 - mobile phase - the solvent (for example water) which moves up the paper.
- Separation depends on the distribution of substances between the stationary phase and the mobile phase.
- The ratio of the distance moved by the spot and the distance moved by the solvent is called the Rf value. It is always a value <1

$$Rf = \frac{\text{Distance travelled by the substance}}{\text{Distance travelled by the solvent}}$$
- Different compounds will have different R_f values in different solvents.
- A pure substance will produce a single spot in all solvents.



$$Rf_{\text{green}} = 8 \div 10 = 0.8$$

Box 5 - RP: Chromatography



Y9 Chemistry Knowledge Organiser

Chemistry of the Atmosphere

Box 1 - The Atmosphere

For 200 million years, the amount of different gases in the atmosphere have been much the same as they are today:

- 78% nitrogen
- 21% oxygen
- The atmosphere also contains small proportions of various other gases, including carbon dioxide, water vapour and noble gases.

Box 2 - The Evolution of the Atmosphere

Scientists are not sure about the gases in the early atmosphere, as it was so long ago (4.6 billion years) and due to the lack of evidence.

Many scientists believe the early atmosphere was made up of mainly carbon dioxide, water vapour and small amounts of methane, ammonia and nitrogen, released by volcanoes. **There was little or no oxygen around at this time.**

Oceans - The early Earth was very hot, but as it cooled the water vapour in the atmosphere condensed and **formed the oceans.**

Decreasing carbon dioxide - As the oceans formed, carbon dioxide dissolved in the ocean. The carbon dioxide formed carbonates which precipitated out (formed solids). This process reduced the amount of carbon dioxide in the atmosphere.

Decreasing carbon dioxide and increasing oxygen - Approximately 2.7 billion years ago algae evolved and soon after this oxygen appeared in the atmosphere. Over the next billion years plants evolved. This decreased the amount of carbon dioxide in the atmosphere and increased the amount of oxygen in the atmosphere as they carried out photosynthesis

When sea animals evolved they used the carbon dioxide in the ocean to form their shells and bones (which are made of carbonates). When these sea creatures died their shells and bones became limestone (calcium carbonate), which is a sedimentary rock.

Once enough oxygen was in the atmosphere, it allowed animals to evolve.

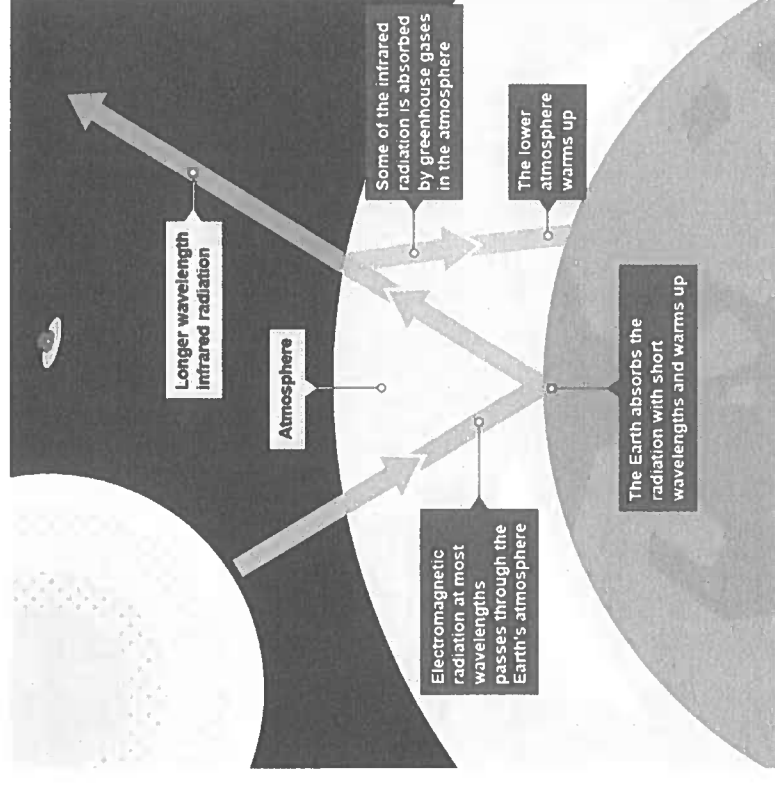
Box 3 - The Greenhouse Effect

The Earth's atmosphere contains greenhouse gases. These gases, which include carbon dioxide, methane and water vapour, maintain the temperature on Earth high enough to support life.

The greenhouse gases allow the short wave infrared radiation emitted by the Sun to pass through it but absorb the long wave infrared radiation which is emitted by the Earth. This is how it insulates the Earth.

Some human activities increase the amounts of greenhouse gases in the atmosphere. These include:

- combustion (burning) of fossil fuels
- deforestation
- methane release from farming and destruction of peat bogs.
- more animal farming (digestion, waste decomposition)

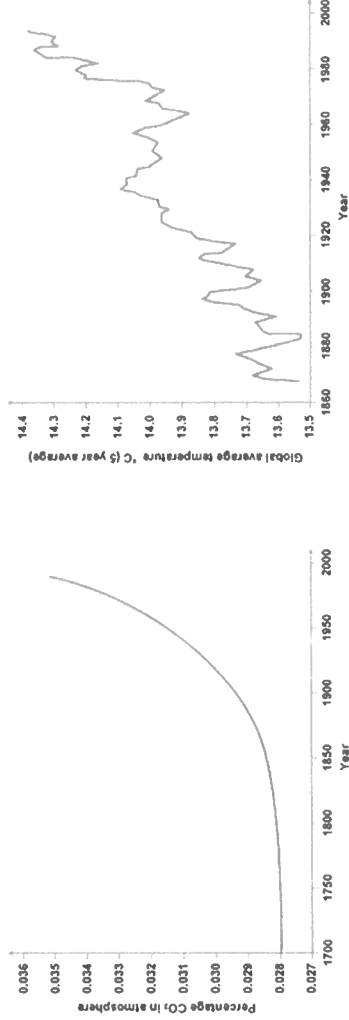


Y9 Chemistry Knowledge Organiser

Chemistry of the Atmosphere

Box 4 - The Enhanced Greenhouse Effect

Humans activities have enhanced the greenhouse effect through combustion of fossil fuels, increased farming and deforestation and destruction of peat bogs. There is correlation between the increased levels of greenhouse gases in the atmosphere and the global average temperature. Based on peer reviewed evidence, many scientists believe this has lead to a **rise in global temperature**.



However, this is such a complex system and it is very difficult to model. When simplified models are presented, it can lead to **inaccurate or biased** opinions being reported in the media.

Box 5 - Consequences of Climate Change

An increase in average global temperature is a major cause of **climate change**. The potential effects of global climate change include:

- melting of polar ice caps and sea level rise, which may cause flooding and increased coastal erosion
- more frequent and severe storms
- changes in the amount, timing and distribution of rainfall
- water shortages for humans and wildlife
- changes in the food producing capacity of some regions
- changes to the distribution and migration patterns of wildlife species.

Key Terms

Peer reviewed evidence

Definitions

This is evidence that has been scrutinised by other independent scientists to check for bias, inaccuracy and any flaws in the design of the investigations or data gathering.

Box 7 - Carbon Footprint

The **carbon footprint** is the total amount of carbon dioxide and other greenhouse gases released over the life of a product. Many people or businesses look to reduce their carbon footprint by:

- increased use of alternative energy supplies
- energy conservation
- carbon capture and storage
- carbon taxes and licences

People also try to **offset** their carbon by planting trees.

If something is carbon neutral, this means that there is no net increase in **carbon dioxide in the atmosphere** when it is used.

Box 8 - Other atmospheric pollutants

The combustion of fuels is a major source of atmospheric pollutants. When burning fuels, other pollutants are made. The effects of these pollutants are summarised below.

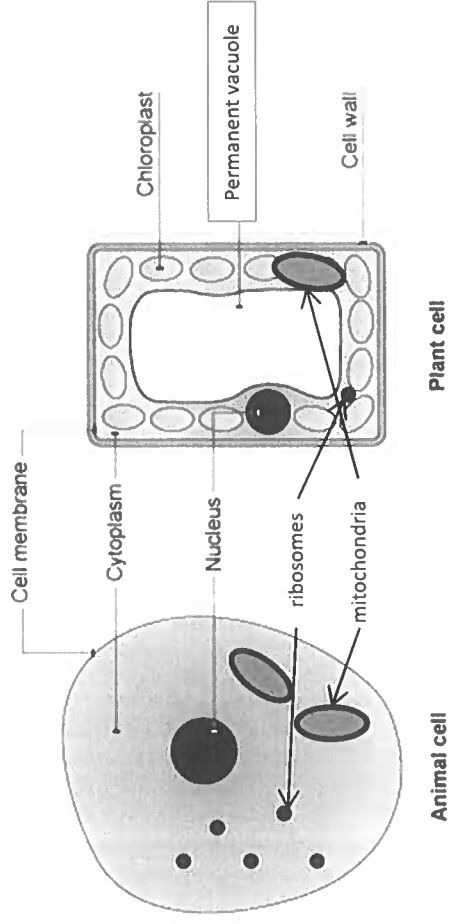
Gas	How are they made?	What is the affect?
Sulphur dioxide	Fuels contain a small amount of sulphur. This reacts with oxygen to form sulphur dioxide	Respiratory problems and acid rain
Nitrous oxides	Oxygen reacts with nitrogen in the air	Respiratory problems and acid rain
Carbon particulates	Is made during incomplete combustion	Can cause global dimming and health problems
Carbon monoxide	Is made in incomplete combustion of a fuel	Is a toxic gas. It is also colourless and odourless

Yr9 Biology Knowledge Organiser

Cell Biology

Box 1 - Eukaryotic Cells

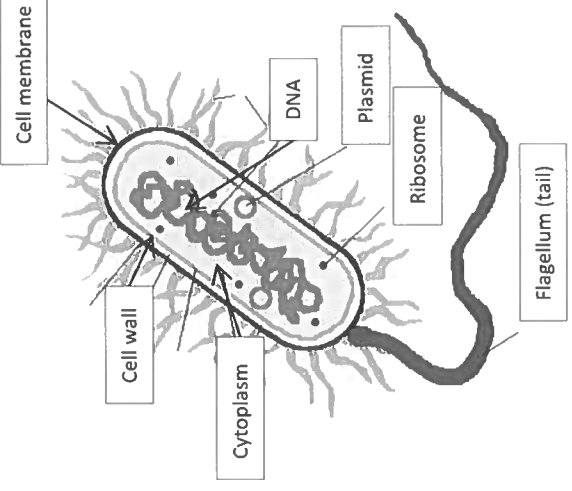
Eukaryotic cells include all plant, animal and fungus cells. They are eukaryotic cells because they **have a nucleus**, unlike prokaryotic cells. Learn how to identify the general cell structures (sub cellular structures) shown below.



Box 2 - Prokaryotic Cells

Bacteria are prokaryotic cells (all bacteria are single-celled organisms). The most important differences to eukaryotic cells are that they are smaller and the do not have a nucleus. (**genetic material (DNA) is not enclosed in a nucleus.**)

Prokaryotic cells have DNA in a loop, and, in addition to the main loop of DNA, they have small loops of DNA called plasmids.



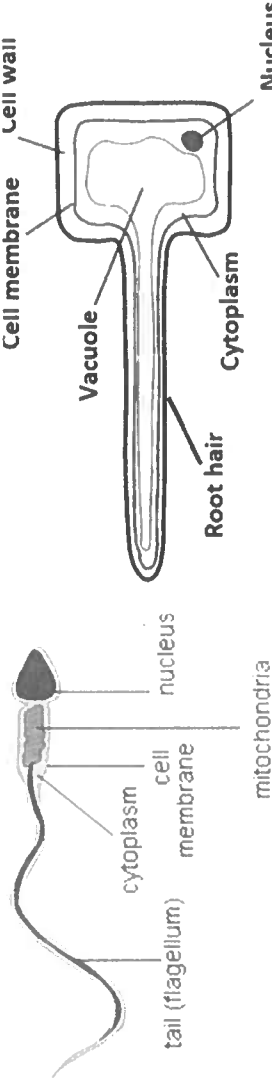
Key Terms	Definitions
cell	The basic unit of <u>all</u> forms of life. (All living organisms are made of a least one cell.)
eukaryotic cells	Cells with a nucleus – e.g. plant, animal and fungal cells.
prokaryotic cells	Cells that don't have a nucleus.
sub-cellular structure	A part of a cell. (Sub- means less than – so these are the component parts of cells.)
cell membrane	Controls the movement of substances into and out of the cell and is partially permeable (lets some things through but not others).
nucleus	The enclosure for genetic material found in plant and animal cells (eukaryotic cells). - controls all cell activities
cytoplasm	Where most of the chemical reactions in the cell take place.
mitochondria	Where aerobic respiration takes place.
ribosome	Site of protein synthesis (i.e. where proteins are made)
chloroplast	The site of photosynthesis – only found in plant cells and algal cells.
permanent vacuole	It is filled with cell sap (a store of nutrients for the cell). A sub-cellular structure only found in plant and algal cells –
cell wall	It is made of cellulose, it is outside the cell membrane and it strengthens the cell. Found in plant, fungal and bacterial cells
DNA	The molecule that holds the genetic information in a cell. In eukaryotic cells, it is in linear strands . In prokaryotic cells, the DNA forms a loop.
plasmid	A small loop of DNA, only found in prokaryotic cells.

Yr9 Biology Knowledge Organiser

Cell Biology

Box 3 - Multicellular Organisms

Multicellular organism are organisms made up from lots of cells. just like all animals, plants and many types of fungus. But, not all cells are the same. Cells become specialised by **differentiation**, which means they develop new features to help them perform a specific function. E.g. sperm cells and root hair cells.



Tissues - Cells with similar structures and functions working together. For example: muscle tissue in animals; phloem tissue in plants.

Organs - Multiple tissues working together to perform a function. For example: the stomach in animals; the leaf in plants.

Organ systems are formed when multiple organs work together. For example: the digestive system in animals; the vascular (transport) system in plants.

Box 4 - Microscopy

Use of a microscope is called microscopy. Microscopes allowed scientists to discover cells and find all the sub-cellular structures.

Because cells and their parts are very small, it is not useful to measure them in metres. Instead, we use small divisions of the metre as follows:

Centimetre = 1/100 metre (10^{-2} m). A centimetre is 1 one hundredth of a metre. (cm)

Millimetre = 1/1000 metre (10^{-3} m). A millimetre is 1 one thousandth of a metre. (mm)

Micrometre = 1/1 000 000 (10^{-6} m). A micrometre is 1 one millionth of a metre. (μ m)

Nanometre = 1/1 000 000 000 (10^{-9} m) A nanometre is 1 one billionth of a metre. (nm)

Electron microscopes have higher magnification and higher resolution (more resolving power) than light microscopes, so they let you see smaller structures and see structures in more detail.

Key Terms	Definitions
organism	Any 'whole' living thing: can be made of one cell or be multicellular. An organism has many organ systems, all contributing to its survival.
multicellular	This describes an organism that is made of lots of cells – such as animals or plants.
specialised cell	A cell with a particular function and a shape and structure to suit its function. e.g. a sperm cell is specialised
tissue	A group of cells with similar structures and functions – i.e. a group of specialised cells.
organ	An organ is a collection (or aggregation) of different tissues working together to perform a particular function (job)
organ system	Organs don't operate alone: they work together to form organ systems.
light microscope	A usual school microscope is a light microscope. You can see large sub-cellular structures like a nucleus with it, but not a lot more detail than that.
magnification	This is the measure of how much a microscope can enlarge the object you are viewing through it.
resolution	This is the measure of the level of detail you can see with a microscope, the clarity between 2 points on an image.
electron microscope	A type of microscope with much higher magnification and resolution than a light microscope. Essential for discovering the smaller sub-cellular structures.
Equation	Meanings of terms in equation
$\text{magnification} = \frac{\text{size of image}}{\text{size of real object}}$	
The image is how it looks through the microscope. The real object is what you are looking at. The image and object must be measured with the same unit, e.g. both in nm.	

Yr9 Biology Knowledge Organiser

Cell Biology

Box 5 - Stem cells

Stem cells that are **undifferentiated** cells that are able to **divide** or **differentiate** into specialised cells. Once cells are specialised, they can't go back to being an unspecialised cell. There are two different types of stem cells.

Embryonic stem cells – These are cells found in early embryos and these stem cells can differentiate into any kind of cell.

Adult stem cells – these are cells found in places such as bone marrow or skin. These cells can differentiate into a limited number of different types of cells. (for example bone marrow stem cells can differentiate to become all the different types of cells found in the blood).

Stem cells from bone marrow and embryos can be grown in a lab to produce clones (genetically identical cells) and then made to differentiate so they can be used in medicine or research

Using stem cells in this way is an active area of medical research, to treat conditions like diabetes and paralysis.

Therapeutic cloning is where stem cells are produced that have the same genetic information as the patient and therefore when they are used as a treatment the patient's body won't reject them.

Some people have ethical objections to stem cell research. For example they believe that every embryo is a potential life and that these cells shouldn't be used for experiments. Plant stem cells are found in the meristems. These are parts where plant growth occurs (e.g. the tips of the shoot and roots). They can continue to differentiate into any kind of cell throughout their life into any kind of plant cell.

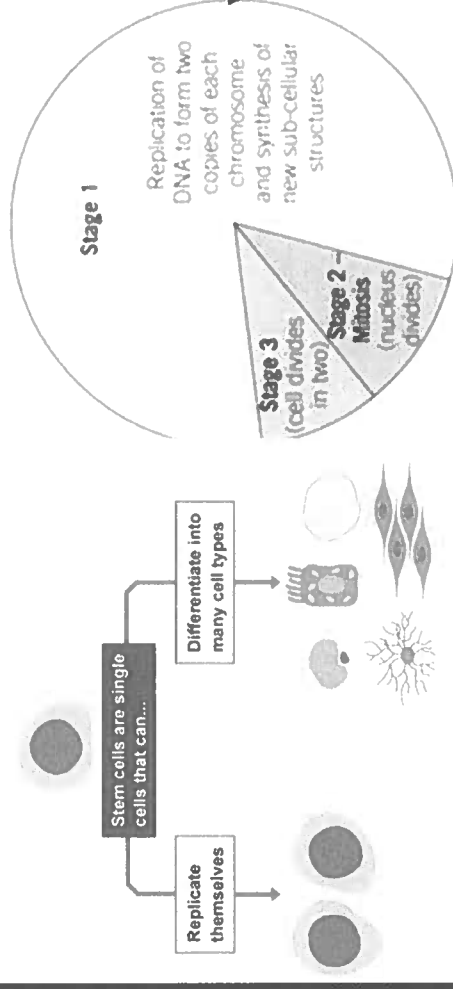
Box 6 - The cell cycle

Cells divide into two to make new cells, for growth and repair, in the **cell cycle**. It isn't as simple as the cell splitting in two: it must prepare before doing that.

Stage 1 - The **cell grows** larger and **makes more sub-cellular structures**, such as ribosomes and mitochondria.. Also the genetic material (**DNA**) is replicated (copied) by making an **exact replica** of the chromosomes. So, there are two copies of every chromosome at this point in the cell cycle.

Stage 2 - **Mitosis** occurs: tiny fibres in the cell pull the copies of each chromosome to opposite ends of the cell, breaking the replica chromosomes apart. This means there is a full set of chromosomes at each end of the cell.

Stage 3 - The cytoplasm and cell membranes divide to form two **genetically identical** cells.



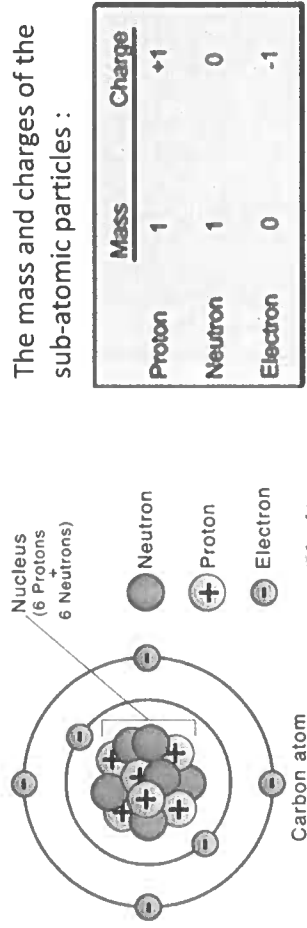
Key Terms	Definitions
differentiation	The process of becoming a specialised cell (e.g. a sperm cell or a root hair cell)
stem cells	Cells that are undifferentiated. Stem cells are capable of dividing and differentiating to form specialised cells.
embryo	A very young multicellular organism, formed by fertilisation. Embryos are made of stem cells.
cell cycle	The series of stages during which cells grow and divide to make new cells.
mitosis	A type of cell division used for growth, repair and asexual reproduction. A part of the cell cycle.
chromosome	A structure made from one molecule of DNA. One chromosome contains many genes. In body cells, chromosomes are found in pairs .

Yr9 Chemistry Knowledge Organiser

Topic: Atomic Structure and the Periodic Table 1

Box 1 - The Structure of the Atom

- All substances are made from atoms. Atoms are very small. The radius of atom is about 0.1 nanometres (1×10^{-10} m).
- The central part of the atom is known as the nucleus. The radius of the nucleus is less than $1/10,000^{\text{th}}$ the radius of an atom (about 1×10^{-14} m).
- An atom is made up of three **sub-atomic** particles: **protons**, **neutrons** and **electrons**.
- Protons and neutrons are found in the **nucleus**.
- Electrons are found orbiting the nucleus in **shells** (also known as *energy levels*).

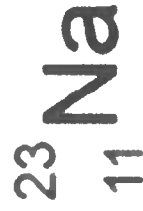


- Atoms have **no overall charge** because they have the same number of positive protons as negative electrons.

Box 2 - Atomic Number and Mass Number

Mass number → ²³
The total number of protons and neutrons in an atom

Atomic number → ₁₁
The number of protons in the nucleus



Therefore sodium has 11 protons, 11 electrons and $23 - 11 = 12$ neutrons. Atoms of the same element can have different numbers of neutrons. These atoms are called **isotopes**.

Key Terms	Definitions
atom	All substances are made of atoms. They are the smallest part of an element that can exist.
element	Elements are substances made of a single type of atom. All atoms of a particular element have the same number of protons. Eg. Helium atoms always have two protons.
nucleus	The nucleus is the centre of an atom; it is made of protons and neutrons.
proton	Protons are sub-atomic particles found in the nucleus, they have an electric charge of +1 and a relative mass of 1.
electron	Electrons are sub-atomic particles found in the electron shells of an atom, they have an electric charge of -1 and a negligible mass.
neutron	Neutrons are sub-atomic particles found in the nucleus of an atom, they have an electric charge of 0 and a mass of 1.
nanometre	A unit of measurement: it is 1×10^{-9} metres. The symbol for nanometres is nm.
sub-atomic	Sub-atomic particles are particles smaller than an atom (protons, neutrons, electrons).
isotope	Isotopes are atoms of an element that have a different number of neutrons.

Box 3 - Electron Configuration/Electronic Structure

The electron configuration of an element describes how electrons are positioned in the electron shells of an atom.

The inner shell is always filled first until it is full. Each shell is filled in turn until it has the maximum number of electrons it can take.

Shell 1: maximum 2 electrons

Shell 2: maximum 8 electrons

Shell 3: maximum 8 electrons

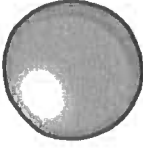
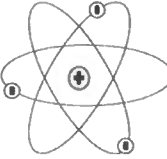
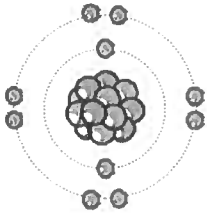


The electronic configuration of Sodium (Na) can also be written like this: 2,8,1. This shows there is 2 electrons in the 1st shell, 8 electrons in the second shell and 1 electron in the 3rd shell.

Yr9 Chemistry Knowledge Organiser Topic: Atomic Structure and the Periodic Table 1

Box 4 - The development of the atomic model

Our understanding of the structure of the atom has changed over time due to experimental evidence, deduction and technological developments. As new evidence is discovered the atomic model may change.

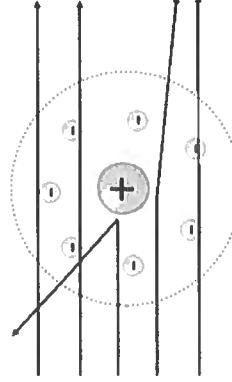
Who and when	Description of atomic model	Diagram of atomic model
John Dalton, 1803	All matter is made up of indivisible spheres called atoms. Substances made of one type of atom are elements and substance made of different types of atom chemically bonded together are compounds	
JJ Thomson, 1897	Discovery of the electron Plum pudding model – positive sphere with electrons dotted through	
Ernest Rutherford, 1909	Discovery of the nucleus Nuclear model - the mass of the atom is concentrated at the centre of the atom in the nucleus , which has a positive charge. Found through the alpha particle scatter experiment .	
Niels Bohr, 1916	Discovery that electrons orbit the nucleus in energy levels/shells .	
Ernest Rutherford, 1920	Discovery of the proton , the positive particle in the nucleus.	
James Chadwick, 1932	Discovered the neutron in the nucleus.	

Box 5 - The alpha particle scattering experiment

Rutherford fired alpha particles at gold leaf (very thin gold). His results showed that the mass of atoms is concentrated at the centre (in the nucleus) and that the nucleus is positively charged.

The observations and conclusions of the experiment

- Most alpha particles pass straight through - atoms are mostly empty space.
- A few deflect, but by more than expected - repelled by nucleus
- Occasionally alpha particles deflected back (completely unexpected) - the nucleus is small and positively charged.



Key Terms

Definitions

mixture
A mixture is made of two or more elements or compounds that are not chemically combined together. The chemical properties of the substances in the mixture are not changed.

compound
Compounds are made of two or more elements that are chemically bonded together in a fixed ratio.

group
Groups are the columns (down) on the periodic table.

period
Periods are the rows (across) on the periodic table.

reactant
Reactants are chemicals you start with in a chemical reaction.

product
Products are the chemicals made in a chemical reaction.

Box 6 - Elements

An element is a substance made from only one type of atom.
All the elements that exist are shown in the periodic table and are given a symbol. E.g Oxygen – O, Iron - Fe

Box 7 - Isotopes

Isotopes are atoms of the same elements that have the same number of protons but a different number of neutrons.

Number of Neutrons = Atomic Mass – Atomic Number

Number of Neutrons
= 12 – 6 = 6



Carbon-12
98.9%

Number of Neutrons
= 13 – 6 = 7



Carbon-13
1.1%

Number of Neutrons
= 14 – 6 = 8



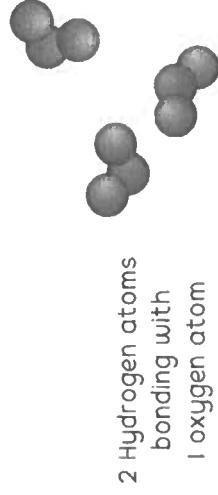
Carbon-14
<0.0001%

Y9 Chemistry Knowledge Organiser Topic: Atomic Structure and the Periodic Table 1

Box 8 - Compounds

- Compounds are made of two or more elements that are chemically bonded together in a fixed ratio.

e.g. water – H₂O



Box 9 - Chemical reactions

In a chemical reaction, chemical bonds in the reactants are broken, the atoms are re-arranged and new chemical bonds are made to form the products.

Either word equations or symbol questions can be used:

Word equation carbon + oxygen → carbon dioxide

Symbol equation $C + O_2 \rightarrow CO_2$

The arrow (→) in chemical reactions means “reacts to make”.

In a chemical reaction, **mass is never lost**; the mass of the products always equals the mass of the reactants – this is the **conservation of mass**.



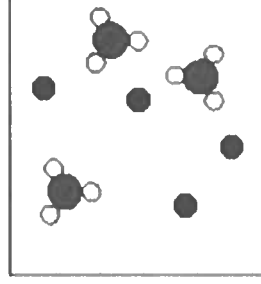
In some chemical reactions it may appear that the mass of the products is less than the mass of reactants. This is not the case and may be because a gas has been made and some has escaped.

Box 10 - Mixtures

A mixture is made of two or more elements or compounds that are not chemically combined together. The chemical properties of the substances in the mixture are not changed.

Mixtures can be separated into the elements and compounds they contain in a variety of ways. Each is a physical process; chemical bonds are not broken, so no new substances are made.

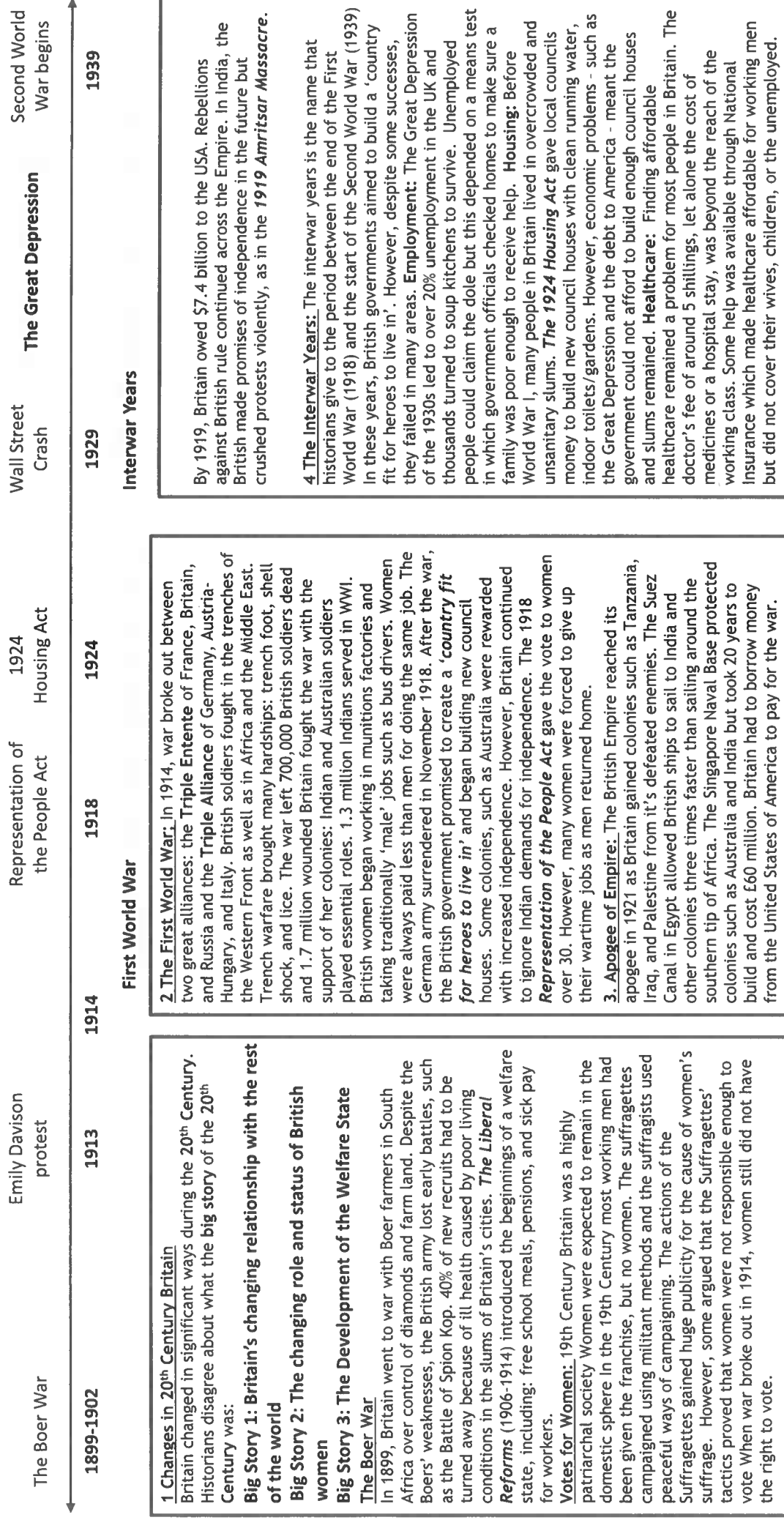
Mixtures can be thought of as **impure** substances; the purpose of separating a mixture may be to recover the elements and compounds in the mixture as **pure** substances.



Box 11 - Separating mixtures

Method	Explanation	Diagram
Filtration	Separating an insoluble solid from a liquid. Eg. A mixture of water and sand can be separated using filter paper.	
Crystallisation	During crystallisation, a solution is heated, and the solvent evaporates leaving the solute. Eg. A solution containing water and salt will leave pure salt crystals when the water is evaporated.	
Distillation	Separate a solvent from a solution or two liquids with different boiling points. Involves evaporation and condensation. Eg. Water can be separated from a salt solution.	
Fractional distillation	Fractional distillation is when two liquids with different boiling points are separated because they boil at different temperatures. Eg. ethanol (alcohol) boils at 78 °C and water boils at 100 °C	
Chromatography	Substances travel at different rates through a medium depending on their solubility in the solvent used (often water, but not always). Eg. To separate and identify the dyes in food colouring.	

History: Knowledge Organiser Year 9 - 20th Century Britain & Communist Russia



5 Communist Russia: Communists criticised capitalist society and had a vision of a fairer world. Karl Marx believed that the workers should form a government.

In October 1917, the Bolsheviks took control of Russia in the Russian Revolution. The Bolsheviks were a communist political party led by Lenin.

The Bolsheviks: established a communist government in Russia, ended the war in Germany, renamed the country the USSR and murdered the Tsar. The Bolsheviks were able to seize power because: Russia was losing the war against Germany, The Tsar was unpopular, most Russians were poor peasants and industrial workers, The Bolsheviks had an effective Red Army led by Leon Trotsky. Lenin changed Russia completely, but did not always live up to Marx's idea of communism.

In 1924, Lenin died. He was succeeded by Joseph Stalin who ruled until his death in 1953. Stalin seized complete power in Russia, becoming a dictator. He removed Trotsky, he purged anyone who challenged his power and he used propaganda to show his greatness.

The lives of women changed under the revolution. 1918, Lenin introduced a decree that gave women equal status to men. It became much easier for women to divorce their husbands. The government encouraged women to access education up to university level. The government ran nurseries so women would have free time to work and study. During WWII, many Russian women fought on the frontline.

Industrialisation: Russia was much less industrialised than other European countries. In 1928, Stalin launched the first Five Year Plan: the first of a series of extremely high targets for producing industrial resources.

The Five Year plan: Russian production of coal, steel, and iron increased. New hospitals/transport systems were built. By the 1940s, USSR was powerful enough to defeat Hitler in WWII. But manufacturing output was still behind the USA. Soviet workers in new cities worked in terrible conditions and were sent to the gulag if they went on strike. Many workers were forced labourers and prisoners.

In 1927, Stalin introduced a policy of **Collectivisation**: This meant that peasants in each village united their farms into one collective farm - known as a kolkhoz. Land, tools and animals were pooled together so everyone could use them. Motor Tractor Stations were set up to distribute tractors to the kolkhoz. 90% of kolkhoz produce went to the government; the farmers kept 10%. The chaos caused famine in 1932-33, leading to over 5 million deaths.

Vocabulary

20 th Century	The period 1900-2000
Agriculture	Farming
Alliance	An agreement to support each other
Anti-Semitism	Hatred of the Jews
Apogee	High point
Boers	Dutch farmers in South Africa
Council houses	Homes built by the government
Capitalism	Economic system in which property is owned by individuals for private profit
Communism	Economic system in which all property is owned by the community, rather than by individuals
Collectivisation	Stalin's Agricultural policy
Debt	Money owed to someone else
The Dole	Slang for unemployment benefit
Franchise	The right to vote
Gulag	Soviet prison camp
Kolkhoz	A collective farm in USSR
Munitions	Weapons and ammunition
Patriarchal	Dominated by men
Purge	Get rid of by force
Significant	Leading to change, causing or revealing
Suffrage	The right to vote
Suffragettes	Suffrage groups using extreme methods
Suffragists	Suffrage groups using legal methods
Slums	Poor quality houses
Treaty of Versailles	Harsh Peace agreement signed by Germany following WWI
Unemployed	Without a job
Unsanitary	Unhygienic, leading to disease
Trenches	Ditches dug for protection in WW1
Welfare State	Government programmes to help people
Working Class	Poorer people
Western Front	Area of fighting between Germany and Britain/France

Y9 History Knowledge Organiser: The First World War



1 Nationalism

The early 20th Century saw the rise of intense nationalism across Europe.

Germany

Germany was a new country. **Unification** had only taken place in 1871. Rapidly, Germany had become the most powerful country on **mainland Europe**. It had a powerful **industrial economy** and looked after it's workers with a **welfare state**.

Germany was not a true democracy. **Kaiser Wilhelm II** controlled the most important decisions. Although he was **Queen Victoria's** grandson, Kaiser Wilhelm was envious of British power. He wanted to turn Germany into a great world power to rival - and maybe replace - Britain.

Wilhelm's plans were under threat however. He worried that the rise of **socialism** and **democracy** in Germany would soon mean that he would not be able to take the decisions he needed to make Germany great.

Britain

British nationalism was based on 200 years of imperial and naval dominance. The 'penny press' celebrated British superiority in novels such as **The Battle of Dorking**.

1 Imperialism

During the 19th Century, European countries developed overseas empires for several reasons:



Prestige - Having a large empire was a sign of a country's superiority. Germany, in particular, wanted to gain colonies to gain equality with Britain.



Trade - European economies needed to find **raw materials** to produce **manufactured goods**. They also needed colonies to provide **markets** for these goods.



Strategy - In some cases, European empires **colonised** territory just to stop a rival empire expanding further. This was especially true in **Africa**.

As European empires expanded, tensions grew between them, creating flashpoints:

In **AFRICA**, **Kaiser Wilhelm** tried to gain a 'place in the sun' for Germany, leading to flashpoints in Morocco in 1905 and 1911.

In **THE BALKANS**, **Austria-Hungary** and **Russia** wrestled for control of countries created by the collapse of the **Ottoman Empire**, leading to flashpoints such as the **1908 Bosnian Crisis**.

Y9 History Knowledge Organiser: The First World War

3 Militarism

Nationalism and imperialism led to aggressive militarism in all European nations.

The military had more influence over government than ever before

Many army generals followed the ideas of Social Darwinism and so believed that war was good for the world because it allowed the strong to triumph over the weak.

In Germany and Russia, generals pressured governments into following a more aggressive policy. For example, German generals persuaded the **Kaiser** to agree to the **Schlieffen Plan**: a plan to defeat France before Russia could **mobilise** soldiers.

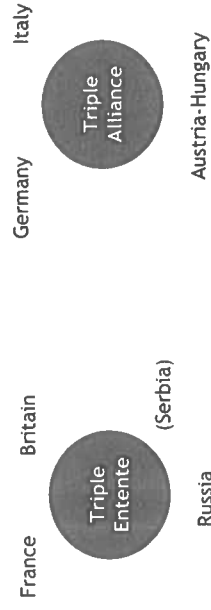
An arms race developed between Britain and Germany

As the risk of war increased, countries began to expand their armed forces. Every country apart from Britain introduced **conscription** in the 1900s. Between 1900 and 1914, Germany increased **military spending** by 73%.

A **naval arms race** developed between Germany and Britain with both sides competing to build new **Dreadnoughts**. Between 1909 and 1911, Germany built 9 **Dreadnoughts** whilst Britain built 18.

5 Alliances

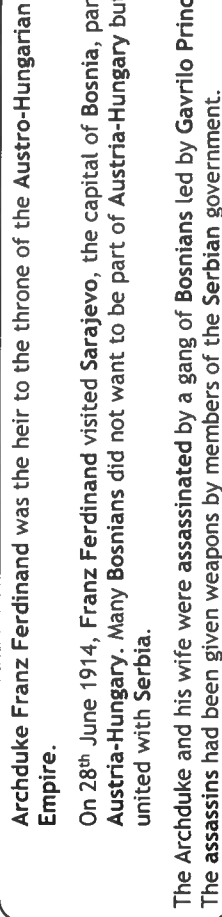
In order to protect themselves, countries negotiated alliances with other countries.



Each member of the alliance promised to **declare war** if another member of the alliance was attacked.

4 The Assassination of Archduke Franz Ferdinand

In June 1914, an assassination triggered a European war.



VOCABULARY

Alliance	An agreement between two countries to support each other in war
Arms race	Competition to build the largest military / most weapons
Assassinated	Shot dead
Conscription	Forcing all men of a certain age to join the army
Dreadnought	Fast modern battleship equipped with large guns
Escalate	Become more serious
Flashpoints	An event where tension could potentially lead to violence
Kaiser Wilhelm	German King
Markets	Places where goods could be sold
Militarism	The army having power / expanding the army and navy
Mobilise	To get an army ready for battle
Nationalism	Believing that your country is superior to others
Over the top	Attacking out of a trench
Overriding	Most important
Penny Press	Cheap books and newspapers
Prestige	Respect and admiration from others
Raw materials	Coal, wood, minerals etc used to manufacture goods
Recklessness	Not being careful
Restore	Bring back
Retail	Attack somebody in return for them attacking you
Revanche	French word for revenge (on Germany)
Squabble	An unimportant disagreement
Strategy	Long term plan
Tsar	The king of Russia
Unification	When different places are brought together to form one country

Year 9 Term 1 – Why is the Middle East an important world region?

Key words • Aquifers: Underground sources of water. • Climatic zone: An area with a similar weather throughout the year. • Colonialism: The process by which one nation has control over another country which they have settled and taken over. • Colonist: Someone who goes to live in a colony. • Conflict: A disagreement between people. • Corruption: where power is used for someone's personal gain. • Culture: the ideas, customs and behaviour of a particular society. • Development Gap: The difference in affluence (wealth) between richer and poorer countries. • Development Indicator: Measures of development • Development: The progress of a country in terms of economic growth, the use of technology and human welfare/wellbeing. • Dictatorship: a form of government where one person is in control. • Diversify: To change the economy to it buys and sells different items and makes money in different ways. • Ethnic group: a community or a population made up of people who share a common cultural background. • Fossil fuel: A natural fuel such as coal, oil or natural gas formed in the past from the remains of living organisms (plants and animals). • Migration: Movement to another place. • Oil: A liquid made from petroleum, a fossil fuel. • Peninsular: an area of land almost surrounded by water or projecting (sticking out) into water. • Population density: Amount of people living in a certain area. • Renewable energy: Energy sources that will not run out when used, such as wind or solar power. • Sustainable: Using something in a way it supports both present and future generations. • Tourism: An industry that drives people to travel for recreation and leisure.	KPI 1 – What and where is the Middle East? Location: • Located where the continents of Asia, Africa and Europe meet. It is in SW Asia. It is surrounded by several seas, including the Red and Arabian Sea • The River Tigris is the second largest river in western Asia and is one of the world's most important waterways. • The Arabian Desert covers most of the Arabian Peninsular and is the second largest desert on Earth Where does the name 'The Middle East' come from? The term the Middle East was first used by European colonists in the 19th century. Traders used it as a way of separating this area from India in the Far East (<i>Southeast Asia and China</i>). After the Second World War, the Middle East became the main term for the whole region (<i>area</i>). The Middle East is an outsiders term describing the geography not the culture. This explains why different countries can be included in this region. How was the Middle East influenced by Europe? In 1916, representatives of Great Britain and France secretly reach an agreement, known as the Sykes-Picot Agreement. It agreed that most of lands under the rule of the Ottoman Empire were to be divided into British and French areas at the end of WWI. Consequences: Different ethnic groups were split up and led to conflict across the region. Different communities had to ability to decide which country they were part of.	KPI 2 What is the climate like in the Middle East? There are two main climatic zones in the Middle East: desert to the south and a Mediterranean climate to the North. Climate Graphs: Used to present the climate of a region graphically. It uses both a bar graph and a line graph. Temperature is shown on a line graph. Rainfall is shown by a bar graph. Months of the year are shown along the bottom. Analysing a climate graph – Statistical Skills • Total: Add up all the data sets i.e., add up all the temperatures throughout the year. • Mean: Total temperature or precipitation ÷ the number of data sets. • Range: Highest piece of data – the lowest piece of data. • Mode: Most common piece of data What problems does the climate create in the Middle East? Causes of water shortages: - Extreme climate - Rising population - Migration to overcrowded cities - Emptying of underground aquifers Potential solutions: - Drip irrigation – using small plastic pipes to water the roots of the crops (saves 40% of water used in farming) - Desalination – removing salt from sea water to create more drinking water. It can only be used in areas with access to the ocean and can double salinity (<i>saltiness</i>) of water if dumped back into the sea. - Buying and selling water – Countries which have surplus rainfall (<i>too much rainfall</i>) can sell water to other countries that a water deficit (<i>not enough water</i>) - Using water from underground aquifers – underground rock is saturated with water that has been stored for thousands of years. This water can be extracted and used.	KPI3 - How is population distributed in the Middle East? • Population of 411 million. • Densely populated areas include coastal areas, capital cities and on rivers in the region (i.e., Nile valley in Egypt) • Highest populations are in countries like Turkey, Syria and Iraq. Reasons for high population density: - Coastal areas have higher density i.e., capital cities on the Arabian peninsular - Areas with access to rivers have a higher population density i.e., areas around the River Nile Reasons for low population density: - Arid (<i>hot and dry</i>) and inhospitable (<i>areas that are not easily to live in</i>) desert areas have lower density. KPI 4 How developed is the Middle East? Development indicators: • Access to healthcare: how many doctors per 1000 people • Access to safe water: % of people that have access to clean water • Literacy rate: % of people aged 15+ that can read and write. • Daily calorie consumption: Calories consumed per day • GNI per capita: Total money earned in a country divided by the total population. • Infant mortality rate: How many babies that do not survive past the age of 5. • Human development index: an average of life expectancy, education, GNI. Human and Physical factors contribute to uneven development: • Physical Factors: Mountainous terrain, extreme heat and low rainfall, supply of oil. • Human Factors: Rapid population growth, lack of government investment, conflicts, dictatorships, corruption; lack of investment.
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Year 9 Term 1 – Why is the Middle East an important world region?

KPI 5 What is the importance of oil in the development of the Middle East? Importance: Oil is an example of a fossil fuel it is used for many things such as; powering machines and vehicles it is also used in the production of plastic. However, it is non-renewable (<i>can run out</i>). OPEC stands for Organisation of Petroleum Exporting Countries which includes countries such as Saudi Arabia, UAE, Iraq and Kuwait. 10 countries in the Middle East rely upon <u>oil</u> and petrol sales for their exports. Why is oil important? - <u>Oil</u> is necessary to produce a range of goods including medical equipment and for transports. - Oil can be sold and generate a lot of income for Middle Eastern countries. United Arab Emirates (UAE): • The UAE is located in Asia, in the region of the Middle East and south of the Persian Gulf. • In the 1960s it mainly relied upon fishing for income, and it had very little <u>oil</u>. Therefore, it diversified its economy. • It diversified by: creating a top luxury tourist destination, developing its trade links, getting cheap labour (<i>workers</i>) from south Asian countries for construction, creating the world's largest tax-free zone (<i>do not have to pay taxes</i>), launching Emirates Airline in Dubai, building the world's tallest hotel – Burj-Al-Arab, creating artificial (<i>man-made</i>) islands off the coast. • After diversifying, only 1% of the economy relies upon <u>oil</u>.	KPI6 Impact of Climate Change on the Middle East Six possible problems climate change will cause the Middle East: - Extreme temperatures: Temperatures are set to rise in the region by at least 4°C by 2050. This will lead to a higher death rate for the population. - Rising sea levels: The average global sea level is set to rise 30–122 centimeters (1 to 4 feet) by the end of the century, which would flood <u>aquifers</u> and wells and lead to some areas of farmland to be destroyed. - Water stress: The cost of water in Jordan has increased by 30% over the past decade because of the lack of groundwater (<i>underground water</i>) from <u>aquifers</u>. - Displacement: With areas being uninhabitable (<i>unable to live</i>), individuals will have to move. - Water conflict: Since December 2020, Turkish dams have cut the flow of the Euphrates River to neighboring countries such as Iraq by 60 percent, which has also resulted in food and power shortages in Syria. - Desertification: Desertification is <i>the process by which fertile becomes desert</i>. Large areas of the Middle East are becoming at risk of desertification.	KPI 7 Impact of tourism on Dubai Why are migrants coming to Dubai? - Strong economy - Politically stable (<i>unlikely to see any conflict</i>) - Modern infrastructure (<i>buildings and transport etc.</i>) Who are the migrants? - Low or semi-skilled workers come from Asia, other areas of the Middle East such as Syria and North Africa. - High skilled workers in the <u>oil</u> and gas industry, as well as banking and finance come from United Kingdom, United States, Australia and Canada. - Over 1.4 million people in the UAE are <u>migrants</u> and they are mainly male. What problems do unskilled migrants face? Until a few years ago if you came to Dubai to work in construction or housekeeping (or any low skill, low pay job) you had to let your employer hang on to your passport, had to ask for their permission to leave and get a new job. If they left without permission, they would lose their work permit and have to leave the country.	KPI 9 Israel and Palestine There is a 100-year-old issue – Israeli Jews and Palestinian Arabs both want the same land and a compromise has been difficult. The Israeli-Palestinian <u>conflict</u> is over who gets what land and how it's controlled. From an Israeli Jew's viewpoint: Palestine was not a country, it was just a part of the Ottoman Empire and then the British Empire. The land was legally given to the new country of Israel and happened to have Palestinian people living there. The land had been the <u>cultural</u> and religious home to Judaism for thousands of years. From a Palestinian Arab's viewpoint: the inhabited the land and were colonised and occupied by the Ottomans and then the British. The British had no right to give the land to the new country of Israel as it was not theirs to give away, meanwhile Jewish migrants and settlers have occupied and taken Palestinian land Suggested solutions: 1. The main approach to solving the conflict today is a so-called "two-state solution" that would establish Palestine as an independent state in Gaza and most of the West Bank, leaving the rest of the land to Israel. 2. The alternative to a two-state solution is a "one-state solution," wherein all of the land becomes either one big Israel or one big Palestine.
		KPI 8 Causes of Poverty in Yemen Yemen is classed as an LIC and is one of the poorest countries in the Middle East. It is an LIC because... • Conflict: Up until the 1990s there were regular outbreaks of civil war between the North and South of Yemen. • Imports and exports: Almost no products are exported. Most food is imported. • Government and wealth from oil: <u>Corrupt</u> governments have misused the nation's wealth and <u>oil</u> reserves are running out. • Infrastructure: No railways and many areas are inaccessible. • Gender equality: Worst country for gender equality – almost 49% of Yemeni women are illiterate (<i>unable to read/write</i>) • Water: 7th most water stressed country on the planet.	

Year 9 Topic 4 Knowledge Organiser – How dangerous are tectonic hazards?

Key terms

- **Magma:** melted rock
- **Continental crust:** the denser crustal layer of Earth that makes up portions of tectonic plates in deep oceans.
- **Epicentre:** the point on the earth's surface vertically above the focus of an earthquake.
- **Focus:** the place inside Earth's crust where an earthquake originates.
- **Conservative plate margin:** Tectonic plate margin where two tectonic plates slide past each other.
- **Constructive plate margin:** Tectonic plate margin where rising magma adds new material to plates that are diverging (*going apart*).
- **Destructive plate margin:** Tectonic plate margin where two plates are converging (*coming together*). It can be linked to violent earthquakes and explosive volcanoes.
- **Earthquake:** A sudden or violent movement within the Earth's crust followed by a series of shocks.
- **Immediate responses:** The reaction of people as disasters happen in the immediate aftermath (*after-effects of an unpleasant event*)
- **Long-term responses:** Later reactions that occur in the weeks, months of years after an event.
- **Monitoring:** Recording physical changes, such as earthquake tremors (*ground shaking*) around a volcano, to help forecast when and where a natural hazard might strike.
- **Plate margin:** The margin (or boundary) between two tectonic plates.
- **Planning:** Actions taken to allow communities to respond and recover from natural disasters.
- **Prediction:** Attempts to forecast (predict) where and where a natural hazard might strike based on current knowledge.
- **Primary effects:** The initial impacts of a natural event on people and property, caused directly by it.
- **Protection:** Actions taken before a hazard strikes to reduce its impact, such as educating people.
- **Secondary Effects:** The after-effects that occur as indirect impacts of a natural event.
- **Tectonic Hazards:** A natural hazard caused by the movement of tectonic plates.
- **Tectonic Plate:** A rigid (*not flexible*) part of the Earth's crust which moves across semi-molten (*melted*) rock below.
- **Economic impact:** The effect of an event on the wealth of an area e.g. the impact on businesses and jobs
- **Environmental impact:** The effect of an event on the landscape and ecology of the surrounding area.
- **Social impact:** The effect of an event on the people e.g. deaths and injuries

KPI1 – What causes tectonic plates to move?

Structure of the Earth

1. **The inner core** is in the center and is the hottest part of the Earth. It is solid and made up of iron and nickel with temperatures of up to 5,500°C.
2. **The outer core** is the layer surrounding the inner core. It is a liquid layer, also made up of iron and nickel.
3. **The mantle** is the thickest section of the Earth at approximately 2,900 km. The mantle is made up of semi-molten rock called **magma**.
4. **The crust** is the outer layer of the Earth. It is a thin layer between 0 - 60 km thick. The crust is the solid rock layer upon which we live. It is either **continental** or **oceanic**. The earth's crust is broken into plates.

How do tectonic plates move?

Theory 1: Convection Currents

Heat rising and falling inside the mantle creates convection currents. The convection currents move the plates floating on the mantle. Where convection currents diverge (*separate*) near the Earth's crust, plates move apart. Where convection currents converge (*move together*), plates move towards each other.

Theory 2: Slab Pull

The denser plate sinks back into the mantle under the influence of gravity. It pulls the rest of the plate along behind it.

Theory 3: Ridge Push

Magma rises as the plates move apart. The magma cools to form new plate material. As it cools it becomes denser and slides down away from the ridge. This causes other plates to move away from each other.

KPI2 – How are tectonic hazards caused?

Destructive Plate Margin

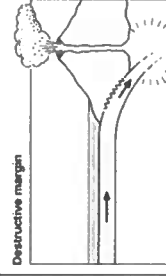
1. A **destructive plate margin** usually involves an **oceanic plate** and a **continental plate**.
2. The plates move **towards** one another, and this movement can cause earthquakes.
3. As the plates collide, the oceanic plate is forced beneath the continental plate. This is known as **subduction**. This happens because the oceanic plate is denser (heavier) than the continental plate.
4. When the plate sinks into the mantle it melts to form **magma**. The pressure of the magma builds up beneath the Earth's surface. The magma escapes through weaknesses in the rock and rises up through a **composite volcano** (*cone shaped*). The volcanic eruptions are often violent, with lots of steam, gas and ash.

Constructive Plate Margin

1. At a **constructive plate margin** the plates move apart from one another.
2. When this happens the magma from the mantle rises up to make (or construct) new land in the form of a **shield volcano** (*low flat shaped*)
3. The movement of the plates over the mantle can cause earthquakes.

Conservative Plate Margin

1. At a **conservative plate margin**, the plates move past each other or are side by side moving at different speeds.
2. As the plates move, friction (*one surface or object rubbing against another*) occurs, and plates become stuck. Pressure builds up because the plates are still trying to move.
3. When the pressure is released, it sends out huge amounts of energy, causing an earthquake.
4. There are no volcanoes at a conservative plate margin.



Year 9 Topic 4 Knowledge Organiser – How dangerous are tectonic hazards?

KPI3 – Why are some volcanoes more dangerous than others?

Structure of a volcano

Volcanoes have distinctive features:

- **magma chamber** - this is where the molten rock is stored beneath the ground
- **main vent** - this is the channel through which **magma** travels to reach the Earth's surface
- **secondary vent** - some magma may escape through the side of the volcano, particularly if the main vent becomes blocked
- **crater** - this is found at the top of the volcano, where the magma erupts from.

Why do volcanoes erupt?

1. Hot, molten rock (magma) has a low density and will rise up through the crust to erupt on the surface.
2. If magma has large amounts of gas and a high viscosity (*sticky*) magma will form an explosive eruption.
3. If magma has a small amounts of gas and (or) low viscosity (*runny*) magma will form a gentle eruption. Where the magma just trickles out of the volcano (lava flow).

Types of Volcanoes

Shield Volcano - found on **constructive plate margins**, where two plates move away from one another. Shield volcanoes have the following characteristics:

- basic lava, which is non-acidic and very runny
- gentle sides as the lava flows for long distances before it solidifies
- no layers, as the volcano just consists of lava
- less violent eruptions
- shorter periods between eruptions

Composite Volcano – found when the oceanic crust sinks beneath the continental crust.

Composite volcanoes have the following characteristics:

- **Acidic lava**, which is very viscous (*sticky*).
- Steep sides as the lava doesn't flow very far before it solidifies (*becomes hard*)
- Alternate layers of ash and lava. For this reason, they're also known as **stratovolcanoes**. Strato means layers.
- Violent eruptions.
- Longer periods between eruptions.

KPI4 – What hazards are produced by volcanoes?

1. **Pyroclastic flows** - A pyroclastic flow is a thick cloud of volcanic ash and gas. As they are heavier than air, they flow from volcanoes down into valleys. Pyroclastic flows move at speeds of over 100 km per hour and can easily flow 8km from a volcano. The temperatures inside a pyroclastic flow can be between 200°C and 700°C, meaning it burns and destroys everything in its path
1. **Ash clouds** - Volcanic ash is a mixture of rock, mineral, and glass particles expelled (*forced out*) from a volcano during a volcanic eruption. The particles are very small—less than 2 millimeters in diameter. Due to their tiny size and low density, the particles that make up volcanic ash can travel long distances, carried by winds. Volcanic ash can be dangerous because its particles are very hard and usually have jagged edges. As a result, it can cause eye, nose, and lung irritation, as well as breathing problems. Also, while in the air, ash can cause problems for jet engines, forcing airlines to cancel flights through the affected area.
1. **Volcanic bombs** - Volcanic bomb is pyroclastic rock that is a cooling of a mass of lava it flies through the air after eruption. If it is to be called a bomb, a specimen must be larger than 2, 5 inch diameter. Volcanic bombs are heavy and often fly at high speed. However, bombs do not travel very far.
1. **Lahars** - A lahar is a fast-flowing mudflow (up to 70km per hour) that is made up of volcanic ash and either:
 - a. Hot water (from the lake in the volcanoes **crater**) or,
 - b. Cold water (from melting snow and ice). Lahars have a texture very similar to concrete.
1. **Volcanic flows** - Lava flows are streams of molten rock that pour or ooze from an erupting vent. The speed at which lava moves across the ground depends on several factors including:
 - a. type of lava erupted and its viscosity
 - b. steepness of the ground over which it travels
 - c. whether the lava flows as a broad sheet, through a confined channel, or down a lava tube
 - d. rate of lava production at the vent.

Everything in the path of an advancing lava flow will be knocked over, surrounded, buried, or ignited by the extremely hot temperature of lava. Deaths caused directly by lava flows are uncommon because most move slowly enough that people can move out the way easily.

Year 9 Topic 4 Knowledge Organiser – How dangerous are tectonic hazards?

KPI 5 – Why do people live near tectonic hazards?

1. **Geothermal Energy:** Water is pumped into permeable rock, the natural heat in volcanic areas turns that water into superheated steam, which turns the turbine to create electricity. 30% of Iceland's electricity is Geothermal energy.
2. **Farming:** Weathering of volcanic lava & ash leaves fertile soil rich in nutrients. Farming in volcanic soils supports 10% of the world's population.
3. **Mining:** Volcanic eruptions create minerals which generates thousands of jobs. Sulphur from Indonesia is used to bleach sugar, make medicines, matches & fertiliser.
4. **Tourism:** More than 100 million tourists visit volcanic sites every year, generating thousands of jobs and income for countries.

KPI 6 – Can people manage risk living near volcanoes?

- **Prediction:** Volcanologists (someone who studies volcanoes) monitor volcanoes all over the world and take readings to determine change so they can predict when a volcano is likely to erupt. One method of prediction is thermal (*heat*) imaging.
- **Planning:** Helps communities to respond and recover from a natural disaster, such as a volcanic eruption. It includes drawing up evacuation plans and using hazard maps to prevent building in high risk areas where lava might flow.
- **Preparation:** Involves educating people on what to do if a volcano erupts such as preparing leaflets and videos giving advice on how to protect yourself.

KPI 8 – What causes tsunamis?

A tsunami can be triggered by events like landslides and volcanoes, however most tsunamis are caused by earthquakes at destructive plate boundaries.

1. A sudden shift in plate movement causes water displacement (*moving something*) at the epicentre
2. Large waves move along the seabed away from the epicentre
3. As the waves move from deep water to shallow water near the coastal area, they increase in height and break

KPI 9 – How can we manage tsunamis?

Sea Wall: In Japan sea walls up to 14 metres high have been built to offer two key protections:

1. Bouncing back the power of the waves, which reduces damage
2. Buying time for evacuation.

Early Warning System: The Pacific Tsunami Warning System is made up of a network of seismic-monitoring stations and sea level gauges. These detect earthquakes and changes in sea level.

KPI 10 – Describe and explain the causes, impacts and responses of the Boxing Day Tsunami

Date: 26th December 2004

Location: Indian Ocean impacting over 13 countries

Cause: An earthquake measuring more than magnitude 9. The earthquake caused the seafloor to uplift, displacing the seawater above.

Impacts:

- 250,000 people died.
- Two million people were made homeless.
- People were swept away in the waters, which arrived rapidly and with little warning.
- Thirteen countries were affected, the worst being Indonesia.
- Indonesia was hit by the tsunami first. Forty-five minutes later the tsunami reached Thailand.

Responses:

- Short-term aid, such as water purification tablets, temporary housing and medical supplies were given from international countries.
- Islands reliant on tourism and fishing, such as the Maldives, had to rebuild their industries.
- An early warning system between countries surrounding the Indian Ocean has been set up.

1	I download songs and I share photos	Je télécharge des chansons et je partage des photos
2	I spend a lot of time in front of a screen	Je passe beaucoup de temps devant un écran
3	I play video games online on my phone	Je joue à des jeux en ligne sur mon portable
4	In my opinion the internet is worrying because there is identity theft	à mon avis, internet c'est inquiétant car il y a des vols d'identité
5	Sometimes I read a good book at home	Parfois je lis un bon livre chez moi
6	In the evening I do cooking	Le soir je fais de la cuisine
7	I have a music lesson at school	J'ai un cours de musique au collège
8	I go to the beach alone	Je vais à la plage seul(e)
9	I am not a member of the football team	Je ne suis pas membre de l'équipe de foot
10	I watch reality TV programmes when I have free time	Je regarde des émissions de télé-réalité quand j'ai du temps libre.

11	I never watch cooking videos.	Je ne regarde jamais de vidéos de cuisine.
12	I prefer to watch comedies at my house.	Je préfère regarder des comédies chez moi.
13	Tomorrow evening we are going to celebrate a birthday.	Demain nous allons fêter un anniversaire.
14	We went out with friends.	Nous sommes sortis avec des copains.
15	On Saturday morning I listened to music.	Samedi matin j' ai écouté de la musique.
16	Yesterday we saw a concert.	Hier nous avons vu un concert.
17	I do that (it) all the time.	Je fais ça tout le temps.
18	I don't watch anything.	Je ne regarde rien.

Year 9 Term 1 Spanish - DIVIÉRTETE

12	I want to go to the pool with my best friend.	Quiero ir a la piscina con mi mejor amigo.
13	During my free time I prefer to go to my friend's house.	Durante mi tiempo libre prefiero ir a la casa de mi amigo.
14	It helps me to forget about everything.	Me ayuda a olvidarme de todo.
15	Two days ago I went to the city centre.	Hace dos días fui al centro.
16	However, I lost my phone.	Sin embargo, perdí mi móvil.
17	Last night I stayed at home.	Anoche me quedé en casa.
18	Next week we are going to attend an event.	La semana que viene vamos a asistir a un evento.
19	I think that it is a waste of time.	Creo que es una pérdida de tiempo.
20	They are dangerous but easy to use.	Son peligrosos pero fáciles de usar.

1	I live in Spain but I am from Argentina.	Vivo en España pero soy de Argentina.
2	I spend three hours a day on my phone	Paso tres horas al día en el móvil
3	I tend to listen to music and send messages.	Suelo escuchar música y mandar mensajes.
4	I am a member of a tennis club and	Soy miembro de un club de tenis y
5	sometimes I do swimming on the weekend.	a veces hago natación los fines de semana.
6	When I was younger I used to play football and I used to do martial arts.	Cuando era más joven jugaba al fútbol y hacía artes marciales.
7	I no longer have time to play football.	Ya no tengo tiempo para jugar al fútbol.
8	This weekend I am going to go to the shopping centre	Este fin de semana voy a ir al centro comercial
9	and I am going to watch a sci-fi film there.	y voy a ver una película de ciencia ficción allí.
10	Three days ago I saw an adventure film and I liked it.	Hace tres días vi una película de aventura y me gustó.
11	I can't go shopping.	No puedo ir de compras.

Show off language

	Opinions
desde mi punto de vista- from my point of view debo admitir que- I must admit that aunque al mismo tiempo- although at the same time no aguanto hacerlo- I can't stand doing it quiero mucho hacerlo porque- I really want to do it because tengo ganas de (+ infinitive)- I fancy (doing something) lo peor de todo- the worst thing of all supongo que- I suppose that	
	Subjunctive
es necesario que lo haga porque- it's necessary that I do it because cuando termine mis exámenes- when I finish my exams cuando gane bastante dinero- when I earn enough money cuando sea mayor- when I'm older	
	Si clauses + conditional
si tuviera tiempo- if I had time (I would...) si fuera rica- If I were rich (I would...) si fuera posible- If it were possible (I would...)	
	Past Tense
lo que más me gustó fue- what I liked the most was me hubiera gustado (+ infinitive)- I would have liked to	
	Idiomatic Language
me di cuenta de que- I realised that a mí me da igual- I don't mind valdrá la pena- it will be worth it al fin y al cabo – at the end of the day	

Example of a French/Spanish LSQ:

Questions	Answers – Test yourself
1. Live in a town which calls itself 'Civetté'.	J'habite dans une ville qui s'appelle Civetté.
2.	J'habite dans une ville qui s'appelle Civetté.
3.	J'habite dans une ville qui s'appelle Civetté.
4. and which finds itself (in trouble) in the South-west of England.	J'habite dans une ville qui s'appelle Civetté, au sud-ouest de l'Angleterre.
5.	J'habite dans une ville qui s'appelle Civetté, au sud-ouest de l'Angleterre.
6.	J'habite dans une ville qui s'appelle Civetté, au sud-ouest de l'Angleterre.
7.	J'habite dans une ville qui s'appelle Civetté, au sud-ouest de l'Angleterre.
8. also a small town near the Bristol.	C'est une petite ville près de Bristol.
9.	C'est une petite ville près de Bristol.
10.	C'est une petite ville près de Bristol.
ADDITIONAL HOMEWORK	Write a short text about your town.
	Programme: 2010 - 2011

5 Key acting skills

Voice: This is how you use your voice in performance. You can change your voice using your: Tone, pitch, pace, emotion, volume, projection, dialogue, dialect, accent, intonation, whistling, SFX, interjection.

Facial Expression: They are used to show the audience how a character is feeling through; Eye contact, eye brows, straight, emotions, gritting teeth, tense, relaxed, wrinkled, creased, staring, twitching.

Posture: This can also be called body language. This is how a character/actor holds their body. For example; Bad posture would mean someone is hunched over.

Gestures: Gestures are movements that have a meaning. For example; if you wave at someone you would be saying hello to them. Gestures can be performed by; Hands, arms, speed, clicking, rubbing, waving, mannerisms.

Movement: This is any movement that does not have a meaning. For example; Walking. Speed, pace, acceleration, gait,

Physical Theatre

Physical Theatre is the a form of drama that emphasises storytelling through use of movement and physical expression.

It often integrates elements of dance and mime. In physical theatre a story or emotion is communicated with the body.

This does not mean that speech is not allowed, it just means the focus of the performance is the movement rather than the dialogue.

Often in physical theatre, objects are created with **bodies** and actors can become the set and props.

When creating physical theatre, performers will often go through something called the, 'Devising Process'. Devising involves the development of character, script, technical elements such as costume, lighting and sound.

When creating physical theatre you have to work as an **Ensemble**. This is a group of performers all working together in a performance for the best possible outcome.

Key Physical Theatre practitioners

Frantic Assembly

Frantic Assembly is a physical theatre company that started out in 1994 in Swansea Wales.

Frantic Assembly say that they, 'create thrilling, energetic and unforgettable theatre.'

They create non-naturalistic pieces through the use of movement and music, although they have always said that this should never take away from the storyline. They have created their own performances but have also adapted other famous plays such as, 'Othello.'

They use ensemble and contact work often in their pieces, and therefore believe in creating a trusting atmosphere when devising work.

Jacques Lecoq

He was a French theatre practitioner best known for his teaching methods in physical theatre, movement, and mime which he taught at the school he founded in Paris. He created a system for acting called, 'The seven states of tension'.

Example of how to self evaluate in Drama.

STRENGTH During my performance, I wanted to show how my character was really happy to see someone. To do this, I waved my hand violently and erratically to express how overjoyed I was at seeing the other character. I also had a very big smile and wide open eyes whilst making a high pitched noise to display my excitement. This was successful because the audience could clearly see how happy I was as my character was about to see his friend after a long time apart.

AREA FOR IMPROVEMENT During my performance, I wanted to show

how my character was really happy to see someone. To do this, I slowly waved my hand and had a slight smile on my face whilst quietly saying 'Hello' in a soft tone. My intention was to show how I was happy but wanted to show it in a subtle way. However, the audience were confused by this and thought that my reaction was too small. If given the chance to perform this moment again, I would make my gestures much bigger, my movements quicker and my facial expressions much more exaggerated so that the audience can see my excitement much more clearly.

Frantic Assembly Techniques

Round-By-Through

This technique was created by Frantic Assembly and allows performers to create a sequence of moves. Performers will either move Round someone, By someone or Through someone.

Chair duets

This is another Frantic assembly technique. In pairs or small groups, performers will sit next to each other on chairs. Performers will then take it in turns to move a part or parts of their body. They can also move their partners body. Eventually the performers will have a sequence of moves which they can repeat over and over again without stopping.

Puppetry

In pairs or small groups one actor will become the puppet and the others will be the puppeteers. The puppeteers will then move the body parts of the puppet one at a time. This will create a performance of one or more characters controlling another character.

Frantic Assembly's Techniques

When using the techniques

mentioned it is important to follow a system which has been created.

Firstly you need to create the moves. Before you know what the scene is going to be or who the characters are you have to just create the basic routine of movements.

Next you can add resistance to the movements. This means that you might add different levels of tension to your own movements, or if your partner is moving your arm then they might resist your movement more.

Thirdly you can change the speed at which you do the movements. Each movement can have a different speed at which it is done.

The penultimately element to add is eye contact. You have to find some moments where you can make eye contact with your partner.

Finally you can add any extras such as Lighting or sound.

Once you have done all of this you will be able to see a story and characters being created without needing to think about it.

Physical Theatre Techniques

Ensemble movement

This is a technique which started during Greek Theatre. Performers will work as a team to create one moving object or scene. An example of this is performers creating the object of a moving car.

Total Theatre

This is a style of theatre created by a practitioner called Steven Berkoff. His style of theatre is physical and exaggerated. It is completely non-naturalistic. Total theatre is where voice, movement, music, lighting all work together with equal importance to create performance. Actors will use their whole bodies to create physical objects such as a bed. The actors will have to physically create the whole object.

Mirroring

Actors will stand opposite each other and copy one another's moves exactly. The audience should not be able to tell who the leader of the pair is as the performers should be so in sync with one another.

How to create tension in performance.

Eye contact – Maintaining eye contact with the person you are in direct conflict with will increase the tension dramatically. It connects you to each other in a non physical way but still very personal.

Pauses – Arguably the most important of the three. Moments of silence are essential when building tension as not only do they show that each character is carefully weighing up their next move but it allows the audience to take some time to absorb the situation and keep them guessing what is going to happen next.

Volume and pace – speaking at a natural volume and pace lulls the audience into a false sense of security. By slowing decreasing both, the audience naturally begin to feel tension building. This can then be increased to a quicker pace and louder volume until the scene reaches a climax.

Five Key Acting Skills

Facial Expressions - How can we show emotions through our faces?
Eye contact, eye brows, straight, emotions, gritting teeth, tense, relaxed, wrinkled, creased, staring, twitching.

Voice - How can we use our voice in performance? Tone, pitch, pace, emotion, volume, projection, dialogue, dialect, accent, intonation, whistling, SFX, interjection.

Posture - How can we use our bodies to help us create performance? Posture, blocking, positioning, front on, side on, emotions, age, open or closed.

Gestures - These are movements with meaning, how can we use them in performance? Hands, arms, speed, clicking, rubbing, waving, mannerisms.

Movement - How can movement be used to create performance? Speed, pace, acceleration, gait, mannerisms, special awareness, stage presence.

Key Terminology

Script - The written words and stage direction which are spoken and performed in a play. A script will be written by a writer and then given to a director to create a performance.

Director - This is the person who is in charge of the actors and performers. The director will tell the actors how they want them to perform and move in each scene. They will block the performance.

Blocking - When creating a performance you must first plan where all the actors are going to be standing and moving to on the stage. You must also plan what set and props are going to be used in your performance. This is called Blocking.

Stage Direction - Text in a script which tells you what you need to be doing while performing. Some scripts may have more stage directions than others. Some directors may also decide not to use all of the stage directions because they have their own ideas for what the performers should be doing.

Characterisation - Using a variety of skills, improvisation techniques and background information to become your character. These skills are your 5 key acting skills. It is important you fully understand the character you are performing. You MUST remember, you are no longer yourself when acting. You become someone else.

Performance Discipline - Maintaining extremely high and professional levels of focus and concentration throughout rehearsals and performance. This involves being on task at all times, not laughing or giggling when you are acting. It is crucial to stay focused when performing.

Ensemble - A group of performers all working together in a performance.

Freeze Frame - When a scene 'freezes' for a moment to allow the audience to really explore the moment. It is like pressing pause on live action.

Tableaux - A collection of still images which create a performance. It is like looking through a photo album.

Immersive theatre - Audience are included in the performance but don't know what is going to happen. Actors may talk to or ask the audience questions about what is happening in the performance.

Example Self-evaluation

STRENGTH During my performance, I wanted to show how my character was really angry with another character. To do this, I scrunched my eyebrows together and tilted my head slightly forward, using facial expression to show my annoyance. I also had a very big frown and narrowed whilst making a low pitched noise to display my frustration. This was successful because the audience could clearly see how angry my character was when seeing their friend after having an argument.

AREA FOR IMPROVEMENT During my performance, I wanted to show how my character was really happy to see someone. To do this, I slowly waved my hand and had a slight smile on my face whilst quietly saying 'Hello' in a soft tone. My intention was to show how I was happy but wanted to show it in a subtle way. However, the audience were confused by this and thought that my reaction was too small. If given the chance to perform this moment again, I would make my gestures much bigger, my movements quicker and my facial expressions much more exaggerated so that the audience can see my excitement much more clearly.

Art Year 9 - Term 1 - Natural Forms

Formal Elements	Definition	Example	Keywords
Line	A mark that connects two or more points.	These can be straight, curved, short or long. Specific types of line include: outline (generally a black line that goes around an image) and continuous line (a line in which you do not take your pencil/pen of the page)	Observational Drawing Drawing something from real life in front of you. Tints & Shades Tint - Adding white to a colour to make it lighter. Shades - Adding black to a colour to make it darker.
Tone	The lightness or darkness or something.	For darker tones use a higher grade B pencil.	
Colour	Colour is what you see when light reflects off something.	Primary Colours - can't be made by mixing colours together (Red, Yellow & Blue) Secondary Colours - mix two primary colours together (Green, Orange & Purple) Tertiary Colours - mix a primary and secondary colour together (Blue + Green = Turquoise) Complementary Colours - Colours opposite each other on the colour wheel (Orange/ Blue, Green/Red and Purple/Yellow)	Proportion The size and relation of objects to one another. Using the grid-method is one way of helping you draw using accurate proportions. Cropping Removing the outer area of a picture, looks like the image has been zoomed into. Still Life A piece that depicts objects or something that is generally static (does not move). Landscape A piece that depicts a view of some sort e.g. mountains, the sea, fields, woodlands, buildings etc.
Texture	How something looks or feels.	Visual Texture - implied sense of texture that the artist creates through the use of various artistic elements such as line , shading, and colour. Physical Texture - texture you can actually feel with your hand Adjectives to describe different textures - fluffy, rough, smooth, soft, bold, uneven, slimy, faint, chalky, tacky etc.	Abstraction Does not attempt to focus on accurate representation of reality but focuses rather on shapes, colours and gestural marks.
Pattern	A symbol, shape or colour that repeats.	Man-made patterns are designed by humans, natural patterns are formed by nature. Patterns can be orderly, uniform, geometric, random or symmetrical.	Realism Accurate representation of reality e.g. a chair looks like a chair.
Shape & Form	Shape is 2D. Form is 3D.	2D shapes include rectangles, squares and triangles. Geometric shapes are angular and have straight lines. Organic shapes have curved lines. 3D shapes include cylinders, spheres and cubes.	Symmetry Two sides of a design are the same.

Key Artist	Key Artist	More Keywords
Name Georgia O'Keeffe Technique/ Style Zooms in very closely and creates abstract looking organic shapes. Inspiration Natural Landscape, especially flowers. Materials used Oil Paints	Name Yellena James Inspiration Combines abstract forms, colourful shapes and tangled lines often found in nature. Materials used Pens, inks, gouache and acrylics	Clay A stiff, sticky fine-grained earth that can be moulded when wet. Kiln a furnace or oven used to fire pottery Ceramic made of clay and permanently hardened by heat. Glaze a substance used to add colour, decorate or waterproof a piece of ceramic work. Slip Watered down clay which is used as a type of glue to stick one piece of clay to another. Carving A shape or pattern cut into a specific material. Layering Laying one material on top of another (building up) Bisque Ware Fired clay that is ready to be glazed. Rolling Guides Wood slats used when rolling clay to give it an even thickness. Ceramics Any artwork produced using clay.

Year 9 PSHE Topic 1 – Peer Influence and Gangs

Key Words: Gangs: a group of people that are committing illegal acts together. Coercion: the act of persuading someone to do something by using force or threats. Identity: being who or what a person is. Peer Influence: when you choose to do something that you wouldn't usually do because you want to feel accepted and valued by your friends. Drug dealing: an individual or group who sells illegal drugs. Criminal responsibility: the age at which a child may be arrested, prosecuted, tried in a court of law. Manipulation: to influence or control someone to your advantage. Support Network: the people in your life that you can trust and can help you to achieve your goals. Exit Strategies: a way to escape Bullying: Doing something that harms another person (physically, emotionally etc.). Career prospects: The chance of future success in a job. Stop and Search: a law that gives a police officer the power to stop and search an individual if they have 'reasonable grounds' to suspect someone could be carrying: illegal drugs, a weapon, stolen property, something that could be used to commit a crime. Joint Enterprise: a if a persons' presence, actions or knowledge lead to a murder or assault then they can be charged even if they didn't directly do anything.	KPI 1: What is a gang? - A gang is usually considered to be a group of people who spend time in public places that: - See themselves (and are seen by others) as a noticeable group - Engage in criminal activity and violence - The specific crimes and behaviours relevant to each individual gang will vary, however it is important to be aware of common trends in gang. Common features of gang membership: - Being engaged in criminal activity and violence, usually starting with petty crime and developing to selling drugs, stealing phones or stabbings. - Laying claims over specific territory, often a postcode or estate - Wearing an identifying feature, often an item of clothing worn in a particular way e.g., turned up trouser leg, bandana, a specific colour - Usually in constant conflict with other gangs and unable to enter another gang's territory - Gang activity is rapidly moving online; encrypted messaging services are used to organise criminal activity and communicate - Gang membership is decreasing in age, with children as young as 11 recruited into gang life - Young gang members (usually aged between 12-17) are often used to transport drugs through a network to sell in less well-policed areas, this is known as maintaining or crossing 'county lines.'	KPI 2: Signs of someone being in a gang: - Wearing gang symbols/clothes or tattoos - Risk taking behaviours - Mixing with well known gang members - Members have a lot of money/expensive clothing without a clear source of income. - Using nicknames KPI 3: Reasons why people join gangs - Sense of belonging and/or identity - Protection - Enjoying risk taking - To get respect - Looking for a glamorous lifestyle - Expectation to join from friends KPI 4: Laws around knife crime: - Possession of a knife has a 5-year prison sentence, even if it is not used. - You can be arrested, charged and sent to prison if someone you are with stabs another person. - The police can stop and search someone if they have 'reasonable grounds' to suspect they are carrying illegal drugs, a weapon, stolen property, something which could be used to commit a crime. - It is illegal to sell knives to anyone under 18. - You can be charged with a crime if you are over the age of 10.	KPI 5: Consequences of being in a gang: - Being subject to threats, blackmail and violence - Being exploited and forced to commit crimes - Being arrested, including for crimes committed by the gang that they have not directly committed under the law of joint enterprise. - Not being able to leave or cut off ties with the gang - Having their safety or the safety of friends and family threatened. - Risk of physical harm, rape and sexual abuse. - Risk of emotional abuse. - Risk of severe injury or being killed. - Abusing drugs, alcohol and other substances. - Long-term impact on education and employment options. If you need further support... Home/School Support: Friends, family members, teacher, tutor, Mr Ogden, Mrs Jones, Mrs Loveridge, Mrs Aston, Mr Robbins. Reputable Organisations: - A Better Medway: www.abettermedway.co.uk - Medway Youth Service (Local advice and support): 01634 33228, youth.enquiries@medway.gov.uk - Childline (Free confidential and emotional support for young people): 0800 1111 www.childline.org.uk - Crimestoppers (Anonymous crime reporting service, independent of the police): 0800 555111 https://crimestoppers-uk.org/ - Fearless Site (providing non-judgmental information and advice about crime and criminality): https://www.fearless.org/en/give-info - Victim Support (A charity working to support people who have been the victim of crime) 0808 16 89 111, www.victimsupport.org.uk - Runaway helpline (A confidential support service for young people in conflict at home): Call or Text 116 000 www.runawayhelpline.org.uk/advice/gangs - Young Minds (A charity offering support for the emotional health and wellbeing of young people) www.youngminds.org.uk
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Year 9 PSHE Topic 2 – The Justice System

Key Terms

- **Law:** a system of rules which a country uses to regulate the behaviour of its citizens.
- **Civil Law:** When there is a dispute between two people and is usually a personal matter, rather than a crime. E.g. divorce
- **Criminal Law:** When someone breaks a law. E.g. stealing
- **Barrister:** A type of lawyer that defends the person charged with a crime in court.
- **Jury:** is made up of 12 adults, who sit in a crown court and decide whether the accused person is innocent or guilty.
- **Judges:** a person who is in charge of a trial in a court and decide how a guilty person should be punished.
- **Magistrate's Court:** All trials starts in a Magistrate's court. A Magistrate can give out sentences but don't have the same power as a Judge so they only rule over minor offenses. More serious crimes get referred to a Crown court, in front of a Judge.
- **The Crown Prosecution Service:** They advise the police on whether they have enough evidence to prosecute someone. They prepare cases for the court and can decide what charge they think the accused should receive.
- **Probation Officer:** they supervise offenders in the community when they've been released from prison.
- **Bail:** an amount of money that a person who has been accused of a crime pays so that they can be released until their trial.
- **Custody:** being kept in prison, while waiting to go to court for trial.
- **Caution:** a spoken warning given by the police to someone who has broken the law
- **Reoffend:** To offend again
- **Joint Enterprise:** a if a persons' presence, actions or knowledge lead to a murder or assault then they can be charged even if they didn't directly do anything.

KP11: Introduction to Laws

Our law comes from legislation (laws passed by parliament) Common law and EU law. England and Wales have the same legal system; Northern Ireland has a very similar system. Scotland has its own system of laws

Types of Law:

- **Criminal law:** A specific crime has been committed. Case between an offender and the government (acting for all citizens) These cases will go through the criminal justice system and could lead to a custodial sentence. Range in severity, not all 'serious' An Act of Parliament has been broken.
- **Civil law:** Disputes between individuals or group. Often linked to rights e.g. company law, adoption, consumer rights. A claimant can bring a case to civil court, normally to claim damages (to sue for money) Can still be 'serious' and involve very emotive issues.

Legal responsibilities:

- Many people in the UK take a role in the running of the legal system. You still have rights, even if you are an offender Citizens can be on a jury (compulsory) train to be a magistrate (to hear cases in courts in their community), become a special constable (trained volunteers who support police) or advise in a tribunal (as an expert) These roles offer great support to justice within the community. If you are arrested you must be told the reason for the arrest, can tell someone, able to get legal aid, offered medical help if needed, provided with a written notice about your rights and offered an interpreter. Human Rights must also be followed in prison (within reason e.g. liberty, democracy).

KP12: Types of Court:

Criminal Courts

- **Magistrates court:** 95% of cases, less serious crimes e.g. theft. Led by trained magistrates, no jury can only give minimal penalties.
- **Crown court:** Serious cases e.g. murder. Led by judge, formal, jury decides on guilt.

Courts must consider mitigating factors. The Crown prosecution Service (CPS) advises the police on cases for possible prosecution. It reviews cases submitted by the police for prosecution and decides the charge in very serious or complex cases.

Civil Courts:

- A dispute between two individuals or groups that requires legal advice Disputes can be solved in civil courts, but also via tribunals (less formal courts) Ombudsmen (expert decision makers) Mediation (talking it through) these are often cheaper and quicker.
- Tribunals produce rulings that are legally binding; an expert judge takes the lead. Ombudsmen are independent and free of charge but can be slow. Mediation can lead to a legally binding agreement.

Youth Justice System:

- The part of the justice system that deals with young people (10- 17) The youth justice system aims to prevent youth crime.
- The UK recognise that YP who break the law should be treated differently.
- Sentences will often focus on rehabilitation.
- YP must have an appropriate adult with them before they are questioned.
- Youth Offending Teams will work with YP to support and educate.
- Youth courts (less formal) are used but very serious crimes can be passed to a crown court.

Office for national statistics:

- The organisation that collects data about what is happening in the UK (including crime).
- Most YP who commit crime have low literacy or difficult backgrounds. Rates of reoffending are high (especially with YP)
- Violent crime has fallen over the last 20 years
- There is a growing view that prisons need to focus more on rehabilitating prisoners.
- Questions what government are doing to address the root causes of crime (literacy, poor home life)
- Crime statistics can be misleading as certain crimes (e.g. rape) may be underreported

Year 9 Unit 1 Python next steps

Keywords	Programming language Interactive mode Script mode Input Print Variable Comment If statement If Else statement Elif statement Comparison Operator Indentation Concatenation Data types Syntax error Run time error Logic error List List.Append List.Insert Procedure Parameter Function	A programming language is designed to communicate instructions to a computer A mode of operation where the user can input commands one at a time when a complete program is executed In python the input statement is used to enable the user to input data into the program In python the print statement is used when the computer wants to output a message to the screen A device used to store data while a program is running Text added to a program that helps programmers understand the purpose of the code. An if statement is a statement used to check a condition, and execute certain code if the condition holds true. If the condition is true, the if block code is executed and if the condition is false, the else block code is executed. An elif statement is used where there are more than two possible outcomes from a decision. Each condition will execute a different piece of code if it is true. Comparison operators can compare numbers or strings and perform evaluations. Examples include =, >, <. After an IF statement the code that is to be executed if the IF statement is True will be indented from the side of the screen. In python, string concatenation is the operation of joining character strings end-to-end. For example, the concatenation of "snow" and "ball" is "snowball". Data can be described in various ways, examples include float (real numbers), integers, string (text) or boolean (True / False) Syntax errors are where the code you have written has a mistake against the rules of the language Run-time errors occur whilst the program is running Some programs run perfectly but they don't work as the programmer intended A lists stores multiple elements of different data types under the same identifier. Instruction to add an item at the end of the list. Instruction to insert an item in a certain location in the list. A self contained piece of code that can be used multiple times in a program. A variable that is passed between the main program and a subroutine. A self contained piece of code that can be used multiple times in a program. A function returns a value to the main program.
Lesson 1	What are the basic data types in python? Float, Int, string, bool What is a selection statement? A selection statement, also known as a conditional statement, is a programming construct that allows a program to execute different blocks of code based on whether a certain condition is true or false.	

Lesson 2	What is a while loop? A "While" Loop is used to repeat a specific block of code an unknown number of times, until a condition is met. What is a for loop? A for loop is used where you know how many times you wish to loop for.
Lesson 3	How does a list differ from a variable? A variable can only hold 1 item. A list can hold thousands of items. What are the advantages of using a list? Using a list reduces the number of variables needed.
Lesson 4	What is a procedure? Subroutines are reusable blocks of code designed to perform specific tasks, and they come in two forms: Procedures: Subroutines that do not return a value.
Lesson 5	What is a function? Subroutines are reusable blocks of code designed to perform specific tasks, and they come in two forms: Procedures: Subroutines that do return a value.
Lesson 6	

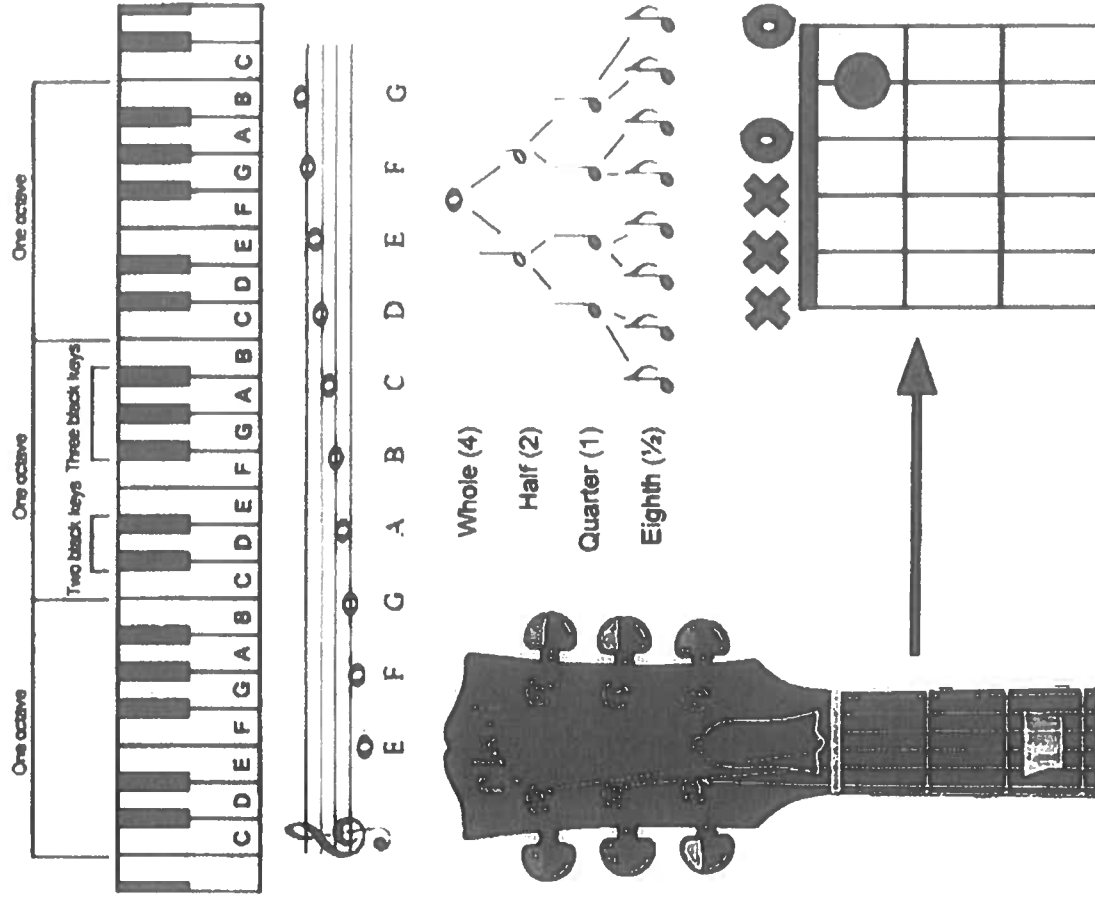
MUSIC - The Elements of Music

Key Terminology

- Conductor** - A person who directs the performance.
- Note** - A singular sound.
- Chord** - A group of three or more notes played at the same time.
- Harmony** - Different notes played or sung together.
- Melody** - A small arrangement of notes that make a tune.
- Scale** - A series of eight notes starting somewhere between A-G.
- Arpeggio** - When you play the 1st, 3rd, 5th, and 8th note of a scale one after each other.
- Rhythm** - The pattern of how notes are played.
- Beat** - The pulse or heartbeat of the music.
- Tempo** - The speed of the music.
- Dynamics** - The volume of the music.
- Octaves** - The jump between the same note going higher or lower on the piano (e.g. lower C to higher C).
- Pitch** - How high or low the notes are played.
- Guitar** - 6-stringed instrument. Can be electric or acoustic.
- Bass Guitar** - Low sounding 4-stringed instrument. Usually electric.
- Piano/Keyboard** - Percussion instrument made up of white keys and black keys.
- Drum Kit** - Percussion instrument made up of drums and cymbals.

Feedback Starters

Positives: *What I thought went well was...*
Points for improvement: *It would be even better if...*

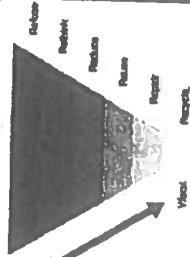




The 6 Rs

The 6 Rs are an important checklist. They are used by designers to reduce the environmental impact of products. They can also be used to evaluate the environmental impact of other products.

The hierarchy of sustainability places the strategies that are best for the planet about those that have a greater negative impact on the environment.



1. Refuse

The first stage in the process is to ask whether the proposed product, part, purchase or even journey is required at all. Asking the question 'Is it really necessary?' can play a major role in reducing the demand on materials. Simply not using something saves 100% of what you have chosen not to use. Example include:

- Using your own carrier bag rather than purchasing a new one.
- Walking or cycling to school instead of being driven.
- Not using products such as some pesticides that are known to be harmful to the environment.
- Not eating (or using) products that are over-farmed, over-fished or on the endangered list.

2. Rethink

Consumers have a growing number of choices to make about where and on what they spend their income. Greener and more sustainable options are not always the cheapest or the best, but making informed decision and rethinking ones spending power can play a huge part in conserving resources.

Deciding on the design of a product, e.g. the materials being used in its production, will directly affect its sustainability. The types of questions designers need to ask are:

- Are the materials locally sourced?
- Are they sustainably produced?
- Is it essential to use this material, of which there is a finite supply?

By rethinking how the product is likely to be made, the product can often be redesigned in a more responsible way.

3. Reduce

Reduction is often the result of having re-thought a design or action. Materials and energy are saved due to efficient manufacturing practices and the use of clever design, incorporating sustainable materials.

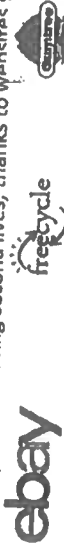
- Modern materials that are lighter and stronger than traditional ones have contributed to the miniaturisation of products, saving material and energy in manufacture and use.
- Reducing the complexity or number of parts a product uses and reducing the number of different materials in a product makes recycling easier.
- In factories, schools and hotels, fitting motion sensitive lighting and smart heating systems can significantly reduce energy usage.
- Many large companies employ staff to conduct 'energy walks' to turn off unused appliances and lights and to ensure windows and doors are shut to conserve heat.

4. Reuse

Reusing products multiple times for the same purpose is also known as **primary recycling**. Reusing a product in a different way from the one it was designed for is known as **secondary recycling**.

The classic glass milk bottle is reused many times before it reaches the end of its useful life, as which point it is recycled. A plastic milk bottle, however, is intended to be used only one, although it can have many different subsequent uses.

Donating to and buying from charity shops extends the life of products and in recent years there has been a resurgence of in products having second lives, thanks to websites such as eBay, Freecycle or Gumtree.



It is also becoming popular for furniture and other household items to be **upcycled** with a coat of paint and some minor repairs or adaptations, extending their useful life by many years.

5. Repair

Being able to repair a product when it is broken or worn is a way of extending its life and delaying the purchase of a new one. Repairing is a positive option over replacement as it means that only some parts of the product are replaced. This creates jobs for skilled people who conduct repairs and stimulates a spare parts market.

Unfortunately, repairing products has become harder over years. Growing number of products are not design to be repaired. There are a number of reasons why items may be designed this way, but it is usually because they are cheaper to replace than repair. Some products, especially modern electronic products, are designed to last only a few years as technology dates quickly and older products will be superseded by newer, faster, more efficient models. This is called **planned obsolescence**.

6. Recycle

Tertiary recycling, although a very important stage, is lower down the hierarchy of preferred options because most materials that are recycled this way tend to be of lower quality than the original material. It takes a lot of energy to recycle materials.

This form of recycling requires the reprocessing of the material and in many cases involves chemicals and/or heat to recover the recycled materials. In an ideal world, tertiary recycling would remove all recyclable materials from our household waste so that only biodegradable materials would be left. Only very few parts of the world are set up to cope with this level of processing.

7. Sustainability

Our planet has to provide all of our basic human needs, such as food, shelter and warmth.

Designers now have a much better understanding of which materials are sustainable and which are not. The general principle is that resources fall into two categories:

- Finite resources** – are ones which are in limited supply or cannot be reproduced.
- Non-finite resources** – are ones which are in abundant supply and are unlikely to be exhausted.

8. Recyclable materials

Once all useful and recyclable materials are removed, the majority of the remaining waste is organic matter and can be processed in one of two ways; 'Recover' or 'Rot'. Food waste and garden waste can be processed at a high temperature and turned into compost. The waste can also be buried in landfill sites where the resulting methane gas from the rotting matter is collected and burned and used to generate heat or electricity in the same way.

Year 9 – Food Technology

Functional Characteristics of Ingredients

Selecting Ingredients	Ingredients are chosen for a number of reasons, *to add flavour, colour or texture *to provide a particular function, e.g. to thicken *to provide nutrients or change the nutritional profile of a dish, e.g. to increase fibre *to extend the shelf life, e.g. vinegar for pickling or chemical preservatives *cost and availability, e.g. fruit in season *to satisfy a need to buy food with a certain provenance, e.g. Red Tractor.
Adding Flavour, Colour or Texture	• Fresh and dried herbs and spices can be added to dishes to provide flavour and replace the salt in some dishes, • Fruit, vegetables, herbs and spices can all be used in recipes to add colour. • Nuts, seeds, grains, fruit and vegetables can be added to recipes to provide texture. • The cooking method and cooking time can impact the texture, e.g. steaming or microwaving vegetables quickly can retain their colour, flavour and firm texture. • Equipment used to process food can impact the texture - blending soup for a smoother texture.
Ingredient functions in recipes	browning , e.g. flour in a bread roll (dextrinisation); raising , e.g. yeast in bread (aeration); setting , e.g. scrambled eggs (coagulation); thickening , e.g. flour in a roux sauce (gelatinisation).
Raising Agents	mechanical , e.g. beating, creaming, rolling and folding, sieving, whisking; chemical , e.g. baking powder, baking powder, self-raising flour; biological , e.g. yeast. Different foods may use one or more of these to achieve a desirable end result.
Tenderisation	Mechanical tenderising – a meat cleaver or meat hammer may be used to beat the meat. Cutting into small cubes or mincing can also help. Chemical tenderisation (marinating) –the addition of any liquid to flavour or soften meat before cooking.

Glossary

Key Terms	Aeration: Incorporating air into a mixture. Caramelisation: The chemical change of heated sucrose (sugar) to caramel, which produces flavour and browning. Coagulation: The irreversible denaturation of protein molecules to thicken and set. Denaturation: A change in the structure of protein molecules, resulting in their unfolding. Dextrinisation: The reaction of dry heat on the surface of food which changes starch to dextrin, e.g. toast. Gelatinisation: The process of thickening which takes place when a mixture of starch and liquid is heated. Shortening: The effect caused when fat is rubbed into flour (rubbing in method - crumble. The fat coats the flour particles, waterproofing them to prevent gluten formation. Allergen: An ingredient that may cause an adverse reaction to food. Back-of-pack labelling: Is legally required and can help consumers make healthier choices. Front-of-pack labelling: Is voluntary but must provide certain information and can use red, amber and green colour coding. Use-by-date: Relates to the safety of the food. Food must be eaten by this date. Best-before-date: Relates to the quality of the food. Food may still be eaten beyond this date.
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Year 9 – Food Technology

Malnutrition (Deficiencies/Excesses & Effects on Health)

Malnutrition	There is a link between a poor diet, and the risk of developing some diseases. This includes the risk of: *cancer; *Coronary heart disease (CHD); *bone health; *anaemia. Having intakes of energy and/or nutrients below or in excess of needs for long periods of time can affect health. The risk of malnutrition is increased by: *increased requirements for some nutrients *restricted range of foods; *reduction in available income; *very low income; *medical conditions; *psychological conditions. Worldwide, Kwashiorkor and marasmus are two common diseases caused by a lack of protein and energy. Fat soluble vitamins (A, D, E and K) are stored in the body so it takes time for deficiency diseases to develop.
Undernutrition	The World Cancer Research Fund has released nine cancer prevention recommendations *Be a healthy weight *Move more *Avoid high-calorie foods and drinks *Enjoy more grains, veg, fruit and barley. Limit intake of red meat and avoid processed meat *Don't drink alcohol *Eat less salt *Don't rely on supplements. Breastfeed your baby.
Diet & Coronary Heart Disease	It is believed that 80% of CHD and strokes could be prevented by changes to lifestyle factors, such as diet, physical activity and smoking. Changes to the diet to reduce the risk of CHD include: *increasing oily fish intake; *reducing salt intake; *increase fruit and vegetables; *decreasing alcohol consumption.
Bone Health	Calcium is important for strong bones. Vitamin D is needed for calcium to be absorbed from food.
Anemia	Iron is vital for making red blood cells. Iron from the diet forms haemoglobin, which carries oxygen in the blood. Anaemia develops if the body's stores of iron are too low.
Obesity	People who are obese are more likely to suffer from CHD, type 2 diabetes, gall stones, arthritis, high blood pressure and some types of cancers, i.e. colon, breast, kidney and stomach.
Inactivity	It is also important that the amount of time being sedentary is reduced. Over time, sedentary behaviour can lead to weight gain and obesity, which can increase the risk of developing chronic diseases in adulthood.

Food Labelling

Packaging Information	Information on the labels of pre-packed food and drink products can be legally required or just for consumer information. Legally required information is: country of origin and place of provenance (where an ingredient is from); date mark; list of ingredients (including additives and allergens); name and address of the manufacturer, packer or seller; name of food or drink; nutrition information; storage and preparation instructions; weight or volume. Consumer information (not a legal requirement) front-of-pack nutrition label; price; serving suggestions/image.
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