



Yate Academy

A better chance of success

Year 9

**Knowledge
Organiser**

Spring Term 2023-2024

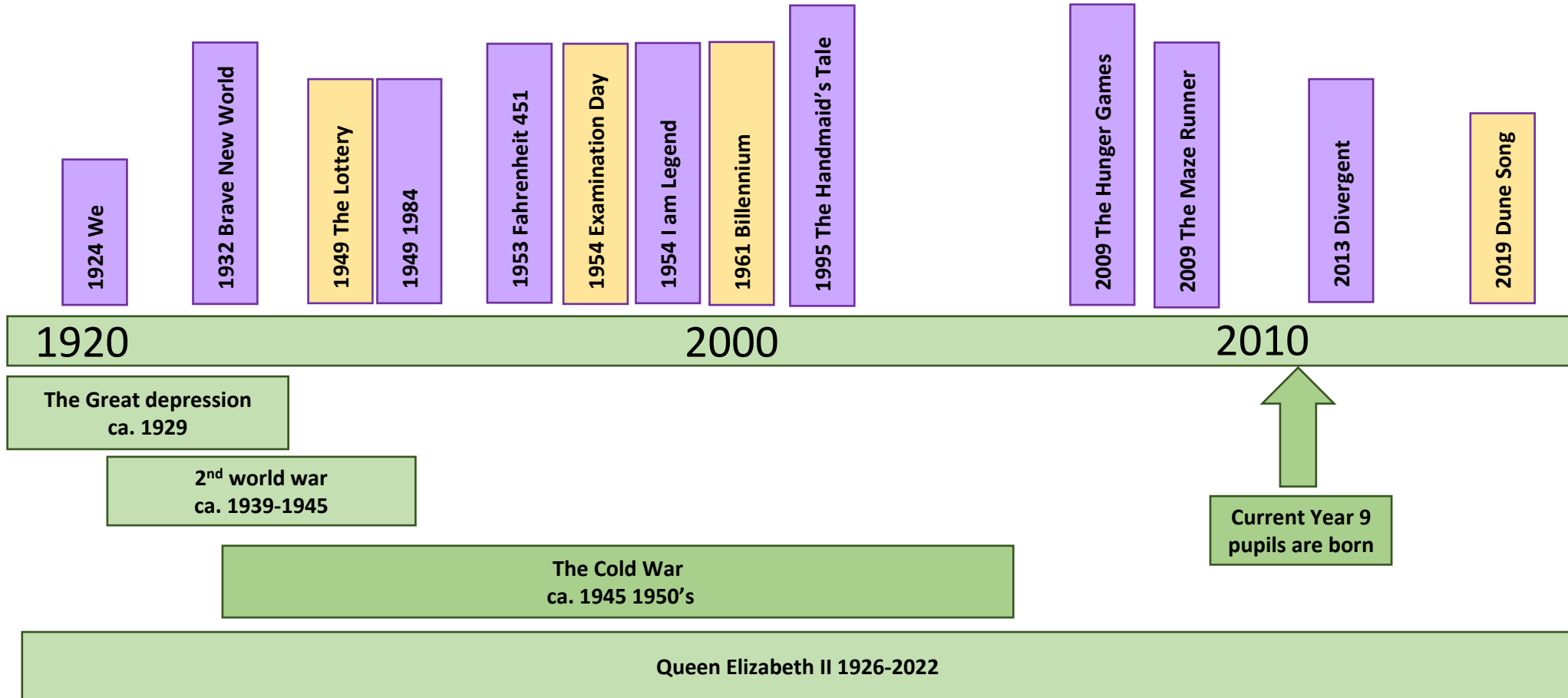
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Is it better for a man to have chosen evil than to have good imposed on him?

9.2.1.a Analytical lenses: Content, Context and Literal meaning

Timeline



<p>Examination Day Henry Slesar (1959)</p> <p>Dickie Jordan is an intelligent and curious youth. He and his family live in a dystopian future.</p> <p>On Dickie's twelfth birthday, he is required by law to undergo an intelligence examination. Dickie's birthday wish is to do well on his exam. When the time comes, his father brings him to a government testing facility. There he is given a serum to ensure he tells the truth and given a series of intelligence assessment questions.</p> <p>After the test is complete, Dickie's parents are soon contacted by the government with the results...</p>	<p>Billennium JG Ballard (1961)</p> <p>Ward lives in a future dystopian society with his close friend, Rossiter. They are confined in a room 4m² due to overpopulation.</p> <p>After being kicked out of their homes, they decide to move in together so that they have space and split the payments. The soon discover a secret, larger-than-average room adjacent to their rented cubicle.</p> <p>Things become complicated when they allow two other close friends to share the space, but soon the news begins to travel...</p>	<p>The Lottery Shirley Jackson (1949)</p> <p>In a small, unnamed village of about 300 residents, the locals are in an excited yet nervous mood on June 27. Children pile up stones as the adults assemble for their annual event, which is apparently practiced to ensure a good harvest.</p> <p>The lottery preparations start the night before, with coal merchant Mr. Summers and postmaster Mr. Graves drawing up a list of all the extended families in town and preparing one paper slip per family. The slips are folded and placed in an age-stained black wooden box, which is stored in a safe at Mr. Summers' office until the lottery is scheduled to begin.</p> <p>On the morning of the lottery, the townspeople gather shortly before 10 a.m. in order to have everything done in time for lunch. One by one, each family draws the slip of paper and reveals whether they have the black spot...</p>	<p>Dune Song Suyi Davies Okungbowa (2019)</p> <p>In a post-apocalyptic world carpeted with sand dunes, the inhabitants of a remote settlement are warned by their Elders never to leave. The outside world is dangerous, say the Elders; those who venture into the dunes will be killed by whistling gods.</p> <p>But a girl named Nata yearns to see the wider world. She wants to visit civilisation, something she has glimpsed in one of the books from before the world became a desert.</p> <p>Most of all, she hopes to find her mother, who said that the whistling gods did not exist – and who disobeyed the Elders, leaving the settlement, never to be seen again.</p> <p>Partnering with the Chief's young son, Tasé, she decides to head out into the dunes.</p>
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<p>We Zamyatin (1924)</p> <p>In a glass-enclosed city of absolute straight lines, ruled over by the all-powerful 'Benefactor', the citizens of the totalitarian society of OneState live out lives with no passion or creativity - until D-503, a mathematician who dreams in numbers, makes a discovery: he has an individual soul.</p>	<p>The Handmaid's Tale – Margaret Atwood (1995)</p> <p>Offred is a Handmaid in the Republic of Gilead. Her life and the lives of women like her are rigorously controlled and they are used to carry children.</p> <p>Offred can remember the years before, when she lived with her husband, Luke; when she played with and protected her daughter; when she had a job, money of her own, and access to knowledge. But all of that is gone now...</p>	<p>Fahrenheit 451 – Ray Bradbury (1953)</p> <p>Guy Montag is a fireman. His job is to destroy the most illegal of commodities, the printed book, along with the houses in which they are hidden. Montag never questions the destruction and ruin his actions produce.</p> <p>Montag befriends a young neighbour, Clarisse, who introduces him to a past where people didn't live in fear and to a present where one sees the real world. Montag quickly begins to question everything he has ever known...</p>	<p>The Maze Runner – James Dashner (2009)</p> <p>When the doors of the lift crank open, the only thing Thomas remembers is his first name. But he's not alone.</p> <p>He's surrounded by boys who welcome him to the Glade – a walled encampment at the centre of a bizarre and terrible stone maze.</p> <p>All they know is that every morning when the walls slide back, they will risk everything – even the Grievors, half-machine, half-animal horror that patrol its corridors, to try and find out what's going on.</p>	<p>Brave New World – Aldous Huxley (1932)</p> <p>Far in the future, the World Controllers have created the ideal society. Through clever use of genetic engineering, brainwashing and recreational sex and drugs all its members are happy consumers.</p> <p>A visit to one of the few remaining Savage Reservations where the old, imperfect life still continues, may be the cure for Bernard's longing to be set free</p>
<p>Divergent – Veronica Roth (2013)</p> <p>On an appointed day of every year, all sixteen-year-olds must select the faction (group) to which they will devote the rest of their lives.</p> <p>For Beatrice, the decision is between staying with her family and being who she really is—she can't have both. So she makes a choice that surprises everyone, including herself.</p> <p>But Tris also has a secret, a secret that might help her save those she loves . . . or it might destroy her.</p>	<p>The Hunger Games – Suzanne Collins (2009)</p> <p>Sixteen-year-old Katniss Everdeen, who lives alone with her mother and younger sister, regards it as a death sentence when she steps forward to take her sister's place in the Games, a fight to the death on live TV.</p> <p>But Katniss has been close to dead before—and survival, for her, is second nature. Without really meaning to, she becomes a contender. But if she is to win, she will have to start making choices that weight survival against humanity and life against love.</p>	<p>1984 – George Orwell (1949)</p> <p>Winston Smith is a young man who works in the Ministry of Truth in a London full of slums and controlled by 'Big Brother'.</p> <p>Winston rebels by opening a diary and starting a relationship, but he soon discovers the price he must pay for rebellng against Big Brother.</p>		

<h1>Dystopia</h1>	<p>What</p> <ul style="list-style-type: none"> • Abstract noun • an imagined state or society in which there is great suffering or injustice, typically one with a government or leader with significant power • Opposite of Utopia – a perfect world <p>Dystopia is a Genre – a category or type of text</p>	<p>Who</p> <ul style="list-style-type: none"> • George Orwell • Aldous Huxley • Shirley Jackson • JG Ballard • Suyi Davies Okungbowa • Suzanne Collins • James Dashner • Veronica Roth
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<h2>Dystopian conventions</h2>	<p>Dystopian society</p> <ul style="list-style-type: none"> • Citizens live in a dehumanised state • A person or figurehead is worshipped by the citizens of the society. • Individuality is bad – everyone does the same thing. • Citizens have a fear of the outside world. • Information, independent thought, and individuality are restricted. • Citizens are perceived to be under surveillance. • The natural world is banished and distrusted. 	<p>Dystopian Protagonists</p> <ul style="list-style-type: none"> • Often feels trapped and is struggling to escape. • Questions the existing social and political systems. • Believes or feels that something is terribly wrong with the society in which he or she lives. • Helps the audience recognise the negative aspects of the dystopian world through his or her perspective. <p>These are conventions – the typical features we see in Dystopian stories</p>
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9.2.2b Analytical Lenses: Form and Structure

Word	Definition	Example – Examination Day	Possible Effect
Exposition	Where the narrator introduces the key elements	Introduction of the Jordan family and the birthday	Establishes setting, theme and character
Inciting incident	An event which starts conflict in the story	First mention of the examination	Creates tension
Rising Action	Where the writer builds tension and conflict unfolds in a story	Dickie's questions, the parents growing anxious & the arrival at the building	Builds tension, evokes emotion for a character or event
Climax	Highest point of tension in the story; the turning point in a story	The examination	Creates a sense of drama
Falling action	Unravelling the conflict in a story	The telephone call	Relieves tension and builds towards resolution
Resolution	Where problems in the story are resolved and questions answered.	The decision the parents face	Solves the problem. Can leave the reader with more, depending on the type of resolution
In medias res	Opening in the middle of a narrative, with no background	Beginning at a fight or climactic situation. The Jordans never spoke of the exam. (ED)	This creates instant tension and drama
Foreshadowing	Where the writer provides a clue or a hint of something which is to come	'Dad,' he said, 'how far away is the sun?' (ED)	This question foreshadows Dickie's intelligence and creates a sense of foreboding that he will fail the test.
Cyclical structure	Where a text begins and ends with the same or similar ideas	'Bobby Martin had already stuffed his pockets full of stones, ... The children had stones already.' (L)	Possibly to suggest something is ongoing/neverending Or to create a contrast or change in something
Flashback	Where a writer goes back in time in the story and shows someone or a significant event.	'Mother was stubborn' (DS)	This often gives an insight into a character's thought or actions in a story and allows us to empathise with the character

Sentence	A sentence is a group of words giving a complete thought. A sentence must contain a subject and a verb.	'We slept in what had once been the gymnasium.' (HT)
Clause	An independent clause is a clause that can stand alone as a sentence. A dependent clauses (or subordinate clause) is one that cannot stand alone as a complete sentence. Remember that a clause has a subject and a verb.	'A balcony ran around the room' (HT)
Simple Sentence	A simple sentence has just one independent or main clause. They are not always short, but they do contain just one clause.	'It's nothing to worry about.' (ED)
Compound Sentence	A compound sentence has at least two independent or main clauses.	'Metal ground against metal; a lurching shudder shook the floor beneath him.' (MR)
Complex Sentence	A complex sentence has an independent or main clause and at least one subordinate/ dependent clause.	'Sinking to the floor, he pulled his legs up tight against his body, hoping his eyes would soon adjust to the darkness.' (MR)
Appositive phrase	An appositive phrase is a noun or a noun phrase that sits next to another noun to rename it or to describe it in another way. The word appositive comes from the Latin for to put near.	'He wanted above all, like the old joke, to shove a marshmallow on a stick in the furnace,' (F451)
Declarative Sentence	A declarative sentence simply makes a statement and ends with a full stop.	'Montag grinned the fierce grin of all men singed and driven back by flame.' (F451)
Imperative Sentence	An imperative sentence is a command or a polite request.	'"Forget about it," he said.' (ED)
Interrogative Sentence	An interrogative sentence asks a question and ends with a question mark.	'You mean a test like in school?' (ED)
Exclamatory Sentence	An exclamatory sentence expresses excitement or emotion. It ends with an exclamation mark.	'"Hey!" Rossiter yelled.' (B)

9.2.3 Analytical Lenses: Imagery and Implied Meaning

Word	Definition	Example
Metaphor	A comparison which describes an object or action which is not literally true.	'Sand hisses in its wake, an unending flute, an orchestra of whistles, a posse of snakes.' (DS)
Extended Metaphor	An extended metaphor is a version of metaphor that extends over the course of multiple lines, paragraphs, or stanzas of prose or writing.	'Through the window he could hear giant fragments of the amplified dialogue booming among the rooftops' (B) Extended metaphor of excess
Simile	A comparison using 'as' or 'like'.	'a smell like burnt oil invaded his senses' (MR)
Personification	Giving something non-human human qualities.	'It moves like a cloud would if it were angry' (DS)
Symbolism	Symbolism uses symbols, e.g. words, people, locations, or abstract ideas to represent something beyond the literal meaning.	'The children had stones already. And someone gave little Davy Hutchinson few pebbles.' (L)
Motif	A recurring/repeated idea in a literary work to form a pattern.	' BIG BROTHER IS WATCHING YOU , the caption said, while the dark eyes looked deep into Winston's own.' (1994)
Semantic Field	A group of words from the same field of meaning.	'the gymnasium; basketball nets; spectators; sweat; chewing gum; perfume; Dances; tissue paper' (HT)
Tricolon / triplet	Tricolon is a rhetorical term for a pattern of three parallel words or clauses in a sentence.	'one step, five steps, and soon she is too far.' (DS)
Subversion	Where the values and principles of a system or government are challenged or reversed.	The firemen in Fahrenheit 451
Juxtaposition	Placing two opposite ideas or concepts side-by-side in a text	Juxtaposing the music and melody with the fire and flame in Fahrenheit 451

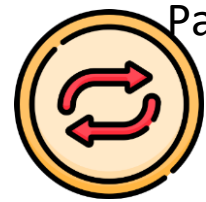
Protagonist	One of the main characters in a story or play.	Katniss is the protagonist of <i>Hunger Games</i>
Antagonist	A person or character who disagrees, opposes or goes against another, the villain.	Coriolanus Snow, president of the Capitol, is the antagonist of the <i>Hunger Games</i>
Characterise	to describe someone or something by stating the main qualities.	Okungbowa, Collins and Roth all characterise their female protagonists as rebellious
Connotation	A feeling or idea that is suggested by a particular word, or something suggested by an object or situation.	The stones in <i>The Lottery</i> have connotations of brutality and violence
Allusion	An allusion is a reference, usually short, to a person, place, thing, event, or other literary work with which the reader is presumably familiar.	'Despite the gloomiest prophecies of the Neo-Malthusians' <i>Billennium</i> – this is a reference to the economist Thomas Malthus.
Allegory	A narrative in which a character, place, or event is used to deliver a broader message about real-world issues and occurrences.	<i>1984</i> was an allegorical novel about the dangers of totalitarian governments, such as the one in Nazi Germany.
Foreshadow	Something in a story or other text which acts as a warning or sign of a future event.	Dickie puckered his brow. 'What makes it green, though? The grass?' (<i>Examination Day</i>) All the questions Dickie asks foreshadows his intelligence
Jargon	Special words or expressions that are used by a particular profession or group and are difficult for others to understand	A.F. 432 (BNW)
Sensory Language	Words and phrases which link to the 5 senses	Echo, gritty, earthy, perfumed, vibrant

Noun	Person, place, object or idea; they can be concrete or abstract and most nouns are common nouns, but some nouns are known as proper nouns (See below for specific definitions)	'The floor was of varnished wood, with stripes and circles' (HT)
Concrete nouns	are real physical things that you can see, touch, taste, smell or hear. They are important because they name the everyday things around us.	'With the brass nozzle in his fists' (F451)
Abstract nouns	are not real physical things but are ideas, feelings, concepts or beliefs. They are important because they name the feelings, ideas and values which make us human.	'Mrs. Jordan first mentioned the subject in his presence' (ED)
Proper noun	a word or group of words (such as "William Shakespeare," "Bath," or "Yate Academy") that is the name of a particular person, place, or thing and that usually begins with a capital letter.	'My name is Thomas, he thought' (MR)
Common noun	a word (such as "singer," "ocean," or "car") that refers to a person, place, or thing but that is not the name of a particular person, place, or thing.	'A SQUAT grey building ' (BNW)
Verb	Action word or state of being (to be, to make, to have are all verbs too)	'its plywood walls flexed and creaked' (B)
Adjective	A word that describes a noun or a pronoun	'like the timbers of a rotting windmill' (B)
Adverb	A word that describes a verb or adjective; there are adverbs of time, place and frequency	'Inside the woods they roam freely' (HG)
Pronoun	A word that replaces a noun	'she slinks away to the community market' (DS)
First person	The pronoun I is known as the first person e.g. First Person Narrative . A first-person narrative is one that uses the word "I" (and sometimes "we"). In other words, the storyteller gives a personal account.	'I only have to pass a few gates to reach the scruffy field called the Meadow.' (HG)
Third person	The pronouns, he/she and it are known as the third person e.g. Third Person Narrative . A third-person narrative is a story told using the pronouns "he," "she," "it," or "they" or using nouns. In other words, the story is not told from a personal perspective.	'The children assembled first, of course.' (L)
Determiner	a word that modifies, describes, or introduces a noun	This, that, the, her
Subordinating Conjunction	A conjunction that introduces a subordinate clause	After, although, since, even though, whereas
Coordinating Conjunction	A conjunction which connects sentences/ clauses of equal rank	For, and, nor, but, or, yet, so
Preposition	Words that show the position of things in relation to something else.	Under, over, in, on, opposite, adjacent to

9.2.4a Analytical Lenses: Voice, Tone and Theme

Word	Definition	Example	Possible Effect
Tone	In literary terms, tone typically refers to the mood implied by an author's word choice and the way that the text can make a reader feel.	'Why did it have to rain today?' he said. 'Why couldn't it rain tomorrow?' (ED) Dickie has a curious tone	To create a sense of character or mood in a text
Voice	This can refer to the voice of the writer, which is the style in which the writer writes, or the voice of the character, which is the style in which any character in the text speaks.	THERE IS ONE mirror in my house. It is behind a sliding panel in the hallway upstairs. Our faction allows me to stand in front of it on the second day of every third month, the day my mother cuts my hair. – Voice of Beatrice in Divergent	In a text you can literally give a voice to someone (or something) that doesn't have a voice. You can also use your own authentic voice and express your own thoughts and feelings.
Omniscient Narrator	A speaker in a text who tells the story and knows everything.	Montag grinned the fierce grin of all men singed and driven back by flame. Narrator in Fahrenheit 451	Can have different effects, can lead us to focus on certain people, events and ideas, can create a bias in the reader, can create a more detached tone
Direct speech	Where the exact words of a person or character are written in speech marks	'Why did it have to rain today?' he said. 'Why couldn't it rain tomorrow?' Dickie in Examination Day	To create a sense of character and tone
Persona	A dramatic character who is different from the writer, who is the speaker of a text.	We learned to whisper almost without sound. In the semi-darkness we could stretch out our arms, when the Aunts weren't looking, and touch each other's hands across space. The persona is Offred in Handmaid's Tale	Writers can use personas to guide the text and to evoke emotion in a reader.
Content	The topic of the text– the things which happen or the things which are considered in the text.	In the <i>Brave New World</i> extract, a group of students are being given a tour of the fertilization room with the director	To give a sense of what is happening and to whom.
Theme	The big idea which is being explored in a text.	In <i>The Lottery</i> , there are themes of community, brutality and change	Themes run through a text and present writers' ideas linked to character, society, context

9.2.5 Analytical Lenses: Repetition and Emphasis



Word	Definition	Example	Possible Effect
Anaphora	Anaphora is the repetition of a word/phrase at the beginning of successive clauses.	'Slipping through the fence, slipping through time and space, slipping in and out of proper reason' (DS)	In persuasive writing it can add emphasis and creates rhythm. In descriptive writing it can create rhythm and pace—and can be used to echo something which repeats.
Anadiplosis	Anadiplosis is a form of repetition in which the last word of one clause or sentence is repeated as the first word of the following clause or sentence.	'The whistle is a warning, a warning that those of the world before it was punished with sand refused to heed.' (DS)	It can create a chaining effect in which the words become linked together in meaning.
Diacope	Diacope is when a writer repeats a word or phrase with one or more words in between.	'Do not go out to the dunes, the Chief tells Isiuwa. The gods will whistle you to death. We mind our own business, the Chief says to Isiuwa. We stay alive because we do not seek beyond our means.' (DS)	Diacope can be used to emphasise or to make something more specific. It is often used to express strong emotion or to draw attention to whatever is being repeated.
Epizeuxis	Epizeuxis is repetition of a word or phrase in quick succession.	'Her eyes are fixed on the glorious, glorious light ahead' (DS)	Epizeuxis certainly emphasises whatever is being repeated, but it also often conveys strong emotions about something.
Asyndetic List	A list with only commas or semicolons	'Dances would have been held there; the music lingered, a palimpsest of unheard sound, style upon style, an undercurrent of drums, a forlorn wail, garlands made of tissue-paper flowers, cardboard devils, a revolving ball of mirrors,' (HT)	To emphasise how something is ongoing or never-ending

1. Number

Standard Form:

$$5326.6 = 5.3266 \times 10^3$$

(A Number) (Standard Form)

I know 5326.6 written in standard form is 5.3266×10^3 because 5.3266×1000 is 5326.6

Bounds

The lower bound is the smallest possible value that a rounded number can take.
The upper bound is the largest possible value that a rounded number can take.

I know the mass of 70 kg, rounded to the nearest 10 kg, has a lower bound of 65 kg, because 65 kg is the smallest mass that rounds to 70 kg. The upper bound is 75 kg, because 75 kg is the smallest mass that would round up to 80kg.

This can be shown as an error interval (using **inequality symbols**)

$$65\text{kg} < \text{mass} < 75\text{kg}$$

3. Quadratics

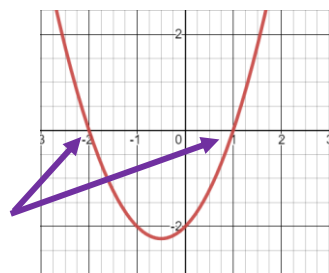
Quadratic Formula: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ for equations in the form $ax^2 + bx + c = 0$

Factorising quadratics:

$$x^2 + x - 2 = 0$$

$$(x + 2)(x - 1) = 0$$

$$x = -2 \text{ or } x = 1 \rightarrow \text{Roots}$$

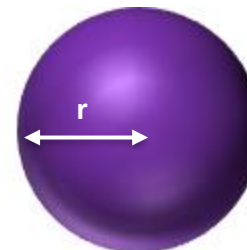


2. Shape

Formulae:

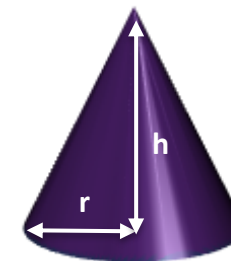
Volume of a Sphere

$$V = \frac{4}{3}\pi r^3$$



Volume of a Cone

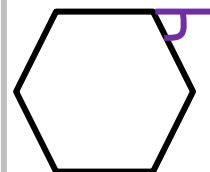
$$V = \frac{1}{3}\pi r^2 h$$



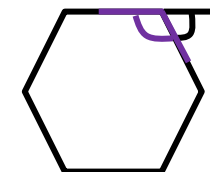
4. Angles in Polygons

Exterior Angle = $360^\circ \div \text{number of sides}$

Interior Angle = $180^\circ - \text{Exterior Angle}$



Eg: $360^\circ \div 6 = 60^\circ$



Eg: $180^\circ - 60^\circ = 120^\circ$

Sum of Interior Angle = $(n - 2) \times 180^\circ$

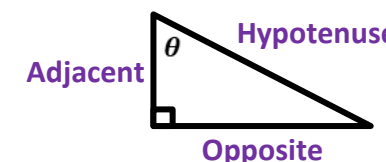
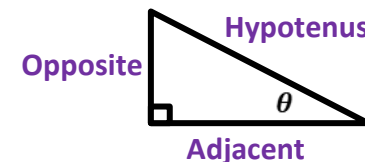
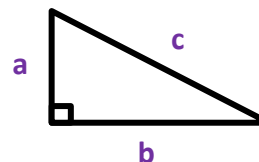
Number of sides

5. Pythagoras Theorem and Trigonometry

Pythagoras Theorem: $a^2 + b^2 = c^2$

Trigonometry: SOH CAH TOA

$$\sin\theta = \frac{O}{H} \quad \cos\theta = \frac{A}{H} \quad \tan\theta = \frac{O}{A}$$



9.2.1 Selective Breeding

1	Selective Breeding	The process by which humans breed plants and animals for particular genetic characteristics.
2	Example of desired characteristics	Resistance from disease, animals with a high yield of milk or meat, domestic dogs with a gentle nature, large or unusual flowers.
3	Disadvantages of selective breeding	Can result in “inbreeding” where some breeds are particularly prone to disease from inherited defects

9.2.2 Selective Breeding

The steps below outline the process of selective breeding:

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

9.2.3 Darwin’s Discoveries

1	Evolution	All organisms have evolved from simple single celled organisms over millions of years.
2	Natural Selection	Theory invented by Darwin which uses the idea of survival of the fittest to explain evolution.
3	Origin of Species	The book Darwin wrote and published his ideas on natural selection in.

9.2.4 Fossils and Extinction

1	Fossils	Fossils are the prints or remains of organisms that have been preserved in rock through a process of mineralisation
2	Uses of Fossils – Species Change	Fossil records are often incomplete but allow scientists to understand changes in species over time
3	Uses of Fossils – Extinct Organisms	Fossils allow us to identify organisms that are now extinct.
4	Extinction	Extinction occurs when there are no remaining individuals of a species still alive.
5	Humans and Extinction	Human behaviours have increased the rate of extinction as species are unable to adapt rapidly enough to the changes brought about by humans.

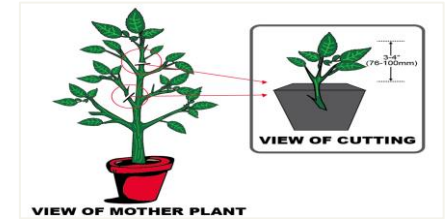
9.2.5 Natural Selection

The steps below outline the process of natural selection:

1	Step 1 – Variation	Individual organisms within a particular species show a wide range of variation for a characteristic.
2	Step 2 – Survival of Fittest	Individuals with characteristics most suited to the environment are more likely to survive to breed successfully.
3	Step 3 – Breeding and Inheritance	The characteristics that have enabled these individuals to survive are then passed on to the next generation.

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

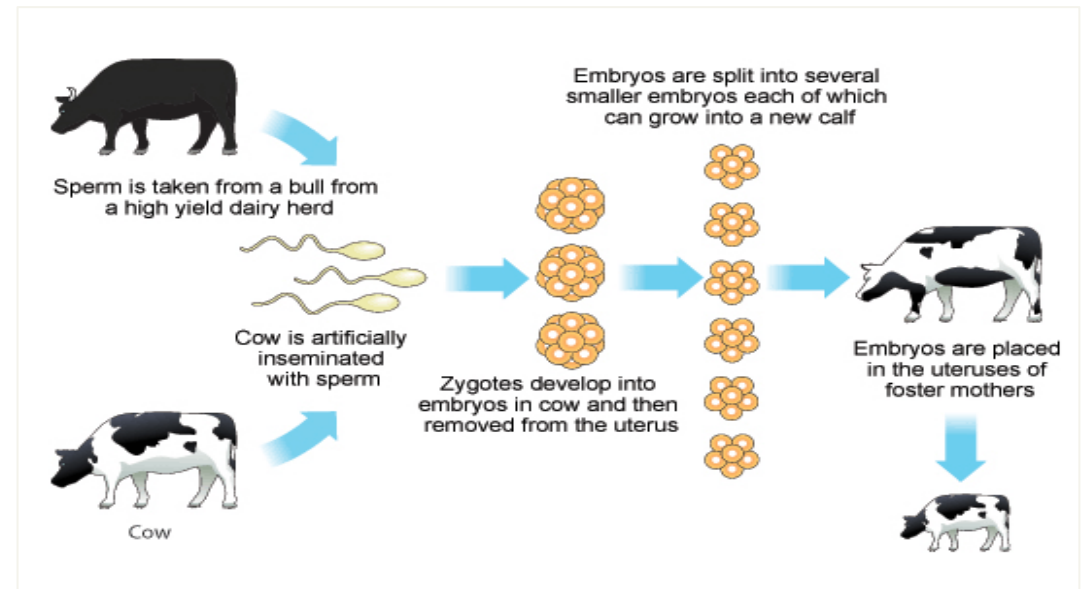
9.2.8 Plant Cloning		
1	Cutting	A small shoot of a plant used to create a clone
2	Cutting Process	<ul style="list-style-type: none"> • A small shoot of the parent plant is cut off • Shoot is placed in rooting hormone • Shoot is then planted in soil. then put in soil.



9.2.7 Embryo Cloning

The steps below outline the process for embryo cloning:

1	Step 1 – Fertilisation	Fertilisation takes place between the egg and sperm from the parents with desirable characteristics
2	Step 2 – Embryo Development	A fertilised egg develops into a cluster of identical cells. This is an embryo. The embryo is formed inside the uterus of the female
3	Step 3 – Embryo Splitting	The embryo is removed from the female and in a laboratory, it is split into several smaller embryos. Each one will be genetically identical to the original and to each other.
4	Step 4 – Implantation	Each of the little identical embryos is implanted into the uterus of a surrogate (foster) mother. Each will give birth to an individual that is identical to the others.



9.2.9 Conservation of mass

1	Atoms	Atoms are the basic units of matter that take part in chemical reactions.
2	Conservation of atoms	Atoms cannot be created or destroyed – during chemical reactions the atoms that make up the reactants rearrange to make the products.
3	Conservation of mass	The total mass of the reactants always equals the mass of the products.

Example:

Magnesium + Oxygen --> Magnesium Oxide
 $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$

Masses used: 4g 2.5g 6.5g

9.2.10 Relative Atomic Mass, A_r

1	Relative Atomic Mass	This is the combined mass of the protons and neutrons in the nucleus.
---	----------------------	---

9.2.11 Key Terms

1	Conservation	When things are kept the same, or maintained.
2	Mass	The physical substance of an object.
3	Element	Substances made of one type of atom, all the substances in the periodic table are different types of element.
4	Compound	A substance made of two or more different elements chemically bonded together in fixed proportions.
5	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

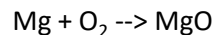
9.2.12 Representing Elements and Compounds using Symbols

1	Elements	All the elements are given a chemical symbol, these are unique to each element and consist of a single capital letter e.g. C for Carbon, or a single capital and single lower case letter e.g. Ca for Calcium.
2	Periodic Table	All the chemical symbols for all the elements that exist are found in the Periodic Table of Elements
3	Compound	Compounds are made when elements react together.

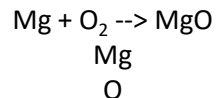
9.2.13 Balancing chemical equations

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.

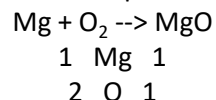
Step 1 – write out the chemical formula in its unbalanced form.



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

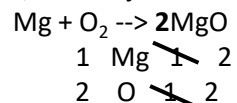


Step 3 – count how many atoms of each element are present:

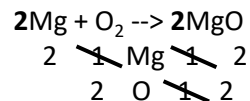


This equation is unbalanced as the number of oxygen atoms is fewer in the products.

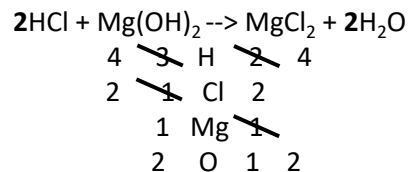
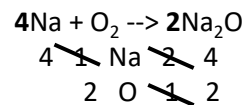
Step 4 – add large numbers in front of the chemicals in the reaction, this means you have added in another atom or molecule of that substance, then adjust the totals:



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



Examples:



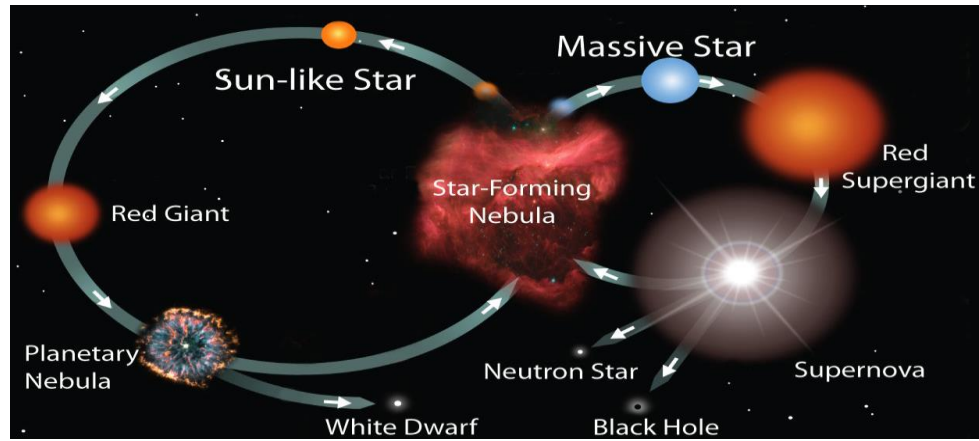
9.2.14 Relative Formula Mass, Mr

1	Relative Formula Mass	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.
2	Relative Formula Mass Example – Calcium Carbonate CaCO ₃	1 calcium atom – Ar 40 for each atom, so 40 x 1 = 40 1 carbon atom – Ar 12 for each atom, so 12 x 1 = 12 3 oxygen atoms – Ar 16 for each atom, so 16 x 3 = 48 40 + 12 + 48 = 100

9.2.15 Moles

1	Moles	Moles are quantities given to substances that relate to how many atoms or molecules are present in a sample.
2	Avogadro's Constant	This is 6.022 x 10²³ particles of a substance, the number of particles in one mole.
3	Calculating number of moles	
	Calculating moles example - Sodium Chloride	A sample of sodium chloride (NaCl) has a mass of 4.75 g. First, calculate the Mr of NaCl Na: 23 x 1 = 23 Cl: 35.5 x 1 = 35.5 23 + 35.5 = 58.5

9.2.16 Life cycle of a star



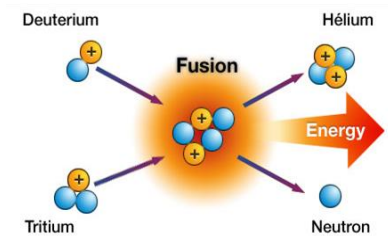
1	Nebula	A star forms from massive clouds of dust and gas in space, also known as a nebula
2	Protostar	A star is formed when it is hot enough for the hydrogen nuclei to fuse together to make helium.
3	Main Sequence Star	During this stable phase in the life of a star, the force of gravity holding the star together is balanced by higher pressure due to the high temperatures.
4	Red Giant	When all the hydrogen has been used up in the fusion process, larger nuclei begin to form and the star expands to become a red giant.
5	White Dwarf	When all the nuclear reactions are over, a small star like the Sun may begin to contract under the pull of gravity.
6	Supernova	A larger star with more mass will go on making nuclear reactions, getting hotter and expanding until it explodes as a supernova.

9.2.17 Key terms

1	Nebula	A giant cloud of dust and gas in space.
2	Sun-like star	A star with a similar mass to the sun. The star fuses hydrogen producing light and heat.
3	Red giant	A star formed after hydrogen has run out. This star fuses mainly helium.
4	Planetary nebula	A ring-shaped nebula round an ageing star.
5	Massive star	A star with a mass much larger than the sun's mass.
6	Supernova	The explosion of a star.
7	Neutron star	A small, very dense star consisting mainly of closely packed neutrons.
8	Black-hole	Formed after very massive stars collapse. It can continue to grow by absorbing the mass of other stars.

9.2.18 Nuclear fusion

1	Nuclear Fusion	Two nuclei fuse (join together) to make a bigger nucleus and energy.
2	Fusion in Stars	Nuclear fusion occurs in stars to give out energy. This is why stars shine.



9.2.19 Doppler effect

1	Doppler Effect	The wavelength of a wave from a moving object is <i>shifted</i> .
2	Objects moving away from you	If the object is moving away, the wavelength is shifted to be longer.
3	Objects moving towards you	If the object is moving towards you, the wavelength is shifted to be shorter.



4	Doppler Effect – Police Car	As the police car approaches the sound waves are compressed and pitch rises.
5	Doppler Effect – Police Car	As the police car moves away the sound waves are stretched and pitch rises.

9.2.20 Red-shift and blue-shift

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

1	Red-shift	When an object is moving away from you the wavelength of light is shifted to be longer (Red-shift).
2	Blue-shift	When an object is moving towards you the wavelength of light is shifted to be shorter (Blue-shift).

9.2.21 The Big Bang

1	The Big Bang Theory	The universe was created 13.7 billion years ago at a single point. The universe expanded from this point and continues to expand.
2	Evidence for the big bang	Red-shift and Cosmic Microwave background Radiation (CMBR) are evidence the big bang theory.
3	Steady State Theory	In this theory, there was not a single creation event and matter is continually created.
4	Evidence for the steady state theory	Cosmic Microwave background Radiation (CMBR) supports the steady state theory.

9.2.22 Cosmological Red-shift

1	Observations of galaxies	When other galaxies in the universe are observed, they are <u>all</u> red-shifted.
2	What does red-shift tell us?	The red-shift we observe tells us that all galaxies are moving away from us at very high speeds.

9.2.23 Hypotheses and Variables

1	Hypothesis	A hypothesis is a prediction made about an experiment based on some previous scientific knowledge.
2	Dependent Variable	What we measure
3	Independent Variable	What we change
4	Control Variable	What we keep the same

9.2.24 Methods

1	Contents of a method	<ul style="list-style-type: none"> A clear sequence Information on which equipment to use Volumes and masses for reagents Scientific language
---	----------------------	---

Example method:

- 25cm³ sulphuric acid was added to a small beaker.
- Using a spatula, excess insoluble base (copper oxide powder) was added to the acid. Check the base is in excess by looking for remaining powder in the beaker.
- The excess base was filtered out using filter paper in a funnel. The filtrate was allowed to filter into a conical flask.
- When filtration was complete, the filter paper was discarded and the filtrate solution was poured into an evaporating dish.
- The solution was left for a few days or the evaporating dish heated for the dissolved salt to crystallise.

Precision (arrow pointing to step 1)

Sequencing (arrow pointing to step 3)

Scientific language (arrow pointing to step 5)

Equipment (arrow pointing to step 4)

9.2.25 Key Terms

1	Independent variable	The variable you change to find out its effect on the dependent variable
2	Dependent variable	The variable you measure to see how it changes
3	Control variable	Any variable that you must keep the same to ensure it doesn't affect the dependent variable
4	Mean	The total of the values divided by the number of values
5	Anomalous data	Data that does not fit the expected pattern

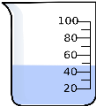



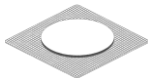


9.2.26 Results Tables






1	Results table layout	The independent variable should always go in the first column, the dependent variable then goes in the column to the right of this.
2	Contents of a results table	<ul style="list-style-type: none"> Show all repeat measurements Include the units in the headings Circle anomalies Discount these when calculating a mean

Example results table:

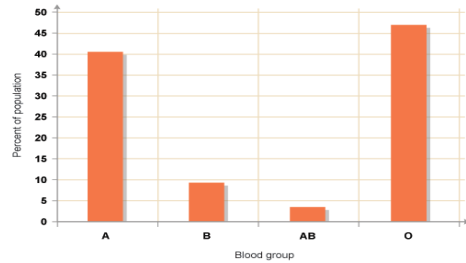
Concentration of acid (M)	Time taken for reaction to complete (s)			Mean (s)
0.1	102.1	105.6	103.4	103.7
0.2	88.8	86.5	87.2	87.5
0.3	69.1	67.3	64.2	66.9
0.4	56.2	40.1	53.3	54.8
0.5	32.1	30.1	33.2	31.8

9.2.27 Common laboratory equipment

1	Beaker		For pouring and transferring liquids and solutions.
2	Conical Flask		For carrying out reactions
3	Bunsen Burner		To heat substances
4	Tripod		To support
5	Gauze		To place an object on for example conical flask that you are going to heat.
6	Heatproof mat		To protect the desk from the heat produced by the Bunsen Burner and any spillages from the substances which are being heated
7	Evaporating basin		To evaporate the water from solutions. Leaving behind the solute.

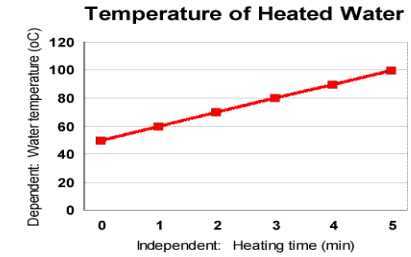
8	Test Tube		For carrying out chemical reactions with small volumes of liquid
9	Boiling Tube		A boiling tube is used to heat substances in a Bunsen Burner
10	Measuring Cylinder		To accurately measure out volumes of liquid
11	Spatula		To move small amounts of solid powders
12	Stirring Rod		To stir solutions.
13	Thermometer		To measure the temperature of a substance
14	Tongs		To hold an move hot solids for example pieces of metal

9.2.28 Discontinuous data



1	Discontinuous data	Discontinuous or categoric data can only take certain values
2	Examples of discontinuous data	Eye colour and blood group,
3	How to plot discontinuous data	Bar Chart

9.2.30 Continuous data



1	Continuous data	Continuous data can take any value
2	Examples of continuous data	Height or temperature.
3	How to plot continuous data	Line Graph

9.2.29 Drawing good line graphs

1	x Axis	Plot the dependent variable
2	y Axis	Plot the independent variable
3	Drawing the graph	<ul style="list-style-type: none"> Label axis and include units Use small precise crosses to mark your points
4	Line of best fit	Line of best fit which goes smoothly through as many points as possible (this does not have to be a straight line)
5	Anomalies	Circle anomalies and don't include them when drawing the line of best fit

Labels for axes, with units given in brackets

Both axes have suitable scales (equal intervals)

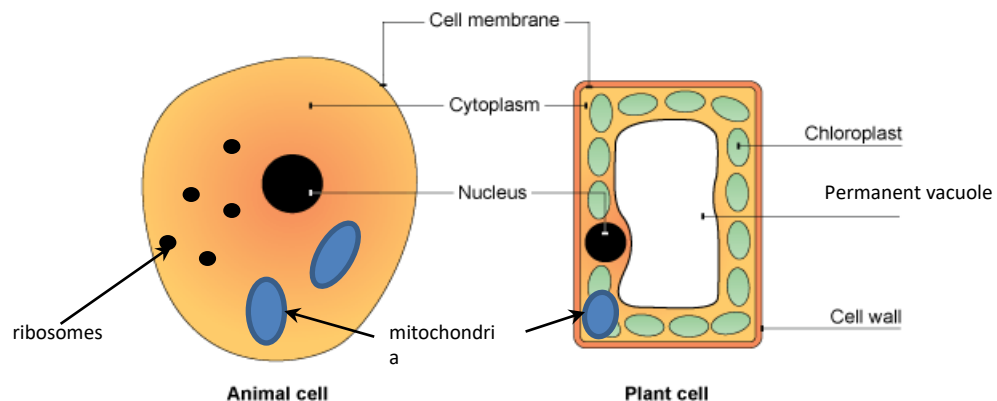
Accurate line of best fit, passing through most points, excluding anomalies.

Neat, accurately placed plots.

Anomaly recognised and highlighted on the graph

9.2.31 Eukaryotic Cells

Eukaryotic cells include all plant, animal and fungus cells. Their most important feature is that they have a nucleus, unlike prokaryotic cells. Learn how to identify the general cell structures shown below.

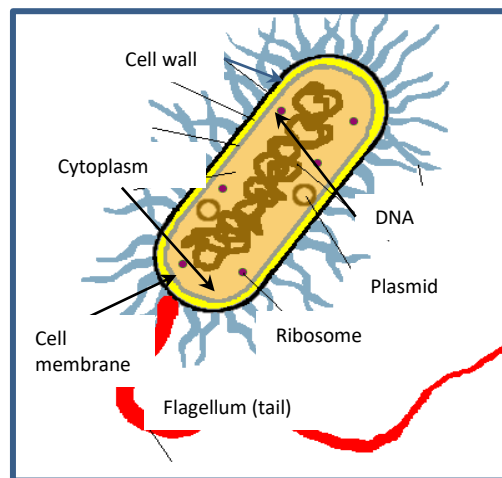


9.2.32 Prokaryotic Cells

Bacteria are prokaryotic cells (all bacteria are single-celled organisms). The most important differences to eukaryotic cells are that they are smaller and their 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.

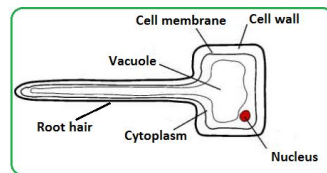
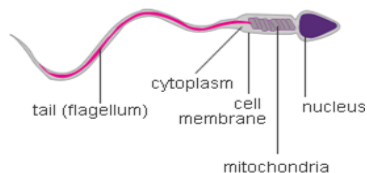
Plasmids allow bacteria to swap genetic information between them.



9.2.33 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 and animal cells.
Prokaryotic cells	Bacterial cells; these don't have a nucleus to enclose their genetic material.
Cell membrane	It controls the movement of substances into and out of the cell.
Subcellular structure	A part of a cell. (Sub- means less than – so these are the component parts of cells.)
Nucleus	The enclosure for genetic material found in plant and animal cells.
Cytoplasm	The interior of a cell, where most of the chemical reactions needed for life take place.
Mitochondria	The sub-cellular structure where aerobic respiration takes place.
Ribosome	The sub-cellular structure where proteins are made (synthesised)
Chloroplast	A sub-cellular structure responsible for photosynthesis – only found in plant cells and algal cells.
Permanent vacuole	A sub-cellular structure only found in plant and algal cells – it is filled with cell sap (a store of nutrients for the cell).
Cell wall	A sub-cellular structure that is never found in animal cells. It is made of cellulose, it is outside the cell membrane and it strengthens the cell.
DNA	The molecule that holds the genetic information in a cell. In eukaryotic cells, it is one linear strand. In prokaryotic cells, the DNA forms a loop.
Plasmid	A small loop of DNA, only found in prokaryotic cells.

9.2.34 Cell Specialisation

Not all cells have the same function. 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 are formed when cells with similar structures and functions work together. For example: muscle tissue in animals; phloem tissue in plants.

Organs are formed from multiple tissues working together. 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.

9.2.35 Microscopy

Use of a microscope is called microscopy. Microscopes allowed scientists to discover cells and find all the subcellular structures. We can calculate the image size produced using the equation to the right.

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 were a vital invention for understanding cells. They have higher magnification and more resolving power than light microscopes, so they let you see smaller structures.

9.2.36 Key Terms	Definitions
Organism	Any 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, plants and many fungi.
Specialised cell	Cells in multicellular organisms that have a particular job, or function.
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 tissues performing a specific function.
Organ system	Organs don't operate alone: they work together to form organ systems.
Light microscope	A usual school microscope is a light microscope. Lower magnification and resolution than an electron microscope.
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.
Electron microscope	A type of microscope with much high magnification and resolution than a light microscope.

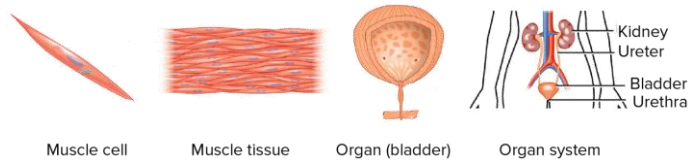
9.2.37 Equation

Image size = object size x magnification

9.2.38 Unicellular vs. multicellular organisms

Unicellular organisms' bodies are simply one cell. All bacteria and other prokaryotic organisms are unicellular. **Multicellular** organisms are made of many cells and are much more complex. In multicellular organisms, cells **differentiate** to become **specialised cells**, as described on the previous page.

The levels of organisation in multicellular organisms form a **hierarchy**. In biology, hierarchies get more complex as you go up because the upper things are made up of the things below them. The organisational hierarchy in multicellular organisms is shown here.

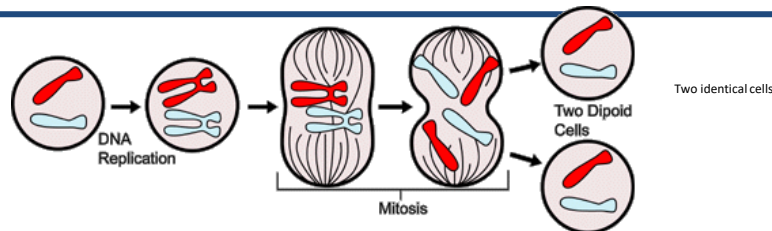
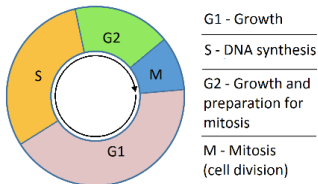


9.2.39 Stem cells

Once cells are specialised, they can't go back to being an un specialised cell. This is why we all start life as a mass of un specialised cells, called **stem cells** – this is what an embryo is. Stem cells can divide to make new cells and can differentiate to become specialised cells.

In an embryo, all the cells are stem cells, so they can be taken, cloned and used to produce any human cells by differentiation.

In adults, there are not many stem cells left – most have differentiated. But there are some, for repair and replacement of specialised cells. For instance, there are stem cells in the bone marrow. These can be collected, cloned and made to differentiate into any type of blood cell. Using stem cells in this way is an active area of medical research, to treat conditions like diabetes and paralysis.



9.2.40 Key Terms	Definitions
Unicellular	Describes organisms formed of only one cell
Differentiation	The process of becoming a specialised cell. Specialised cells are the result of differentiation of stem cells .
Stem cells	Cells that are undifferentiated.
Embryo	A ball of stem cells
Cell cycle	The series of stages during which cells divide to make new cells. In the cell cycle, the DNA is replicated (copied exactly) and the cell splits by mitosis into two cells with one set of DNA each.
Mitosis	The specific part of the cell cycle where the cell divides to make two new cells, which are identical.
Chromosome	DNA that has been tightly wound up.

9.2.41 The Cell Cycle – diagram bottom left

Cells divide 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.

1. The cell grows larger and makes more subcellular structures, such as ribosomes and mitochondria. (It makes enough for two cells!)
2. The genetic material (**DNA**) is doubled by making an exact replica of the chromosomes. So, there are two copies of every chromosome at this point in the cell cycle.
3. Then, **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 are two full sets of chromosomes at each end of the cell.
4. The cytoplasm and cell membranes divide to form two genetically identical cells.

9.2.42 Exchange and Transport

To stay alive, all organisms must **exchange** substances with their environment. This means they must transport **into** cells the substances they need from the environment and transport **out** waste products to the environment.

Substances can be transported into or out of cells by: **diffusion, osmosis** or **active transport**.

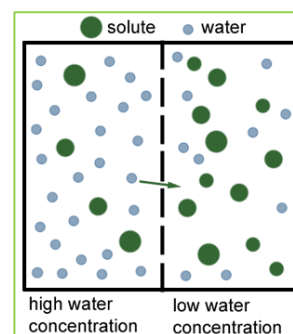
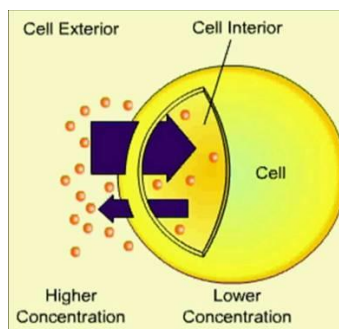
9.2.43 Diffusion

Diffusion allows many substances to move into or out of cells. Thanks to the random motion of particles in liquids and gases, particles will spread out until the concentration is equal throughout. Overall, the **net movement** of the substance will be from higher to lower concentration, as the diagram shows.

Diffusion is the process by which oxygen is transported into the bloodstream, and carbon dioxide is transported out (in the lungs, or gills of fish). It is also how the waste product **urea** moves from cells into the bloodstream, before removal in the urine.

The **rate** of diffusion is affected by:

1. The steepness of the concentration gradient
2. The temperature (a higher temperature increases the rate of diffusion as particles have more kinetic energy)
3. The surface area of the membrane (a larger surface area of cell membrane increases the rate of diffusion into/out of a cell).



9.2.44 Osmosis

Osmosis is the movement of water from a more dilute solution (more 'watery') to a more concentrated solution (less 'watery') across a **partially permeable membrane**, such as a cell membrane. Osmosis causes cells to swell up if they are placed in a dilute solution, or shrivel up if they are placed in a concentrated solution (a solution of salt, for instance, or sugar).

9.2.45 Key Terms

Definitions

Diffusion	The net (overall) movement of particles from a higher concentration to a lower concentration
Concentration gradient	The difference in concentration of a substance between two places. A 'steeper' concentration gradient means there is a bigger difference in concentration.
Surface area to volume ratio	The surface area divided by the volume of an organism, organ or cell. Generally, the smaller an organism is, the larger the surface area to volume ratio.
Exchange surface	A surface where exchange of substances takes place.
Diffusion pathway	The distance over which a substance must diffuse.
Osmosis	The diffusion of water from a dilute solution to a more concentrated solution across a partially permeable membrane.
Partially permeable membrane	A membrane that only allows some substances through – others are prevented from travelling through. (e.g. a cell membrane)
Active transport	The movement of substances against the concentration gradient – from lower to higher concentration. This requires energy from respiration.

9.2.46 Active Transport

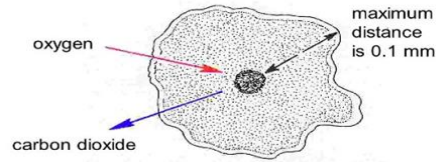
Active transport is the movement of particles from a low concentration to a high concentration, which requires energy.

E.g. in plants: Root hair cells absorb mineral ions (like magnesium ions and nitrate ions) from the soil by active transport, needed for healthy growth.

E.g. in animals: absorption of sugar from the intestine into the blood – the blood has a higher sugar concentration so active transport is needed. The sugar is needed by all cells in the body for respiration.

9.2.47 Adaptations for efficient exchange and transport

Unicellular organisms have a very large surface area to volume ratio compared to multicellular organisms. This means that they simply exchange substances through their cell membrane directly with their environment. They are small enough that diffusion is sufficient to meet their needs (see diagram).



However, in multicellular organisms, cells that are not at the surface wouldn't be able to directly exchange substances with the environment. This is why organs with specialised exchange surfaces have evolved. Without lungs, gills, or leaves, for example, multicellular organisms wouldn't be able to obtain enough of the substances they need to survive, or be able to get rid of waste products efficiently.

9.2.48 Specialised exchange surfaces

To be effective at exchanging substances with the environment, any exchange surface must have a **large surface area**, and a thin wall/membrane for a **short diffusion pathway**. In animals, a constant blood supply also increases effectiveness, and in the lungs, ventilation (breathing in and out) increases effectiveness by refreshing the concentration gradient with each breath.

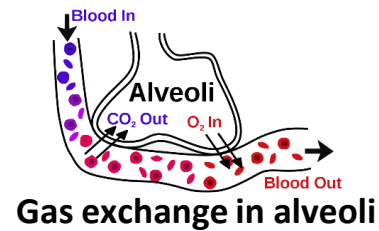
9.2.49 Exchange in animals and plants

Gas exchange in many animals happens in the lungs. The structures in the lungs where it happens are the **alveoli**. There are millions of these tiny air sacs, so their surface area is gigantic. They also have a short diffusion pathway, a good blood supply and air supply due to **ventilation**.

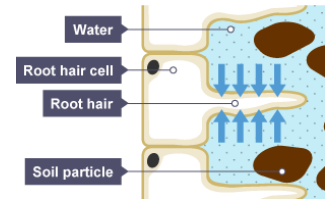
In fish, gills are where gas exchange takes place (see diagram). Again, a huge surface area increases the efficiency of gas exchange, along with a short diffusion pathway and good blood supply. The huge surface area comes from the division of gills into very thin plates of tissue called **lamellae**. This also creates the short diffusion pathway.

In plants, the **roots** absorb water and mineral ions. The root hair cells have **long projections** that increase the surface area of this exchange surface, and shorten the diffusion pathway. The **stomata** in the **leaves** are responsible for gas exchange, including oxygen out and water vapour out, and carbon dioxide in. Being flat and broad increases the effectiveness of the leaves as exchange surfaces, by increasing the surface area and shortening the diffusion pathway.

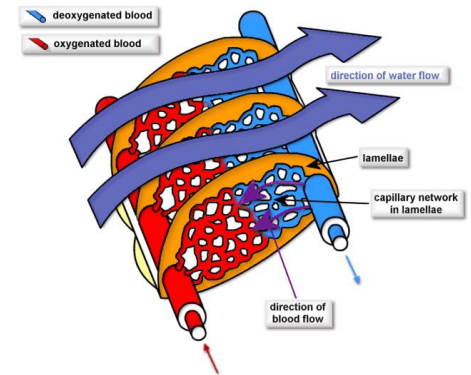
9.2.50 Key Terms	Definitions
Small intestine	The organ in the digestive system where products of digestion are absorbed into the bloodstream.
Lungs	The organs where gas exchange takes place. The air sacs where gases are actually exchanged are called alveoli .
Gills	The organs in fish where gas exchange takes place. Oxygen is absorbed from the water into the blood, and carbon dioxide is transferred to the water.
Leaves	The plant organs responsible for gas exchange.
Ventilation	Technical term for breathing in and out.



Gas exchange in alveoli



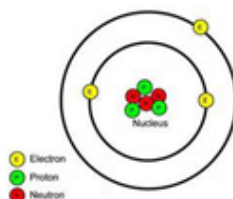
Substance exchange in roots



Gas exchange in gills

9.2.51 The Structure of the Atom

- All matter is made from atoms. Atoms are very small. The radius of atom is about 1×10^{-10} m (this is also known as 0.1 nanometres).
- The central part of the atom is known as the nucleus. It is only 1×10^{-14} m across, which is 10,000 times smaller than the total atom.
- An atom is made up of three subatomic particles: **protons**, **neutrons** and **electrons**.
- Protons and neutrons are found in the **nucleus**
- Electrons are found orbiting the nucleus in shells.

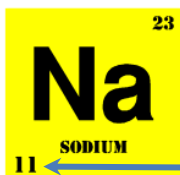


- The mass and charges of the subatomic particles is shown below:

	Mass	Charge
Proton	1	+1
Neutron	1	0
Electron	0	-1

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

9.2.52 Atomic Number and Mass Number



Mass number: This is the total protons+neutrons

Atomic number: This is the number of protons

Therefore, sodium has 11 protons, 11 electrons and $23 - 11 = 12$ neutrons.

9.2.53 Key Terms	Definitions
Atom	The particles that make up all substances with mass; they are made of protons, neutrons and electrons.
Nucleus	The centre of an atom; it is made of protons and neutrons.
Nanometre	A unit of measurement: 1×10^{-9} m
Proton	A positively charged particle in the nucleus of an atom
Electron	The negatively charged particle found on the shells of an atom
Subatomic	Particles smaller than an atom (protons, neutrons, electrons)
Neutron	A neutral particle found in the nucleus of an atom
Atomic number	The number of protons in an atom.
Mass number	The total of protons and neutrons in an atom.

9.2.54 Electron Configuration/Electronic Structure

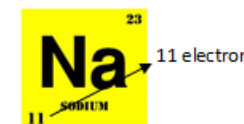
There are very strict rules about how electron fill up the electron shells, the inner shell is always filled first. Each shell has a maximum number of electrons it can take.

Shell 1: maximum 2 electrons

Shell 2: maximum 8 electrons

Shell 3: maximum 8 electrons

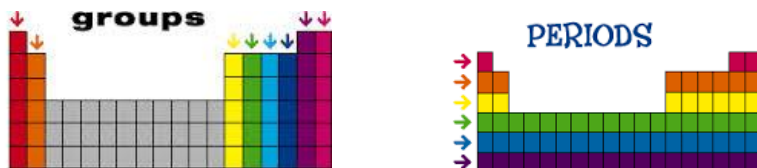
Example:



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

9.2.55 Elements

- An **element** is a substance made from only one type of atom. All elements are given a symbol and are found on the periodic table. You need to learn the symbols for the first 20.
- The Periodic Table is arranged into groups (columns) and periods (rows), as shown below.



Elements in the same group have:

- The same number of electrons in their outer shell
- Similar properties

Elements in the same period have:

- The same number of electron shells

9.2.56 Compounds

- Compounds are made of 2 or more elements that are chemically bonded
- These are made in chemical reactions.
- Compounds are given a formula. For example, carbon dioxide is CO₂ means 1 carbon atom and 2 oxygen atoms.

9.2.57 Mixtures

- Mixtures are made up of different elements or compounds that are not chemically bonded e.g. a mixture of salt and water

9.2.58 Chemical Reactions always Conserve Mass

- In some chemical reactions, it may appear that there are less products than there were reactants; however, this is often because a gas has been made and this has escaped into the atmosphere.

9.2.59 Key Terms

Definitions

Element	A substance that contains only one type of atom
Mixture	Two or more different atoms which are not chemically bonded
Compound	Two or more elements that are chemically bonded
Group	The columns on the periodic table
Period	The rows on the periodic table
Reactant	Chemicals you start with in a chemical reaction
Product	Chemicals made in a chemical reaction

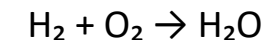
9.2.60 The Conservation of Mass

- In a chemical reaction, chemical bonds in the reactants are broken, the atoms are rearranged and new bonds are made to form the products.
- In a chemical reaction you must start and finish with the **same mass**.

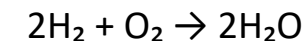


9.2.61 Balancing Equations

- We need to write balanced chemical equations represent chemical reactions and the conservation of mass.
- For example: The equation below shows hydrogen and oxygen making water but there are more oxygen atoms on the right than the left.

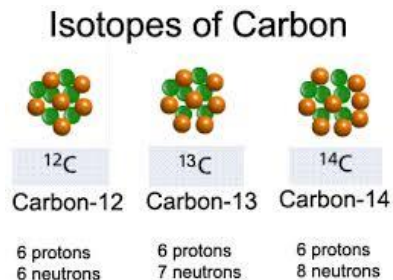


- In the equation below there are 4 hydrogen atoms on the left and right of the equation and 2 oxygen atoms on each side



9.2.62 The History of the Periodic Table

- Throughout history scientists have tried to classify substances and many scientists attempted to construct a periodic table.
- Before the knowledge of protons, neutrons and electrons, scientists arranged the Periodic table by **atomic weight**. This meant the groups were not always correct.
- In 1869 Dimitri **Mendeleev**, a Russian Scientist, published his periodic table. It was slightly different to those that had been before. He still arranged elements by atomic weight but he also left gaps for where he predicted elements would be.
- He very accurately predicted the properties of elements that were not discovered until many years later; for example: Gallium.
- Mendeleev's Periodic Table is still different from the modern one as some of his masses were wrong due to the existence of **isotopes**
- Isotopes are elements with same number of **protons and electrons** but a different number of **neutrons** and therefore different atomic weights.

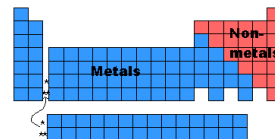


Mendeleev's Periodic Table

H = 1	Be = 9,4	Mg = 24	Zn = 65,2	Cd = 112	Hg = 200
B = 11	Al = 27,4	?	?	U = 116	Au = 197?
C = 12	Si = 28	?	?	Sn = 118	Bi = 210?
N = 14	P = 31	As = 75	Sb = 122	?	?
O = 16	S = 32	Se = 78,4	Te = 128?	?	?
F = 19	Cl = 35,5	Br = 80	I = 127	?	?
Li = 7	Na = 23	K = 39	Rb = 85,4	Cs = 133	Tl = 204
		Ca = 40	Sr = 87,6	Ba = 137	Pb = 207
		Y = 46	Ce = 92		
		?Zr = 56	La = 94		
		?Yt = 60	Di = 95		
		?In = 75,6	Th = 118?		
		Ti = 50	Zr = 90	? = 180	
		V = 51	Nb = 94	Ta = 182	
		Cr = 52	Mo = 98	W = 186	
		Mn = 55	Rh = 104,4	Pt = 197,4	
		Fe = 56	Ru = 101,1	Ir = 195	
		Cu = 63,4	Ag = 108	Hg = 200	

9.2.63 Metals and Non-Metals

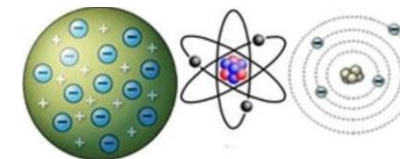
- Metals** are found on the left hand side of the periodic table. The majority of elements are metals.
- When metals react, they lose an electrons to form positive ions.
- Non metals** gain electrons to form a negative charge.

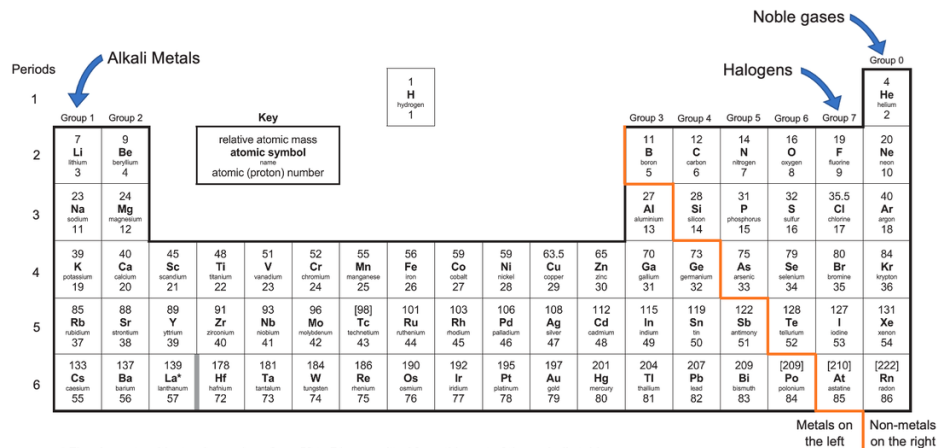


9.2.64 Key Terms	Definitions
Isotope	Two atoms of an element with the <u>same</u> number of protons and electrons but a <u>different</u> number of neutrons
Metal	An element which loses electrons to form a positively charged ion
Non metal	An element which gains electrons to form a negatively charged ion
Ion	A particle (e.g. an atom) with a positive or negative charge

9.2.65 The History of the Atom

- Before electrons were discovered, atoms were thought of as tiny, hard spheres that couldn't be divided into smaller particles.
- Plum Pudding Model (Thompson) - Electrons were discovered so the model was modified. The atom was described as a ball of positive charge with negative electrons embedded in it (first model below)
- Nuclear Model (Rutherford) - A famous experiment showed that atoms have a hard, very small concentration of positively charged mass in the centre – which was named the nucleus (second model below)
- Nuclear Model + Shells (Bohr) - The nuclear model was further developed to include the idea that electrons orbit at specific distances from the nucleus in shells (third model)
- Nuclear Model, Shells + Neutrons (Chadwick) - in 1932, it was proved that there were also uncharged particles in the nucleus, called 'neutrons' as they are neutral: no charge. It's like the last model but with neutrons.





9.3.34 Key Terms	Definitions
Alkali Metals	Group 1 elements - all with 1 electron on their outer shell
Halogens	Group 7 elements - all with 7 electron on their outer shell
Noble Gases	Group 0 elements - all with a full outer shell
Diatomic Elements	Elements that exist in pairs, so they are molecules e.g. O ₂ , Cl ₂ , H ₂

9.3.33 Groups in the Periodic Table

Group	Physical properties	Chemical Properties	Equation Example	Trends/Explanation
Group 1 Alkali metals	Soft, low density	React vigorously with water to form a metal hydroxide and hydrogen	Sodium + Water → Sodium Hydroxide + Hydrogen	More reactive as you go down the group: outermost electron is further from the nucleus so the attraction to the nucleus is weaker. This makes it easier to lose the outer electron
Group 7 Halogens	Low melting point, exist as diatomic elements (Cl ₂)	React with group 1 metals to form compounds. Can carry out displacement reactions	Sodium + Chlorine → Sodium Chloride Sodium Bromide + Chlorine → Sodium Chloride + Bromine	Higher melting point as you go down the group because the molecules get bigger. Less reactive as you go down the group: outermost electron is further from the nucleus so the attraction to the nucleus is weaker. This makes it harder to gain an outer electron
Group 0 Noble Gases	Low melting point/boiling point	Unreactive, as they have a full outer shell	N/A	Higher melting point and boiling point as you go down the group

A	Key vocabulary	
1	patriarchal	ruled and dominated by men
2	heir	the person next in line to be king
3	industrial	to do with factories
4	sources	fragments of the past that have survived like diaries, newspapers, photographs, and physical remains such as clothes
5	independence	freedom from an empire
6	to settle	to move permanently to a new place
7	democracy	the idea that people should choose their leaders by voting in elections
8	Protestants	Christians who want the bible to be in English and the monarch to be head of the church
9	Catholics	Christians who want the bible to be in Latin and the Pope to be head of the church
10	the Reformation	When Christianity split between Protestantism and Catholicism in the 16 th Century
11	empire	One place ruling lots of other places
12	colony	a place controlled by an empire
13	to rebel	to fight against the King / government
14	to abolish	to get rid of / to end (slavery)
15	to enslave	to make (someone) into a slave

B Protestant beliefs		
1	Who should be head of the church?	The monarch (the king or queen)
2	What language should the Bible be in?	English
3	How should churches be decorated?	Plain and simple: bare walls, a plain wooden table for an altar
4	What did you need to do to get to heaven?	Just believe in God
5	Were monasteries important?	No

C Catholic beliefs		
1	Who should be head of the church?	The Pope
2	What language should the Bible be in?	Latin
3	How should churches be decorated?	Highly decorated with stained-glass windows and images of Jesus and the saints
4	What did you need to do to get to heaven?	Good works, indulgences, pilgrimages
5	Were monasteries important?	Yes

D The Reformation geography		
1	The Netherlands	a hotbed of Protestant belief
2	London and the southeast	more likely to be Protestant because they were well connected to the Netherlands
3	Towns	more likely to be Protestant because more people were literate
4	educated and literate people	more likely to be Protestant because they wanted to read the bible in English
5	The North and West	more likely to be Catholic because they were less connected to the Netherlands
6	The countryside	more likely to be Catholic because fewer people were literate
7	Uneducated and illiterate people	more likely to be Catholic because they couldn't read the bible and relied on images
8	Wales and Cornwall	more likely to be Catholic because the English bible threatened their languages

E	Key Vocabulary	
1	imperial	to do with an empire
2	militant	uses violent methods as part of political protest
3	campaigner	someone working toward a change in society
4	suffragists	Suffrage campaigners who used peaceful methods
5	suffragettes	Suffrage campaigners who used militant methods
6	domestic sphere	the home
7	working class	the poorest people, who work in factories and lived in slums
8	middle class	wealthier people who were lawyers/teachers/factory owners etc

E	Who were the suffragists?	
1	What was their leading organisation?	The National Union of Women's Suffrage Societies (NUWSS)
2	When did their campaign begin?	In the 19 th Century
3	What methods did they use?	Letters to MPs, organising marches, 'votes for women' MPs
4	Were their methods peaceful or militant?	Peaceful, non-violent

F	Who were the suffragettes?	
1	What was their leading organisation?	The Women's Social and Political Union (WSPU)
2	When did their campaign begin?	1905
3	What methods did they use?	Planting bombs in MPs houses; organising hunger strikes in prison; damage to property
4	Were their methods peaceful or militant?	militant

I	Key Vocabulary	
1	alliance	an agreement to protect each other
2	arms race	countries competing to have the most powerful armed forces
3	flashpoint	An event where tension turns into conflict
4	to deter	to put someone off doing something
5	militarism	the belief in having a strong army / navy
6	nationalism	A belief that your country is the best
7	imperialism	The policy of colonising parts of the world
8	imperial rivalry	rivalry between empires trying to colonise the same part of the world
9	to mobilise	To get an army ready to fight
10	unification	becoming one country

J	The alliance system	
1	Which countries formed the Triple Entente?	Britain, France and Russia
2	Which countries formed the Triple Alliance?	Germany, Austria-Hungary and Italy
3	How did alliances prevent war at first?	It deterred countries from attacking each other

K	The Assassination of Franz Ferdinand	
1	Who was Archduke Franz Ferdinand?	Heir to the throne of the Austro-Hungarian Empire
2	Who assassinated him?	A Bosnian, Gavrilo Princip
3	Why were Serbia blamed?	Many Bosnians wanted to be part of Serbia, not Austria-Hungary, so Austria-Hungary claimed Serbia had planned the assassination
4	How did the Triple Alliance respond?	Austria-Hungary prepared to retaliate and Germany agreed to support Austria-Hungary
5	Why was war declared in August 1914?	Russia mobilised to protect Serbia, so Germany attacked France (following the Schlieffen Plan). Britain declared war as a result.

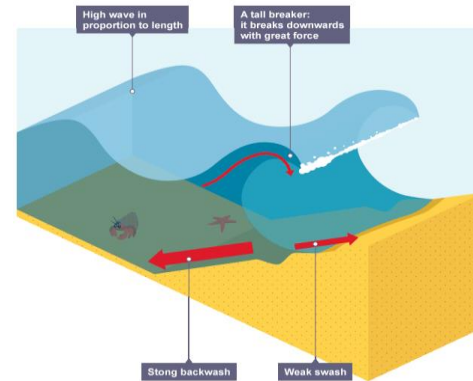
I	Key Vocabulary	
1	armistice	an agreement to stop fighting
2	sepoys	Indian soldiers who fought for Britain
3	British Raj	India under British rule
4	Viceroy	the British man who ruled India on behalf of the king
5	reform	small gradual change
6	satyagraha	a form of peaceful protest led by Gandhi
7	independence	freedom from an empire
8	imperial rivalry	rivalry between empires trying to colonise the same part of the world
9	turning point	an event that leads to significant change
10	Indian National Congress	the organisation of Indians fighting back against British rule

J	India chronology			
	DATE	EVENT	DETAILS	IMPACT
1	1914-1918	The First World War	Indian men fought for Britain	led Indians to expect reforms as a reward for their loyalty.
2	1919	The Jallianwala Bagh Massacre	Soldiers killed 500 Indians	convinced Indians to fight for complete independence.
3	1930	The Salt Satyagraha	A peaceful protest against British rule	gained India publicity and sympathy in the United States.
4	1939-1945	The Second World War	Threat of invasion and a famine	showed everyone that Britain could not be trusted to rule India well.
5	1947	Independence and Partition	India partitioned into India (for Hindus) and Pakistan (for Muslims)	led to thousands of Indians migrating to escape violence.
J	Key individuals			
1	Mohandas Gandhi	<ul style="list-style-type: none"> Returned to India in 1915 led stayagrahas against British rule assassinated in 1948 		
2	Sarojini Naidu	<ul style="list-style-type: none"> A leader of the Indian National Congress Led the Salt Satyagraha after Gandhi's arrest Became the Governor of Uttar Pradesh after independence 		
3	General Dyer	<ul style="list-style-type: none"> Commander of the British army in Punjab Ordered the Jallianwala Bagh Massacre and the crawling order 		

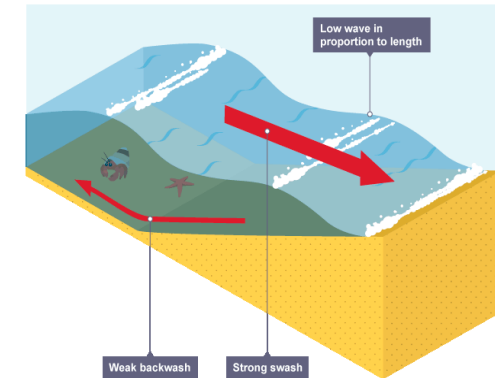
A		Key terms
1	Prevailing wind	The most dominant wind direction
2	Erosion	The break down and removal of rocks
3	Discordant coastline	An uneven coastline with alternating bands of hard and soft rock running perpendicular to the sea
4	Concordant coastline	A more even coastline with one type of rock running parallel to the sea
5	Deposition	When there is a lack of energy in waves so sediment is dropped
6	Hard engineering	Man made structures to protect the coastline
7	Soft Engineering	Protecting the coastline by using the coasts natural systems

B		Waves
1	Fetch	The distance a wave has travelled.
2	Swash	When a wave moves up the beach it is called the swash.
3	Backwash	When a wave moves down the beach it is called the backwash.
4	Constructive waves	Smaller waves that have a stronger swash than backwash. They build up the beach
5	Destructive waves	Larger waves that have a stronger backwash than swash. They remove the beach.

Destructive waves



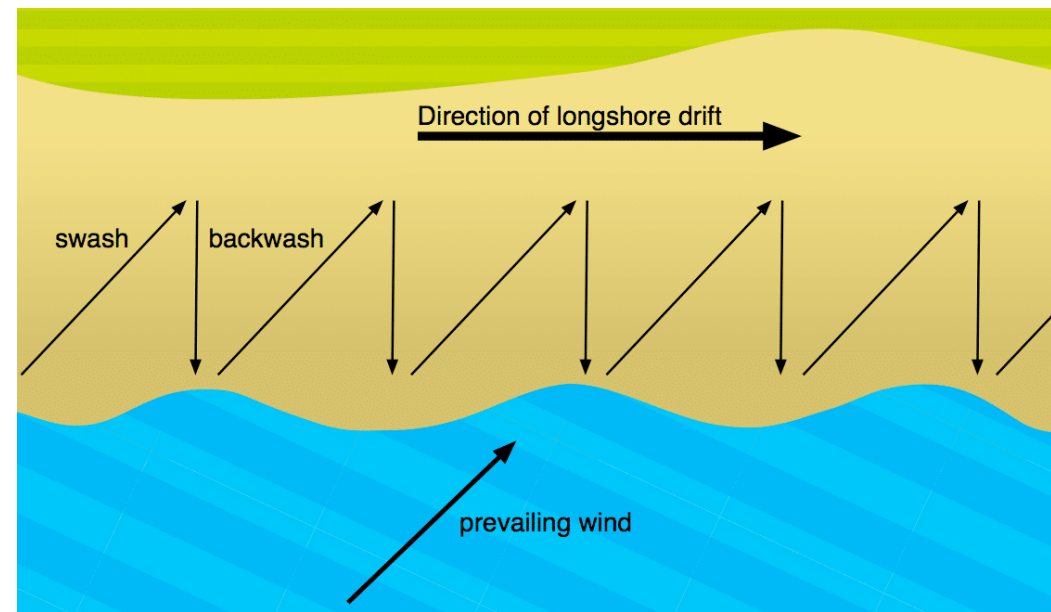
Constructive waves



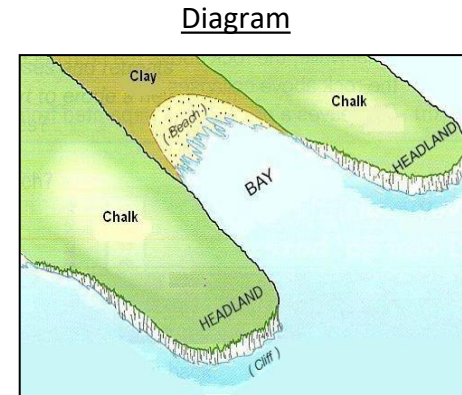
C Coastal processes – Erosion		
1	Hydraulic Action	The force of air and water into cracks forcing them wider.
2	Abrasion	Rocks rub against a surface making it smoother over time.
3	Attrition	Rocks hitting each other to become smaller, smoother and more rounded.
4	Solution	Sea water can dissolve certain types of rock slowly over time.

D Coastal processes – Weathering		
1	Freeze-Thaw	Water enters a crack and freezes which takes up more space and forces the crack wider.
2	Biological	The roots of plants and burrowing animals can break apart soil and rocks.
3	Chemical	Rainwater can be slightly acidic which can slowly dissolve rocks such as limestone.

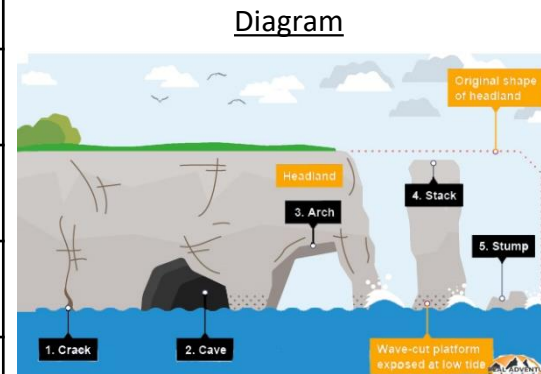
E Coastal processes – Longshore Drift		
1	Step 1	The swash moves up the beach in the direction of the prevailing wind.
2	Step 2	The swash moves sediment up the beach.
3	Step 3	The backwash moves down the beach at a 90 degree angle due to the force of gravity.
4	Step 4	The backwash moves sediment down the beach.
5	Step 5	This process repeats in a zig zag motion transporting sediment from one end of the beach to the other.



F Erosional Landform – Headlands and Bays		
1	Step 1	Alternating bands of hard and soft rock run perpendicular to the coastline.
2	Step 2	The soft rock is less resistant and is eroded back creating a bay.
3	Step 3	The hard rock is more resistant and is left jutting out to sea forming a headland.
4	Step 4	The headland shelters the bay from destructive waves so a beach can build up in the bay.

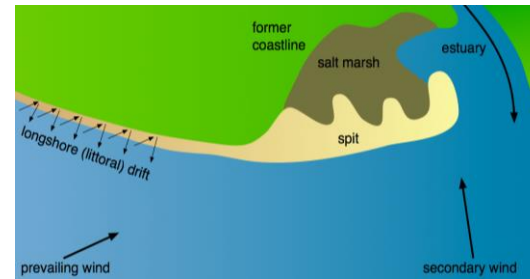


G Erosional Landform – Cave, Arch , Stack		
1	Step 1	A crack in the cliff is made larger through hydraulic action.
2	Step 2	The crack becomes a cave which is made larger and deeper by abrasion
3	Step 3	The cave breaks through to the other side of the headland forming an arch.
4	Step 4	The base of the arch is further eroded and can't support the top which eventually collapses
5	Step 5	This leaves an isolated stack of rock
6	Step 6	The base of the stack is further eroded and can't support the stack so the stack collapses leaving a stump.



H Depositional Landform – Spit		
1	Step 1	Longshore drift (LSD) transports sediment along the coast in the direction of the prevailing wind
2	Step 2	When there is a change in the direction of the coastline LSD continues past.
3	Step 3	Over time a thin ridge of sand is deposited called a spit.
4	Step 4	Behind the spit a salt marsh forms due to low energy and high rates of deposition. This can eventually form new land.
5	Step 5	The end of the spit is curved due to a secondary wind. It will not extend any further if there is an estuary.

Diagram

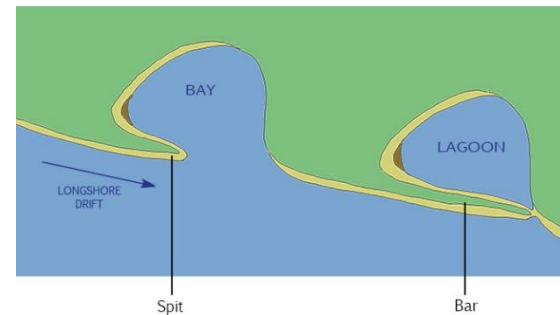


Photo



I Depositional Landform – Bar		
1	Step 1	A spit needs to form first and extend across a bay.
2	Step 2	If there is no estuary to wash the material out to sea longshore drift can extend the spit across the bay.
3	Step 3	The spit will continue to extend until it attaches to another headland. This is called a bar.
4	Step 4	The water that is trapped behind the spit is called a lagoon. This may eventually dry out and create new land.

Diagram



Photo



J Why protect the coastline?		
1	People	5.3 million people in England and Wales live in coastal towns
2	Environment	We have unique habitats such as salt marshes that are under threat
3	Industry	UK ports import and export goods. In 2017 this was worth £29billion
4	Tourism	Coastal areas are tourist hot spots which provided jobs and income. It generates around £8billion for the UK economy

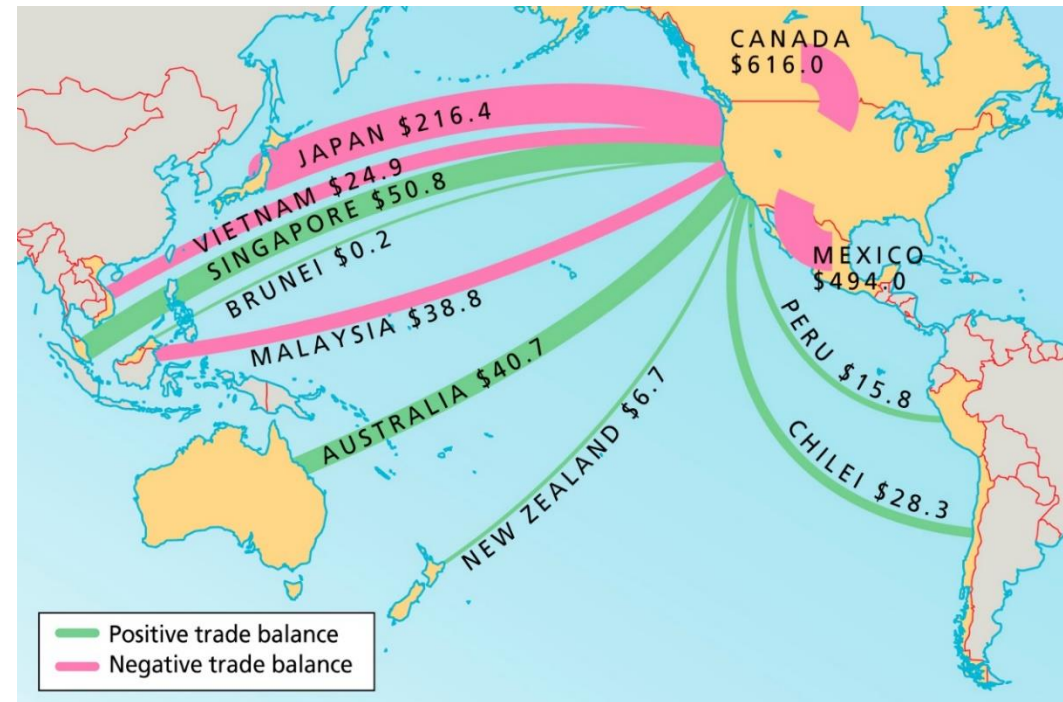
K Managing the coastline				
		How it protects the coastline	Advantages	Disadvantages
1	Sea wall	Reflects the waves energy back to sea	Can stop erosion. People feel protected The top of the wall I uses as a path	Most expensive coastal defence. When they are damaged the cost of repair is very high. Look unnatural
2	Groynes	Prevents longshore drift so the beach builds up and absorbs wave energy	Helps prevent erosion Large beaches attract tourists which helps support local economies	Can starve other areas along the beach of sediment increasing erosion elsewhere.
3	Beach nourishment	Adding sand to a beach to help build it up and absorb wave energy	Looks natural and is attractive to tourists. Cheap coastal defence	High maintenance as it is easily removed by longshore drift.

L	Key terms	
1	Economy	All activities going on in a country, in producing, buying, selling and distributing goods and services
2	Global Supply Chain	A network that spans multiple continents and countries to source and supply customers with goods and services.
3	Trans-national Corporations	A company that has operations in more than one country
4	Trading Bloc	A group of countries who have agreed to share trading agreements, and minimise barriers of trade between them.
5	Primary Sector	people produce things from the land and sea. E.g. farming, fishing, mining
6	Secondary Sector	people make or build things from the primary sector e.g. construction, product making
7	Tertiary Sector	Economic industries that provide a service for example shops, restaurants, entertainment
8	Quaternary Sector	people with high-level expertise solving problems and developing new goods and services e.g. scientists, engineers
9	Trade deficit	When a country's value of exports is less than its imports
10	Trade	When a country's value of exports is

M	How employment sectors impact a country	
1	Primary	<p>Generally these jobs tend to be lower paid as they are more manual and deal with raw materials.</p> <p>Countries that have many people working in this sector tend to be LICs as the people earn less and therefore pay less tax.</p>
2	Secondary	<p>These jobs pay slightly more than the primary sector as they are turning the raw materials into more valuable products.</p> <p>Countries that have many people in this sector are going through industrialisation. They are classed as NEEs as the country will be earning more and developing further.</p>
3	Tertiary	<p>Jobs in this sector are classed as service jobs. They normally require a higher level of skill than those in the primary or secondary sector and therefore pay more.</p> <p>Countries with many people working in this sector are normally HICs.</p>
4	Quaternary	<p>This is a newer sector. It will be larger in HICs as it usually requires a high level of education which is more common in HICs.</p> <p>These jobs are based around research and can generate a high income for a country.</p>

N		What are the jobs of the future?
1	Artificial Intelligence (AI)	<ul style="list-style-type: none"> Machines are being programmed to do jobs that usually need humans For example, robot arms in factories and self drive cars Experts say AI will take over much of the repetitive work we do
2	Green Jobs	<ul style="list-style-type: none"> Green jobs are jobs that help to protect the environment, limit climate change and reduce the impacts of climate change By law the UK must be carbon neutral by 2050. This generates lots of work. Two areas where green jobs need development are a ban on petrol and diesel cars by 2030 and planting trees to absorb CO2
3	The Gig	<ul style="list-style-type: none"> These are jobs where you use an online platform to find short jobs rather than permanent ones. Each job is called a gig.
O		Global Supply Chain
		<ul style="list-style-type: none"> The platform links a person who needs a job with a job they can do Food delivery, plumbing and legal work are examples of jobs in a gig economy.
1	Sourcing Materials	Raw materials are often sourced in LICs where they will be mined or harvested such as cotton for clothing.
2	Production	Production is often spread across many countries as places may specialise in certain elements of a product. It can also help to reduce cost. All parts will eventually be assembled before its final destination the customer.
3	Transportation	Ensuring transportation and distribution of the products at every step of the supply chain is vital to it running smoothly.
4	Customers	If the supply chain is well managed then customer satisfaction will be ensured as it will arrive in the condition and time they expect.
5	Benefits	<p>Developing countries have had a boost to employment</p> <p>Supplies people around the world with items they both want and need</p> <p>Can help to reduce the cost of goods while improving the profits of businesses</p>
6	Challenges	<p>Can increase the poor working conditions in LICs</p> <p>Can force small independent businesses to close as they can not compete with the larger supply chains</p>
7	Risks	Supply chains can be disrupted by conflict, natural disasters or global pandemics. This in turn delays product production and delivery meaning people are without products they need. It can also push the price of good up.

P Patterns of trade		
1	HICs	Export valuable manufactured goods such as electronics and cars and import cheaper primary products such as tea and coffee.
2	LICs/NEEs	Import expensive products and export cheaper primary products. This means that added to their existing debts, it gives them little purchasing power and they remain in poverty.
3	Trade surplus	Allows a country's economy to grow as they are making more money than they spend on trade.
4	Trade deficit	A country's economy suffers as they are spending more on trade than they make from it.



Q Example of a trading bloc – Trans-Pacific Partnership (TPP)		
1	The TPP	<ul style="list-style-type: none"> • 11 countries that have a combined population of 800 million. • All have agreed to the same rules of trade.
2	Aims of the TPP	<ul style="list-style-type: none"> • The TPP aims to deepen economic ties between these nations, slashing tariffs and fostering trade to boost growth.
3	Benefits of the TPP	<ul style="list-style-type: none"> • Boost in member economies e.g. New Zealand will increase from \$880 million to \$2.9 billion • Countries can have easier access to the industries in other countries e.g. agriculture • Guaranteed minimum wage for all workers
4	Challenges of the TPP	<ul style="list-style-type: none"> • Some countries have had a decline in manufacturing as they have been moved to the LICs in the TPP • Some countries are in a trade deficit with other countries in the TPP so are not really benefiting economically from it. • Part of the deal is that countries can own the patent to certain medicines which could increase the price for many

R How has globalisation affected trade patterns?		
1	What is globalisation	Improved communications and transport has increased the spread of ideas, cultures and goods across the globe.
2	Benefits	Companies have greater access to new markets and can increase their profits People have greater choice of goods and services Goods can be moved from one place to another much more efficiently
3	Challenges	If something happens in one country it can have a knock on effect that is much more global. Companies that are unable to use globalisation effectively risk being left behind and eventually go out of business.
S Trans-national Corporations		
1	Positive effects	Create many jobs across countries When one TNC locates in a country this attracts other TNCs Creates new jobs in areas they locate Will often invest in improve the area they are in, for example building new roads.
2	Negative effects	Some may have poor working conditions in the LICs they locate in. They may also under pay workers and get away with it due to the poor regulations Can harm the environment by exploiting their natural resources.

T TNC Case Study: Coca-Cola		
1	Background	<ul style="list-style-type: none"> • Number one manufacturer of soft drinks in the world. • Sell 400 different products in 192 countries.
2	Positive effects on India	<ul style="list-style-type: none"> • Created 25,000 jobs in India • Some of the bottling factories are owned by local companies so more of the profit stays in India • Pledge \$2billion over 5 years to help improve infrastructure and community projects
3	Negative effects on India	<ul style="list-style-type: none"> • Have reduced the water table from 12m to 35m below ground level • Farmers have gone out of business as a result • Locals have to travel further (5km twice a day) to access water they can use. • Has put traditional fruit juice vendor out of business.

French: Knowledge Organiser 9.2: Le temps de loisirs

1	Pendant mon temps libre je joue au foot	During my free time I play football
2	et je joue de la guitare <u>depuis</u> trois ans.	and I play (have been playing) the guitar <u>since</u> (for) three years.
3	Je trouve ça génial et ça me rend heureux	I find it great and it makes me happy
4	mais je n'aime pas jouer au rugby <u>car</u> je le trouve trop agressif.	but I don't like to play (playing) rugby <u>because</u> I find it too aggressive.
5	De plus, c'est un sport <u>qui demande</u> de l'endurance.	In addition, it's a sport <u>which asks for</u> (requires) endurance.
6	En outre j'aime passer du temps sur Internet	Furthermore, I like to spend (spending) time on the internet
7	parce que c'est <u>plus divertissant que</u> le sport <u>mais c'est moins</u> actif.	because it's <u>more entertaining than</u> sport <u>but it's less</u> active.
8	Je mets les photos <u>que je veux partager</u> avec mes potes sur Instagram	I put photos on Instagram <u>that I want to share</u> with my mates.
9	Je crée des playlists et <u>il est facile de télécharger</u> de la musique.	I create playlists and <u>it's easy to download</u> music.
10	Maintenant, je ne lis jamais des magazines	Now, I never read magazines
11	<u>pourtant quand j'étais</u> plus jeune je lisais très souvent.	<u>however when I was</u> younger I used to read very often.
12	D'habitude, <u>le soir, je regarde</u> la télé, <u>surtout</u> les séries américaines	Usually, <u>in the evening, I watch</u> TV, <u>especially</u> American series
13	<u>puisque je les trouve</u> originales	<u>since I find</u> them original
14	et <u>plus intéressantes que</u> les documentaires.	and <u>more interesting than</u> documentaries.
15	Mon émission préférée c'est Sherlock	My favourite programme is Sherlock
16	parce que les acteurs sont vraiment doués.	Because the actors are really talented.
17	<u>Je dirais que je suis</u> passionné(e) de cinéma et j'adore Audrey Tautou.	<u>I would say that I am</u> passionate about cinema and I love Audrey Tautou.
18	<u>Selon moi, elle est</u> <u>l'actrice la plus talentueuse</u> du monde !	<u>According to me, she is</u> <u>the most talented actress</u> in the world!
19	Le week-end dernier je suis sorti(e) avec mes amis	<u>Last weekend</u> I went out with my friends
20	et nous sommes allés au cinéma.	And we went to the cinema.
21	Nous avons regardé une comédie avec Gérard Depardieu	We watched a comedy with Gérard Depardieu
22	<u>qui est si doué et marrant-</u> <u>je suis fan de</u> ses films et <u>je les recommanderais.</u>	<u>Who is so talented and funny-</u> <u>I am a fan of</u> his films and I would recommend them.
23	Je vais voir son prochain film <u>bientôt.</u>	I'm going to see his next film <u>soon.</u>
24	Je crois qu'il est <u>le meilleur</u> acteur	I believe that he is <u>the best</u> actor
25	<u>bien qu'il soit</u> un peu arrogant.	<u>Even though he is</u> a bit arrogant.

Spanish: Knowledge Organiser 9.2: ¡Desconéctate!

1	<u>Normalmente durante las vacaciones</u>	<u>Normally during the holidays</u>
2	cuando hace buen tiempo monto a caballo	when it does (it is) good weather I go horse riding (I ride a horse)
3	<u>o voy</u> a la playa <u>con</u> mis amigos.	<u>or I go</u> to the beach <u>with</u> my friends.
4	<u>En mi región todos los días</u> hace frio y hay chubascos.	<u>In my region every day</u> it's (it does) cold and there are downpours.
5	Cuando llueve me mola ver la tele <u>con</u> mis hermanos	<u>When it rains</u> I love to watch TV <u>with</u> my siblings
6	<u>pero</u> prefiero leer los tebeos <u>en mi dormitorio</u> .	<u>But I prefer to read</u> comics <u>in my room</u> .
7	<u>A veces</u> voy de vacaciones a España <u>con</u> mi familia	<u>Sometimes</u> I go on holiday to Spain <u>with</u> my family
8	<u>pero</u> prefiero pasar las vacaciones <u>con</u> mis amigos.	<u>but I prefer to spend</u> the holidays <u>with</u> my friends.
9	<u>El año pasado</u> fui de vacaciones a Londres <u>con</u> mis padres.	<u>Last year</u> I went on holiday to London <u>with</u> my parents.
10	Viajamos en coche <u>puesto que es más</u> rápido <u>que</u> en tren.	We travelled by car <u>because it's</u> <u>faster than</u> by train.
11	Me alojé en un hotel, <u>era</u> moderno y caro.	I stayed in a hotel, <u>it was</u> modern and expensive.
12	Cuando hizo mal tiempo descansé en el hotel.	<u>When it was</u> bad weather I relaxed in the hotel.
13	Cuando hizo sol visité monumentos en el centro.	<u>When it was</u> sunny I visited monuments in the centre.
14	Lo mejor fue cuando fui al acuario.	The best thing was when I went to the aquarium.
15	Lo peor fue cuando perdí mi móvil at aeropuerto.	The worst thing was when I lost my phone at the airport.
16	Lo bueno del pueblo era que era muy animado.	The good thing about the town was that it was very lively.
17	Lo malo del pueblo era que había mucho tráfico.	The bad thing about the town was that there was lots of traffic.
18	Me gustó mi viaje <u>porque fue tan</u> inolvidable.	I liked my trip <u>because it was so</u> unforgettable.
19	<u>En julio si hace calor</u> voy a viajar por el mundo	<u>In July if it's hot</u> I am going to travel the world
20	<u>para visitar</u> los monumentos.	<u>(in order) to visit</u> the monuments.
21	Quiero reservar una habitación doble <u>con</u> vistas al mar.	I want to reserve a double room <u>with</u> views of the sea.
22	Quiero quejarme <u>dado que</u> el aire acondicionado no funciona .	I want to complain <u>because</u> the air conditioning does not work .

A Sanctity of life and Quality of life		
1	Sanctity of life	All life is sacred because it is God given. God gives lives so only God can take it away
2	Quality of life	The general well being of a person in relation to their health and happiness. The values of life depends on how good/satisfying it is.

B Sanctity of life principle in Christianity	
1	Christians believe that all life is sacred as it is God given and so God can only decide when life is taken away
2	<p>Teachings that support this idea are:-</p> <ul style="list-style-type: none"> • Humans are made in the image of God (imago dei) • God breathed life into humans • Humans are the only creatures to have a soul • The human body is 'the temple of the Holy spirit' • The decalogue - 'Thou shalt not kill'

C Sanctity of life principle in Islam	
1	Muslims believe that all human life is sacred because it is given by Allah and that Allah chooses how long each person will live. Human beings should not interfere in this.
2	<p>Quotes from the Qur'an that support this idea are:-</p> <p>'Do not take life, which Allah made sacred, other than in the course of justice'</p> <p>Allah decides how long each of us will live</p> <p>'And no person can ever die except by Allah's leave and at an appointed term.'</p>

On the one hand, quality of life:

- People are given free will to choose?
- Which is kindest?
- Impact on others?
- Compassion for those suffering?



On the other hand, sanctity of life:

- Part of God's Creation?
- Life shouldn't be taken?
- Religious teachings?
- Even suffering has a purpose?

D Quality of life	
1	People who have no belief in an afterlife, believe that it is only this life that matters. Therefore how enjoyable life is matters. If it stops being enjoyable then you should be able to end your life

E	
1	<p>Contraception</p> <p>The deliberate use of artificial methods or other techniques to prevent pregnancy</p>

F Christianity		G Islam	
1	<p>The Catholic church think contraception is <i>'intrinsically evil'</i> As humans should procreate <i>'go forth and multiply'</i>. Catholics also believe that it may lead to more promiscuity. Catholics see the morning after pill as abortion and murder.</p>	1	<p>children are seen as a gift from allah and having children is seen as a duty.</p>
2	<p>Anglicans argue that contraception is allowed Family planning Free will God gave people the intelligence to invent contraception Protects marriage Most loving thing to do</p>	2	<p>But contraception can be used for family planning purposes</p>
		3	<p>Can be used if mothers life is in danger or will be harmed by having another child</p>
		4	<p>Only reversible methods are allowed however e.g sterilisation and vasectomies are usually not accepted as these are permanent and the morning pill as this is seen as abortion.</p>

H Humanists/Secular Society	
1	<p>Saves unwanted children being born Helps stop the spread of STD's/STI's</p>

I	Fertility
1	<p>What types of fertility treatment are there?</p> <ul style="list-style-type: none"> •AIH (Artificial Insemination by Husband) – a procedure whereby the sperm of the male is placed directly into the uterus (womb) of his female partner so that fertilisation of the ovum can be achieved. •AID (Artificial Insemination by Donor) – a procedure as with AIH, however the sperm is provided by a donor who is not the woman's partner. •IVF (In Vitro Fertilisation) – a process whereby the ovum is fertilised outside the woman's body. 'In vitro' means 'in glass', i.e. a petri dish or cell culture dish (not a test tube).

J	Christianity
1	<p>AIH For: helps a husband and wife procreate Against: Fertility treatment is unnatural. It is God's will if a couple does not have children.</p>
2	<p>AID For: Donation is a compassionate act to help a fellow human being. Against: Some Christians do not agree with donation of sperm or an egg. They say this is introducing a third person into the relationship and is like committing adultery, which is forbidden by the Ten Commandments. For the same reasons they would be against surrogacy.</p>
3	<p>IVF For: It is common for more than one embryo to be produced by IVF, and for some to be left over. Embryos can be frozen for use at a later date by the couple. A couple may give their consent for the spare embryos to be used for research or be destroyed within 14 days (according to UK law). The Church of England and the Methodist Church supports this view. Against: Goes against the sanctity of life principle as left over embryos are destroyed</p>

K	Islam
1	<p>AIH and IVF For – it is the duty of every Muslim to create a family and therefore a married couple seeking fertility treatment by AIH or IVF should be supported. As long as the genetic material used in the process is from the married couple, Against - It is Allah's will if a couple does not have children.</p>
2	<p>IVF and spare embryos For - many Muslims do not regard an embryo as a life until it has been ensouled at 120 days and therefore may accept the use of embryos in medical research for the pursuit of human knowledge. Against - other Muslims will say that life begins at conception and will refer to the principle of the sanctity of life and warn against 'playing God'.</p>
3	<p>AID and surrogacy (requiring donor) For - in some Islamic states men may have up to four wives and one of the reasons for this is if one wife cannot have children then there may still be children in the family. Therefore, although AID and surrogacy are generally not permitted, having more than one wife offers an alternative that is within an Islamic marriage contract. Against - most Muslims are against AID because they consider introducing an egg or sperm from a third party to be a form of adultery. The birth of a child using a surrogate mother would also introduce a third person into the birth process and is equally not accepted in Islam</p>

L	
1	Abortion is the deliberate termination of a pregnancy.
2	In 1967 abortion was legalised in the UK up to 24 weeks

M	Christianity
1	<p>Pro life – Catholic sanctity of life principle. life begins at conception so see abortion as murder.</p> <p>Decalogue states ‘thou shalt not commit murder’</p> <p>Abortion is also undesirable, as god ‘created mankind in his own image (Genesis).</p>
2	<p>Pro Choice – Some Christians believe that passive Euthanasia is acting in a Christian manner as shows a deep level of compassion in ending suffering.</p> <p>Anglicans allow passive euthanasia as suffering should not be extended at all costs. They argue that quality of life must be considered and so enact situation ethics through ‘Love thy neighbour’ teaching</p>

N	Islam
1	Muslims are usually against Euthanasia ‘ neither kill or destroy yourself ’ because their lives are sacred and Allah’s.
2	Muslims believe that Allah has a plan for every human and that humans do not have the right to interfere (sanctity of life) ‘ When their time comes they cannot delay it for a single hour nor can they bring it forward by a single hour ’ (Qur’an).
3	A person committing euthanasia is committing a sin and is destined not to enter Jannah.
4	Islam teaches that life on earth is a test and that God transcendent and so it is not ours to question why but to wait to the day of judgement. Muslims therefore support hospices and use the extended family network to try and care for relatives at home

O	Humanists/Secular Society
1	<p>Quality of life argument</p> <p>We have a right to life we should have a right to die</p> <p>Principle of Utility</p> <p>Suffering is pointless</p>

P	
1	Euthanasia means 'gentle and easy death'.
2	What does UK law say about euthanasia? Active Euthanasia or Assisted suicide is also illegal in the UK. It is punishable by law and can carry a penalty of up to 14 years' imprisonment.
3	The four types of euthanasia: 1. Voluntary (the person asks to die) 2. Active (given something to end life e.g a lethal injection) 3. Passive (treatment is removed and this results in the person dying) 4. Involuntary (person is unable to make the decision to end their life so a doctor makes it for them.)`
4	Active Euthanasia is legal in countries like Belgium, Holland & Switzerland,

Q	Christianity
1	Pro life – Catholics against all forms of Euthanasia Euthanasia goes against the Decalogue – ‘ thou shalt not murder ’ sanctity of life principle Suffering is part of life – Jesus suffered on the cross for us and so knows human suffering. Suffering is a test, suffering makes people realise the importance and beauty of life hospices care for the terminally ill by offering palliative care .
2	Pro-choice – Anglican /Quakers Abortion is allowed in certain circumstances as situation ethics comes into play e.g. such as the mother's life is at risk. Quakers believe that the life of an unborn child cannot be valued above that of a woman's. Also allowing a woman to choose is a way of showing Christian compassion and Jesus taught the Golden rule .

R	Islam
1	Islam allows abortion before ensoulment so it can be accepted before 120 days but only in certain circumstances e.g. if the mother's life is at risk, the baby will be born with a serious and life threatening condition.
2	After 120 days abortion is only allowed to save the life of the mother. Abortion outside of these rules is seen as a sin (Haram).
3	And no person can ever die except by Allah's leave and at an appointed term.

S	Humanists/Secular Society
1	Humanists - Woman's choice - her body Principle of Utility - if having an abortion leads to the greatest good then should be supported

T	
1	Gene therapy removes a gene causing a disease or illness
2	Genetic engineering modifies genes to enhance a person e.g taller, stronger, cleverer
3	Saviour sibling - a child who is conceived following embryo screening for a particular tissue type. Their stem cells, taken from umbilical cord blood after birth, can be donated to a sick sibling . This is a form of gene therapy because the technology is used to cure a sick sibling.

U	Christianity
1	Some Christians may argue that altering an individual's genes goes further than conventional medicine, and say it is playing God .
2	The Roman Catholic Church teaches: To create embryos with the intention of destroying them, even with the intention of helping the sick, is completely incompatible with human dignity. To Catholics life begins at conception and so an embryo is God's plan and design
3	Other Christians argue that God have humans dominion (power) over the world. So therefore have the knowledge and ability to decide what is best For some Christians The Golden Rule 'do to others what you would have them do to you' could also mean genetic engineering to cure diseases and disorders is acceptable. Jesus healed people through his 37 miracles and Christians should aim to follow in his footsteps

V	Islam
1	Many Muslims would argue that Allah has given human beings the knowledge and skills to develop treatments for diseases and conditions that cause suffering.
2	Embryology can lead to cures and can be seen as a way of helping people who are suffering from diseases or disorders. Islam teaches Muslims to care for the sick and cure disease, so this would lead some Muslims to support these processes.
3	Allah creates each human being. Some Muslims would be against genetic engineering that aims to 'improve' on Allah's creation. This might be considered to be acting like Allah, and could be referred to as shirk .

W	
1	Organ Transplant In transplant surgery, body parts from one person, dead or alive, are used to replace body parts in someone else.
2	Organ donation is now opt out rather than opt in. One person's organs can give life to up to seven different people. Most organ donations came from dead donors, although liver, kidney and bone marrow transplants can be from a live donor.

X	Christianity
1	Jesus said 'freely you have received: freely give' The Pope 'Organ donation is a particularly praiseworthy example of everyday heroism'
2	Christians believe that they should act compassionately towards those who are sick. They should follow in Jesus's footsteps who helped and healed people e.g a blind man In the Bible it says that we should: Love your neighbour as you love yourself and follow The Golden Rule.

Y	Islam
1	Many Muslims believe that organ donation is haram, prohibited. This is because the human body is considered sacred as needed for the afterlife
2	However, The Quran also states 'If anyone saves a life, it is as if he saves the lives of all humankind'. Thus many Muslims understand from this verse that donating one's organs is a blessed act.
3	In 1995, the Muslim Law (Sharia) Council UK issued a fatwa, religious edict, saying organ donation is permitted

Z	
1	Capital punishment is the death penalty. It is illegal in the UK since 1965.
2	In those countries where it is legal, capital punishment aims to protect society, deter others from committing crime and compensate the victims of the crime (this is known as reparation).

AA	<u>Christianity</u>
1	<p>Christian arguments for capital punishment</p> <p>Some Christians argue that capital punishment helps to maintain order and protection in society. They would say this because: The Bible details the death penalty for some crimes, so it must be acceptable to God. The Old Testament seems to support retribution/revenge 'eye for an eye'</p>
2	<p>Christian arguments against capital punishment</p> <p>Some Christians would argue that capital punishment can never be justified because of the Decalogue stated thou shalt not kill and Sanctity of Life Principle. Also because of the belief in Judgement day and that it is only God's job to Judge 'Do not take revenge, my friends, but leave room for God's wrath'</p> <p>Jesus amended the Old Testament teaching on retribution during the Sermon on the Mount when he said "You have heard that it was said, 'Eye for eye, and tooth for tooth.' But I tell you, do not resist an evil person. If anyone slaps you on the right cheek, turn to them the other cheek also."</p>

BB	<u>Islam</u>
1	<p>the death penalty is a punishment established by God in the Qur'an: Take not life, which God has made sacred, except by way of justice and law. This verse teaches that although murder is considered a sin, it is acceptable to use capital punishment when required by law</p>
2	<p>the death penalty is a punishment established by God in the Qur'an: Take not life, which God has made sacred, except by way of justice and law. This verse teaches that although murder is considered a sin, it is acceptable to use capital punishment when required by law.</p> <ul style="list-style-type: none"> •The Prophet Muhammad sentenced people to death for murder. •Shari'ah law states that the punishment for murder, adultery and denying Islam is the death penalty.

Useful telephone numbers

- **NSPCC (Childline) confidential helpline for children and young people:** 0800 1111 (24 hrs)
- **Family Lives:** 0808 800 2222
- **The Mix:** 0800 8084994
- **CAMHS CRISIS LINE** 0300 3031320
- **Avon/ Wiltshire Mental Health Service Crisis Line:** 0800 9531919 (This is all day every day!)
- **24hr Domestic Violence Helpline:** 0808 2000 247
- **National sexual health helpline:** 0300 123 7123
- **YoungMinds:** <https://youngminds.org.uk>, 0808 802 5544 (Weekdays 9.30am – 4pm), Parent Email: parents@youngminds.org.uk

Me and my Identity

- http://www.mind.org.uk/information-support/guides-to-support-and-services/children-and-young-people/#.Wt259pWG_IU
- <http://www.unicef.org.uk/what-we-do/un-convention-child-rights>
- <http://www.equalityhumanrights.com/en>

Peer Pressure and belonging

- <http://youngpeople.nyas.net/>
- <http://thenayj.org.uk/>

Online Safety

- <http://www.childline.org.uk/info-advice/bullying-abuse-safety/online-mobile-safety/sexting>
- <http://www.childline.org.uk/info-advice/bullying-abuse-safety/online-mobile-safety/staying-safe-online/>
- <http://www.thinkuknow.co.uk/>
- www.gov.uk/report-terrorism
- www.iwf.org.uk
- www.saferinternet.org.uk
- www.ceop.police.uk/safety-centre
- <https://www.nspcc.org.uk/what-is-child-abuse/types-of-abuse/online-abuse/>
- <https://www.gloucestershire.police.uk/advice/advice-and-information/>

Stereotypes, prejudice, discrimination, Hate crimes,

- <http://unicefstories.org/2016/10/20/breaking-gender-stereotypes-a-young-girl-reminds-women-and-girls-of-their-rights>
- <http://www.amnesty.org/en/latest/education/2016/03/three-education-activities-for-young-people-to-challenge-discrimination>
- <https://www.gov.uk/guidance/equality-act-2010-guidance>
- <http://www.equalityhumanrights.com/en/equality-act/protected-characteristics>
- <https://www.stonewall.org.uk/lgbt-britain-hate-crime-and-discrimination>

Human rights, Social Justice and Social Inequality

- <http://unicef.org.uk/what-we-do/un-convention-child-rights>
- <http://www.libertyhumanrights.org.uk/>
- <http://www.un.org/en/sections/issues-depth/human-rights>
- <http://www.equalityhumanrights.com/en/human-rights/what-are-human-rights>
- <https://ff.hrw.org/london>
- <http://www.gov.uk/guidance/equality-act-2010-guidance>

Support for Bullying

- <https://www.nspcc.org.uk/>
- <https://www.kidscape.org.uk/>
- <https://www.childline.org.uk/>
- <http://unicef.org.uk/what-we-do/un-convention-child-rights>
- www.anti-bullyingalliance.org.uk
- www.disrespectnobody.co.uk

Government structure, Law and the judiciary

- <https://assets-learning.parliament.uk/uploads/2019/12/KS3-Booklet-Get-to-know-your-UK-Parliament.pdf>
- <https://www.parliament.uk/>
- <https://www.judiciary.uk/>

Healthy and Puberty

- <http://www.nhs.uk/pages/home.aspx>
- <https://www.nhs.uk/live-well/>
- <http://www.talktofrank.com/>
- www.healthforteens.co.uk/growing-up/puberty
- www.nhs.uk/conditions/ivf

LGBTQ+

- <https://www.stonewall.org.uk/>
- www.galop.org.uk
- <https://www.childline.org.uk/info-advice/your-feelings/sexual-identity/sexual-orientation/>

Bereavement, grief and Loss

- <http://www.sueryder.org/how-we-can-help/someone-close-to-me-has-died/advice-and-support/supporting-young-people-with-grief>
- <http://www.nhs.uk/conditions/stress-anxiety-depression/bereavement-and-young-people>
- <https://www.childbereavementuk.org/>

First/Emergency Aid

- www.redcross.org.uk
- www.get-licensed.co.uk
- www.emergency-live.com

Gambling and Finances

- www.begambleaware.org/NGTS.html
- <https://www.moneyadviceservice.org.uk/en/articles/how-to-help-teenagers-manage-their-money>
- www.citizensadvice.org.uk
- <https://natwest.mymoneysense.com>

Support for mental health and coping strategies and managing stress and anxiety

- <http://www.youngminds.org.uk/>
- www.kooth.com
- <https://www.otrbristol.org.uk>
- <http://www.mentalhealth.org.uk/your-mental-health/getting-help>
- <http://www.nhs.uk/conditions/stress-anxiety-depression/reduce-stress>
- <https://www.gov.uk/government/publications/children-and-young-peoples-mental-health-peer-support>
- <http://www.youngpeopleshealth.org.uk/wp-content/uploads/2016/03/resilience-resource-15-march-version.pdf>
- www.themix.org.uk
- <http://www.mind.org.uk/>
- <http://www.mentalhealth.org.uk/>
- <http://www.centreformentalhealth.org.uk/>
- <http://www.childrenssociety.org.uk/>
- www.getselfhelp.co.uk

Support for unhealthy/abusive relationships:

Child Sexual Exploitation, Child Criminal Exploitation, Coercive control, Grooming, Radicalisation, and FGM

- <https://www.nspcc.org.uk/what-is-child-abuse/types-of-abuse/grooming/>
- <https://www.nspcc.org.uk/what-you-can-do/report-abuse/dedicated-helplines/protecting-children-from-radicalisation/>
- <https://www.childrensociety.org.uk/what-we-do/our-work/help-us-stop-child-sexual-exploitation-cse>
- <https://www.nspcc.org.uk/what-is-child-abuse/types-of-abuse/child-sexual-abuse>
- <http://www.womensaid.org.uk/information-support/what-is-domestic-abuse/coercive-control>
- <https://www.nspcc.org.uk/preventing-abuse/keeping-children-safe/staying-safe-away-from-home/gangs-young-people/>
- <https://karmanirvana.org.uk/>
- www.nationaldomesticbiolencehelpline.org.uk
- <http://www.actionaid.org.uk/about-us/what-we-do/violence-against-women-and-girls/vawg>
- www.childline.org.uk/info-advice/bullying-abuse-safety/abuse-safety/female-circumcision-fgm-cutting

Consent, law and sexual Health

- <http://www.consentiseverything.com/>
- <https://www.healthforteens.co.uk/sexual-health>
- <https://www.nhs.uk/live-well/sexual-health/where-can-i-get-sexual-health-advice-now/>
- www.nhs.uk/live-well/sexual-health
- <https://www.nhs.uk/conditions/sexually-transmitted-infections-stis>
- <http://www.eufic.org/en/healthy-living/article/tips-for-a-healthier-you-video>
- <http://www.nspcc.org.uk/>
- www.nhs.uk/conditions/contraception
- <https://www.thinkuknow.co.uk/>
- <https://lawstuff.org.uk/at-what-age-can-i/>
- <https://parentzone.org.uk/article/how-old-does-your-child-have-be>
- <https://fullfact.org/law/legal-age-limits>
- <https://www.brook.org.uk/>
- <https://www.nhs.uk/live-well/sexual-health/are-you-ready-for-sex/><https://www.childline.org.uk/info-advice/friends-relationships-sex/sex-relationships/healthy-unhealthy-relationships/>
- <https://www.familylives.org.uk/advice/teenagers/sex/healthy-relationships/>
- <https://www.relate.org.uk/relationship-help/help-young-adults>

Drugs, substances and the law

- www.talktofrank.com
- <http://www.nhs.uk/pages/home.aspx>
- <https://www.nhs.uk/live-well/>
- <http://www.drinkaware.co.uk/>
- <http://www.askthe.police.uk/content/@1.htm>