Glenmoor & Winton Academies
High Achievement – High Standards
Part of United Learning

Knowledge Organiser

Year 9 - 2024/25

Student Name: _

Need to ask your teacher about any of these topics? Make a note here!

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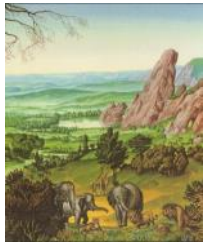
Art - Book Illustration

Key Term	Definition
Composition	Composition is how an artist arranges visual elements within their images.
Illustration	Illustration is creating an image to communicate a message or an idea.
Collage	Collage describes the technique of composing an artwork by gluing a wide range of materials - including pieces of paper, fabric, newspaper clippings, and sometimes ready made objects - to a surface.
Watercolour	**Wash** A watercolour wash refers to a layer of colour that is fairly transparent because it is applied with a diluted paint mixture. Typically, washes are applied to help create backgrounds or build layers of colour. **Wet on Wet** Wet paint applied to a wet surface, such as pre-moistened paper or a still-wet layer of paint. **Stipple** A painting technique that involves applying small dots or specks of paint onto the paper using a brush or other painting tool.
Fantasy	Fantasy is a genre of speculative fiction involving magical elements, typically set in a fictional universe and usually inspired by mythology and folklore.
Goblin	The meaning of **GOBLIN** is an **ugly or grotesque sprite** that is usually **mischievous** and sometimes evil and malicious.
Narrative	A spoken or written account of connected events; a story.
Perspective	**Foreground** The part of a view that is nearest to the observer, especially in a picture or photograph. **Middle** The middle distance of a painting or photograph. **Background** The things that can be seen behind the main subject of an image.

Ui De Rico

Images © Ui De Rico

- A contemporary illustrator.
- Highly detailed fantasy oil paintings.
- He is most famous for illustrating The Rainbow Goblins (1978).


Stacy Rozick

Images © Stacy Rozick

- A contemporary painter.
- Her watercolour and gouache paintings reflect her interest in cultural narratives, textile patterns and folklore details.


Romantic Landscape Painters

- Gainsborough
- Constable
- Turner

Turner and Constable were romantic painters in so far as they looked for truth, spiritualism and beauty in nature; they shared Gainsborough's infectious love of the countryside and dedicated their lives to painting it, which is why they are considered Britain's most recognisable landscape artists.



Gainsborough's forest (1748) **The Cornfield** (1826) **The junction of the Severn an Wye** (1845)

Fauve

Henri Matisse

Andre Derain

- An early twentieth century art movement.
- The name Fauves is French for 'Wild Beasts'.

Called this because they used intense and vibrant colours in a violent uncontrolled way.

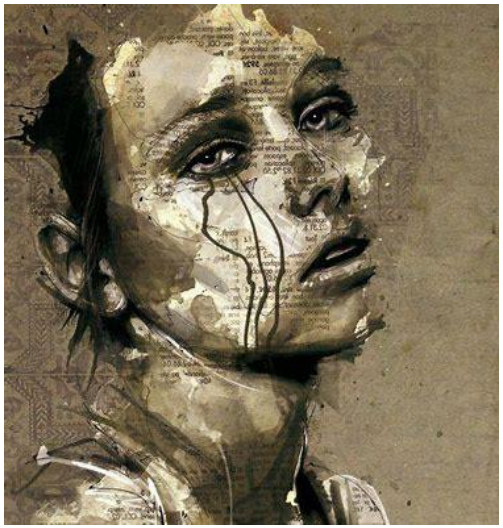

Jardin du Luxembourg, Paris 1902 Charing Cross Bridge, London, 1906

Art - Protest

Key Definition	
Protest	Protest is a statement or action expressing disapproval of or objection to something. An example of this might be an anti-war demonstration.
Types of Protest	• Marches • Demonstrations • Boycotts • Silent vigils • Petitions • Peaceful street protest • Picketing
Emotive self portrait	A visual representation of your face which shows strong emotion captured through facial expression.

Artistic Techniques & Media	
Monoprint	The monoprint is a form of printmaking where the image can only be made once, unlike most printmaking which allows for multiple originals.
Mixed Media	Mixed media is a term used to describe artworks composed from a combination of different media or materials.
Mark-making	Mark making is a term used for the creation of different patterns, lines, textures and shapes. This may be on a piece of paper, on the floor, outside in the garden or on an object or surface.
Oil Pastels	An oil pastel is a painting and drawing medium formed into a stick, containing pigment mixed with a binder of oil and wax. Oil pastels are bold and bright. They can be blended easily but they can break easily too.
Stencil Printing	A thin sheet of card, plastic, or metal with a pattern or letters cut out of it, used to produce the cut design on the surface below by the application of ink or paint through the holes.

Artists		
Guy Denning	Guy Denning is an English contemporary artist. He is part of the Bristol urban art scene and often draws and paints on found grounds such as newspaper or cardboard. War has been a great influence and he works from observation and photographic references.	 *Image© Guy Denning*
Jenny Saville	Jenny Saville is a contemporary British figurative painter concerned with body image and representation. Her paintings are often large in scale and made with overlapping lines and expressive brush marks. She uses pencil, oil and chalk pastel and oil paint. Areas of interest are the female nude, body image, motherhood, plastic surgery and injury. As a result, her works are very emotive.	 *Image© Jenny Saville*



Art - Masks

Key Term	Definition
Mask	A *mask* conceals something from view. It can be worn to cover all or part of the face: to disguise, hide, protect, amuse or frighten others. Masks are made and worn for different reasons including: Ceremonial, Ritual, Ornamental and theatre.
Maquette	A maquette is model for a larger piece of sculpture, created in order to visualise how it might look and to work out approaches and materials for how it might be made.
Relief Sculpture	A sculpture in which the three-dimensional elements are raised from a flat base.
Patina	Patination refers to the process of developing or forming a colour upon a surface or sculpture. A patina can be a protective or decorative finish. This is most commonly seen on works of bronze or copper.
Culture	The customary beliefs, social forms, and material traits of a racial, religious, or social group.
Design	The process of planning a creation.

Art		
Masks in History	Cultural masks are known to have been worn long before human beings developed written language. Masks have been made for centuries. The oldest known mask is thought to be about 9,000 years old. Every culture has some form of mask. It is important to understand that masks from certain times in history, were not made for 'art' purposes and had a function within a culture or society.	
Traditional African Masks	African masks are an important part of Africa's ancient tribal traditions, and they are still being made and used today. African tribes believe these masks can provide a vital gateway into the spiritual world when worn during rituals and ceremonies, so they hold a special sacred significance. Most African masks are carved out of wood, although some have been made out of bronze, brass, copper ivory, pottery and textile.	
Tibetan Cham Masks	Worn by practitioners of the cham dance in Bhutan, Nepal and India, cham masks are symbolic and ritualistic objects in Vajrayana Buddhism. These masks are believed to embody wrathful, protective deities and inspire fear and terror in the hearts of evil forces.	
Chinese Sorcerer's Mask	Sorcerer's masks were used in regions Yunnan and Guizhou. They were worn by groups of people during ceremonies that were held to welcome gods and good spirits.	

Chopping Board Colours	
RED	Raw meat
BLUE	Raw Fish
YELLOW	Cooked Meat
GREEN	Salad and Fruit
BROWN	Vegetables
WHITE	Dairy

Target Market	
Customer Profile	An outline of the type of customer likely to purchase your product.
Customer	People who buy products. The end user of the product.
Client	Buying a service from you, often a company asking you to design something for them to sell.

The Eatwell Guide	
	The Eatwell Guide shows how much of what we eat overall should come from each food group to achieve a healthy, balanced diet. You do not need to achieve this balance with every meal, but try to get the balance right over a day or even a week.
	• Eat at least 5 portions of a variety of fruit and vegetables a day. • They should make up over a third of the food we eat each day.
	• Base meals on potatoes, bread, rice, pasta or other starchy carbohydrates. • Starchy foods are a good source of energy and the main source of a range of nutrients in our diet.
	• Unsaturated fats are healthier fats and include vegetable, rapeseed, olive and sunflower oils. • Remember all types of fat are high in energy and should be eaten sparingly.
	• Milk, cheese, yoghurt and fromage frais are good sources of protein and some vitamins, and they're also an important source of calcium, which helps keep our bones strong.
	• Protein, vitamins and minerals. • Pulses, such as beans, peas and lentils, are good alternatives to meat because they're lower in fat and higher in fibre and protein, too.

Knife Skills

Bridge Hold

Create a bridge over the food with your hand. The fingers should be on one side and the thumb should be on the other. Hold the food to be cut between the fingers and thumb creating a bridge. The knife should go through the bridge to cut the food.

Claw Grip

Create a claw by partly curling your fingers together into a claw shape. Press the tips of your fingers (nails) against the food to be gripped and then lean your fingers slightly forward of your nails so that you can't see your nails when you look down on your hand.

Citizenship - Health and Wellbeing

1. Drugs and Addiction

Addiction	A compulsive, need for a substance, behaviour, or activity having harmful
Recreational Drugs	A drug used without medical justification for its psychoactive

Consequences of Addiction:

Physical: Kidney damage, liver failure, heart disease, lung damage, strokes

Psychological: Hallucinations, anxiety, paranoia, aggressiveness

Vape	A device used for inhaling vapour containing nicotine and flavouring.

Risks of Vaping:

- Nicotine is highly addictive
- Nicotine can harm adolescent brain development
- Vapes contain other harmful substances that can increase risk of cancer and lung disease

2. Alcohol

Dependency	A state in which a person relies upon a substance to feel or function as normal.
Depressant	A type of drug that slows body systems, lowers cognitive abilities and slows reactions.

Consequences of Alcohol misuse:

Short term: Vomiting, blurred vision, risky behaviour: doing and saying things one wouldn't normally do.

Long term: High blood pressure, cancer, liver disease, depression

Connected Careers

- Counselling/therapy
- Psychologist
- Medicine: Nurse/Doctor/Health Care assistant
- Dietician
- Personal Trainer
- Dental care

3. How to Prevent Poor Health

Personal Hygiene	How you care for your body.
Self-Screening	Examining yourself to check for signs of disease or illness.

Factors that contribute to a healthy lifestyle:
A healthy, varied diet: A balanced diet can support a strong immune system and keep energy up.
Regular exercise: Exercise gives greater flexibility and strength, prevents boredom and helps sleep.
Sleeping well: Sleeping gives bodies and minds the time to rest, recover and process all the things which have happened during the day.

Key Concepts

Resilience	Being able to recover quickly from difficulties.
Risk Factors	Things that could result in a period of poor mental health. Such as: • Social isolation/loneliness • Traumatic life event • Severe or long-term stress • Poor physical health
Protective Factors	Things that support mental health. Such as: • Strong support network • Healthy habits; diet, sleep, exercise • Mindfulness • High self-esteem

Helpful Resources

- **FRANK:** Information, help and advice about drugs. **Website**: talktofrank.com **Helpline**: 03001236600
- **We Are With You:** Free, confidential support with alcohol, drugs or mental health. **Website**: wearewithyou.org.uk
- **Mind UK:** Mental health charity. **Website**: mind.org.uk **Helpline**: 0300 123 3393
- **Childline:** Children's charity. Call their helpline for a free, private and confidential service where you can talk about anything. **Helpline**: 0800 1111 **Website**: childline.org.uk

Citizenship - Relationships

1. Choices in Relationships

Consent	'A person consents if he/she agrees **by choice**, and has the **freedom** and **capacity** to make that choice.'
Contraception	Methods used to prevent pregnancy from occurring.

Types of Contraception:

- Condoms
- The pill
- Contraceptive implants
- Intrauterine device (coil)

2. Safe Relationships

Harassment	Aggressive pressure or intimidation.
Pornography	Pornography is not a healthy and real representation of healthy relationships.
Boundaries	'Rules' in a relationship that guide how people interact.

Examples of healthy boundaries for a safe relationship:

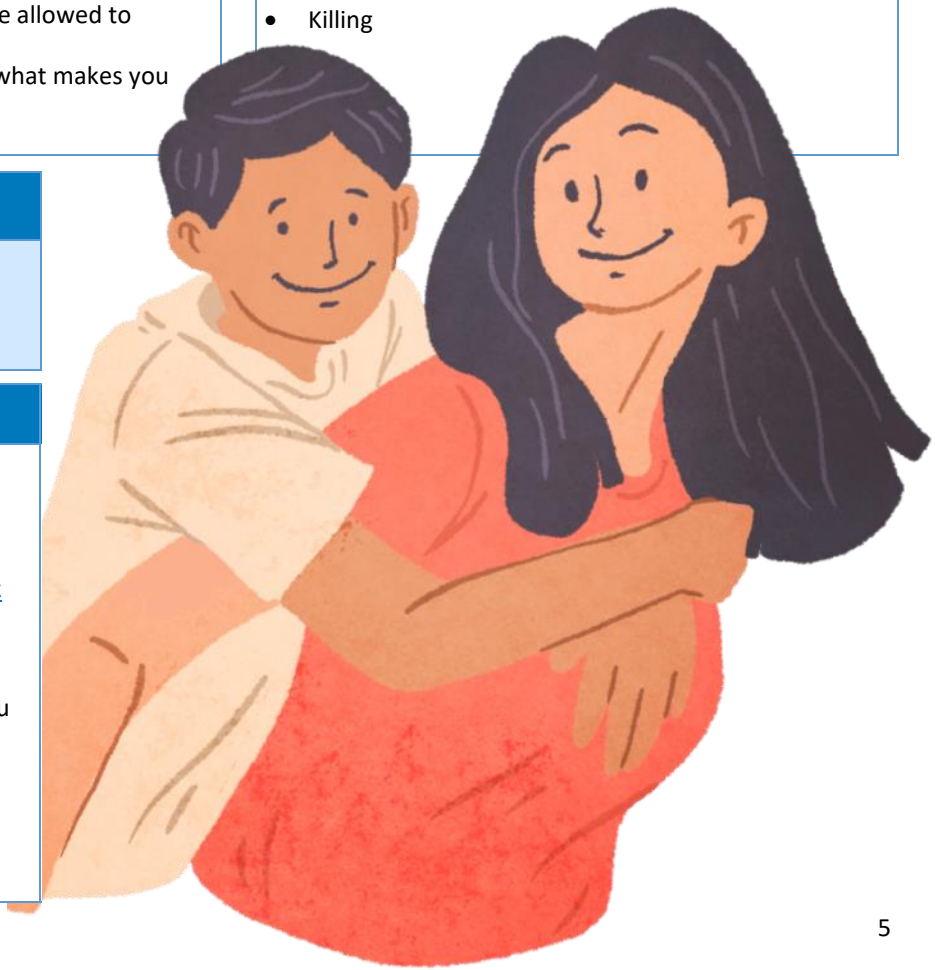
- Not excessively texting one another
- Maintaining individuality, personal space, and personal hobbies
- Having other healthy relationships that are allowed to flourish
- Being able to say 'No' and being clear on what makes you uncomfortable

3. Relationship Abuse

Coercion	Using force or threats to get your own way.
Honour-based violence (HBV)	Practices used to control the behaviour of (mostly) women and girls.

Types of Honour-based violence:

- Physical abuse e.g. beating and kicking
- Psychological pressure e.g. threats and humiliation
- Forced marriage
- Abandonment
- Killing



Connected Careers

- Relationships counselling and therapy
- Safeguarding: police, social work, pastoral leader in schools
- Charity work

Helpful Resources

- **National domestic abuse hotline:** 0808 2000 247
- **Women's Aid:** This charity supports young girls and women who face domestic abuse www.womensaid.org.uk
- **Mankind:** Service supporting young boys and men who face domestic abuse www.mankind.org.uk
- **Galop:** Support for LGBT+ people experiencing abuse.
  Website: http://www.galop.org.uk **Helpline:** 0800 999 5428
- **Childline:** Children's charity. Call their helpline for a free, private and confidential service where you can talk about anything. **Helpline:** 0800 1111 **Website:** childline.org.uk
- **Respect:** Support those exhibiting controlling behaviours **Helpline:** 0808 802 4040

Citizenship - Democracy and Government

1. UK Political Parties

General Election	Voting for the political party that will govern the country.
Political Party	A group of people with similar ideas and beliefs who have come together to work to achieve their aims. E.g. The Conservative Party, The Labour Party and the Liberal Democrat Party.
The Conservative Party	Current leader: Rishi Sunak Promises: • Funding for NHS. • Tougher immigration control. • No income tax rises.
The Labour Party	Current leader: Keir Starmer Promises: • More funding to all public services. • Tackle poverty and inequality. • Bettering international relations.
The Liberal Democrat Party	Current Leader: Ed Davey **Promises:** • Stop Brexit. • Funding for education. • Raising income tax for invest in services such as mental health.

Helpful Resources

Parliament Website: **www.parliament.uk**

See voting history of your MP: **www.theyworkforyou.com**

Contact your local MP or councillor: **www.writetothem.com**

UK Youth Parliament: **https://www.byc.org.uk/uk/uk-youth-parliament**

2. Should Politicians be Model Citizens?

Politician	A person who is professionally involved in politics, especially as a holder of an elected office, such as an MP.
Member of Parliament (MP):	The candidate with the most votes for their area (constituency). Their role is to represent their constituents in Parliament.

Demographics of MPs (2019)

Gender: Currently there are 225 female MPs: 34% of all MPs.

Age: 49% of MPs elected in 2019 were aged over 50.

Ethnicity: In 2019, 10% of total MPs were from non-white backgrounds, a record number.

Connected Careers

- Member of the civil service in departments such as the Diplomatic Service, the Treasury or security and intelligence services
- Researcher for governments
- Politician
- Communications
- Working for local authority
- Charity
- See and read more on **Unifrog.org**

3. Our Role in Democracy

Democracy	'Rule by the people'. A form of government where the people rule, either directly or through elected representatives, e.g. UK.
Local Government	Local government is responsible for issues which are relevant on a local level. For example, they are responsible for aspects of local education, transport, social care, libraries, waste management and housing.

How can our voices be heard?

- Voting
- Contact Local Councillors
- Contact your MP
- Participate in the UK Youth Parliament

Citizenship - Managing Money

1. Managing Money	
Income	Money received, especially on a regular basis.
Income Tax	Tax taken straight from a person's earnings.
Deductions	The money taken from your salary before it is paid to you. Includes: income tax, National Insurance, Pension, Student Loan Repayments.
Take home pay (net pay)	The amount of money you are paid of your salary after deductions. (Gross pay – Deductions = net pay).

3. Money Today	
Buy now pay later	A way to purchase a product without paying for it immediately: the money is loaned to you and you pay back, with interest later.
Gambling	Gambling involves playing a game, placing a bet or taking a risk in the hope of winning money or something else desirable.
Cryptocurrency	A digital currency in which transactions are verified and records maintained by a decentralized system using cryptography, rather than by a centralized authority.

2. Money Decisions	
Budget	A financial plan for a set period of time, including planned savings and expenses.
Expenses	Money spent, such as for bills, food and any other purchases.
Mortgage	A loan used to borrow money for the purchase of a house.
Deposit	The amount of money you pay upfront towards the cost of a property (the mortgage covers the rest).
Interest	Either: money you receive from a bank when you save, OR: money you have to pay when you borrow money on top of the actual amount you borrowed.

Connected Careers
Retail and investment banking
Finance managers for businesses, schools etc.
Accountant
Insurance advisor
Cyber security

Resources

- Natwest Resources and games to teach about finances https://natwest.mymoneysense.com/home/
- Money makes sense resources https://www.moneymakesense.co.uk/
- **Childline:** Free counselling service for young people to talk about any issues that is causing distress or concern. **Helpline:** 0800 1111 **Website:** www.childline.org.uk
- **GamCare:** Information and support for the prevention and treatment of problem gambling. **Helpline:** 0808 8020 133 **Website:** www.gamcare.org.uk
- **Cifas:** Fraud prevention service with lots of information on preventing financial crime. **Website:** www.cifas.org.uk

Citizenship - Law and the Justice System

1. Why do we need laws on equality?	
Equality	Equality is about ensuring that every individual has an equal opportunity to make the most of their lives and talents.
Discrimination	Treating people differently based on prejudice. Examples of discrimination include: sexism, racism, transphobia and xenophobia.
Prejudice	Prejudging people without good reason. Often based on characteristics such as race/religion/disability.
The Equality Act (2010)	A law in the UK which brought together multiple acts regarding equality and discrimination made to advance equality for all.

Protected Characteristics:
The protected characteristics according to the Equality Act 2010 are:

Age	Sex
Disability	Sexual Orientation
Gender Reassignment	Pregnancy and maternity
Race	Marriage and Civil Partnership
Religion or Belief	

Connected Careers

- Law enforcement
- Careers related to law: Bailiff, Barrister, Court legal adviser, Court assistants, Prosecutor, Judge
- Forensic science and psychology
- Prison and probation officer

See and read more on **unifrog.org**

2. How far have we made progress on equality in the UK?	
Inequality	The unfair situation in society when some people have more opportunities or other privileges than other people.
Disability	You are disabled if you have a physical or mental impairment that has a 'substantial' and 'long-term' negative effect on your ability to do normal daily activities. (Equality Act 2010).
Types of Disability	Physical disability, Visual Impairment, Hearing Impairment, Progressive conditions such as cancer, Learning difficulties, Mental Health conditions.
The Equality Act (2010) for disability	This act made it illegal to discriminate against disabled people across multiple circumstances. Service providers must make reasonable adjustments to enable disabled people to access services.
Reasonable Adjustment Examples	• Flexible working hours. • Modifying work performance targets • Special equipment. • Providing information in an accessible format i.e. Braille or Large Print. • Ramps for wheelchair access. • Adapted toilets.

3. Does the law in the UK need updating?	
The Justice System	The collection of agencies involved in the detection, prevention and prosecution of crimes. The Three components of the Justice system are: • Law Enforcement (Police) • Courts System • Corrections System
Bill	The idea that is brought to the house of commons and house of laws in hopes of forming a new law.
Royal Assent	The King must agree to a bill and sign it in order for it to become an official law.

Resources

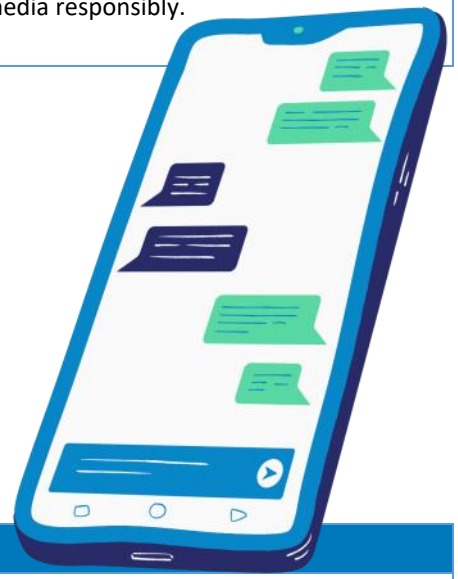
- See Bills that are currently being debated in Parliament here: https://bills.parliament.uk/
- **Childline:** Children's charity. Call their helpline for a free, private and confidential service where you can talk about anything. **Helpline:** 0800 1111 Website: childline.org.uk
- Read more about your rights and the law regarding equality from the Equality and Human Rights commission at: www.equalityhumanrights.com
- Further resources about crime and an anonymous crime reporting online form at https://www.fearless.org/en

Citizenship - Media Literacy

1. Cybercrime	
Cybercrime	Criminal activities carried out by means of computers or the internet.
Grooming	When someone builds a relationship with another person to gain their trust for the purposes of harm or abuse.
Breck Foundation	A charity set up to tackle online grooming following the murder of 14 year old Breck Bednar.
The Breck Principles	• Be aware and believe • Report it • Educate and Empower • Communicate • Know the signs and keep safe

2. Information Sharing	
Phishing	When someone pretends to be someone else online in order to try and get your personal information.
CEOP	The Child Exploitation and Online Protection Centre.
Indecent image	A sexual image of a child that may include nudity, partial nudity or children sexually posing, including self-generated images.
Victim blaming	Someone saying, implying or treating a person who has experienced harmful or abusive behaviour like it was a result of something they did or said.
The Law on Nude Sharing	It is an offence for a person to take, distribute, possess or publish indecent photographs of a child under 18.

3. Digital Citizenship	
Citizenship	The ability to safely and responsibly access digital technologies, as well as being an active and respectful member of society, both online and offline.
Evaluate	Judging and weighing the strengths and weaknesses of something.
Digital Footprint	Data that is left behind when users have been online.
Media Literacy	The ability to critically analyse and evaluate the messages conveyed through media and use digital media responsibly.



Connected Careers

- Journalism
- Social media manager
- Advertising
- Software development
- Web designer
- Intelligence officer, cyber security officer
- IT support technician
- See and read more on **unifrog.org**

Resources

Childline: Children's charity. Call their helpline for a free, private and confidential service where you can talk about anything. **Helpline: 0800 1111** **Website:** childline.org.uk

Breck Foundation: https://www.breckfoundation.org

Child Exploitation and Online Protection (CEOP): Report online abuse and access support at https://www.ceop.police.uk/Safety-Centre/

Safer Internet Centre- https://www.saferinternet.org.uk

English - Grammar

	Sentence Construction	
1	**Capital letters**	Used at the beginning of sentences and for proper nouns.
2	**Clause**	A group of words containing a subject and a verb.
3	**Main clause**	A clause that does make sense on its own.
4	**Subordinate clause**	A clause that doesn't make sense on its own.
5	**Embedded clause**	A subordinate clause used within a main clause.
6	**Subordinating conjunction**	Introduces a subordinate clause e.g. despite, since, as, if.
7	**Coordinating conjunction (FANBOYS)**	A word that connects main clauses or phrases e.g. for, and, nor, but, or, yet, so.
8	**Declarative sentence**	Makes a statement.
9	**Imperative sentence**	A command or instruction.
10	**Interrogative sentence**	Asks a question.
11	**Exclamatory sentence**	Expresses strong emotion and ends with an exclamation mark.
12	**Fragment sentence**	A sentence that does not contain a verb and/or subject.
13	**Simple sentence**	A sentence consisting of only one main clause.
14	**Compound sentence**	A sentence which includes two main clauses joined by a semi colon or coordinating conjunction.
15	**Complex sentence**	A sentence which includes a main clause and one or more subordinate clauses.
16	**Compound-complex sentence**	A sentence that contains two main clauses and one or more subordinate clauses.

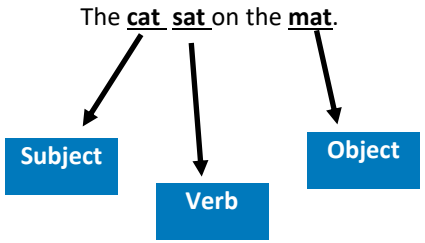
	Punctuation	
17	**Full stops**	Used to mark the end of a sentence.
18	**Commas**	• To separate main and subordinate clauses. • To separate items in a list. • After introductory clauses, phrases, discourse markers.
19	**Apostrophes**	Used to show possession and omission.
20	**Semi colon**	• Used between two main clauses that are closely related. • Used in-between ideas of a list that are already complex due to the inclusion of commas and conjunctions.
21	**Colon**	• Introduce a list, information, idea and explanation. • Introduce quoted information.
22	**Dash**	• To add extra information. • To signal a change in thought or shift in tone.
23	**Hyphen**	Used to combine words into compound word. e.g. washing-up.
24	**Brackets**	• Separates extra information in an informal style (round). • Gives alternatives (round). • Around the ellipsis that shows words have been omitted from a quote (square).

	Word Types	
25	**Abstract noun**	An idea or concept e.g. bravery, courage, love.
26	**Noun**	A name, place or thing.
27	**Proper noun**	Names of people and places which require a capital letter e.g. London, Anna.
28	**Noun appositive**	A noun phrase that renames the noun right beside it e.g. Winston Churchill, the Prime Minister during WWII, was…
29	**Adjective**	A word that describes the noun.
30	**Superlative adjective**	Used to show something is of the greatest degree. E.g. Smallest, tallest, quickest
31	**Verb**	Action or state (be, have).
32	**Modal verb**	A verb that shows necessity or possibility. e.g. will, should, could
33	**Adverb**	A word that describes a verb.
34	**Indefinite Article**	Words used with nouns that classify them (a/an).
35	**Definite Article**	Words used with nouns that classify them as already known (the).
36	**Preposition**	Providing information on time, place, and position.
37	**Quantifier**	A pronoun indicative of a quantity e.g. few, many, some
38	**Personal Pronoun**	Words used in place of names of people or things. e.g. she, I, you
39	**Collective Pronoun**	Words that are used to show a group of people. e.g. our, us, we

English - Grammar

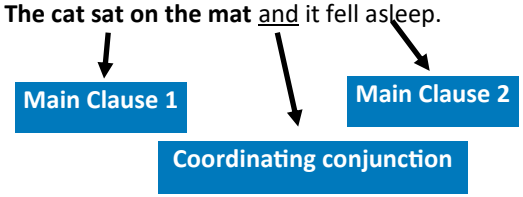
Simple Sentence

A sentence consisting of only 1 main clause. EXAMPLE:



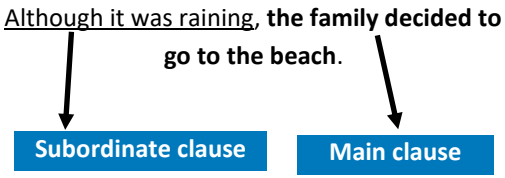
Compound sentence

A sentence consisting of two main clauses joined by a coordinating conjunction or semi colon. Example:



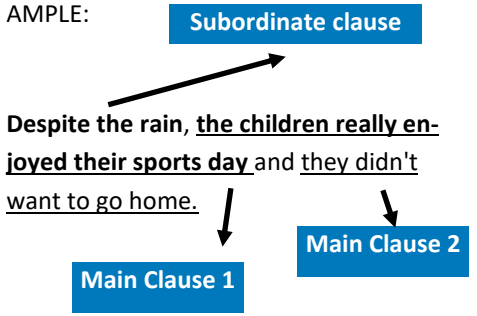
Complex sentence

A sentence which includes a main clause and one or more subordinate clauses. EXAMPLE:



Compound complex sentence

A sentence that contains two main clauses and one or more subordinate clauses. EXAMPLE:



Commas	Apostrophes
1. To separate main and subordinate clauses. EXAMPLE: As I wandered through the street, I noticed the tired looking shops.	1. Used to show omission Omission is when we show that we have taken a letter out of a word and replaced it with an apostrophe. EXAMPLE 1: I do not think we should do this. = I don't think we should do this. EXAMPLE 2: It is clear that you are right. = It's clear that you are right.
2. To separate items in a list. EXAMPLE 1: I went to the shops to buy milk, eggs, bread and cheese. EXAMPLE 2: The door was old, worn, battered and overwhelmingly large.	2. Used to show possession Possession is when we show that we have used an apostrophe to show that something belongs to someone. EXAMPLE 1: Miss Smith must mark all the students' papers. EXAMPLE 2: James' bike was broken. EXAMPLE 3: The writer's use of the noun "table" suggests…
3. After introductory clauses, phrases, discourse markers EXAMPLE: Firstly, I believe that we should not keep animals for testing. EXAMPLE 2: Additionally, I strongly view healthy eating as important.	

English - Blood Brothers

Key context		
1	**The British class system**	A hierarchical system that separates class according to wealth, occupation and social status: lower, middle and upper. Typically, the class system favours the wealthy whilst limiting the poor.
2	**Conservative**	The Conservative party is rooted in capitalism and focuses on individual responsibility and the creation of wealth.
3	**Labour**	The Labour party is rooted in socialism and prioritises workers' rights and the welfare system.
4	**The welfare state**	A British post-war initiative to protect the health and well-being of its citizens by introducing free health care, benefits for those in need and a state pension for all.
5	**Margaret Thatcher**	First female British Prime Minister for the Conservative party from 1979-1990. Her policies (Thatcherism) promoted a small state, which meant that individuals were encouraged to take responsibility to help themselves and not look to government.
6	**Recession**	A period of temporary economic decline leading to rising unemployment and higher cost of living.

Key dramatic terminology		
	Term	**Definition**
7	**Stage directions**	Instructions in the text of the play for actors, staging, lighting etc.
8	**Narrator (play)**	A character who speaks directly to the audience and 'narrates' the play.
9	**Playwright**	The author of the play.
10	**Prologue**	Introductory scene in verse which establishes themes, plot or characters of the play.
11	**Tragedy**	Drama based on human suffering – typically involving death.
12	**Dramatic irony**	Where the audience knows more than the characters in the play.
13	**Pathos**	Evokes pity or sadness.
14	**Dramatic foil**	A character who deliberately contrasts with another to emphasise their differences.
15	**Symbolism**	Using objects or characters to represent an important idea or concept.
16	**Motif**	A repeated image or idea.

Key vocabulary		
	Term	**Definition**
17	**Socialism**	A belief that all people are equal and should have an equal share in the country's money.
18	**Capitalism**	An economic system in which business and industry are privately owned in order to create the biggest profits possible for individual people.
19	**Social inequality**	When resources are given unevenly across the social classes (the wealthy prosper whilst the poor suffer).
20	**Superstition**	Genuine - and often irrational - belief in supernatural influences leading to good or bad luck.
21	**Dialect**	A form of language belonging to a specific region.
22	**Sociolect**	The dialect of a specific social class.
23	**Classism**	The negative treatment of someone based on social class.
24	**Nature vs. nurture**	The debate between whether inherited traits or your environment establish who you are as a person.

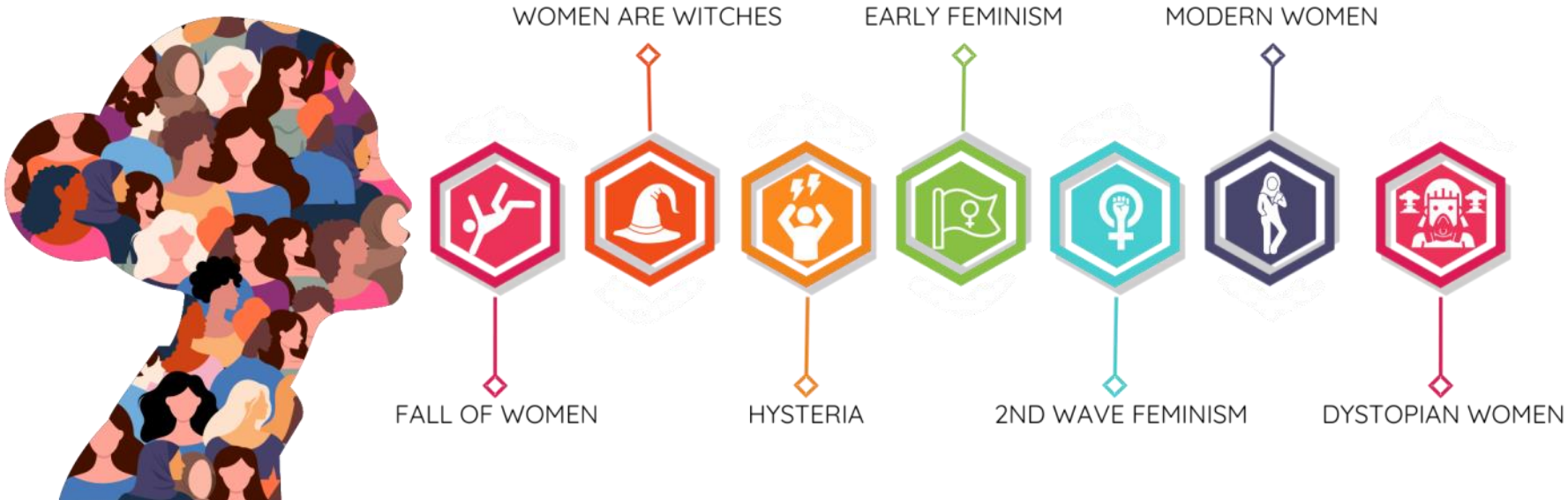
English - Women in Literature

Poetic Terminology	
Stanza	A paragraph in a poem.
Enjambment	No punctuation at the end of a line of poetry.
Rhyme	When the ends of lines of poetry have the same sound.
Rhyme scheme	Fixed pattern of organising rhyme. e.g. abab, aabb, abba.
Rhythm	Patterns of stresses and unstressed syllables in poetry.
Quatrain	A stanza of four lines. 22 25 26
Rhyming couplet	A pair of rhyming lines.
Refrain	A repeated line or lines in a poem.
Tone	The speaker's feelings or attitude in the poem.
Speaker	The person speaking in a poem.
Alliteration	When the same letter or sound starts two or more words in a line.
Repetition	The repeating of a word or phrase.

Key terminology	
Original sin	All humans are born with sin **because Adam and Eve ate the fruit from the tree of knowledge.**
Dystopian	An imagined state or society where there is great suffering or injustice.

Key Vocabulary	
Subservient	Prepared to obey others unquestioningly.
Hysteria	A term often used to describe emotionally charged behaviour that seems excessive and out of control.
Oppression	Prolonged cruel or unjust treatment or control.
Marginalise	Treat a person, group, or concept as insignificant.
Suffragette	A suffragette was a member of an activist women's organisation in the early 20th century who fought for the right to vote in public elections.
Stereotypes	A generalised belief about a particular group of people.
Feminism	A movement that fights for the equality of the sexes.
Empowerment	Authority or power given to someone to do something.
Prejudice	An opinion that is not based on reason or actual experience.
Subvert	To go against or change.

Learning Timeline



English - Rhetoric

	Term	Definition
1	**Ethos**	The writer or speaker's experience and qualifications.
2	**Logos**	The main argument in a piece of persuasive writing. Is normally full of facts and statistics.
3	**Pathos**	Appeals to the emotions of the audience and elicits feelings that already reside in them.

Types of Tone		
4	**Accusatory**	Suggesting someone has done something wrong, complaining.
5	**Cautionary**	Gives warning or raises awareness.
6	**Humorous**	Amusing, entertaining or playful.
7	**Imploring**	Begging or pleading.
8	**Nostalgic**	Thinking about the past.

	Forms of Writing	
9	**Speech**	An address delivered to a group of people.
10	**Article**	A piece of writing included with others in a newspaper, magazine or online.
11	**Letter**	A form of written communication sent to a particular person.

	Key Terms	
12	**Anecdote**	A short story.
13	**Fact**	A true statement.
14	**Opinion**	Someone's beliefs or thoughts.
15	**Rhetorical question**	A question asked by the writer or speaker which does not expect an answer.
16	**Emotive language**	Words used to evoke an emotion in the reader.
17	**Statistics**	A fact or piece of data obtained from a study of a large quantity of numerical data.
18	**Triple**	Three words used in a list to describe something.
19	**Collective pronouns**	Words to replace a noun such as 'we', 'us', 'our'.
20	**Direct address**	Speaking directly to the audience 'you'.
21	**Analogy**	A comparison between one thing and another.
22	**Anadiplosis**	Repetition of the same word at the end of one clause and the start of the next clause.
23	**Hypophora**	Asking a question and then providing an answer.
24	**Expert voice**	Using a knowledgeable figure or person who can express an opinion which supports your point.
25	**Anaphora**	Repetition of the same word/phrase at the beginning of successive clauses.
26	**Tone**	The choice of writing style the writer employs to convey specific feelings, emotions or attitudes.

English - Identity Poetry

	Poetic Forms	
25	**Form**	The physical structure of a poem.
12	**Verse**	Has a regular rhythm and a fixed rhyme scheme.
33	**Free Verse**	No rhyme scheme or regular metre.
25	**Elegy**	A poem that is supposed to show mourning or loss.
6	**Slam Poetry**	A form of performance poetry that combines the elements of performance and audience participation.
	Poetic Structure	
28	**End-stopped**	Line ending in a punctuation mark.
22	**Enjambment**	No punctuation at the end of a line of poetry.
24	**Caesura**	Pause in a line indicated by a punctuation mark
26	**Volta**	Turning point in a poem; shift in tone.
3	**Stanza**	A paragraph in a poem.
23	**Tercet**	A stanza of three lines.
11	**Quatrain**	A stanza of four lines.

10	**Rhyme Scheme**	Fixed pattern of organising rhyme. e.g. abab, aabb, abba
27	**Refrain**	A repeated line in a poem.
18	**Internal Rhyme**	Where there are two words which rhyme in the same line as each other.

	Poetic Methods	
30	**Simile**	When one thing is compared to another using like or as.
16	**Metaphor**	When one thing is directly compared to another. e.g. 'the tank is a monster'
15	**Personification**	Giving human qualities to an object e.g. the bullets screamed.
7	**Speaker**	The voice behind the poem.
8	**Imagery**	Where the writer uses words or phrases that create a certain image in the reader's mind.
4	**Tone**	The speaker's feelings or attitude in the poem.
9	**Oxymoron**	Putting two words together that create something 'impossible'. e.g. 'cold heat'
32	**Symbolism**	Using objects or characters to represent an important idea or concept.
20	**Juxtaposition**	Placing two very different things alongside each other.
31	**Direct Address**	Speaking directly to the reader using 'you'.
17	**Extended Metaphor**	A metaphor which is consistent throughout a text.
14	**Repetition**	Where the same line, word or phrase is written more than once.
29	**Rhetorical Question**	A question that does not require an answer.
13	**Semantic field**	Where a group of words all link together to form a similar idea or concept.
	Key Concepts	
1	**Identity**	Who you are and the way you think about yourself.
2	**Nation**	Population united by language, history and culture in one country.
19	**Culture**	Ideas, skills, traditions, beliefs and morals shared by a large group of people.
5	**Ethnicity**	Belonging to a large group of people with the same national, racial or cultural origins.
21	**Stereotype**	A widely held but fixed and oversimplified image or idea of a particular type of person or thing.

English - Introduction to the Gothic

Key Terminology		
Term		**Definition**
1	**Gothic Fiction**	A style of writing that is characterised by elements of fear, horror, death and extreme emotions.
2	**Literary Conventions**	Defining features of particular literary genres, such as novel, short story, ballad, sonnet, and play.
3	**Motif**	A repeated image or idea.
4	**Supernatural**	Something that cannot be explained by science or reason.
5	**Characterisation**	A literary device in which in an author builds up a character in a narrative.
6	**Symbolism**	Using objects or characters to represent an important idea or concept.
7	**Setting**	The time and place in which the story takes place in a piece of literature.
8	**Tension**	The feeling of suspense and anticipation.

Key features of the Gothic	
9	Death and darkness
	Supernatural (magic, ghosts, vampires, monsters)
	Focus on body parts/ transformation
	Depiction of madness and hyperbolic emotion
	Mystery, terror and suspense

Key contextual ideas		
10	**Romanticism**	• A literary genre in the 18th-19th century. • Celebrated nature, beauty and imagination. • Rejected industrialisation and rationalism.
11	**The Sublime**	• An overwhelming feeling of awe in the presence of nature. • Fear vs wonder.
12	**Fin de siècle**	The end of a century, especially the 19th century.
13	**Victorian Values**	• Victorian society valued religion. • There was a strict social code of conduct. • Men were expected to always be respectful, logical and rational.
14	**Fear of moral degradation**	• The fear that society will begin to fall apart and lose its respect/dignity. • Victorians believed moral degradation could be caused by immigration, crime, disease and unacceptable sexual behaviour.

Ethics - Religion and Morality

1. Abrahamic Religions	
Abraham	A prophet who made a covenant with God to worship only one God.
Isaac	Abraham's son with Sarah and an ancestor of Jesus.
Ishmael	Abraham's son with Hagar and an ancestor of Prophet Muhammad.

2. Catholic and Church of England		
Catholic Church	**Papal Infallibility**- the Pope is never wrong on moral or religious issues.	Jesus appointed the first Pope (Peter).
	Magisterium- The official teachings of the church.	
Church of England	**State Church-** The official religion of England, led by the Archbishop of Canterbury.	Started by Henry VIII in 1534.

3. Quaker and Evangelical		
Quaker	**Agape love**- Unconditional love.	Began in 1600s and focused on a personal relationship with God.
	Conscience- Our conscience is the *"small, still voice of God."*	
Evangelical	**Traditional view-** The Bible is the literal word of God and must be followed.	Started in the 1700s as a protest against formal worship.

4. Natural Law	
Natural Law	The idea we can use our God-given reason to determine what is 'good' and 'bad'.
St Thomas Aquinas	A Catholic theologian who had a substantial impact on Catholic teachings.
Five Primary Precepts	Precepts humans know **innately** (by nature) to help us be good. They are: Protect life, live in a society, worship God, reproduce and educate children.
Secondary Precepts	Rules based off the primary precepts e.g. not using contraception as we should reproduce.

5. Situation Ethics	
Situation Ethics	The idea that each situation should be considered when deciding right or wrong, rather than following absolute rules. (Pragmatic, personal, practical).
Joseph Fletcher	An American Philosopher who developed Situation Ethics as a moral theory.
Based on love	Fletcher said that all moral decisions should be based on the principle of agape love.
Agape Love	Agape love in this context is love that promotes the wellbeing of others. Love and justice should be treated as the same.

Monotheism	Revelation	Night of Power	Torah	Qur'an	Bible	Absolute Morality	Relative Morality
The belief in one God.	How God reveals His nature through prophets and angels.	When Angel Jibril first revealed the Qur'an to Prophet Muhammad.	The Hebrew Bible, studied by Jews.	The holy book of Islam, said to be Allah's exact words.	The holy book of Christianity, consisting of the Old Testament and New Testament.	The idea that some actions are always right or wrong, no matter the situation.	The idea that the rightness of wrongness of an action depends on the situation.

Ethics - Component 1 - Issues of Life & Death

Creation

Origin of the universe

Christian	Humanist
Genesis 1: • God created universe ex nihilo in 6 days and rested on 7th. • Created humans Imago Dei.	Big Bang: • A theory that states the universe is expanding from a **singularity** (13.7 billion years ago). • Developed by Stephen Hawking. • Richard Dawkins (atheist) critiqued Big Bang as a 'God of the Gaps' argument.

Origin of humans

Christian	Humanist
Genesis 2: • Adam= dust, Eve=rib • Adam receives "breath of life" (soul)	Evolution: • A theory that states humanity has evolved by the process of natural selection— Useful, random mutations are passed down and species gradually change. • First formulated by Charles Darwin. • Richard Dawkins argued genes behave in a way that ensures their own survival (Selfish Gene). Supported Darwin.

Christian Interpretations of Genesis

Creationist ***Evangelical***	• Genesis is a factual, historical account. • World is 10,000 years old (Adam & Eve's family tree). • Ken Ham (Young earth creationism) - USA.
Progressive ***Catholic***	• Allegory- Genesis is not a historical account, but has hidden meanings e.g. "breath of life" shows God is close to us and we have a spiritual nature like God. • Theistic guided evolution- God guided evolution over 7 'yom' (period of time). • Big Bang- God is the first cause of the Big Bang (proposed by George LeMaitre).

Environment

Christianity

Stewardship	A God-given special responsibility to care for creation	• *"Care and cultivate" Garden of Eden.* • *Imago Dei- We represent God on earth.*	• Christian Climate Action- Work with Extinction Rebellion e.g. blocking London roads.
Dominion	God-given power to rule over nature on God's behalf.	• *"Fill the earth and subdue it"* • *"Rule over the fish of the sea and birds of the sky"*	• Permission to use world's resources in a sustainable way e.g. fossil fuels, meat industry.

Humanism

Humanist Climate Action	A group of UK Humanist volunteers who campaign for policies that are low-carbon and promote sustainability.	• 'Plant a humanist forest'- A 2022 project.
Utilitarianism	Moral philosophy based on '*greatest good for greatest number*'.	• Reduce extinction rates.
Global citizenship	Humans have a duty to leave a legacy for future generations of a healthy planet.	• Humanist and scientist, Hermann Bondi: 'I want my grandchildren to see elephants'

Sanctity of life vs Speciesism

Religious view– Christianity and Islam

Sanctity of life	• All life is sacred and belongs to God. • Humans were made as the pinnacle of creation. • *"Breath of life"/ "Imago dei"*

Humanist view

Equality of all life forms	• All **sentient** beings (ability to experience pain/pleasure) should have the same protections. • Veganism, campaigning against animal testing;
Speciesism (Peter Singer)	Religious attitudes are speciesist as they encourage humans to discriminate against other species. *"Christianity is our foe"*

Abortion

Catholic- Always wrong	• Contravenes first primary precept 'self preservation'- Natural Law. • "Before I formed you in the womb I knew you"- Bible. • "Abortion is not the lesser of two evils" Pope Francis.
Islam - Can be acceptable (halal)	• Acceptable before the foetus receives a 'ruh' (soul) at 120 days. • Is not acceptable for financial reasons (zakat can be used): "Do not kill your children for fear of want" Qur'an
Humanist- Individual's choice.	• We have autonomy (control) over our bodies, not God. • Utilitarianism- "*Greatest good…*" Reduces backstreet abortions. • Guided by law– The Abortion Act 1967.

Quality of life	Sanctity of life	Afterlife	Evolution	Global Citizenship	Euthanasia	Abortion	Environmental Sustainability	Soul
The standard of health or happiness experienced by an individual.	All life is sacred and given by God.	The belief that life continues after death.	The process where physical characteristics of living creatures change over time.	The idea that we should work as a community to look after the world.	Assisted suicide- ending a patient's life to relieve suffering.	The deliberate termination of a foetus up to 24 weeks.	To use natural resources responsibly to preserve them for future generations.	Non-physical, immortal part of a human.

Ethics - Component 1 - Life & Death

The Soul	
Dualism	The belief that we are made up of a spiritual soul & physical body.
Christianity	
God-given	God breathed first soul into Adam through the "breath of life".
Immortal	Unlike our current bodies, our soul will live forever.
Judgement	We will be judged on the content of our souls, not our bodies.
Islam	
Ruh	The Arabic word for soul.
Allah-given	Allah breathed a "ruh" into Adam's nostrils
Fitrah	Our souls have inner knowledge of Allah & good/ evil.
Humanism	
Materialism	The belief that only the physical/empirical world is all there is. There is no evidence for a soul.
Bertrand Russell	A Humanist philosopher- *"When I die, my body shall rot. No part of shall survive."*

Euthanasia	
Catholic- Always wrong.	• *"It is a false act of compassion"*- Pope Francis • "Thou shall not kill" 10 Commandments • Support the hospice movement. Hospices provide spiritual and physical comfort for those entering the dying process.
Islam- Rarely acceptable.	• *"The term of every life is fixed by Allah"*- Qur'an • Passive euthanasia may be acceptable if it is artificially sustaining life (e.g. patient is brain dead).
Humanist- Individual's choice	• Dignity in Dying= campaign to legalise euthanasia in the UK- supported by 90% of the UK. • Influence MPs, using social media to mobilise support, holding local debates and inviting guest speakers. • We should have autonomy over our bodies (e.g. **Paul Lamb** failed to overturn ban in Supreme Court).

Funerals	
Christian Practice	**Link to afterlife**
Prayers and Hymns from the Bible e.g. *the lord is my shepherd.*	Communicating with God in the hope the deceased with achieve a place in heaven.
The priest will light candles in a church.	Physical representation of hope and light– Jesus leading us to salvation.
Islamic Practice	**Link to afterlife**
Shahadah is recited *"There is one God Allah and Muhammed is his messenger".*	Said as a reminder of a Muslims lifelong faith. Faith will be tested by two angels in the afterlife, so the Shahadah acts as a prompt.
Buried in a white shroud, facing Mecca.	This garment represents equality in death "*equal as the teeth of a comb*". Facing this direction will increase their chances of reaching Jannah.
Humanist Practice	**Link to afterlife**
Celebrant	A Humanist celebrant leads the service.
Music / eulogy	Music with meaning and messages from relative may be shared with no mention of God or faith. Instead a focus on the legacy they have left behind.

Judgement		
Christianity		
Bodily resurrection	On Judgement Day we will be raised with new, immortal bodies.	"The body is sown perishable and raised imperishable"
Parable of the sheep & Goats	Jesus will judge everybody and those who have helped others will go to Heaven.	"When I was hungry, you fed me"- Jesus
Islam		
Barzakh	A cold sleep our 'ruh' waits in until judgement. Asked three questions to determine barzakh.	
Day of Judgement	Allah is 'most-just' and will judge us on our book of good and bad deeds presented by Raqib and Atid.	

Afterlife	
Traditional View: Physical place	**Contemporary view: Spiritual**
Heaven: • Rapture- Christians believe they will physically ascend to Heaven (as Jesus did). • God created the "Heavens and the Earth". • God's dwelling, angels, a new "tree of life."	• A feeling of closeness to God and comfort. • "*Heaven is within you*" • Universalism- All souls will eventually experience Heaven.
Hell: • An eternal place of torture- darkness and fire. • *"Weeping and gnashing of teeth"*	• Sinners will not be resurrected. • *"Sinners will not reach eternal life"*

Islam	
Azrail	Angel of death is commanded to take our soul as *"the term of every life is fixed by Allah"*
As-Sirat	Bridge crossing over to Jannah which is *"thin as a hair and sharp as a sword"*
Jannah	Paradise, described as a garden with *"rivers of milk & honey"* 7 stages- the prophets are already in Jannah.
Jahannam	A place of torture where people wear "*garments of fire*" 7 stages- the 7th stage is for hypocrites.

Humanism		
No afterlife	There is no immortal part to us- only our legacy. No expectation of reward.	Bertrand Russell- *"the things we care for will continue"*

Ethics - Equality & Human Rights

1. Personal Conviction	
Oscar Romero	• El Salvador/Archbishop • Stood up against government. • Broadcasted truth on the radio, shot dead by army. • *"Release the oppressed"*- Jesus
Malala Yousafzai	• Lived under the Taliban in Pakistan. • Blogged about female education. • Shot (survived) in 2012 for going to school. • Khadija– Businesswoman

2. Prejudice and Racism	
Christianity	
Martin Luther King Jr	Stood up for Civil Rights in 1960s USA through peaceful marches. "I have a dream" speech.
Ku Klux Klan	White supremacist group who used the Bible to justify racism e.g. Abraham had slaves.
Islam	
Malcolm X	Previously supported 'African racial superiority' Changed views after Hajj- saw all races as equal.
Qur'an	"Allah made Adam from soil of many colours"

3. & 4. Prejudice and Gender / LGBTQ+	
Gender	
Catholic	Women have a role in worship, but not priesthood. "Christ is head of man, man is head of woman"
Islam	• Women must be treated with respect, but are mostly not permitted to become an imam. • Mariam Mosque (Denmark)- fights Islamophobia & patriarchy.
LGBTQ+	
Law	• Same-sex relationships decriminalised in 1972. • Still illegal in over 60 countries worldwide.
Catholic	• No same-sex marriage due to Primary Precept to 'Reproduce'. • Permitted Civil Unions as we are all 'children of God'.
Islam	• Commonly not accepted in Islam. • "As for two men guilty of lewdness, punish both" (Qur'an) • IMAAN– First Muslim LGBTQ+ charity.

5. Prejudice and Disability	
Disability	A physical/mental condition that limits movement, senses, or activities.
Prejudice	72% of people in Britain think of disabled people as less productive than others.
Christianity	Some Christians view disability as linked with sin. "Stop sinning or something worse will happen to you"- Jesus
Islam	Disability viewed as a challenge from Allah. Muslims should help the poor as shown by the Final Sermon.

6. Religious Expression	
Evangelism	Preach with the intention of converting. ***"Go and preach the gospel" Jesus***
Religious Protest	Some Christians protest outside abortion clinics.
Religious clothing	Muslim women may choose to wear a hijab. ***"Women should guard their modesty"***

7. Extremism	
Anti–Abortion	George Tiller (a doctor) murdered by anti-abortion militant.
ISIS	• Use violence to create an Islamic state. • Criticised- *#notinmyname*

8. Censorship	
Christianity	
FOR	• Harmful material should be censored. • "Bad company corrupts good character.
AGAINST	• Preaching should not be censored. • "Go and preach the gospel"
Islam	
FOR	Images of Allah should be censored (shirk).
AGAINST	Religious clothing should not be censored e.g. France.

9. Wealth & Charity	
Christianity	
Attitude	"Love of money is the root of all evil"
Acquisition	Christians should choose a job that benefits others.
Use	Charity (tithe=10% voluntary).
Example	Tearfund: Work in over 50 countries e.g. Colombia.
Islam	
Attitude	All wealth is Allah's and part of His plan (Al Qadr).
Acquisition	**Riba** (earning interest) is forbidden.
Use	Charity (Zakat: Compulsory (2.5%) Sadaqah:Voluntary)
Example	National Zakat Foundation: Since 2011 raised £25 million.

Geography - Life in a newly emerging economy (NEE)

1. What are newly emerging economies?	
Term	**Definition**
NEE	Newly emerging economy. A country that has experienced rapid economic growth.
BRICs	The fastest growing economies named in 2001. Brazil, Russia, India, China.
MINTs	The four more recently growing NEEs named in 2014. Mexico, Indonesia, Nigeria, Turkey.
Industrialisation	The process of a country moving from mostly agriculture (farming) to manufacturing goods (factories).
Brandt line	The line that divided the rich north from the poor south.

2. What are the characteristics of NEEs?	
Large land masses….	…means countries have space for industries to develop.
Large, young populations….	…means countries have a lots of people to work and pay tax.
Rich in natural resources….	…means countries can sell (export) them to other countries.
Key role in world trade. Home to TNCs….	…this means there are more jobs available.
Large secondary sector….	…because of the growth of industries.

4. Rural to urban migration in Nigeria	
Term	**Definition**
Rural – urban migration	The movement of people from rural areas (countryside) to urban areas (cities).
Push factors	Things that make people want to leave an area. E.g. mechanisation meant few jobs in the countryside. Political unrest. Boko Haram kidnapped girls.
Pull factors	Things that attract people to live in an area. E.g. Wages are four times higher in urban areas. E.g. 68% get a secondary school education.
Urbanisation	The increasing percentage of people living in urban areas.
Mechanisation	When machines do the jobs people used to do e.g. using tractors on farms.

3. Changing employment structure	
Term	**Definition**
Employment structure	How the workforce is divided up between primary, secondary, tertiary and quaternary employment.
NEE employment structure	Secondary is increasing and primary is decreasing.
Informal employment Jobs which are not recognised by the government.	Jobs which are not taxed, workers don't have contracts or rights. Causes: • There are not enough formal jobs. • Jobs not created quick enough. • Migrants are not skilled enough.

5. What are the impacts of a TNC locating in a NEE?	
Term	**Definition**
Transnational Corporation (TNC)	Companies that operate in more than one country. 40 TNCs in Nigeria including Shell.
Positive multiplier effect	The cycle where investment in one area leads to further improvement. Jobs so they pay more tax, lead to investment, so more jobs created.
Source country	The country where a TNC has its headquarters (HIC)

7. Shell in Nigeria. A TNC in an NEE			
	Point	**Double**	**Develop**
Positives of Shell (Benefits)	65,000 direct jobs.	So people can earn a higher wage.	Means increase in disposable income so can buy goods and services.
	91% of contracts given to Nigerian companies.	Therefore the government receives more tax.	Which can be invested in infrastructure or services like health care.
Negatives of Shell (Costs)	Bodo oil spill 08/09 spilled 11 mill gallons over 20km$^{2.}$	Which polluted water and farmland.	Therefore, local farmers lose their income and source of food (fish).
	Gas flares affect people's health.	Causing breathing problems.	Unable to work reducing their quality of life.

Geography - Life in a newly emerging economy (NEE)

6. Introduction to Nigeria	
Located just north of the equator, in west Africa.	
Employment structure	Secondary sector is increasing. Primary sector is decreasing.
Importance of Nigeria	
Global importance	NEE in 2014 and World's 21st largest economy. 5th largest contributor to UN peace keeping.
Local importance	Fastest growing economy in Africa. 2014- highest GDP.
Nigeria's context	
Political	Boko Haram have killed 17,000 people since 2002.
Environmental	Rainforest in south and savanna in north.
Social	500 ethnic groups. Life expectancy 55 yrs
Cultural	Nollywood (2nd largest film industry).

7. Aid in Nigeria	
Term	**Definition**
Top down aid	Large scale, expensive projects, where TNCs and government make the decisions.
Bottom up aid	Small scale, local projects where charities and local people make the decisions.
Aid in Nigeria	Over 60% live on less than US$1 a day. Nigeria receives 4% of aid given to Africa. UK gives £3 billion a year to Nigeria.
Nets for Life	$2 mosquito net reduces bites which cause malaria. 85,000 nets given out in Abuja (Nigeria's capital city).

8.What are the impacts of economic development?	
Quality of life	Happiness and health.
Tax	Money paid to the government.
Disposable income	Money people have after paying for essentials.
Life expectancy	The average age a person is expected to live to in a country. In Nigeria, it has increased from 46 to 55 years.
Air pollution	Particles in the air that can cause damage to health.

9. Squatter settlements	
Squatter settlements	An area of poor-quality housing (often illegal) lacking basic services e.g., sanitation.
Sanitation	Access to clean water and a toilet.
Makoko	Squatter settlement in Lagos by the lagoon.
Inequality	Differences in wealth and well-being between different people.

10. Opportunities of living in Lagos	
Social opportunities	68% have a secondary education (40% don't attend primary school in the rural north).
	Thriving film and music industry in 'Nollywood'.
Economic Opportunities	Many jobs available especially in construction of developments like Eko Atlantic.
	Wages are four times higher than in rural areas.

11. Challenges of living in Lagos	
Social challenges	66% live in squatter settlements like Makoko. Communal water point 3km away. High crime as the large area is difficult to police. Gangs like 'Area boys'.
	Traffic congestion. 2 hour commute called the 'Go Slow'.
Environmental challenges	10,000 illegal industries so waste disposal and emissions aren't controlled.
Economic challenges	Not enough formal jobs. People earn low wages shining shoes.

12. Managing challenges	
Waste disposal	LAWMA started to collect rubbish overnight and placed recycling banks to each estate.
Air and water pollution	Lagos has banned the import of mini generators so communities are encouraged to share a larger generator. Invested in $2.5 million water treatment plant.
Traffic congestion	Creating Bus Rapid Transit network that is built to cope with 200,000 daily.

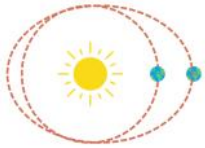
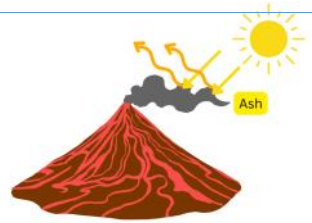
12. Urban planning: Makoko Floating school		
Built in 2013. Educated 100 of the poorest children in Makoko	**How does it improve QoL?**	**Was it successful?**
	Collects rainwater. Improved job prospects for locals.	Increased quality of life. Collapsed after a storm in 2016.

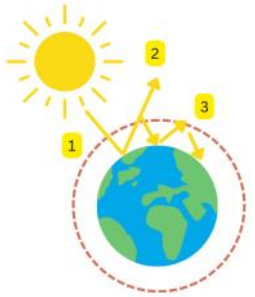
Geography - Climate Change

1. How have global temperatures changed over time?	
Key term	**Definition**
Climate change	A change in the global climate from the expected average.
Global warming	A gradual increase in temperature attributed to the enhanced greenhouse effect.
Quaternary period	A period in geological time which stretches from 2.6 million years ago to now.

2. Evidence for climate change	
Evidence	**Explanation**
Photographs	Comparing photos from 1850s with today show how glaciers have shrunk.
Ice cores	Ice cores are drilled out by scientists who analyse the ancient air. More GHGs = higher temperatures. This can go back 450,000 years.
Temperature	Records using thermometers show us temperature variations. Only since 1850s.
Tree rings	Good growing conditions (warm and wet) means rings are wide. Extreme weather (droughts/frost) means are rings thin. Trees can go back 10,000 years.

5b. Why are LICs more vulnerable?	
Lots of farmers	Lost food and income due to drought.
Lack of money for defences	More damage to buildings from sea level rise and flooding.

3. What are the natural causes of climate change?		
Solar output e.g. sunspots	The amount of radiation the sun releases can vary in an 11-year cycle. It is a dark patch on the sun which increases sun spot activity results in higher temperatures.	
Changes in Earth's orbit or axis	The Earth's orbit moves from circular to oval every 100,000 years. Circular rotation so the Earth is closer to the sun which means a warmer climate. Oval so Earth is further from sun resulting in glacial periods (ice ages).	
Volcanic activity	Large volcanic eruptions emit ash and gas into the atmosphere that block the sun and cool the earth's climate. Example: 1816 Year without a summer.	

4. What are the human causes of climate change?		
Greenhouse gases (GHGs)	Three main greenhouse gasses are - carbon dioxide (CO_2) methane (CH_4) and nitrous oxide (N_20).	
Human causes	• Burning fossil fuels to power cars, make electricity and power factories emits CO_2. • Deforestation means trees can no longer absorb CO_2. • Agribusiness (large scale intensive farming practices) leads to an increase CH_4 from livestock and increase N_20 from fertilisers.	
Enhanced greenhouse effect	The human intensification of climate change by creating a thicker greenhouse layer. 1. Sun's energy enters the atmosphere and heat up the earth. 2. Heat is absorbed is trapped or escapes back to space. 3. Humans emit GHGs from burning fossil fuels which means more heat is trapped. 4. The Earth's temperatures increases, speeding up global warming.	

Geography - Climate Change

5a. What are the effects of climate change?	
Social impacts	• Less rain so more droughts resulting in famine (more extreme malnourishment) e.g. Yemen (2016-present) • Temperatures increase so ice caps melt which means sea levels rise resulting in floods so people migrate e.g. Fairbourne, Wales • More extreme weather events e.g. tropical storms = more homes and businesses destroyed.
Environmental impacts	• Temperature increases so ice sheets melt resulting in polar habitat impacted e.g. 30% worlds Polar Bears could be lost by 2050. • Temperature increases this means ice sheets melt. So sea levels rise resulting in flooding of coastal habitats e.g Fairbourne, Wales • Sea temperatures increase leading to coral reef bleaching e.g. 25% of worlds reefs have severe bleaching.

6. Managing climate change: Mitigation				
Mitigation	**Reducing the causes of climate change (greenhouse gasses)**			
Strategy	**Description (P)**	**Explanation (D)**	**Explanation (DD)**	**Assessment**
International agreements e.g. COP 26, Glasgow 2022	Agreements between countries which set limits on much CO_2 emissions.	This means countries look for alternative sources of energy e.g. solar energy.	This means less CO_2 in the atmosphere, so global warming slows down.	COP26 agreed to reduce coal use, not ban it.
Alternative energy sources e.g. Thanet windfarm, UK (2010)	Energy sources such as wind energy.	These don't release GHGs.		MPs voted against Navitas Bay wind farm of Dorset coast to protect tourism.
Carbon capture and storage e.g. Shell in the UK	CO_2 produced from factories (e.g. Shell in the UK, Acorn Project) is collected and stored underground.	Less CO_2 is released into atmosphere.		Expensive. It costs $1bn to convert a power station to capture carbon.
Planting trees e.g. Great Green Wall, Sahel, Africa.	Encouraging **afforestation** means that there will be more trees.	Trees absorb CO_2 during photosynthesis.		Takes time for trees to grow.

7. Managing climate change: Adaptation				
Adaptation	Action taken to adjust to climate change. (Minimise the impacts)			
Strategy	**Description (P)**	**Explanation (D)**	**Explanation (DD)**	**Assessment**
Drought resistant crops e.g. Millet, Kenya.	Adapting farming practices.	Allows people to continue farming when there is less rainfall.	People don't have to migrate (environmental refugees).	Expensive technology, most in need cannot afford them.
Managing water supplies e.g. Water Butts to collect Rainwater	Using buckets and butts to collect rainwater and meters to monitor use.	More water is available for people who previously faced water deficit.	People don't have to migrate.	Can be inexpensive, most in need can improve quality of life.
Reducing risk of rising sea levels e.g. Thames Barrier, UK.	Flood barriers (Thames Barrier) as sea level rising (82cm by 2100).	Barriers would hold back the rising sea preventing flooding.	Protecting people and buildings.	Barriers are expensive, not affordable in LICs.

Geography - Resources

1. What are resources?

Term	Definition
Resource	A stock or supply of something that has a value or a purpose (food, energy, water).
Resource management	Control and monitoring of resources so they don't become depleted or exhausted.

Significance for well being

Resources are key to human wellbeing. Their social and economic benefits increase standard of living.

Food	More than 1 billion are malnourished (this > chance of diseases). Calories provide energy which are vital for people (work, school).
Water	Needed for drinking, cooking, and washing. Walking long distances to collect water can stop people working /going to school. Dirty water kills (diseases like cholera).
Energy	Allows industry to develop, creating jobs and making countries richer. Vital for transport. Without it, people burn wood/kerosene to heat homes (causes breathing problems damages environment)

Resources inequality

Distribution Uneven	Some countries don't have energy reserves or have unsuitable climates to grow food.
Dependent on wealth	Countries without must import them or find technological solutions. (Expensive)
Consumption	Greatest in **HIC**s (> money, expect higher living standard). Rapidly increasing in **NEE**s. Low in **LICs**. Can't afford to exploit resources or import them.

2. Food in the UK

Demand	Increasing… rising population, demand for greater choice, more disposable income.
Importing 40% food	Expensive in the UK due to poor harvests. Greater demand for exotic foods. Unsuitable climate for growing some food. Demand for seasonal foods all year round.

Problems with importing food…

Carbon footprint	A measure of the greenhouse gases produced. If we transport goods from abroad the carbon footprint is larger.
Food miles	The distance food travels. The smaller the better.

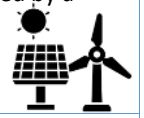
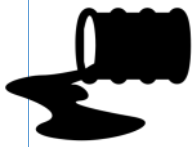
Current food trends in the UK…

Agribusiness	Large scale, industrial farming aimed to maximise the amount of food produced.
Organic produce	Food grown without the use of chemicals. Higher labours costs can make it expensive.
Eat local	Buy from local farms means lower food miles.

4. Water in the UK

Demand	Demand is increasing (70% since 1985). Higher population > more houses > more water intensive appliances e.g. dishwashers
Water quality	Water quality improving. But pollution present from fertilisers, oil spills, vehicle pollutants.
Managing pollution	Stricter regulations on fertilisers, filtering water for sediment, purifying water (chlorine).

3. Energy in the UK

Demand	We consume LESS energy even though there are more people because of industry decline and energy efficient products like light bulbs.
Energy mix	The different energy resources used by a country. Renewable + non-renewable. 
How is it changing?	Renewables are increasing. 1970 – 91% came from coal and oil. 2014 – 19% came from renewable. 50% came from coal and oil.
Reduced domestic supplies coal, gas, oil	North Sea oil + gas reserves running out. We still have coal reserves, but all coal fired power stations will close by 2025.
Issues with energy exploitation 	Economic Extraction is expensive. Money needed to research alternatives UK must pay to import energy. Environmental Fracking can cause mini earthquakes. Burning fossil fuels release CO_2. Oil spills can leak toxic chemicals.
Areas of deficit	**South and east UK** High population = high demand but low rainfall.
Areas of surplus	**North and west UK** High rainfall but low population.
Water transfer	From areas of surplus to areas of deficit. e.g. Mid Wales (surplus) to Birmingham. BUT expensive, affects wildlife, social conflict.

Geography - Resources - Water

1. Water overview

Water insecurity **Affected by:**	Not having enough clean water. • Rainfall available. • Access to water. • Size of population. • Amount used.
Water surplus	More than enough water. (supply > demand)
Water security	Having enough clean water to meet everyone's needs.
Water deficit	Not enough water. (demand > supply)
Water stress	When demand exceeds water supply for a certain period.
Aquifer	Underground layer of water stored in permeable rocks.
Permeable rock	Rock with pores (air spaces) in that can store water.

2. Factors affecting water demand

Population	More water for drinking, washing, etc.
Irrigation	70% of water used in agriculture. More people > higher food demand.
Industrialisation	More water in manufacturing.
Energy production	50 billion m^3 of freshwater used each year to generate electricity.
Living standards	More water used for toilets, showers.

3. Factors affecting supply

Physical factors	• **Climate** – rainfall and temperature. • **Geology** – e.g. Impermeable rock = easy access.
Economic factors and social factors	• **Over-abstraction** – taking water faster than it can be replaced. • **Pollution** – industry and agricultural waste. • **Infrastructure** – having enough pumps, pipes and sewers to access to water. • **Poverty** – being able to afford water.

4. Impacts of water insecurity

Diseases	Drinking contaminated water.
Conflict	Countries going to war over a water source
Reduced industrial output	Less goods produced so people lose jobs
Reduced food production	Cannot irrigate crops so leads to famine

5. Water supplies can be increased

Dams/reservoirs	A storage dam across a river traps water creating a reservoir.
Water diversion	Redirects water (but doesn't store it).
Water transfer	Moving water from dams to drier areas by canals.
Desalination	Removing salt from sea water.

6. Sustainable water supply

Sustainable water supply	Having enough clean water to meet everyone's needs today, without preventing future generations from meeting their own needs.
Water conservation	Using less water e.g. Fixing leaks and dual flush toilets (saves 3.5L).
Groundwater	Water stored in rock, managed by laws + fines.
Recycling	Using water again. E.g for irrigation and industry.
Grey water	Recycled water that is used then treated.

7. Water transfer example – STNWTP

Example	South to North Water Transfer Project, China
Water insecurity in North of China	• **High population** and **rising living standards** increase demand for water in the north. • **Development** increases demand from industry and agriculture. • Less rainfall than south.
STNWTP	**$62bn project**, transfers 44.9bn m^3 of water from south to north through canals + tunnels.
Advantages	• **20 cities have clean water** including Beijing and Tianjin (**100m people benefited)**. • **Development =** positive multiplier effect.
Disadvantages	• **Large areas flooded** destroying habitats. • 345 000 people moved (received little compensation). • **Water in Beijing is expensive**, due to costs of transporting and building infrastructure.

8. Sustainable water supply example – sand dams, Kenya

Example	1m high sand dams built across rivers to store water in Kenya, East Africa.
Water insecurity	• Hot and dry most of the year. Most rivers only flow in wet season. • In dry season people travel 6-9 hours for water.
Who?	UDO - Utooni Development Organisation to reduce water insecurity.
Sand Dams	• Water trapped in sand behind 1m wall. • Sand stops evaporation. • Water extracted by digging a well in the sand or installing a pipe into the sand.
Advantages	Cheap + local materials, Kya Kimew Dam, Machakos reduced distance by 9km to get water.
Disadvantages	Small scale benefits.

History - The First World War

How did alliances and militarism lead to war?	
Militarism	The building-up of armies and navies, fuelling capacity for war
Alliances	• Pacts made by countries to support each other if war broke out • Designed to deter a war from starting
Triple Alliance	• Germany, Austria Hungary & Italy • They were encircled by the Triple Entente
Triple Entente	Great Britain, France & Russia
Arms Race	European countries prioritising military spending to build up their armies
Naval Race	• Britain had a large navy to protect its empire • Kaiser Wilhelm wanted to create a strong German navy • British launched the Dreadnought (new battleship) in 1906
Brinkmanship	• To pursue a dangerous policy to the limits of safety especially in politics
Schlieffen Plan	• Germany felt threatened by France & Russia • They created a plan in 1905 to attack and defeat France before turning to deal with Russia

How did Imperialism cause war?	
Imperialism	Desire to build an empire
European Empires	• Britain: largest empire in the world • France: Second largest empire • Russia: No overseas empire but wanted to expand into the Balkans • Austria-Hungary: Large empire in central Europe • Germany: Had third largest overseas empire. The Kaiser was keen to ex-pand it.
Why did they want Empires?	• Access raw materials • Build power and wealth
Kaiser Wilhelm II	King of Germany during the First World War and before.
Moroccan Crises	• 1905 – Germany challenged France's power over Morocco. Resolved through the **Algeciras Conference** (1906) • 1911 – Germany sent a war ship, The Panther, to Morocco in response to more French troops there. Germany eventually backed down
Algeciras Conference	• Ended the First Moroccan Crisis; strengthen the bond between GB and France; left Germany feeling humiliated.
Scramble for Africa	The invasion and colonisation of Africa by European countries

How did Nationalism cause war?	
Nationalism	Belief in the superiority of your country
Balkans	Region in south eastern Europe.
Ottoman Empire	Old empire based in Turkey losing control of the Balkans
Self-determination	A desire to have economic and political independence
Serbs	• A regional identity for people from Serbia and around the Balkans. Serbia wanted to create a bigger country uniting all Serbs • The **Black Hand** were a terrorist group fighting for Serbian independence
Austria -Hungary declares war on Serbia	• Austria-Hungary took control of Bosnia in the Balkans • Archduke Franz Ferdinand heir to Austro-Hungarian empire was murdered by Gavrilo Princip: Member of the Black Hand • Austria-Hungary gave Serbia an ultimatum
How did the alliances get involved?	• Germany gave a Austria a 'Blank Cheque' (offer of support) • Russia wanted to protect Serbia • France and Britain dragged into war through alliances

Serving in WW1	
War of Attrition	A long conflict where each side seeks to gradually wear down the other
Conscription	Compulsory military service
Pals Battalions	Men from the same village, sports team etc. encouraged to join the army together
'Often forgotten armies'	Term used to describe soldiers from around the world who fought in WW1 but have not always been remembered in the same way as others

Interpretations of Field Marshall Haig	
Douglas Haig	Field Marshall who planned and led the Battle of the Somme Often called the 'Butcher of the Somme'
Battle of the Somme	British planned to destroy German trenches through a week-long bombardment to help relieve pressure on French troops in Verdun

The Battle was a success	The Battle was a failure
• British troops did relieve the pressure on French troops • German troops were pushed back Britain used tanks for the first time	Haig's plan did not work; his tactics were seen as outdated even at the time • 57,000 British troops injured on the first day of the battle – including 19,000 killed • Close to 400,000 British troops killed over the 141 days of battle

1882 Triple Alliance formed	1907 Triple Entente formed	28 Jun 1914 Franz Ferdinand assassinated	Jul 1914 Serbia reject ultimatum	4 August 1914 Britain declares war	1916 Battle of the Somme	1917 Russia leaves the war & USA join	11 Nov Armistice is signed

History - Female suffrage in Britain and Europe after WW1

Suffragette movement	
Suffragette	Campaigner for female equality who believed in using militant methods
Suffragette tactics	Arson: Setting fire to property Violent protest—criminal damage Hunger strikes whilst in prison—they would then be force fed
Cat & Mouse Act	Law passed by the government to allow the release and re-arrest of hunger strikers
WSPU	Women's Social and Political Union Suffragette group led by the Pankhurst family
Notable members of the WSPU	• Emeline Pankhurst:: Served time in prison and was force fed • Christabel Pankhurst: Trained lawyer but was not allowed to practice • Annie Kenney: Working class member involved in militant activities • Emily Wilding Davison: Was killed whilst campaigning at Epsom race course

Suffragist movement	
Suffrage	The right to vote
Suffragist	• A campaigner who believed equality for women • They believed in constitutional (legal) methods of campaigning
Methods used by Suffragists	• Marches—protest marches/gatherings • Petitions—people showing support for cause by signing
NUWSS	• National Union of Women's Suffrage • Led by Millicent Fawcett
Nancy Astor	Became the first female MP in 1919

Women in WW1	
Home Front	The people back in Britain
War effort	• Contributing to WW1 at home • Working in essential jobs like agriculture and munitions
Munition factories	• Weapon factories • Many women worked in them who became known as the 'Canary Girls' due to TNT turning their skin orange
Representation of the People Act	• Law passed giving men over 21 and women over 30 the right to vote

Impact of the Treaty of Versailles on Germany	
Armistice	Ceasefire signifying end of WW1
Treaty of Versailles	Peace Treaty that Germany was forced to sign in 1919
Terms of Versailles	• Blame: Germany had to accept all blame for WW1– known as the War Guilt Clause • Reparations: Germany had to pay compensation (£6.6 billion) • Armed Forces: Army limited to 100,000, 6 battleships, no air force • Territory: All colonies lost. Alsace Lorraine given to France
German reaction to TOV	• **Dolchstoss:** Stab in the Back – Critics of the Treaty in Germany said they had been betrayed by their government • **Diktat:** Word used to describe German feelings towards TOV – Germans

Twentieth Century dictatorships	
Dictator	A single strong leader can do what they want - has complete power
Communism	An economic and political system in which all property is state owned (Left Wing)
Democracy	A political system that allows people to vote
Fascism	A political system that focuses on the strength of the nation (Right Wing)
Propaganda	Communications (for example posters and films) designed to mislead people by giving a very biased view
Stalin	Communist dictator of the Soviet Union between 1924-53
Hitler	Fascist dictator of Germany—also known as the Fuhrer between 1933-45
Mussolini	Fascist dictator of Italy
Totalitarian	A form of rule where the government has unlimited power over all parts of society
NSDAP	Nationalist Socialist German Workers party (Nazi party)
Purge	To remove a group or people often violently
Bolsheviks	Radical left wing group that seized control of Russia in 1917

1897 NUWSS formed	1903 WSPU formed	1905 WSPU militant campaign begins	1908 mass rally in London where windows were smashed	1909 Force feeding begins for suffragettes	1913 Emily Wilding Davison is killed	1914 both leaders of NUWSS & WSPU support the war effort	1918 Representation of the People Act passed	1919 Nancy Astor becomes an MP	1928 Equal voting rights achieved

History - Turning points of WW2

How did WW2 start?	
Nazi beliefs that helped lead to war	• Wanted to unite all German speakers • Wanted the cancellation of the Treaty of Versailles • Wanted Lebensraum or 'living space'
Appeasement	British & French policy of giving into demands to avoid conflict
Examples of Appeasement	• Germany allowed to re-militarise • No challenge when Germany militarised the Rhineland • The Anschluss: Germany allowed to unite with Austria • Occupation of the Sudetenland (part of Czechoslovakia)
Why did war breakout?	• Nazi invasion of Poland resulted in the French & British declaring war
Axis Powers	• Alliance of Fascist countries (Germany, Italy & Japan)
Allied Powers	• British Empire, Russia (USSR) & USA

Dunkirk	
Blitzkrieg	• 'Lightning War' German term for fast moving warfare • Allowed the Nazis to defeat the French & British
Dunkirk	• Coastal town where British & French armies were forced to evacuate by the Nazis
Reasons Dunkirk can be seen as an allied defeat	• Victory for the Germans allowing them to occupy France • The British and French left behind important equipment and lost huge numbers in wounded and prisoners
Reasons Dunkirk can be seen as an allied victory	• Over 300,000 allied troops rescued • British media reported the heroic spirit of the rescue • Birth of the idea 'Dunkirk Spirit'. A country coming together in a time of adversity

Battle of Britain	
Battle of Britain	• Fought in the skies over southern England between the RAF (Royal Air Force) & Luftwaffe (German air force)
Operation Sea Lion	• Nazi plan to invade Britain • First stage of the plan was to defeat the RAF
Consequences of the Battle of Britain	• British victory • Prevented a German invasion of Britain • Nazis changed tactics and started the bombing of cities (The Blitz)

Nazi invasion of the USSR	
Operation Barbarossa	• The Nazi invasion of the USSR (Russia) • Nazis invaded to gain land & resources
Stalingrad	• Russian city that suffered a brutal siege by the Germans • Huge casualties on both sides but eventually Germans defeated
Scorched Earth Policy	The Russians retreated and burnt all supplies to starve the German army
Reasons the invasion of USSR was important	• Nazis had to fight on two fronts • German army lost huge numbers in fighting the Russians • Churchill said it 'tore the heart out' of the Germans • Gave the USA & Britain time to prepare Operation Overlord

Pearl Harbor	
US policies before 1941	• Isolationism — US policy of avoiding involvement in world affairs • Lend Lease — US policy of supplying Britain & USSR before 1941
Pearl Harbor	US military base on island of Hawaii in the Pacific Ocean
Reasons for the attack Pearl Harbor	• The Japanese Wanted to secure their empire in the far east • The USA had was enforcing an oil embargo against Japan • Japanese thought a surprise attack would remove the US threat
Consequences of Pearl Harbor	• Brought the powerful US into the war on the allies side • Main US involvement was the D-Day invasions leading to the defeat of Nazi Germany

Dropping of the Atomic Bomb	
End of WW2 in Europe	• D-Day invasion led to the German surrender in May 1945 • 8 May VE (Victory in Europe) Day
Continued war with Japan	• Japanese refused to surrender in May 1945 • US forces had captured the islands of Iwo Jima and Okinawa with heavy casualties on both sides
Manhattan Project	• Code name for the US development of the Atomic Bomb • Atom Bomb was used against the Japanese at Hiroshima and Nagasaki to force Japanese surrender
USA & USSR relations 1945	• USA followed a political system of capitalism • USSR followed a rival political system of communism • USA & USSR were the two superpowers at the end of WW2 • The dropping of the atom bomb could have been the US demonstrating their military strength

1933 Hitler begins to rearm Germany	**Sep 1938** Munich Agreement—Hitler was allowed to occupy Sudetenland	**March 1939** Hitler invades Czechoslovakia	**Sep 1939** Britain & France declare war on Germany	**May 1940** Dunkirk	**Jul-Oct 1940** Battle of Britain	**Jun 1941** Operation Barbarossa	**Dec 1941** Pearl Harbor	**Jun** 1944 D-Day	**May 1945** German surrender	**Aug 1945** Atom Bomb

History - The persecution of the Jews and the Holocaust

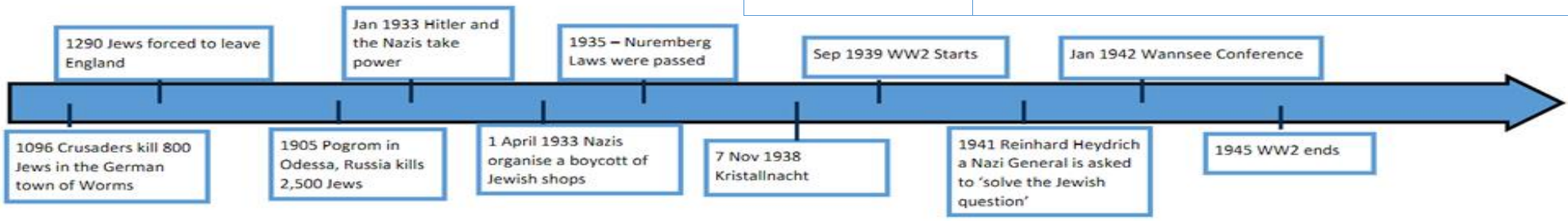
Why were Jews persecuted?	
Antisemitism	Hostile actions and prejudice towards Jewish people
Pogrom	Organised violence against Jewish communities
Stereotype	A widely held belief that is very simplified and often completely untrue
Reasons for historical persecution of Jews	• Christianity was the dominant religion in Europe • Jews were blamed for the death of Jesus • Many money lenders were Jewish so people in debt often disliked them • Jews were seen as an 'inferior' race

Persecution begins under Nazis 1933-8	
Aryan Race	The Nazi belief that white Europeans os 'Aryans' were superior to other ethnic groups
Boycott	People avoiding using certain businesses to make a point. In 1933 the Nazis encouraged Germans to boycott Jewish businesses
Nuremberg Laws	A series of laws passed in 1935 by the Nazis, said that Jews were not German citizens and banned Jews from having relationships with 'Aryans'
Reasons the Nazis disliked the Jews	• Blamed them for losing WW1 • Blamed them for causing economic problems in Germany • Stereotyped them as being anti-German

Violence against Jews and Ghettos 1938-42	
Kristallnacht-7th Nov 1938	• Means the 'Night of broken glass' • Nazi thugs destroyed thousands of Jewish businesses, burned 250 synagogues and arrested 30,000 Jews
Ghetto	• A walled off part of a city where Jews would be forced to live often in terrible living conditions with lots of disease and starvation
Warsaw Ghetto	• Ghetto in Warsaw, Poland with over 400,000 occupants • In 1943 there was an armed uprising led by a Jewish resistance group in response to people being moved to extermination camps
WW2-1939	• When the war started millions more Jews came under Nazi control in Poland and Russia
Einsatzgruppen	Nazi killing squads whose job it was to murder Jews

The Final Solution	
Final Solution	The name given to the Nazi idea of dealing with the 'Jewish problem' - 6,000,000 Jews would be murdered
Wannsee Conference	Meeting held in 1942 where leading Nazis decided to exterminate the Jews under their control
Extermination camps	• Camps designed with the specific purpose of killing, often using Zyklon B gas • The largest of these camps was Auschwitz-Birkenau

Interpretations about the Holocaust	
Intentionalist	A historian who believes that events like the Holocaust were carefully planned
Functionalist	A historian who believes that events like the Holocaust happen as situations present themselves



History - US and British Civil Rights

Life for Black Americans after Emancipation	
Emancipation Proclamation	• Issued by US President Abraham Lincoln on 1st January 1863 • Declared that all slaves in the USA would be freed
Segregation	The forced separation of people based on their race
Jim Crow Laws	Laws in the southern states of the US that enforced segregation Impacted education, housing, transport etc
Lynching	• The execution of a person without a trial • Frequently carried out against Black Americans in the 19th and early 20th centuries
Emmett Till	• Black teenager lynched in the US state of Mississippi in 1955 • His white murderers were found not guilty

US Civil Rights	
Civil Rights Movement	In the 1950s & 60s, groups of Black Americans tried different ways to persuade the government to give them equal rights
Little Rock Nine	A group of Black American students who enrolled at Little Rock High School after desegregation in 1957; first black students to attend a previously segregated school
Rosa Parks	A Black American woman; refused to move seats on a public bus; started the Montgomery Bus Boycott
Martin Luther King	Christian pastor from Alabama Encouraged non-violent protests such as boycotts and marches
Civil Rights Act	1964 law which prevented discrimination due to race, colour, sex, religion or national origin

Life for Black Britons after WW2	
The 1948 Nationality Act	Gave all British subjects in the Commonwealth and British colonies the rights to citizenship and to migrate to Britain
HMT Empire Windrush	One of the first ships to bring Caribbean migrants to Britain in 1948 Gave rise to the term 'The Windrush Generation'
Notting Hill Race Riots, 1958	A series of racially motivated riots against members of the Black community in Notting Hill, London

Black British campaigns in the 1960s	
The Colour Bar	Black people were banned from working in customer serving roles in some parts of Britain
Paul Stephenson	• A Black youth worker who led the Bristol Bus Boycott in 1963 • Campaigned for Black and Asian people to be allowed to be employed as bus workers
Jocelyn Barrow	Led a campaign against the Colour Bar General Secretary of The Campaign Against Race Discrimination (CARD)
Bernard Coard	• Grenadian academic who wrote a book entitled 'How the West Indian Child is Made Educationally Sub-Normal in the British School System.' • Highlighted the bias of education against Black students in Britain
Grassroots activism	Community-led, local, movements that aim to create progress for their causes

British women and Black Power	
Black Power	A political term that encapsulates the aim of self determination for Black people
Stokely Carmichael	A member of an American Black Power group who gave a speech in London in 1967 encouraging the Black Power movement in Britain
Olive Morris	Led campaigns against racism after being mistreated by police in 1969 Founded the Brixton Black Women's Group (BBWG)
Claudia Jones	• Helped found the Notting Hill Carnival • Set up the West Indian Gazette the first major newspaper in Britain for the Black community
Altheia Jones LeCointe	• A member of the British Black Panthers (Black Power group) • Was arrested for inciting a riot outside the Mangrove restaurant in 1970 • Successfully defended herself in the Mangrove 9 trial

Legacy of the British Civil Rights movement	
Stephen Lawrence	• A Black teenager murdered in 1993 • The case was dropped by the police and no trial took place • In 2012 two men were found guilty of his murder
Macpherson Report	• A government enquiry in 1997 introduced because of the Stephen Lawrence case • Found that the police was institutionally racist

1863 The Emancipation Act	1948 Windrush lands in Britain	1955 Murder of Emmett Till	1955 Montgomery Bus Boycott	1957 Little Rock 9	1964 Civil Rights Act in the USA	1958 Notting Hill Race Riots	1963 Bristol Bus Boycott	1970 Mangrove 9	1993 Murder of Stephen Lawrence	1997 Macpherson Report

History - Medicine Through Time - Medieval c.1250-1500

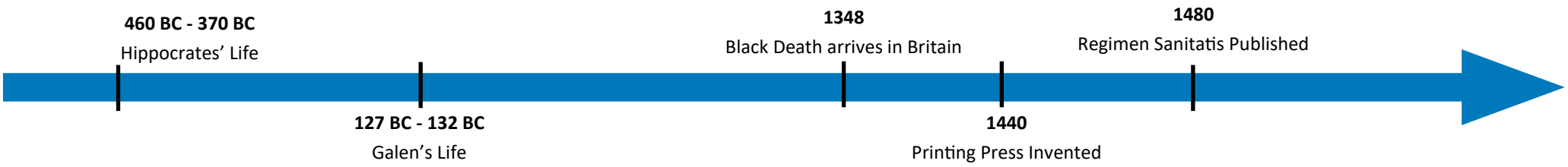
Believed causes of illness in medieval period	
Religion	The catholic church taught that illness was a punishment from God or a test of faith
Miasma	A belief that disease was caused by foul smelling or 'bad' air
Four humours	An ancient Greek doctor, Hippocrates, created a theory that the body contained four fluids; blood, phlegm, yellow bile and black bile, all 4 must be in balance to be healthy Galen (Roman) developed the Theory of opposites
Astrology	A belief that the alignment of the planets and stars could cause illness

Treatments in the Medieval Period	
Religious treatments	• Praying, pilgrimages, fasting, self-flagellation (people whipping themselves)
Miasma treatments	• Herbs burnt and fires lit to ward-off bad smells • Keeping clean (regimen sanitates)
Humoral treatments	• Bloodletting-leeches, cupping & cutting the veins • Purging– make the patient vomit or use a laxative to make them go to the toilet • Remedies and bathing-herbal remedies, steam baths
Astrological treatments	• Star charts consulted before treating. Treatments depended on alignment of the planets • Herbs, bleeding, purging, cutting hair and nails at right time

Prevention and diagnosis of illness	
Hospitals	• 30% of hospitals were owned by the church, run by monks and nuns. • Other hospitals funded by charitable donations (endowments) • Mainly places to rest and recover. No treatment other than prayers • Most care was provided by woman and home
Physicians	• Diagnosed illness, recommended treatment. Diagnosis based on the work of Galen and Hippocrates • Studied at university for 7 years. Did not treat
Apothecaries	• Mixed herbal remedies • Had no formal training, mainly apprenticeships
Barber surgeon	• Barbers who carried out simple operations. Teeth pulling and amputations. Had no formal training

Case study: The Black Death, 1348	
The Plague	• Bubonic Plague caused buboes (swellings) and fever leading to death
Believed Causes	• God deserting mankind, punishment for sin, unusual positioning of planets, miasma
Treatments and Prevention	• Praying, pilgrimages, self flagellation, bleeding, purging , herbal remedies, lancing buboes • Some cities did close gates and people tried to run away

Reasons for continuity	
Influence of the church	• Priests wrote most books and therefore controlled information • Dissection was illegal. Church thought Galen was correct
Lack of alternatives	• No other theories were taught. Science was very limited due to lack of technology



Mathematics - Number

Key Term	Definition
Ascending	Increasing in size (or numerical value)
Compare	To look at two or more numbers and say what is similar or different.
Composite Numbers	A positive integer with more than two factors.
Consecutive	Describing things which follow each other in a particular order.
Cube Numbers	The result of multiplying a number by itself twice. 1, 8, 27, 64, 125, 216, 343, 512, 729, 1000
Decimal Places	The number of digits to the right of a decimal point in a decimal number.
Degree of Accuracy	Describing how precise or accurate a value is, in terms of number of decimal places or significant figures.
Denominator	The bottom number of a fraction. Must be an integer.
Descending	Decreasing in size (or numerical value)
Difference	The result of a subtraction.
Divisible	One number is divisible by another if it is capable of being divided exactly, without a remainder.
Equivalent	Of equal value.
Estimate	To find an approximate answer to a calculation by rounding the numbers involved, commonly to 1 significant figure.
Evaluate	To find the numerical value of.
Factor	An integer that divides another integer exactly, without a remainder.
Factor Pair	A set of two factors that have a particular product.
Fraction	A number which represents part (or parts of) a whole.
Highest Common Factor	The largest number that divides exactly into two or more numbers.

Key Equivalents		
FDP Conversion	$1 = \frac{1}{1} = 100\%$ $0.5 = \frac{1}{2} = 50\%$ $0.1 = \frac{1}{10} = 10\%$ $0.25 = \frac{1}{4} = 25\%$	$0.75 = \frac{3}{4} = 75\%$ $0.2 = \frac{1}{5} = 20\%$ $0.\dot{3} = \frac{1}{3} = 33.\dot{3}\%$

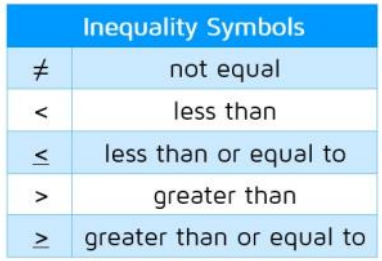
Key Term	Definition
Improper Fraction	A fraction where the numerator is larger than the denominator.
Indices	The power of a number which shows how many times the number is multiplied by itself.
Inequality	The relationship between two numbers that are not equal to each other, shown using the symbols <, > , ≤, ≥ or ≠.
Integer	A whole number including positive and negative numbers and zero.
Lowest Common Multiple	The smallest number which appears in the list of multiples for two or more numbers.
Mixed Number	A number formed of both an integer (whole number) and a fraction.
Multiple	The result of multiplying a number by an integer, i.e. the times tables of a number.
Numerator	The top number of a fraction. Must be an integer.
Order of Operations	BIDMAS—Brackets, Indices, Division & Multiplication and Addition & Subtraction.
Power of 10	The product of multiplying 10 by itself, a number of times.
Prime Number	A positive integer with only two factors, 1 and itself. 2, 3, 5, 7, 11, 13, 17, 19, 23, 29
Product	The result of a multiplication.
Proper Fraction	A fraction in which the numerator is less than the denominator.
Remainder	In division, the amount leftover when a number does not divide exactly.
Square Numbers	The result of multiplying a number by itself. 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, 169, 196, 225
Square Root	The particular factor of a number which can be multiplied by itself to produce that number.
Sum	The result of an addition.
Unit Fraction	A proper fraction with a numerator of 1.
Significant figures	The significant figures of a number are the digits which **carry meaning** (ie. are significant) to the size of the number. The **first significant figure** of a number **cannot be zero**.

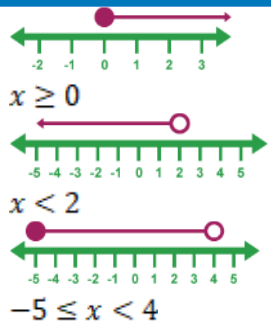
Mathematics - Number

Key Definition		Definition
Equivalent Fractions		Fractions which have different numerators and denominators but represent the same value.
Percentage Increase/Decrease		Calculating a percentage of an amount and either adding this onto (increasing) or subtracting this from (decreasing) the original amount.
Percentage Change		To calculate the percentage change, use the following: $\frac{difference}{original} \times 100$
Percentage Multiplier		The number you multiply a quantity by to increase or decrease it by a percentage. E.g. to increase by 10% the multiplier is 1.1.
Write number in standard form		A way of writing large or small numbers.
Product of prime factors / Prime factorisation		Finding which prime numbers multiply together to make the original number. Should be written as primes multiplied together e.g. 20 = 5x2x2 or as index form :20 = $5x2^2$
Simple Interest		Interest calculated as a percentage of the original amount.
Compound Interest		Interest calculated as a percentage of the current value.
Cube Root		The particular factor of a number which can be multiplied by itself twice to produce that number.
Key units of measurement	**Time** 1 hour = 60 minutes 1 minutes = 60 seconds 1 hour = 3600 seconds	**Length** 1 cm = 10mm 1m = 100cm 1km = 1000m
	Mass 1kg = 1000g 1 tonne = 1000kg	**Area** $1cm^2 = 100mm^2$ $1m^2 = 10000cm^2$

Mathematics - Algebra

Key Term	Definition
Algebra	A branch of mathematics in which letters are used to represent numbers.
Coefficient	A constant value which multiplies a variable. Always written before the variable.
Constant	A fixed number on its own.
Equation	A mathematical statement in which two expressions with equal values are connected by an equals sign.
Expand	To remove the brackets from an expression by multiplying terms and simplifying as necessary.
Expression	An algebraic expression is made up of two or more terms combined by operators.
Factorise	To rewrite an expression in brackets. Completed by finding the highest common factor, placing this outside the bracket and dividing by this to get an expression for inside the bracket.
Formula	An equation that shows the relationship between two or more variables.
Identity	An equation that is true for all values.
Linear	Contain only variables with a power of one, such as x
Simplify	To write an expression or fraction in a more concise form using the rules of algebra.
Solution	The value or values that can be substituted for the unknown in an equation to make it true.
Solve	To find the solution(s) to an equation by isolating the unknown.
Subject	The dependant variable in a formula or equation, identifiable by being on its own on one side of the equals sign.
Substitution	The process by which symbols are replaced by numbers in order to evaluate an expression or formula.
Term	A constant, variable or coefficient and one or more variables.
Unknown	A value that is not known in an equation.
Variable	A symbol, often a letter, whose value can vary.

Key Term	Definition
Inverse operation	The opposite operation that is being performed on a variable.
Term	A constant, variable or coefficient and one or more variables.
Inequality	

Key Term	Definition	Examples
Inequalities on a Number Line	Inequalities can be shown on a number line. Open circles are used for numbers that are less than or greater than $(< or >)$ Closed circles are used for numbers that are less than or equal or greater than or equal $(\leq or \geq)$	

Key Term	Definition
Direct Proportion	If two quantities are in direct proportion, as one increases, the other increases by the same percentage.
Inverse Proportion	If two quantities are inversely proportional, as one increases, the other decreases by the same percentage.
Scale Factor	A factor by which a shape is enlarged
Ratio	Comparing the size of one part to another. The ratio of a to b is written as a:b.
Equivalent ratio	Equivalent ratios are found by multiplying/dividing all parts of the ratio by the same value.

Key Term	Definition
Quadratic	A quadratic expression is of the form $ax^2 + bx + c$ where a, b and c are numbers, $a \neq 0$

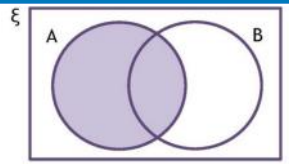
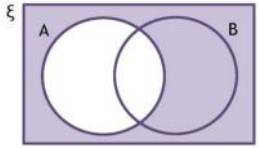
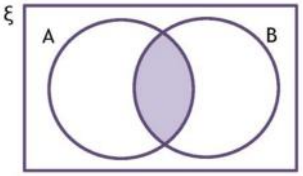
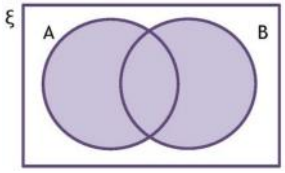
Key Term	Definition
Function machine	Shows the relationship between two variables, the input and the output.

Key term	Definition
Multiplication Index Law	When **multiplying** with the same base (number or letter), **add the powers**. $a^m \times a^n = a^{m+n}$
Division Index Law	When **dividing** with the same base (number or letter), **subtract the powers**. $a^m \div a^n = a^{m-n}$
Brackets Index Laws	When raising a power to another power, multiply the powers together. $(a^m)^n = a^{mn}$
Notable Powers	$p^0 = 1$ $\quad$ $p^1 = p$

Key Term	Definition
Linear Sequence	A number pattern with a common difference.
Term	Each value in a sequence is called a term.
Term-to-term rule	A rule which allows you to find the next term in a sequence if you know the previous term.
nth term	A rule which allows you to calculate the term that is in the nth position of the sequence. Also known as the 'position-to-term' rule. n refers to the position of a term in a sequence.

Mathematics - Statistics & Probability

Key Term	Definition
Basics	Probabilities add to 1.
Probability Scale	Impossible will definitely happen 0 Unlikely Likely 1
Relative Frequency	$frequency \div total\ trials$
Independent Events	Independent events: one event doesn't impact the other.
Expected Outcome	Expected outcome = probability x number of trials

Key Term	Definition
A	Everything in the set A 
A'	Complement. Everything **not in** set A 
A ∩ B	Intersection of set A and set B. i.e. In A **and** in B 
A ∪ B	Union of set A and set B. i.e. In A **or** in B 

Key Term	Definition
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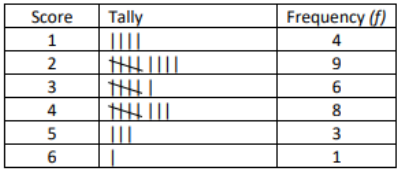
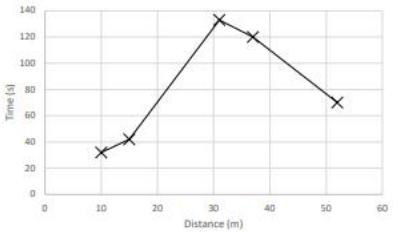
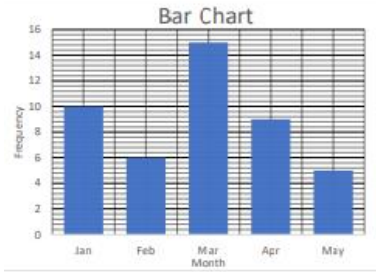
Mathematics - Statistics

Key term	Definition
Average	A single number or value that is used to represent a set of data. There are three main averages we focus on: mode, median and mean.
Data	Information in the form of facts and numbers.
Data point	A single item from a data set.
Data Set	A collection of data which all refers to the same category or topic.
Intersection	The numbers of elements that belong to both/all sets. In a Venn Diagram, this is where the circles overlap.
Mean	The sum of all the values in a data set, divided by the number of values in the data set.
Median	The middle value in an ordered list.
Mode	The most common value. It is possible to have more than one mode
Qualitative Data	A type of data that can be grouped under named categories, often described as data that can be described.
Quantitative Data	Types of data that can be represented numerically, often described as data that can be counted.
Range	The difference between the smallest and largest value.
Two-way Table	A diagram in which frequencies for two categories may be organised; one variable in rows and the other in columns.
Venn Diagram	A diagram in which circles are used to illustrate the relationships between different sets. Must have a box drawn around it.

Key term	Definition	Examples
Frequency Table	A table showing how often something occurs. Can include tally charts.	 Score | Tally | Frequency (*f*) 1 | ||| | 4 2 | 𝍸 ||| | 9 3 | 𝍸 | | 6 4 | 𝍸 ||| | 8 5 | ||| | 3 6 | | | 1
Line Graph	Uses lines to join points on a graph to represent a data set.	
Bar Chart	A way of displaying data using horizontal or vertical bars which are the same width and have gaps between them.	
Pie Chart	A method of displaying proportional information by dividing a circle up into different-sized sectors.	

Statistics	Definition
Frequency	How many times something occurs.
Continuous data	Data that can take any value. E.g. height, weight, length.
Discrete data	Data that can only take certain values. E.g. shoe size.

Mathematics - Geometry and Measure

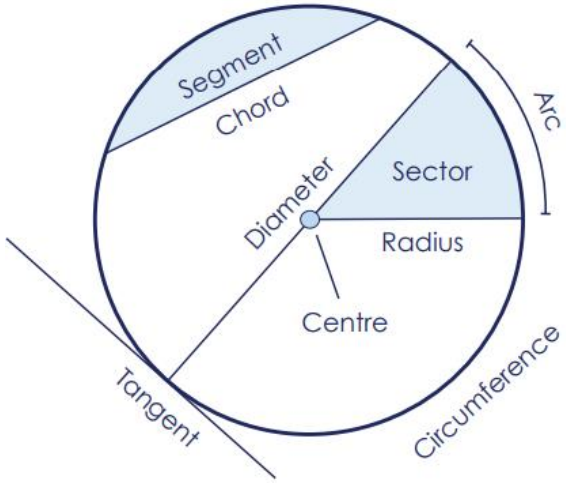
Key Term	Definition
Acute Angle	An angle less than 90°.
Adjacent	Next to, or near.
Area	A measure of the space inside a closed two-dimensional shape.
Axes	The straight lines on a graph used to define the position of a point. The x-axis goes across (horizontal). The y-axis goes up (vertical).
Centimetre (cm)	A metric unit of length equal to one hundredth of a metre. 100cm = 1m
Compound Shape	A shape made up of two or more geometric shapes.
Coordinate	An ordered pair of points that show an exact position on a set of
Exterior Angle	An angle between one side of a shape and a line extending from an
Irregular Polygon	A polygon with unequal length sides and angles.
Kilometre (km)	A metric unit of length equal to one thousand metres. 1km = 1000m
Line of Symmetry	A line that can divide a shape into identical halves, which are mirror
Metre (m)	The base unit of length in the international system of units.
Midpoint	The point exactly halfway between two points.
Millimetre (mm)	A metric unit of length equal to one thousandth of a metre. 10mm = 1cm
Obtuse Angle	An angle measuring between 90° and 180°.
Order of Rotation	The number of times that a shape appears identical during a turn of
Origin	The point with coordinate (0, 0).
Parallel	Two lines that will never cross and that will remain the same
Perpendicular	Two lines that meet at an angle of 90°.

Key term	Definition
Perpendicular	Two lines that meet at an angle of 90°.
Perimeter	The total distance around the outside of a closed two-dimensional shape.
Polygon	A closed two-dimensional shape made up of all straight edges.
Protractor	An instrument used to measure angles.
Quadrilateral	A two-dimensional shape with four sides.
Reflex Angle	An angle measuring between 180° and 360°.
Regular Polygon	A polygon with sides of equal length and angles of equal size.
Right-angle	A 90° angle.
Rotational Symmetry	A symmetry in which a shape may be rotated about a central point and appears identical after a turn of less than 360°.
Square Units	Units used to measure area.
Triangle	A two-dimensional shape with three sides.
Vertex	A point on a polygon at which two lines meet to form an angle.

Key terms	Definition
Angles around a point	Angles around a point sum to 360°.
Angles on a straight line	Angles on a point on a straight line sum to 180°.
Angles in a triangle	Angles in a triangle sum to 180°.
Angles in a quadrilateral	Angles in a quadrilateral sum to 360°.

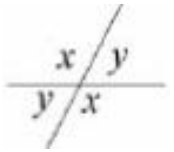
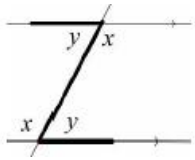
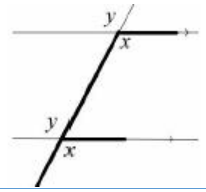
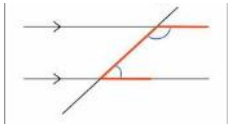
Key terms	Definition
Area of a rectangle or square	Length x width
Area of a parallelogram	Length x perpendicular height
Area of a triangle	$\frac{\text{Base x perpendicular height}}{2}$
Area of a trapezium	$\frac{a + b}{2} \times h$, where a and b are parallel sides.

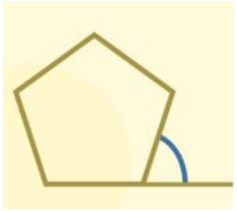
Mathematics - Geometry & Measure

Key Term	Definition
Parts of a circle	
Arc	A section of the circumference.
Sector	The area bounded by two radii and an arc.
Chord	A straight line joining any two parts of the circumference.
Circumference	The distance around the outside of the circle.
Diameter	A straight line going from one end of the circle to another passing through the centre.
Segment	The area bound by the circumference and a chord
Tangent	A straight line that touches the circumference at a single point.
Pi (π)	The ratio of a circle's circumference to its diameter.

Key Term	Definition
Circumference	The perimeter of the circle. C = πd
Radius	$diameter \div 2$
Diameter	$2 \times radius$
Perimeter of semi-circle	$p = \frac{\pi d}{2} + d$
Perimeter of quarter circle	$p = \frac{\pi d}{4} 2r$
Perimeter of three-quarter circle	$p = \frac{3}{4}\pi d + 2r$
Area of a circle	$A = \pi r^2$
Area of a semi-circle	$A = \frac{\pi r^2}{2}$
Area of a quarter-circle	$A = \frac{\pi r^2}{4}$
Area of three-quarter circle	$A = \frac{3\pi r^2}{4}$
Sector	**Sectors** are sections of a circle that are created by two radii and an arc
Arc	A portion of the circumference
Area of sector	$Area\ of\ a\ sector = \frac{\theta}{360}\pi r^2$
Length of arc	$length\ of\ arc = \frac{\theta}{360}\pi d$

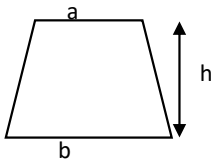
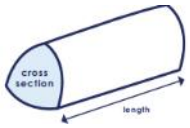
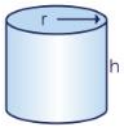
Mathematics - Geometry & Measure

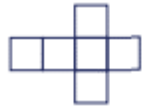
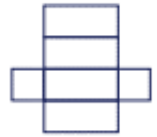
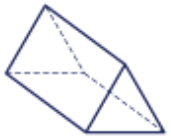
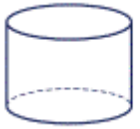
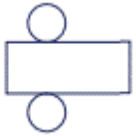
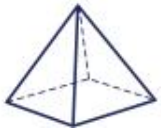
Key Term	Definition
Vertically Opposite Angles	Vertically opposite angles are equal. 
Alternate Angles	Alternate angles are equal. 
Corresponding Angles	Corresponding angles are equal. 
Co-Interior Angles	Co-Interior angles add up to 180°. 

Key Term	Definition
Sum of all angles in Polygons	n is the number of sides. $(n-2) \times 180$
Internal angle in regular polygon	$\frac{(n-2) \times 180}{n}$
External angle	The angle between a side of a polygon and an extended adjacent side.
Exterior angle regular polygon	 $\frac{360}{n}$

Key term	Definition
Translation	Translate means to move a shape. The shape does not change size or orientation.
Column Vector	In a column vector, the top number moves left (-) or right (+) and the bottom number moves up (+) or down (-)
Rotation	The size does not change, but the shape is turned around a point.
Reflection	The size does not change, but the shape is 'flipped' like in a mirror. Line $x = ?$ is a vertical mirror line. Line $y = ?$ is a horizontal mirror line. Line $y = x$ is a diagonal mirror line.
Enlargement	The shape will get bigger or smaller in relation to a centre of enlargement. Multiply each side by the scale factor.
Scale factor	The multiplier for the length of each side of a shape when carrying out an enlargement.
Centre	Used in rotations and enlargements as the centre for the transformation.

Mathematics - Geometry & Measure

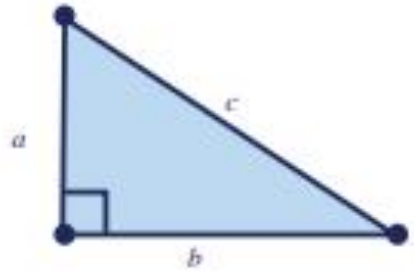
Key Term	Definition
Area of a trapezium	$\frac{a+b}{2} \times h$ 
Face	A face is a single flat surface.
Edge	An edge is a line segment between two faces.
Volume	The amount of 'space' a solid object occupies. Units: ***mm³, cm³, m³***, etc. The volume of a prism ***V = Area of Cross Section x Length***  The volume of a *cylinder* = $\pi r^2 h$ 
Volume of a cube / cuboid	Length x width x height
Prism	A 3D shape with a constant cross-section.
Cross-section	The 2D shape that is consistent throughout the prism
Volume conversions	1 L = 1000 cm^3 0.5 L = 500 cm^3

Key Term	Definition	Shape	Net
Cube	6 square faces 12 edges 8 vertices		
Cuboid	6 rectangular faces 12 edges 8 vertices		
Triangular Prism	5 faces 9 edges 6 vertices		
Cylinder	3 faces 2 edges 0 vertices		
Square-based Pyramid	5 faces 8 edges 5 vertices		
Triangular-based Pyramid	4 faces 6 edges 4 vertices		
Cone	2 faces 1 edge 1 vertex		
Sphere	1 face 0 edges 0 vertices Half a sphere is known as a hemisphere.		

Mathematics - Geometry & Measure

Key Term	Definition
Properties of Solids	Faces = flat surfaces Edges = sides/lengths where faces meet Vertices = corners where edges meet
Plans and Elevations **Plan View** **Side Elevation:** **Front Elevation**	This takes 3D drawings and produces 2D drawings. from **above** from the **side** from the **front**

Key Term	Definition
Surface Area	The total area of all the faces of a 3D shape.
Surface area of a cylinder	$A = 2\pi rh + 2\pi r^2$
Volume of a Prism	$V = Area\ of\ Cross\ Section \times Length$

Key Term	Definition
Right-angled triangle	A triangle that contains a 90^0 angle
Hypotenuse	The longest side – opposite the right angle
Pythagoras' theorem	For any right-angled triangle, the area of the square of the longer length (the hypotenuse) is equal to the area of the squares of the shorter lengths added together. $c^2 = a^2 + b^2$ $a^2 = c^2 - b^2$ $b^2 = c^2 - a^2$ 

French - Les rapports familiaux et les passetemps

1. Parle-moi de ta famille	Tell me about your family
Dans ma famille il y a	In my family there is
Mes parents et moi	My parents and me
Mon frère	My brother
Ma sœur	My sister
Mon père	My father
Ma mère	My mother
Ma tante	My aunt
Mon oncle	My uncle
Mon grand-père	My grandad
Ma grand-mère	My grandma
Mon cousin	My cousin (male)
Ma cousine	My cousin (female)
Ma demi-sœur	My half sister
Mon demi-frère	My half brother

4. Avec qui tu t'entends bien ?	Who do you get on with?
Je m'entends bien avec	I get on well with
Je me dispute avec	I argue with
Je me chamaille avec	I bicker with
Je m'amuse avec	I have fun with
Je me confie à	I confide in

5. Voudrais-tu te marier ?	Would you like to marry?
Je voudrais me marier	I would like to marry
Je voudrais tomber amoureux /euse de quelqu'un	I would like to fall in love with someone
Je voudrais me fiancer	I would like to get engaged

2. Tu peux décrire ton frère ou ta sœur ?	Can you describe your brother or sister?
Il / elle est	He / she is
Grand (e)	Tall
Petit (e)	Small
De taille moyenne	Average height
Mince	Slim
Maigre	Thin
Gros / se	Fat
Il / elle a	He / she has
Les cheveux courts	Short hair
Les cheveux longs	Long hair
Les cheveux raides	Straight hair
Les cheveux bouclés	Curly hair
Les cheveux blonds	Blond hair
Les cheveux bruns	Brown hair
Les yeux bleus	Blue eyes

Reasons	
Parce que	Because
Car	Because
Puisque	Because
Étant donné que	Given that

Ce serait	It would be
Car ce serait romantique	Because it would be romantic
Car ce serait incroyable	Because it would be incredible
Ce serait trop cher	I would be too expensive

3. Il / elle est comment?	What is he / she like?
Il / elle est	He / she is
Il / elle peut être	He / she can be
Il n'est jamais	He is never
Elle n'est pas	She is not

Extra detail	Intensifer
Très	Very
Assez	Quite
Un peu	A bit

Intelligent (e)	Clever
Drôle	Funny
Sportif / ive	Sporty
Généreux / euse	Generous
Fiable	Trustworthy
Timide	Shy
Debrouillard (e)	Resourceful
Branché (e)	Trendy
Gentil /le	Kind
Sympa / aimable	Nice

Têtu (e)	Stubborn
Egoïste	Selfish
Agaçant(e), énervant(e)	Annoying
Paresseux / euse	Lazy
Méchant(e)	Nasty / mean
Pénible	A pain

Il / elle m'aide	He / she helps me
Il / elle me soutient	He / she supports me
Il / elle me fait rire	He / she makes me laugh

French - Les rapports familiaux et les passetemps

PRESENT - I form

6. Que fais-tu le weekend ?	What do you do at the weekend?
Je danse / je fais de la danse	I dance
Je fais de la natation	I swim
Je fais des arts martiaux	I do martial arts
Je joue de la guitarre	I play guitar
Je joue du piano	I play piano
Je joue au golf / tennis / foot / rugby / netball	I play golf / tennis / football / rugby / netball
Je traine avec mes amis	I hang out with my friends
Je regarde des films	I watch films
Je lis	I read
Je vais à la gym	I go to the gym

7. Que fais tu sur ton portable / ton ordi?	What do you do on your phone / computer?
Je partage des photos	I share photos
Je vais sur des réseaux-sociaux	I go on social media sites
Je lis des blogs	I read blogs
Je commente des photos	I comment on photos
Je regarde des clips sur youtube	I watch clips on youtube
Je fais des quiz	I do quizzes
Je joue à des jeux	I play games
Je télécharge de la musique	I download music
Je fais mes devoirs	I do my homework

If you use an opinion verb like 'j'aime the next verb needs to be an INFINITIVE. It will end in **–er**, **-re** or **-ir**

Eg J'aime FAIRE du vélo

If you don't use an opinion verb, it ends in E

PRESENT - Opinion + Infinitive

8. Qu'est-ce que tu aimes faire ?	What do you like to do?
Time expressions	
D'habitude / Normalement	Normally
Quand il fait beau	When it is nice
De temps en temps	From time to time

Opinions	
J'aime	I like
J'adore	I love
Je préfère	I prefer
Je n'aime pas	I don't like
Je déteste	I hate

Faire des magasins	To do (go) shopping
Aller à la plage	**To go to the beach**
Faire du sport	**To do sport**
Sortir avec mes amis	**To go out with my friends**
Aller au cinéma	**To go to the cinema**
Faire des randonnées	**To go hiking**
Faire du vélo	To do cycling

What to include in your writing (colour key)	
C	Connectives
O	Opinions
R	Reasons
N	Negatives
E	Extra detail
T	Time expressions
T	Tenses
I	Interesting adjectives
	Masculine
	Feminine
	Plural

PAST - Imperfect

Time expression	
Quand j'étais petit (e)	When I was little

9. Que faisais tu quand tu étais petit/e ?	What did you do when you were younger?
J'aimais	I used to like
Je n'aimais pas	I didn't like
J'aimais lire	I used to like to read
J'aimais écouter des histoires	I used to like to listen to stories
J'aimais dessiner	I used to like drawing
J'aimais chanter	I used to like singing
Je n'aimais pas étudier	I didn't like studying
C'était	It was

FUTURE

Time expression	
Ce weekend	This weekend

10. Que vas-tu faire ?	What are you going to do?
Je vais + infinitive	**I am going to...**
Ce weekend je vais sortir	This weekend I am going to go out
Je vais rencontrer des amis en ville	I am going to meet friends in town
Je vais manger au restaurant	I am going to eat at a restaurant
Ce sera divertissant	It will be fun

Spanish - Relaciones familiales y tiempo libre

	1 ¿Quién hay en tu familia?	Who is in your family?
	Hay	There is / there are
	En mi familia hay	In my family there is
	Mi hermana	My sister
	Mi tia	My aunt
	Mi madre	My mum
	Mi abuela	My grandma
	Mi prima	My cousin (fem)
	Mi madrastra	My stepmum
	Mi hermano	My brother
	Mi padre	My dad
	Mi tio	My uncle
	Mi abuelo	My grandad
	Mi primo	My cousin (m)
	Mi padrastro	My stepdad
	Mis padres	My parents

2 ¿Con quién te llevas bien?	Who do you get on with?
Me llevo bien con	I get on with
Discuto con	I argue with
Me peleo con	I bicker with
Me divierto con	I have fun with
Confio en	I trust

	3 ¿Te gustaría casarte?	Would you like to marry?
	(No) Me gustaría	I would (not) like
	Me gustaría casarme	I would like to marry
	Enamorarme	To fall in love with some-one

Reasons	
Porque	Because
Ya que	Because
Dado que	Because
Puesto que	Because

Sería	It would be
Sería increíble	It would be incredible
Sería romántico	It would be romantic
Sería demasiado caro	It would be too expensive

	4 ¿Puedes describir a tu hermano / a?	Can you describe your brother or sister?
	Es	He / she is
	Alto /a	Tall
	Bajo /a	Small
	Medio /a	Average height
	Delgado /a	Slim
	Gordito/a	Chubby
	Tiene	He / she has
	El pelo corto	Short hair
	El pelo largo	Long hair
	El pelo liso	Straight hair
	El pelo rizado	Curly hair
	El pelo rubio	Blond hair
	El pelo castaño	Brown hair
	Los ojos azules	Blue eyes

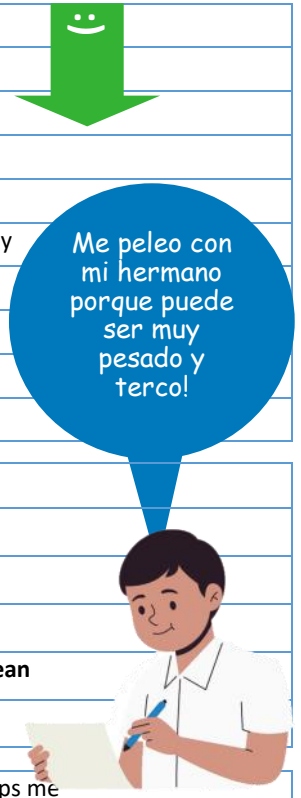
What to include in your writing	
C	Connectives
O	Opinions
R	Reasons
N	Negatives
E	Extra detail
T	Time expressions
T	Tenses
I	Interesting adjectives
	Masculine
	Feminine
	Plural

5 ¿Cómo es?	What is he / she like?
Es	He / she is
Puede ser	He / she can be
Nunca es	He / she is never
No es	He / she is not

	Extra detail	Intensifer
	Muy	Very
	Bastante	Quite
	Un poco	A bit

	Inteligente	Clever
	Gracioso /a	Funny
	Deportista	Sporty
	Generoso /a	Generous
	Guapo /a	Beautiful
	De confianza	Trustworthy
	Tímido /a	Shy
	Listo /a	Smart
	Amable	Kind
	Simpático /a	Nice

	Terco /a	Stubborn
	Egoísta	**Selfish**
	Pesado /a	**Annoying**
	Perezoso /a	**Lazy**
	Cruel	**Nasty / mean**
	Molesto/a	Annoying



	Me ayuda	He / she helps me
	Me apoya	**He / she supports me**
	Me hace reír	He / she makes me laugh

Spanish - Relaciones familiales y tiempo libre

PRESENT - I form - ends o

6 ¿Qué haces el fin de semana?	What do you do at the weekend?
Bailo	I dance
Hago natación / nado	I swim
Hago artes marciales	I do martial arts
Toco la guitarra	I play guitar
Toco el piano	I play piano
Juego al golf / tenis / futbol / rugby / netball	I play golf / tennis / football / rugby / netball
Paso el rato con mis amigos	I hang out with my friends
Veo las películas	I watch films
Leo	I read
Voy*al gimnasio	I go to the gym

7 ¿Qué haces en tu móvil?	What do you do on your phone / computer?
Comparto las fotos	I share photos
Voy en las redes sociales	I go on social media sites
Leo los blogs	I read blogs
Comento en las fotos	I comment on photos
Pongo al día mis gustos	I update my likes
Veo los clips en Youtube	I watch clips on youtube
Hago los quiz	I do quizzes
Juego a los videojuegos	I play games
Descargo música	I download music
Hago mis deberes	I do my homework

PRESENT - Opinion + Infinitive

	8 ¿Qué te gusta hacer?	What do you like to do?
	Time expression	
	Normalmente	Normally
	Cuando hace buen tiempo	When it is nice
	De vez en cuando	From time to time

	Opinions	
	Me gusta	**I like**
	Me encanta	**I love**
	Prefiero	**I prefer**
	No me gusta	**I don't like**
	Odio	**I hate**

Ir de compras	**To go shopping**
Ir a la playa	**To go to the beach**
Hacer deporte	**To do sport**
Salir con mis amigos	**To go out with my friends**
Ir al cine	**To go to the cinema**
Hacer senderismo	**To go hiking**
Hacer ciclismo	**To do cycling**

Very important!

If you use an opinion verb like 'me gusta' the next verb needs to be an **INFINITIVE**. It will end in **–ar –er –ir.** Eg me gusta jugar

If you don't use an opinion verb, you need to remove the **–ar –er –ir** and replace with **o**

PAST - Imperfect

Time expression	
Cuando era pequeño /a	When I was little

9 ¿Qué solias hacer cuando eras pequeño?	What did you do when you were younger?
Solía	I used to
No solía	I didn't use to
Me gustaba	I used to like
Solía leer	I used to read
Solía escuchar historias	I used to listen to stories
Solía dibujar	I used to draw
Solía cantar	I used to sing
Solía estudiar	I used to study
Era	It was

FUTURE

Time expression	
Este fin de semana	This weekend

10 ¿Qué vas a hacer?	What are you going to do?
Voy a	I'm going to
Este fin de semana voy a salir	This weekend I am going to go out
Voy a quedar con mis amigos	I am going to meet friends in town
Voy a comer al restaurante	I am going to eat at a restaurant
Será divertido	It will be fun

French - Les fêtes et les traditions

What to include in your writing	
C	Connectives
O	Opinions
R	Reasons
N	Negatives
E	Extra detail
T	Time expressions
T	Tenses
I	Interesting adjectives
	Masculine
	Feminine
	Plural

1. Qu'est-ce qu'on mange en France ?	What do they eat in France?
Au dîner	At dinner
Au déjeuner	At lunch
Au petit-déjeuner	At breakfast
On mange	One eats
On prends	One eats
De la viande	Meat
Du poisson	Fish
Du pain	Bread
Du fromage	Cheese
Des céréales avec du lait	Cereal with milk
Des légumes	Vegetables

3. Quel est ton festival préféré ?	What is your favourite festival?
Mon festival français préféré est..	My favourite French festival is
Pâques	Easter
La fête du citron	Mentón Lemon festival
Le quatorze juillet	Bastille Day
la fête de la musique	The festival of music
la Saint -Sylvestre	New Years Eve
La fête des lumières	The festival of light

4. Quel est ton opinion des festivals?	What is your opinion of festivals?
À mon avis les festivals sont	In my opinion festivals are
Un aspect important du patrimoine	An important part of the heritage
Traditionnels et intéressants	Traditional and interesting
Importants	Important
Trop commercialisés	Too commercialised
Trop bondés	Too packed
Trop chers	Too expensive

Opinions	
2. Qu'est-ce que tu aimes manger ?	**What do you like to eat?**
J'aime manger	I like to eat
Je préfère manger	I prefer to eat
Je déteste manger	I hate to eat

Du chocolat	Chocolate
Du fromage	Cheese
Du yaourt	Yogurt
Du paté	Paté
Du jambon	Ham
De la charcuterie	Cold meat
Des tartes	Tarts
Des gâteaux	Cakes
Des produits laitiers	Dairy products

Reasons	
Parce que	Because
Car	Because
Puisque	Because
C'est délicieux	It's delicious
C'est degoûtant	It's digusting
C'est trop épicé	It's too spicy
C'est sain	It's healthy

5. Comment est le Noël en France ?	What is Christmas like in France?
On chante	One / We sings
On danse	One / We dances
On porte le déguisement	One / We wear fancy dress
On mange	One / We eat
On boit	One / We drink
On fête	One / We celebrate
On rejoint sa famille	We meet up with family
On joue des instruments	One / We play instruments
On offre des cadeaux	One / We give gifts

PAST - Passé Composé

6. Tu es allé à quel festival ?	Which festival did you go to?
L'année dernière je suis allé (e) au festival de..	Last year I went to the….festival
J'y suis allé (e) avec ma famille	I went there with my family
Nous sommes restés dans un hôtel / un appartement	We stayed in a hotel / flat
On a vu des défilés	We saw parades
On a dansé et chanté	We danced and sang
On a bu et mangé	We drank and ate
On a vu des feux d'artifices	We saw fireworks

French - Les fêtes et les traditions / Ta ville

7. Où habites-tu?	Where do you live?
J'habite à + city	I live in + city
Dans le sud de l'Angle-	It is in the South of England
Elle se trouve	It is located
Sur la côte	On the coast
À la campagne	In the countryside
C'est	It is
Une grande ville	city
Une petite ville	A small town
Un village	a village
Un quartier	A zone / area
Il y a	There is
Une région	A region
Une montagne	A mountain
Une rivière	A river
Un lac	A lake
Un volcan	A volcano
Des collines	Hills

8. Qu'est-ce qu'il y a ?	What is there?
Il y a	There is / are
Il n'y a pas de (no article)	There is not
Un centre de loisirs	A leisure centre
Un parc	A park
Un centre commercial	A shopping centre
Un cinéma	A cinema
Un magasin	A shop
Un marché	A market
Un restaurant	A restaurant
Une cathédrale	A cathedral / church
Une piscine	Swimming pool
Une plage	A beach
Des magasins	Some shops
Des restaurants	Some restaurants

9. C'est comment?	What is it like?
C'est	Is it
Rural(e)	Rural
Tranquille	Quiet /peaceful
Sûr (e)	Safe
Dangereux/euse	Dangerous
Propre	Clean
Sale	Dirty
Joli(e)	Pretty
Beau / belle	Pretty
Moche	Ugly
Touristique	Touristy
Industriel/le	Industrial

PAST - Imperfect

Time Expressions	
Avant	Before
Dans le passé	In the past

C'était It was

Plus	More
Moins	Less

Sale	Dirty
Propre	Clean
Bruyant	Noisy
Pollué	Polluted
Animé	Lively
Cher	Expensive

Que **Than**

Maintenant **Now**

Present

10. Quel temps fait-il ?	What is the weather like ?
S'il fait beau	If it's nice
S'il fait chaud	If it's hot
S'il pleut	If it rains
Quand il fait froid	When it's cold
Quand il y a du soleil	When it's sunny

11. Qu'est-ce qu'on peut faire?	What can you do ?
On peut	One can
On peut aller à la plage	You can go to the beach
On peut faire des sports nautiques	You can do watersports
On peut aller au cinéma	You can go to the cinema
On peut faire des magasins	You can go shopping
On peut faire du vélo	You can go cycling
On peut faire de la randonnée	You can go hiking

Future

12. Où voudrais-tu visiter?	Where would you like to visit?
je veux visiter	I want to visit
j'aimerais visiter	I would like to visit
Je voudrais visiter	I would like to visit
Je ne voudrais pas visiter	I wouldn't like to visit
Ce serait	It would be
Incroyable	Incredible

Spanish - Fiestas y tradiciones

1 ¿Qué se come en España?	What do they eat in Spain?
Para cenar	At dinner
Para comer	At lunch
Para desayaunar	At breakfast
Se come	One eats
(El) pescado	Fish
(El) pan	Bread
(El) queso	cheese
(La) carne	Meat
(Los) cereales con leche	Cereal with milk
(Las) verduras	Vegetables
(Las) tostadas	Toasted bread

Grammar note

After se come you **DON'T** need an article (el / la / los / las) Eg Para desayunar se come tostadas

2 ¿Cuál es tu fiesta favorita?	What is your favourite festival?
Mi fiesta española favorita es	My favourite Spanish festival is
La Semana Santa	Holy Week—Over Easter there are processions in the street
La Tomatina	The Tomatina—Tomato throwing in Buñol
La Fallas de Valencia	The Fallas of Valencia—burning big structures
El Día de los Muertos	The Day of the Dead—In South America
La Noche Vieja	New Years Eve—Eating grapes at midnight
La Fiesta de San Fermín	San Fermin—running of the bulls

Opinions	
3 ¿Qué te gusta comer?	**What do you like to eat?**
Me gusta comer	I like to eat
Prefiero comer	I prefer to eat
Odio comer	I hate to eat

Chocolate	Chocolate
Pasteles	Cakes
Tartas	Tarts
Tortilla española	Spanish omlette
Jámon	Ham
Chorizo	Chorizo (spicy sausage)
Queso	Chesse
Albondigas	Meatballs
Productos lácteos	Dairy products

Reasons	
Porque	Because
Ya que	Because
Es delicioso	It is delicious
Es rico	It is delicious
Es saboroso	It is tasty
Es soso	It is bland
Es asqueroso	It is disgusting

4 ¿Cómo es la Navidad en España?	What is Christmas like in Spain
La gente canta	People sing
La gente baila	People dance
La gente lleva disfraces	People wear fancy dress
La gente come una gran comida especial	People eat a big special meal
La gente bebe	People drink
La gente regala regalos	People give gifts
La familia se junta	The family gets together

PAST - Preterite

5 ¿Fuiste a cuál fiesta ?	Which festival did you go to?
El año pasado fui a la fiesta de…	Last year I went to the….festival
Fui con mi familia	I went there with my family
Nos quedamos en un hotel / un apartamento	We stayed in a hotel / flat
Vimos los desfiles	We saw parades
Bailamos y cantamos	We danced and sang
Bebimos y comimos	We drank and ate
Vimos los fuegos artificiales	We saw fireworks

6 ¿Cuál es tu opinión de las fiestas?	What is your opinion of festivals?
En mi opinion las fiestas son	In my opinion festivals are
Un aspecto importante del patrimonio	An important part of the heritage
Tradicionales y interesantes	Traditional and interesting
Importantes	Important
Comercializadas	Commercialised
Concurridas	Packed
Demasiado caras	Too expensive

Spanish - Fiestas y tradiciones

7 ¿Dónde vives?	Where do you live?
Vivo en	I live in
Está	It is located
Está en el sur de Inglaterra	It is in the South of England
Está en la costa	It is on the coast
Un gran pueblo	A town
Un pueblo	A village
Un barrio	A zone / area
Un rio	A river
Un lago	A lake
Un volcán	A volcano
Una colina	A hill
Una ciudad	A city
Una región	A region
Una montaña	A mountain

9 ¿Qué hay en tu ciudad ?	What is there?
Hay	There is / there are
No hay (no article)	There is not
Un polideportivo	A leisure centre
Un parque	A park
Un centro commercial	A shopping centre
Un cine	A cinema
Un mercado	A market
Un restaurante	A restaurant
Un puerto	A port
Una piscina	A swimming pool
Una playa	A beach
Una tienda	A shop
Una catedral	A cathedral

11 ¿Cómo es?	What is it like?
Es	It is
Rural	Rural (in the countryside)
Tranquilo /a	Quiet /peaceful
Seguro /a	Safe
Peligroso /a	Dangerous
Hermoso /a	Pretty
Bonito /a	Pretty
Feo /a	Ugly
Turístico /a	Touristy
Industrial	Industrial
Está	It is (with clean and dirty)
Limpio /a	Clean
Sucio /a	Dirty

PAST - Imperfect

Antes	Before
En el pasado	In the past

Estaba	It was
Era	It was

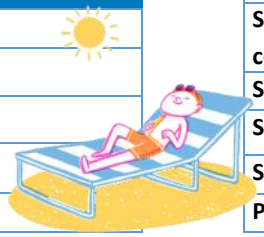
Más	More
Menos	less

Sucio	Dirty
Limpio	Clean
Animado	Lively
Peligroso	Dangerous

Que	Than
Ahora	Now

Present

8 ¿Qué tiempo hace?	What is the weather like ?
Si hace buen tiempo	If it's nice
Si hace calor	If it's hot
Si llueve	If it rains
Cuando hace frío	When it's cold
Cuando hace sol	When it's sunny



10 ¿Qué se puede hacer?	What can you do ?
Se puede	You can
Se puede ir a la playa	You can go to the beach
Se puede hacer deportes acúaticos	You can do watersports
Se puede ir al cine	You can go to the cinema
Se puede ir de compras	You can go shopping
Se puede montar en bici	You can go cycling
Puedes hacer senderismo	You can go hiking

Future

12 ¿Dónde te gustaría	Where would you like to visit?
Quiero visitar	I want to visit
Me gustaría visitar	I would like to visit
Me encantaría visitar	I would love to visit
No me gustaría visitar	I wouldn't like to visit
Sería	It would be
Increíble	Incredible

French - L'environnement

1.	Quels sont les problèmes de l'environnement dans ta région?	What are the environmental problems in your local area?
	Malheureusement	Unfortunately
	Il y a	There is / there are
	Trop de	Too much
	Beaucoup de	Too many
	Voitures	Cars
	Déchets	Rubbish
	Plastique	Plastic
	Monde	People
	Emballages	Packaging
	Circulation	Traffic
	Il n'y a pas assez de	There aren't enough
	Poubelles	Bins
	Espaces verts	Green spaces
	Transports en commun	Public transport
	Quel dommage!	What a shame

Dans le passé il y avait moins de circulation que maintenant. Maintenant, il y a plus des gens et il n'y a pas assez des transports en commun.

2. Qu'est-ce qu'on peut faire ?	What can we do?
On peut	We can
On pourrait	We could
On doit	We must
On devrait	We should …
Utiliser	Use
Recycler	Recycle
Réutiliser	Reuse
Réduire la consommation de	Reduce the consumption of
Sauver	Save (animals, the planet)
économiser	Save up (not spend)
Eteindre les lumières	Turn the light off
Débrancher les appareils électriques	Unplug electrical devices
Utiliser les transports en commun	Use public transport
Consommer moins d'ener-gie	Consume less energy
Utiliser moins d'eau	Use less water
Refuser le plastique	Refuse plastic

What to include in your writing	
C	Connectives
O	Opinions
R	Reasons
N	Negatives
E	Extra detail
T	Time expressions
T	Tenses
I	Interesting adjectives
	Masculine
	Feminine
	Plural

3. Quels problèmes y avait-il avant ?	What problems were there before?
Avant	Before
Dans la passé	In the past
Il y avait	There was
C'était	It was

Plus	More
Moins	Less

de circulation	Traffic
de pollution	pollution
de bâtiments	Buildings
de gens	People

Sale	Dirty
Propre	Clean
Bruyant	Noisy
Tranquille	Quiet

Que	Than
Maintenant	Now

Time expressions	
Quand ?	**When?**
Après le collège	After school
Normalement	Normally
Jamais	Never
Toujours	Always
Parfois / quel-quefois	Sometimes
Le lundi	On Monday
Le mardi	On Tuesday
Le mercredi	On Wednesday
Le jeudi	On Thursday
Le vendredi	On Friday
Le samedi	On Saturday
Le dimanche	On Sunday

French - L'environnement

4.	Quels droits ont les enfants?	What rights do children have?
	Les enfants ont le droit	To have the right to
	De jouer	To play
	De vivre en paix	To live in peace
	À l'éducation	To education
	À la liberté d'expression	To freedom of speech
	À l'amour	To love
	À la nourriture	To food
	Je pense que c'est normal	I think it's normal
	Je crois que c'est juste	I think it's fair

Opinions		
	Il me semble que	**It seems to me that**
	C'est juste	**It's fair**
	C'est injuste	**It is not fair**
	C'est inacceptable	**It is unacceptable**
	C'est important	**It is important**

6.	Comment peut-on aider les autres ?	How can we help others?
	On peut	We can…
	Acheter des produits issus du commerce équitable	Buy fair trade products
	Collecter des fonds	Fundraise
	Donner de l'argent / des vêtements	Donate money /clothes
	Travailler comme bénévolat	Work as volunteer
	Visiter les boutiques de charité	Visit charity shops
	Utiliser les magasins d'occasion	Use second hand shops
	Aider les ONG	Help NGOs (non governmental organisation = charity)
	Une association caritative	Charity

5. Qu'est-ce qu'ils doivent faire?	What do they have to do?
Les enfants doivent	**Children must / have to**
Faire du travail manuel	**Do manual work**
Aider à la maison	**Help at home**
Gagner de l'argent	**Earn money**
Chercher de l'eau	**Look for water**
Recolter les fruits	**Harvest fruit**

What to include in your writing	
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T	Time expressions
T	Tenses
I	Interesting adjectives
	Masculine
	Feminine
	Plural

Spanish - El medioambiente

1 ¿Qué problemas medioambientales hay?	What environmental problems are there?
(No) hay	There is/are (no)
Mucha/o/s	A lot of
Demasiada/o/s	Too much
Mucho tráfico	A lot of traffic
Demasiado plástico	Too much plastic
Mucho ruido	Lots of noise
Demasiado embalaje	Too much packaging
Muchos contenedores	Lots of bins
Muchos espacios verdes	Lots of green spaces
Demasiada contaminación	Too much pollution
Mucha basura	Lots of rubbish
Es un desastre	It is a disaster
¡Qué lastima!	What a shame
Desafortunadamente	Unfortunately

3 ¿Qué se puede hacer?	What can we do/be done?
Se puede	We can
Se podría	We could
Se debería	We shoud
Se debe / hay que	We must
Usar el transporte público	Use public transport
Reciclar la basura	Recycle rubbish
Reusar las bolsas	Reuse bags
Reducir el consumo de agua	Reduce the consumption of water
Ahorrar	Save (as in save up, not to rescue or salvage)
Apagar la luz	Turn the light off
Desenchufar los aparatos eléctri-cos	Unplug electrical devices

What to include in your writing	
C	Connectives
O	Opinions
R	Reasons
N	Negatives
E	Extra detail
T	Time expressions
T	Tenses
I	Interesting adjectives
	Masculine
	Feminine
	Plural

2 ¿Qué problemas había antes ?	What problems were there before?
Antes	Before
En el pasado	In the past
Había	There was
Estaba	It was
Era	It was

Más	More
Menos	Less

Tráfico	Traffic
Contamina-ción	Pollution
Edificios	Buildings
Gente	People

Sucio	Dirty
Limpio	Clean

Animado	Lively
Peligroso	Dangerous

Que	Than
Ahora	Now

4 ¿Cuándo?	When?
Después del insti	After school
Normalmente	Normally
Nunca	Never
Siempre	Always
A veces	Sometimes
Los lunes	On Mondays
Los martes	On Tuesdays
Los miércoles	On Wednesdays
Los jueves	On Thursdays
Los viernes	On Fridays
Los sábados	On Saturdays
Los domingos	On Sundays

Spanish - El medioambiente

5 ¿Qué derechos tienen los niños?	What rights do children have?
Tienen	They have
Tienen derecho a	They have the right to
Jugar	Play
La libertad (de expresión)	Freedom (of speech)
La educación	Education
La securidad	To security
Vivir en paz	To live in peace
Ser feliz	To be happy
Lo que es	Which is
Lo que es justo	Which is fair
Lo que es normal	Which is normal

6 ¿Cómo podemos ayudar a otros?	How can we help others?
Se puede	We can…
Comprar productos de comecio justo	Buy fair trade products
Recaudar fondos	Fundraise
Donar dinero y ropa	Donate money /clothes
Trabajar de voluntaria/o	Work as volunteer
Visitar las tiendas benéficas	Visit charity shops
Ir a las tiendas de segunda mano	To go to second hand shops
ONG	NGO (non gouvernemental organisation = charity)
Asociación de ayuda (al refugiado, a los animales, a la infancia…)	Charity helping (refugees, animals, children…)
Porque vale la pena	Because it's worth it

	7 ¿Que tienen que hacer en ciertos paises?	What do they have to do in some countries?
	Hay que + infinitive	You have to
	Tienen que	They have to
	Trabajar	Work
	Ayudar en casa	Help at home
	Ganar dinero	Earn money
	Estudiar	Study
	Llevar	Wear
	Me parece que	I think that
	Es injusto / no es justo	It's unjust / it is not fair
	Es inaceptable	It is inacceptable

Opinions		
	En mi opinión	In my opinion
	Desde mi punto de vista	From my point of view
	Es muy fácil	It's very easy
	Es muy importante	It's very important
	No es complicado	It's not complicated

What to include in your writing	
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Drama Styles	
Term	**Definition**
Non-Naturalistic	Presenting a story, character or theme in a stylised way.
Clowning	The use of physicality for comedic affect
Meta Theatre	A play within a play which highlights dramatic conventions and stereotypes - usually for comedic effect.

Drama Practitioners	
Term	**Definition**
Jacques Lecoq	A French drama practitioner in 1940's-1990s and developed the use of mime and physical theatre.

Dramatic Genres	
Term	**Definition**
Comedy	A story which is intended to make the audience laugh.
Tragedy	A serious story which has a sad or depressing ending.
History	A story based on real historical events.
Documentary	A story which is intended to communicate factual information.

Vocal skills	
Term	**Definition**
Accent	The way a character pronounces words according to their regional location or social class.
Emphasis	Adding stress to a word or phrase to enhance importance and communicate meaning.
Pace	How quickly or slowly a person speaks.
Pause	A moment of silence to build tension, add emphasis or communicate other meaning.
Pitch	How high or deep the voice is.
Volume	How loud or quiet the voice is.
Tone	The way the character speaks to show emotion.

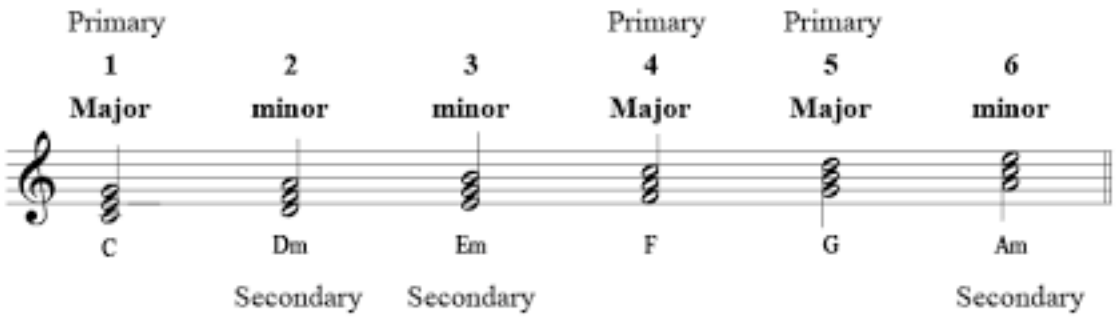
Dramatic Conventions and Techniques	
Term	**Definition**
Multi-role	Actors playing more than one character in a play.
Archetypes	The main types of characters we see in lots of different stories.
Stereotype	Exaggerating the common features of a type of category of people based on their job, gender, culture or class to make them easy to identify for the audience
Soliloquy	A long speech where a character speaks their inner thoughts alone onstage or directly with the audience.
Monologue	A long speech delivered by one character to other characters on the stage.
Direct Address	When an actor or character speaks directly to the audience.
Choral Speaking	A group of people speaking together.
Choral Movement	A group of people moving together.
Choreography	A Sequence of stylised movement created to communicate meaning to an audience.
Unison	A group of people moving as one.
Canon	Performing the same phrase of movement or speech one after the other.
Mime	Using only gesture, facial expression and movement to communicate action, character or emotion.

Physical Skills	
Term	**Definition**
Eye contact	Use of the eyes to communicate meaning.
Gait	The way the character walks.
Gestures	Use of hands, head and shoulders to communicate meaning
Facial expressions	Use of the face to communicate meaning.
Posture	How the body is held or the shape of the back.

Tempo Italian terms	
Tempo	The speed of the music
Adagio	Slowly
Andante	At a walking pace
Allegro	Quite fast
Vivace	Quick and lively
Accelerando	Gradually speeding up
Rallentando	Gradually slowing down

Key words connected with song	
Intro	Found at the start of the song, it sets up the style, tempo and dynamics
Verse	A set of lines with different words but the same melody. There are multiple verses in a song.
Pre-chorus	A short section of a song found in between the verse and chorus.
Chorus	A section of the song which often contains the catchy part. It has the same words and melody.
Bridge	A contrasting section of the song. It can be instrumental.
Outro	A short section of the song which ends the song. It can end in a fade out.

Primary and secondary chords



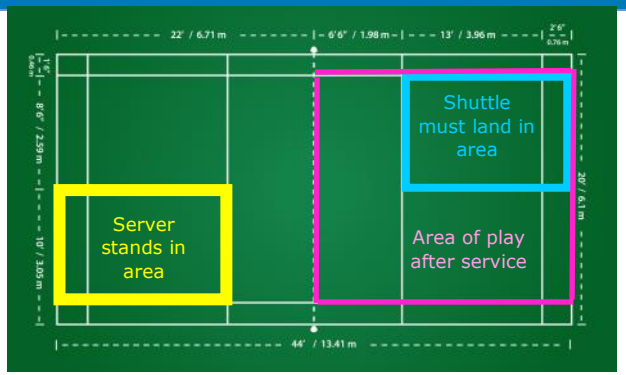
Elements of music	
Term	**Definition**
Dynamics	How loud or quiet the music is
Duration	The length of the notes
Harmony	The accompaniment to the melody
Melody	The tune
Pitch	How high or low a sound is
Rhythm	The pattern of beats in a piece of music
Sonority	The instrument's tone colour or sound FX used
Texture	The layers in a piece of music

Film music key terms	
Diegetic	Music that is part of the action. The characters can hear the music.
Non-diegetic	Music that is not part of the action, the characters in the film cannot hear it. It is just for the audience.
Pedal	A repeated note.
Drone	A continuous note.
Mickey-mousing	When the music fits precisely with a specific part of the action in a film.
Underscore	Where the music is played at the same time as the action/ dialogue.

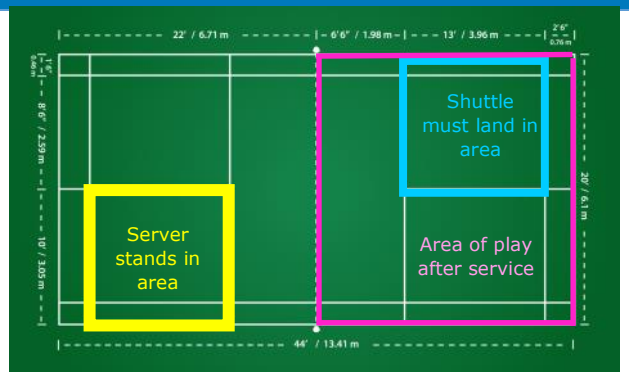
Texture key terms	
Monophonic	One single melody or rhythm played with no accompaniment.
Homophonic	Melody and accompaniment.
Polyphonic	Multiple melodies or rhythms played at the same time and each of equal importance.

Physical Education - Badminton

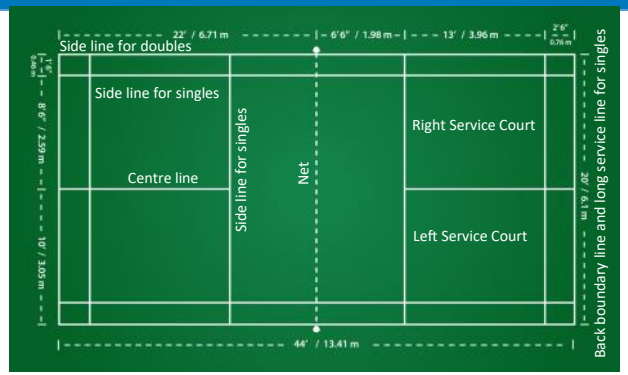
Single Court Lines



Doubles Court Line



Badminton Court Lines



Key Skills

	Key Skills	What is it?	Why is it used?
Serving	**Short**	Shuttle to be hit towards the front of the court, pass the 'service line'.	To bring the opponent closer to the front of the court, therefore hitting your return shot to the back of the court.
	Long	Shuttle to be hit towards the back of the court.	To move the opponent to the back of the court, therefore your return shot should be hit towards the front of the
	Flick	A serve that is disguised to look like at short serve.	To trick your opponent to think you are going to serve short, but you hit it long towards the back of the court.
Forehand Clears	**Overhead**	Use the overhead clear to move your opponent to the backcourt.	A defensive shot that will create space for you to move up the court and give you time to regain centre position on the court
	Underarm	To clear the shuttle to the back of the court when it is low down.	A defensive shot to put pressure back on your opponent and give you time to regain court position.
Doubles positions	**Side to Side**	Partners play next to each other and take responsibility for their side of the court.	Both players are positioned by the net, side to side. You are offensive and can cover most of the court. Most effective positioning in doubles.
	Front and Back	One player plays at the net whilst their partner covers the back of the court.	Communication must be strong between you and your team-mate as there is a big open target between the front and back player, giving your opponents an opportunity to land the shuttle in that area.
Shot	**Drop**	The forehand overhead drop shot is like the action of throwing a ball.	To disguise your shot to make it look like a back court shot and then play it to the front of the court, putting pressure
	Smash	The smash is a shot hit with power and speed downward to your	The angle and the steepness of the shuttle's trajectory will make it hard for your opponent to retrieve.

Key Rules

Rule	Definition
Service Fault	Server puts foot on or over the service line. The shuttle does not cross the service line on opponents' side. Racket contacts shuttle above the wrist.
Net Fault	Player reaches over the net to play the shuttle When a player contacts the net. Player steps over the centre line under the net

- Games are played, first to 21.
- Whoever wins the rally wins the point.
- You keep serving until you lose the point. After the point is won, the players will move to the opposite serving area.
- No second serves.
- You are not allowed to touch the net.
- No double hits allowed.
- You must serve from behind the service line and diagonally across the net.

Physical Education - Fast Netball

KEY SKILLS		
Key Skill	**Key Skills**	**Why is it used?**
Passing	**Chest**	Used during centre passes and getting the ball quickly in and out of circle
	Bounce	Used in and around the circle to go under a defender
	Overhead & Shoulder	Power and distance – BUT not over a third used for side-line or back line to clear a defender
Shooting	**BEEF**	**Balance, Elbow, Eye, Flick/Follow Through - Bend and push** – adding power if from distance.
Defend	**Rebounds**	When the shooter misses a shot, you can turn over ball by jumping to get the ball first.
	Intercepting	Turn over the ball during open play. This can be a tip or a full two-handed interception
	Marking	3ft / 0.9M away – Get your distance first, then hands up to mark the ball. Helps to limit passing options and block view.
Attack	**Dodging**	Used effectively during centre passes, back or side-line passes
		Feint dodge – you fake going one way and signal and move the other to receive the ball. **Sprint dodge** – at speed drive out to receive ball.

Physical Education - Fast Netball

Phases of Warm up	What it is	Specific Examples	Benefits of a warmup
Pulse Raiser	Slowly increasing heart rate and body temperature.	Jogging around the netball court	Warming up muscles
Mobility	Taking joints to their full range of movement.	Circling shoulders – opening closing the gate	Preparing the body physically and mentally for competition
Stretching	Static and Dynamic.	Hamstring stretch or opening/closing gate	Increase in body temperature
Dynamic movements	Show a change in speed and direction.	Sprint shuttles, fast feet and bounding	Improved flexibility of muscles and joints
Skill rehearsal	Practising movement patterns and skills that will be used in the activity.	Passing – bow tie	Reduced risk of injury

KEY RULES		
Rule	**Definition**	**Sanction**
Game Start	Centre pass	
Scoring **Only the GS and GA can shoot.**	1pt is scored when shot from within the inner circle. 2pts are scored when shot from within the outer goal circle. 3pts are scored when shot from outside both the goal circles. **Goals must be scored within the goal third.**	
Positions **5 Players on court**	**GS –** Attack third and Goal Circle **GA –** Centre third, Attack third and Goal Circle **C –** everywhere except for both Goal Circles **GD –** Centre third, Defence third and Goal Circle **GK –** Defence third and Goal Circle	
Footwork	Players who receive the ball with one foot on the ground may step, or pivot with the second foot in any direction. Players who receive the ball with both feet on the ground may step or pivot with one foot in any direction.	Free pass
Contact	Players may come into physical contact with each other while playing provided they do not interfere with each other's play or use their bodies to gain an unfair advantage over their opponent. A player may not push, trip, knock, bump, or hold an opponent, either deliberately or accidentally.	Penalty = Penalty Pass/Shot
Offside	A player is deemed offside when they enter a court area not designated for that player's position. This applies whether the player has contact with the ball or not. A player can reach across and pick up the ball from an offside area, or lean on the ball in an offside area, provided the player makes no contact with the ground in that area.	Free Pass
Obstruction	When defending another player with the ball, you must be 0.9M away. A defending player may be within 0.9m of an opponent with the ball as long as they make no effort to deflect or intercept the ball or defend the player with the ball.	Penalty Pass/Shot

Physical Education - Football

Phases of Warm up	What it is	Specific Examples	Benefits of warmup
Pulse Raiser	Slowly increasing HR	Jogging around the football pitch	Warming up muscles Increase body temperature - Improve flexibility of muscles and joints. Reduce chance of injury.
Stretching	Static – stationary - Dynamic - moving stretches	Hamstring stretch or Lunges	
Dynamic movements	Show a change in speed and direction	Sprint shuttles, fast feet and bounding	
Skill rehearsal	Practising movement patterns and skills that will be used in the activity	Pass and moving – rondo	

KEY SKILLS		
	Teaching points	**Why is it used?**
Dribbling	Keep your head up	Attacking skill to cover as much space as possible towards your attacking goal.
	Use inside and outside of BOTH feet	
	Change of speed	
Short Passing	Place dominant foot at a right angle in line with the ball. Non-dominant foot next to the	To retain the ball within your teammates.
	Use inside of the foot to pass the ball	
	Receive with an open body on back foot.	
	Follow through with your kicking leg to create more power.	
Long passing	Use the top/laces of boots to pass the ball over the longer distance.	To create attacking opportunities for your team or to prevent losing possession in defensive areas.
	Follow through with your kicking leg to create more power.	
	Accuracy is important	
Shooting	Power and accuracy	To create a scoring opportunity for your team.
	Non-dominant foot next to the ball	
	Strike the ball with your dominant foot using the inside.	

RULES		OUTCOME
How long is a football match?	45-minute halves 90 minutes overall	Duration of a professional football game.
Centre kick	A centre kick is taken from to start the game and when a goal is scored.	Centre kick is taken from the centre spot inside the centre circle.
Handball	The goalkeeper is the only player allowed to handle the ball, apart from throw ins which are taken at the touch line by any player.	Free kick (outside 18-yard box) Penalty (inside 18-yard box)
What happens if the ball is kicked out of play?	**Corner –** if it is kicked out the goal line by a defensive player. **Goal kick** - if it is kicked out the goal line by an attacking player. **Throw in –** If it is kicked out the touch line.	Corner Goal kick Throw in

FORMATIONS = 4-4-2

Goalkeeper (1) Defenders (2, 5, 6, 3) Centre Midfielders (8, 4) Wingers (7,11) Strikers (10, 9)

Physical Education - Gymnastics

Phases of Warm up	What it is	Specific Examples	Benefits of warmup
Pulse Raiser	Slowly increasing heart rate and body temperature.	Jogging around the hall	Warming up muscles
Mobility	Taking joints to their full range of movement.	Circling shoulders – opening closing the gate	Preparing the body physically and mentally for competition
Stretching	Static and Dynamic.	Hamstring stretch or opening/closing gate	Increase body temperature - Improve flexibility of muscles and joints.
Dynamic movements	Show a change in speed and direction.	Sprint shuttles, fast feet and bounding	Reduce chance of injury.
Skill rehearsal	Practising movement patterns and skills that will be used in the activity.	Practicing rolls, cartwheels or jumps	

KEY SKILLS		
Key Skill	**What is it?**	**Why is it used?**
Roll	Travelling across the mat using rotation and different parts of the body. Rolls allow you to travel forwards, backwards and sideways	To travel across the mat and link skills together to create a sequence of movement.
Jump	Creating height and shape in the air, before landing safely	To demonstrate skill level in use of different shape and to link skills together
Balance	Holding a position/shape for a minimum of 3 seconds without falling or wobbling, with or without another person	To demonstrate different shapes and body tension
Linking	Moving from one skill to another without stopping	To increase difficulty of skills and create sequences or routines
Entry	The movement **INTO** a skill	Allows you to link a variety of skills together easily
Exit	The movement **OUT** of a skill	Allows you to link a variety of skills together easily
Routine	A series of skills linked together using equipment	To demonstrate ability to link skills together
Vaulting	Being able to spring, using hands & feet over an apparatus to land safely	To be able to negotiate apparatus in order to move over it, on top of it and around it
Mount & Dismount	Getting onto, and off, a piece of apparatus – usually a vault or block	To travel over, on and off a high piece of apparatus, allows you to fluently move through skills using apparatus
Taking weight on hands	Using the hands to take the weight of your body EG: handstand, through vault, cartwheel, handspring (see diagram) 	To show strength in gymnastics. The ability to create shapes & movements where the weight is on your upper body
Decision Making	Working out how a basic skill can be performed or adapted to add different apparatus	To show your ability to adapt skills for apparatus. To work out how a skill can be performed differently (entry/exit etc) when using apparatus
Flight	The action of flying through the air. In gymnastics this is with the aid of a vault, springboard etc.	Flight in gymnastics allows you to create different shapes and rotations in the air before landing safely EG: straddle jump; handspring; somersault

Physical Education - Gymnastics

KEY TERMINOLOGY	
Term	**Definition**
Extension	Straightening/extending the arms and legs to show clarity of shape. EG: point the toes, keeping legs straight
Balance	The ability to hold a centre of mass over a base of support EG: an arabesque requires you to be able to balance on one foot
Aesthetics	How a skill or routine looks to the audience
Fluency	Moving from one skill to another easily and smoothly
Body tension	Tensing & stretching the muscles in order to keep the body in line & held in a shape during a skill
Shape	The position the body holds during a skill
Explore	Try out different ways of performing basic skills EG: rolls – forwards, backwards, sideways; creating different shapes in the air, during a skill
Take Off	The preparation for a jump. Two feet together, swing arms behind and upwards to push the feet off the floor
Landing	The placement of the feet on the floor/apparatus at the end of a jump/flight. Bend the knees on contact with the floor/apparatus, arms out in front of the body to control the landing
Travel	The movement from one area to another, using gymnastics skils. EG: a leap, a roll
Routine	A routine is skills performed in different directions around the floor area and on equipment
Compositional Gymnastics	Using apparatus to link skills together and create routines. Use of vaults, benches, springboards to develop key gymnastics skills
Flight	The action of flying through the air
Apparatus	Different equipment used in gymnastics. Mats, vaults, benches, springboards, trampettes etc
Control of movement	How the movement is held at the start, during (balance, speed), and at the end – there should be no wobbling or falling over!

Physical Education - Health Related Fitness

Phases of Warm up	What it is	Specific Examples	Benefits of warmup
Pulse Raiser	Slowly increasing HR	Jogging around the field/hall	Warming up muscles Preparing the body physically and mentally for competition Increase body temperature - Improve flexibility of muscles and joints. Reduce chance of injury.
Mobility	Taking joints to their full range of movement	Circling shoulders – opening closing the gate	
Stretching	Static – stationary - Dynamic - moving stretches	Hamstring stretch or Lunges	
Dynamic movements	Show a change in speed and direction	Sprint shuttles, fast feet and bounding	
Skill rehearsal	Practising movement patterns and skills that will be used in the activity	Passing in football	

Key terms	
Aerobic	With oxygen
Anaerobic	Without oxygen
Maximum HR	Maximum heart rate = 220 - AGE
RHR	Resting Heart Rate
Aerobic threshold	60-80% of Maximum heart rate (HR)
Anaerobic threshold	80-90% of maximum heart rate (HR)

Principles of Training		
Basic Principles of Training	**Frequency**	How often you train
	Intensity	How hard you train
	Time	How long you train for
	Type	What type of training you do

Method of Training		
Method of Training	**Description**	**Example**
Circuit	Exercises performed at stations -Usually, 6-8 stations -Works all components of fitness	• Station 1: Press ups • Station 2: Burpees • Station 3: Sit ups • Station 4: Mountain Climbers • Station 5: Tricep Dips • Station 6: Sprint shuttle
Interval	High intensity with rests	Sprint Shuttles
Continuous	Moderate intensity for a minimum of 20 minutes	Cross country run around the school field
Fartlek	This is where the intensity of the training is varied with speeds or different terrains. Known as speed play.	Lines of different cones. Sprint to one colour, jog to another, walk to another then repeat.
Flexibility	This is using a range of stretching movements to increase the range of motion around a joint to improve flexibility.	Stretching after exercise

Physical Education - Health Related Fitness

Method of Training			
Training methods		**Advantages**	**Disadvantages**
Flexibility Training	**Static Stretching (active and passive)**	Can be made sport specific Little or no cost and no need for specialist equipment Improves flexibility which can reduce risk of injury	May require two performers to perform certain techniques (passive and PNF stretching)
	Ballistic Stretching	Strengthens muscle mobility	Can risk injury due to the bounding and stress placed on joints and muscles.
	PNF Stretching	Increases muscular strength and flexibility	Not suitable for young athletes Requires a pro-longed warm up
Strength, Muscular and Power Training	**Weight Training**	Can be adapted to suit different performers	Requires specialist equipment and if done incorrectly or with poor technique can risk long term injury
	Plyometric Training	Increases explosive strength and power Can be adapted to suit most sports	Not suitable for young athletes Can risk injury as it can be very dangerous and puts a lot of stress onto joints and muscles. Requires equipment of boxes or jumping objects or specific heights
	Circuit Training	Can be adapted to suit individual fitness goals or type of sport	Often requires a lot of equipment and space
Aerobic Endurance Training	**Continuous Training**	Easy to organise and do, little equipment needed, can be done anywhere, Improves aerobic endurance, muscular endurance and suitable for beginners	Training for long distance is boring, only developments aerobic endurance and not anaerobic fitness, not ideal for team sport players as it doesn't improve speed
	Fartlek Training	Suitable for games-based players, changing of intensities and different speeds, variation due to the different terrains	Requires varied surfaces, can be tough for beginners due to the demands
	Circuit Training	Can be adapted to suit individual fitness goals or type of sport	Often requires a lot of equipment and space
Speed Training	**Acceleration Sprints**	Needs little specialist equipment and can be adapted to suit individual's training needs	Can become tedious and should be used with other training methods
	Hollow Sprints		
	Interval Training	Can develop different components of fitness (aerobic and anaerobic fitness, speed and endurance), requires little equipment and recovery times get shorter as fitness improves	You must ensure that you work at maximal levels A risk of overtraining which can cause injury (variation is key to prevent this)

Physical Education - Lacrosse

Phases of Warm up	What is it?	Specific Examples	Benefits of a warmup
Pulse Raiser	Slowly increasing HR	Jogging around the lacrosse pitch	Warming up muscles Preparing the body physically and mentally for competition Increase body temperature - Improve flexibility of muscles and joints. · Reduce chance of injury.
Mobility	Taking joints to their full range of movement	Circling shoulders – opening and closing the gate	
Stretching	Static-stationary/ Dynamic-moving stretches	Hamstring stretch or lunges	
Dynamic Movements	Show a change in speed and direction	Sprint shuttles, fast feet and bounding	
Skill Rehearsal	Practising movement patterns and skills that will be used in the activity	Pass and moving	

Key Skills				
Who would use this?	**Skill**	**What is it?**		**Why is it used?**
All players	**Change hands**	Moving the stick from one hand to another whilst cradling the ball		Used to increase options for players
		Reduces the risk of your stick being checked by an opponent		
		Aim to use your body to protect your stick		
Attacker	**Shooting**	Getting the ball into the opponent's goal		Used to score goals
		Scoring a point for your team		
		Fast and powerful movement		
		Difficult for the other team to defend		
	Dodging	**Split dodge**	A sidestep dodge to get round an opponent	Used to over commit a defender
			Fast and explosive movement	
			Used to change direction	
			Avoids the chance of a tackle	
		Roll dodge	A step and turn movement to get round an opponent	
			Fast and controlled movement	
			Used to change direction	
			Avoids the chance of a tackle	
			Confuses opponent	
Defender	**Channelling**		Use your stick and body to direct where an opponent must run	Used to dictate attackers' movements
			Drives an opponent either left or right away from the goal	
			Bold and strong body position	
	Blocking		Mirror opponent's movement with your stick	Used to be an effective defender
			Used to check opponent and limit their options	

Physical Education - Lacrosse

Teaching Points of Key Skills					
Who would use this?	**Skill**	**Teaching Points**		**Why is it used?**	**What does it look like?**
All players	**Change hands**	Hands wide apart on the stick		Used to increase options for players	 
		Top hand pushes stick through a loose bottom hand			
		Bottom hand at chest height			
		Bottom hand move up, over top hand			
		Protect stick on new top hand side			
Attacker	**Shooting**	Top hand lower than sticks middle		Used to score goals	 
		Wide side on stance			
		High front elbow (helps to aim)			
		Pull stick down with bottom hand			
		Push forward quickly with top hand			
		Swing through to point at goal			
	Dodging	**Split dodge**	Run at a defender	Used to over commit a defender	 
			Step quick to one side		
			Move to the other side and accelerate away from defender		
			This is effectively a sidestep		
			Requires defenders to believe in the first step		
		Roll dodge	Run at a defender		 
			Step into a defender with the foot of bottom hand		
			Pivot on same foot as the bottom hands so back is facing defender		
			At this point change hands		
			Keep turning and sprint past the side of them		
Defender	**Channelling**		Stand in between attacker and goal	Used to dictate attackers' movements	
			Low body position		
			Semi side on stance angled to side lines		
			Use stick to increase the length of body		
	Blocking		Stand in between attacker and goal with a low, side on position	Used to be an effective defender	
			Make upper body as big as possible and shadow their movements		

Physical Education - Leadership

Phases of Warm up	What it is	Specific Examples	Benefits of a warmup
Pulse Raiser	Slowly increasing heart rate and body temperature.	Jogging around the netball court	Warming up muscles
Mobility	Taking joints to their full range of movement.	Circling shoulders – opening closing the gate	Preparing the body physically and mentally for competition
Stretching	Static and Dynamic.	Hamstring stretch or opening/closing gate	Increase in body temperature
Dynamic movements	Show a change in speed and direction.	Sprint shuttles, fast feet and bounding	Improved flexibility of muscles and joints
Skill rehearsal	Practising movement patterns and skills that will be used in the activity.	Jogging, passing and shooting	Reduced risk of injury

KEY SKILLS of a leader			
Key Skills		**What is it?**	**Why is it used?**
A Skill is something that can be taught and improved through practice. All leaders should display certain skills.			
Skills of a leader	**Communication**	Verbal and non-verbal	The imparting or exchanging of information by speaking, writing or gestures.
	Teamwork	Working with others	This is needed in everyday life.
	Organisation	Is the idea of putting things together	To make sure you are prepared for work, school, clubs or leading.
	Listening	Giving attention to a sound	Giving attention to others – taking on board what other people are saying.
Problem Solving		The process of finding solutions to difficult or complex issues	It enables us to apply control over our environment.
How to plan for an activity. Use STEP	**Space**	What area you will use when for an activity	So, you can plan the correct space – too big or small could cause injuries or de-motivate pupils.
	Time	How long you will spend on an activity	Good pacing - avoids boredom of an activity. Everyone gets a turn.
	Equipment	All the resources needed for a session - cones, balls, bibs, stopwatch etc	Helps with organisation and helps play the activity.
	People	How many people are needed?	How many peers you will have to lead – knowing numbers will help with organisation of equipment.
Leader		A leader is expected to behave as a role model to the other people they lead.	
Behaviours of a leader	**Motivated**	Determined because you really want to do something	Being very enthusiastic can encourage others to try or give something a go.
	Resilience	The ability to be happy, successful AGAIN after something difficult or bad has happened	To keep going no matter what – trying your best.
	Clear	Instructions are clear – with good tone	Everyone knows what is expected of them and what needs to be done to complete a task.
	Approachable	Friendly and easy to talk to	Peers are not worried about asking questions regarding the task of asking for help.

Physical Education - Netball

Phases of Warm up	What it is	Specific Examples	Benefits of warmup
Pulse Raiser	Slowly increasing HR	Jogging around the netball court	Warming up muscles Preparing the body physically and mentally for competition Increase body temperature - Improve flexibility of muscles and joints.
Mobility	Taking joints to their full range of movement	Circling shoulders – opening closing the	
Stretching	Static – stationary - Dynamic - moving stretches	Hamstring stretch or Lunges	
Dynamic movements	Show a change in speed and direction	Sprint shuttles, fast feet and bounding	
Skill rehearsal	Practising movement patterns and skills that will be used in the activity	Pass and moving – bow tie	

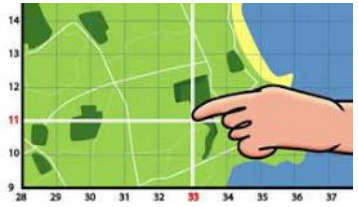
KEY SKILLS			
	Key Skills	**What is it?**	**Why is it used?**
Passing	**Centre Passes**	• Centre steps into the circle • On whistle all key players drive forward to receive the pass	• To start the game • WA, WD, GA and GD drive to • give options to C player.
Ball Handling	**Free Passes**	• Who should take the pass and movements of the other players?	• When a player has been called for contact, obstruction or footwork.
Shooting	**Semi-Circle tactics**	• Movement in and around the semi-circle to get the best opportunity to shoot.	• Set patterns of play involving GS, GA, WA, C, in order to maximise shooting opportunities.
Defend	**Rebounds**	• Be able to have quick reactions	• Jump higher than others to retrieve the ball.
	Interceptions	• Be able to turn over ball and keep control when landing to	• Turnover ball and start the attack to your end
	Marking	• apply 1M rule and get your distance before hands.	• Perform this everywhere on court to turn over ball
Attack	**Dodging**	• Use either sprint or feint to create space anywhere on court	• Used effectively during a centre pass, back or side-line passes.

Key skills for being an effective player	
Skills	**Why it's used**
Reading Play	• Good players can read the play and react quickly using their – • PERCEPTUAL SKILL - how we see our surroundings/ interpreting a stimulus • COGNITIVE SKILL - thinking skills • MOTOR SKILL - learned movement outcome
Positioning	• Players can position themselves between their players and the ball. • Aware of movement of others and not to all crowd an area. • Position during centre passes – one on the inside and outside of their opposition and WA and C positioning around the circle.
Timing	• Knowing when to move and when to hold your space. • Pass the ball in front of the receiving player to move the ball up court. • Timing for rebounds to get the best chance to turn over ball.

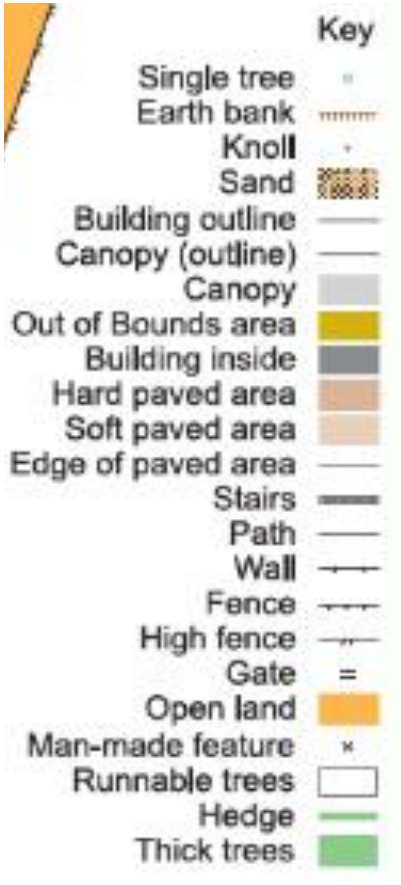
Physical Education - Orienteering

Phases of Warm up	What it is	Specific Examples	Benefits of warmup
Pulse Raiser	Slowly increasing heart rate and body temperature.	Jogging around the field	• Warming up muscles • Preparing the body physically and mentally for competition • Increase body temperature - Improve flexibility of muscles and joints. • Reduce chance of injury.
Mobility	Taking joints to their full range of movement.	Circling shoulders – opening closing the gate	
Stretching	Static and Dynamic.	Hamstring stretch or opening/closing gate	
Dynamic movements	Show a change in speed and direction.	Sprint shuttles, fast feet and bounding	
Skill rehearsal	Practising movement patterns and skills that will be used in the activity.	Shuttle runs	

Key Skills

	What is it?	Why is it used?	What does it look like?
Map Reading	**Navigating an area** using a map and the legend.	To help you move around an area and locate key features	
Orientate the map	Rotating the map to match your surroundings – move your body round the map	To make your map reading more accurate	
Legend (key)	A table with **symbols** or colours and their **definitions**	To allow people to understand what different features are on a map	

Legend symbols



Physical Education - Rounders

Phases of Warm up	What it is	Specific Examples	Benefits of warmup
Pulse Raiser	Slowly increasing HR	Jogging around the rounders diamond	Warming up muscles Preparing the body physically and mentally for competition Increase body temperature - Improve flexibility of muscles and joints. Reduce chance of injury.
Mobility	Taking joints to their full range of movement	Circling shoulders – opening closing the gate	
Stretching	Static – still & Dynamic - moving	Hamstring stretch or Lunges	
Dynamic movements	Show a change in speed and direction	Sprint shuttles, fast feet and bounding	
Skill rehearsal	Practising movement patterns and skills that will be used in the activity	Catching and throwing in groups	

KEY SKILLS		
Key Skills		**Why is it used?**
Fielding	**Overarm Throw**	Deep fielders use to get the ball into bases quickly. Backstop would use to get the ball to 2nd base.
	Underarm Throw	Ball hasn't travelled far, and fielders pass it into a base they are close too – backer up into base.
	Catching	Base players at 2nd or 4th need to be able to take a clean catch to try and stump out batters running to the base.
	Long barriers on move	Quickly and efficiently collect the ball making an accurate throw to 2nd or 4th base.
Batting	**Placement**	Place the ball where no fielders are stood – backhand shot. Adjusting body for the type of shot.
	Contact	The further the ball goes the more likely a batter is to get back to 4th base.
Bowling	**Fast**	Fast bowl reduces the chance of the batter hitting the ball, reducing chance of scoring. Decision making – judging which type of bowl to use depending on batters' strengths and weaknesses.
	Spin	To get the bowl to the batters but adding backspin. With backspin added to a ball it will not go as far meaning less likely to score
	Donkey Drop	Ball bowls up and falls at the front of batter's box. Due to the direction of the ball batter's usually hit the ball vertically into air making it easier to catch

Key Rules	
Rules	**Definition**
Running around	• Batters must always keep contact with the post – hand/ bat. • You don't have to move to the next post every time a ball is bowled. • A batter may not remain at the same post as another batter. • If you are at a post, you cannot keep on moving to the next post when the bowler has the ball in their box.
A player is out when:	• A batter runs on the inside of the posts • The post the batter is running to is stumped • You overtake a previous batter on the field • The batter misses or hits the ball and their foot is over the front or back line of the batting square • A fielder obstructs a batter • You deliberately throw a bat • The batter is caught out
Batting Rules	• Each batter will have one good ball bowled to them. • A batter must hold on to the bat whilst running round the track.
It is a no ball when:	• The ball is above the head/below the knee • The ball bounces on its way to you • The ball is wide or straight at body • The bowler's foot is outside of the square when they release the ball • The bowler does not use a smooth underarm action
Obstruction	• Post/Base Fielder must stand on the inside of their posts. • Must not get in the way of a batting running around the pitch. • If obstruction occurs, the batting team get ½ a rounder.

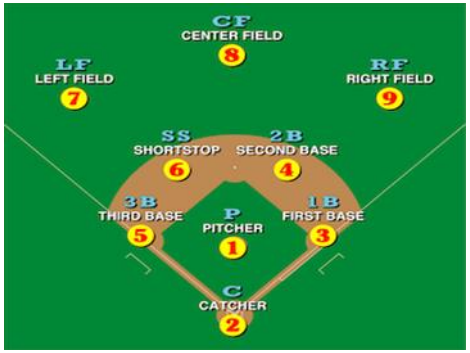
Physical Education - Rugby

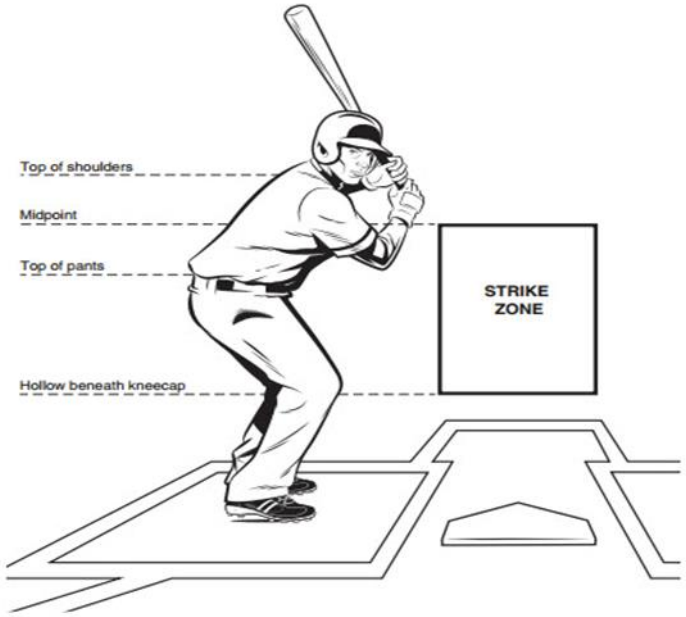
Phases of Warm up	What it is	Specific Examples	Benefits of warmup
Pulse Raiser	Slowly increasing heart rate and body temperature.	Jogging around the rugby pitch	Warming up muscles Preparing the body physically and mentally for competition Increase body temperature - Improve flexibility of muscles and joints.
Mobility	Taking joints to their full range of movement.	Circling shoulders – opening closing the gate	
Stretching	Static and Dynamic.	Hamstring stretch or opening/closing gate	
Dynamic movements	Show a change in speed and direction.	Sprint shuttles, fast feet and bounding	
Skill rehearsal	Practising movement patterns and skills that will be used.	Pass and moving.	

KEY SKILLS			
	Key Skills	**What is it?**	**Why is it used?**
Passing	**Miss Pass**	Passing the ball behind the back of a dummy runner. So, **the ball skips a player** in the attacking line.	To suck in defenders and create space out wide.
	Line out	The ball is thrown in straight between the two lines. Players can either jump or be lifted to receive the ball.	When the ball goes out of play or a player with the ball touches the touch line/ goes out of play.
Tackling	**NHS**	Knees, Hips, Shoulder - correct falling technique.	Emphasis on arms not taking weight of the fall.
	Tower of Power	Squat position where back remains straight.	Balanced stance.
	Ring of steel	Arms wrap around the ball carrier's legs/ midriff in a strong embrace.	No need to lock arms or fingers together. Keep hold of player.
	Cheek 2 Cheek	Place the head on the correct side of the ball carrier by placing face cheek to their bum cheek.	This is so they do not put their head in the way of knees potentially giving players concussion.
Rucking	**Rucking (Golden Meter)**	This means the first player **going past the ball (1 meter),** in the ruck, clearing out any opposing team members.	To retain possession after a tackle.
	Counter Rucking (Jackal)	If the attacking team are slow to the ruck, the initial player from the defending team should look to **'Jackal'** the tackled player.	To steal possession off the attacking team after a tackle. Jackal- to take the ball, which is on the floor from within the ruck, Jackaler must be on their feet supporting their own weight.
Attack	**Working in Pods**	In attacking play, players should **work in groups 3.**	Purpose- 1 to take the ball into contact, 1 to clear the ruck, 1 to secure the ruck by holding tower of power position over the tackled player.
Kicking	**Punt**	Kicked from hands, as far as possible.	Used to clear the ball out from defensive line.
	Place	From a cone/tee, over the posts.	To score conversion/penalty.
	Grubber	Kicked from hands, along the floor.	Advanced attacking kick which remains bouncing along the floor.

Physical Education - Softball

Phases of Warm up	What it is	Specific Examples	Benefits of warmup
Pulse Raiser	Slowly increasing heart rate and body temperature.	Jogging around the softball pitch	• Warming up muscles • Preparing the body physically and mentally for competition • Increase body temperature - Improve flexibility of muscles and joints. • Reduce chance of injury.
Mobility	Taking joints to their full range of movement.	Circling shoulders – opening closing the gate	
Stretching	Static and Dynamic.	Hamstring stretch or opening/closing gate	
Dynamic movements	Show a change in speed and direction.	Sprint shuttles, fast feet and bounding	
Skill rehearsal	Practising movement patterns and skills that will be used in the activity.	Throwing and catching	





KEY TERMS & POSITIONS	
Infield	Fielders who are positioned in and around the diamond (1B, 2B, 3B, SS, P, C) See diagram for positions
Outfield	Fielders who are positioned outside of the diamond (LF, CF, RF) See diagram for positions
RBI (Run Batted In)	An RBI is awarded to a hitter who is responsible for hitting the ball which allows a baserunner to run Home (4th base) therefore scoring a run.

KEY RULES	
Rule	**Definition**
Strike Out	If you get 3 Strikes, you are out!
Hitting	If you hit between 1st & 3rd, you must drop the bat & run
Foul Ball	A ball that is hit out of play, outside the 1st or 3rd base line. It is given as a Strike (You cannot be Struck Out from a Foul Ball)
Caught	You can be caught anywhere on the field (Including in Foul Territory)
Forced	If you are forced to run and the ball is collected at the base before you get there
Tag	If you are off base and you are tagged with the ball
Pitching	Must be done underarm.
Walk	If 4 'Balls' are pitched to the same Hitter, the Hitter gets a free pass to 1st Base
Inning	An inning ends when the hitting team gets 3 outs and then swap with the fielding team
Home Run	A hit that clears the field. The hitter will circle the bases and score a run (Also runs counted for those already on base)

Physical Education - Tennis

Phases of Warm up	What it is	Specific Examples	Benefits of warmup
Pulse Raiser	Slowly increasing HR	Jogging around the tennis court	Warming up muscles Preparing the body physically and mentally for competition Increase body temperature - Improve flexibility of muscles and joints. Reduce chance of injury.
Mobility	Taking joints to their full range of movement	Circling shoulders, high knees,	
Stretching	Static – stationary - Dynamic - moving stretches	Hamstring walk, rotated lunges, triceps and upper arm stretches.	
Dynamic movements	Show a change in speed and direction	Sprint shuttles, agility cones, small quick feet	
Skill rehearsal	Practising movement patterns and skills that will be used in the activity	Bouncing the ball on racket – stationary, moving, rotating the racket	

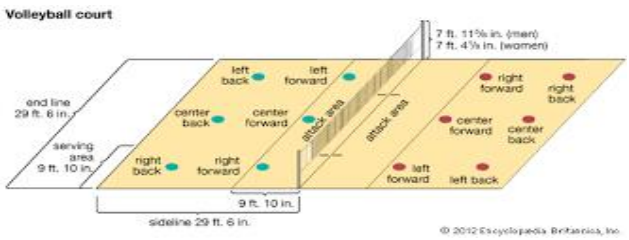
KEY SKILLS

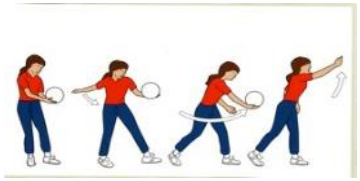
	Key Skills	What is it?	Why is it used?
Ground stroke	**Slice**	A shot that uses backspin to create a low bounce and travels back in the direction from where it came.	To keep the ball low, forcing your opponent to really stretch to get to the ball over the net
	Topspin	A shot that spins end-over-end and bounces very high in the direction it was hit upon impact.	Increase the player's consistency, allows a player a greater margin of error because topspin brings the ball down toward the ground quicker, a player can hit the ball higher over the net, thus increasing the margin of error
Advanced shot	**Overhead/ Smash**	A shot that is hit powerfully above the hitter's head with a serve-like motion.	Usually following a poorly hit lob close to the net.
	Lob	A high, loopy shot meant to go over the head of a player at the net.	To put the ball in the open space near the baseline
	Passing shot	A shot from the backcourt that is designed to go past an opponent at the net, often hit on the run	When one's opponent is running to the net or at net already.
	Drop shot	A shot that just goes over the net with some disguise and a low bounce.	To make your opponent run forward for the ball, keeping them off balance.

Key skills for being an effective player

Skills	Why it's used
Reading Play	Good players can read the play and react quickly using their – **PERCEPTUAL SKILL** - how we see our surroundings/ interpreting a stimulus **COGNITIVE SKILL** - thinking skills **MOTOR SKILL** - learned physical skill that create movement
Coordination	The ability to move two or more body parts under control, smoothly and efficiently. – e.g. when serving.
Muscular endurance	The ability to move your body and muscles repeatedly without fatiguing. E.g. hitting 18 shots in a rally.
Power	The ability to exert a maximal force in as short a time as possible. E.g. when hitting a smash
Speed	The ability to move quickly across the ground or move limbs rapidly through movements. E.g. running to a wide sliced backhand
Reaction time	The ability to respond quickly to a stimulus. E.g. Moving to a ball that has unexpectedly hit the net,

Physical Education - Volleyball

Positions	
The 'setter' controls the team's attackers. Ideally the setter volleys the ball after the serve has been received. The 'outside hitter' attacks the ball from the left-hand side of the court and aim to spike the ball onto the floor of the opposite side.	
The 'middle hitter' works closely to the setter and can respond quickly to a set in the middle of the court, but they also need to be quick to block any attack from the opposition. Back court players are 'diggers'. They receive the ball from a serve, take the power out of the ball and send it high towards the front court players.	

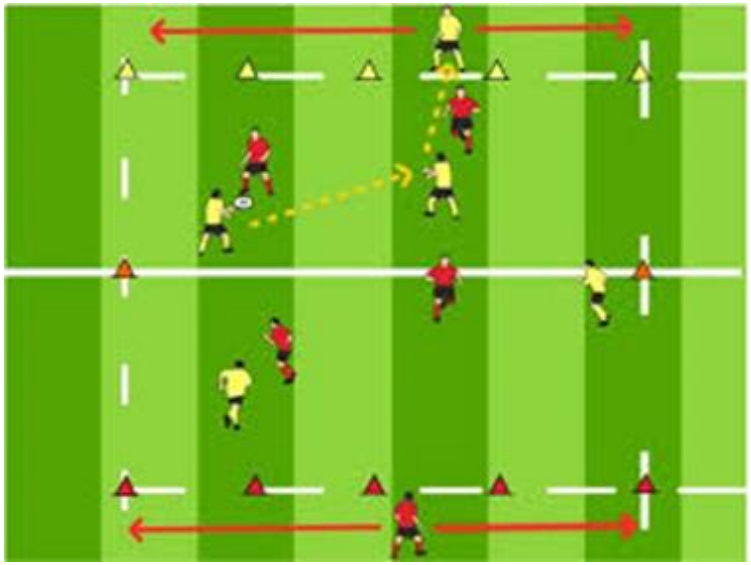
Key Skills		Tactics	Rules
Volley or Set shot	• An attacking skill to play the ball high in front of the net. • The ball must not come to rest in the players hands.	• The player setting the ball can set it to any position along the net. • It is usually the second skill after the dig when setting up a point scoring position.	• 6 players on a team. 3 on the front row, 3 on the back row. • Maximum of three hits per side. • A serve must be taken from the back line. • Player may not hit the ball twice in succession. • It is illegal to catch hold or throw the ball.
Dig	• This is a defensive skill, played when receiving a serve. • The ball needs to be low. • It helps give height and control the ball.	The first dig of a rally should be aimed towards one of the setters at the front of the court.	
Underarm Serve	• Hold the ball in the non-dominant hand waist height. • Feet slightly apart with the non-dominant foot forward. • Contact the ball at waist height by swinging the arm forward hitting the ball with the base of the palm.		**Scoring** Each game is played to 25 points and must be won by 2 clear points. A point can be scored off either teams serve. • The ball may be played off the net during a rally point, but not from a serve. • A ball hitting a boundary line is in. A ball is out if it hits • the floor completely outside the court • the net and lands on the same side • the ceiling above a non-playable area.
Overarm Serve	• Feet shoulder width apart. • Bring your dominant hand back and throw the ball up with the opposite hand. • Transfer weight on to the front foot and contact the ball using the palm of your hand.		
Spike	• Take 2 steps towards the ball and jump straight up. • Elbow needs to be level with your shoulder and the forearm above head. • Ball is hit with the palm.	This skill is played following a set at the front of the net. It is the third shot in the sequence, it needs to be fast and direct. The follow through motion adds strength and speed to the shot with the aim of scoring a point.	

Physical Education - Vortex

Phases of Warm up	What is it?	Specific Examples	Benefits of a warmup
Pulse Raiser	Slowly increasing HR	Jogging around the vortex pitch	Warming up muscles Preparing the body physically and mentally for competition Increase body temperature - Improve flexibility of muscles and joints therefore reducing the chance of injury.
Mobility	Taking joints to their full range of movement	Circling shoulders – opening and closing the gate	
Stretching	Static-stationary/ Dynamic-moving stretches	Hamstring stretch or lunges	
Dynamic Movements	Show a change in speed and direction	Sprint shuttles, fast feet and side steps	
Skill Rehearsal	Practising movement patterns and skills that will be used in the activity	Throwing and catching	

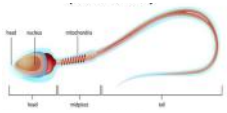
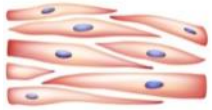
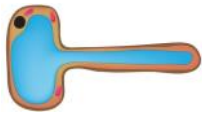
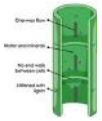
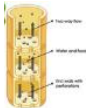
Key Skills		
Skill	**What is it?**	**Why is it used?**
Throwing	Passing the vortex from one player to another.	Used to move the vortex on the pitch towards the attacking end.
Catching	Receiving the vortex in your hands.	To receive the vortex from your team. Can either be stationary or moving.
Marking	Staying close to someone from the other team.	To prevent the other team from getting the ball and to try and gain possession of the vortex through an interception.
Dodging	Quick movement using changes of direction and speed.	Allows you to get into space or away from the opposition to receive a pass.

Key Rules		
Rule	**Definition**	**Sanction**
Contact	If you play dangerously or cause harm to another player by trying to win the vortex.	Free pass to the other team from where the offence took place.
Out of play	If the vortex is thrown out of the playing area.	The other team throws it in from where it went out.
Goal	Passing the vortex to your teammate within the goal zone without them dropping it.	If they drop it, no goal is scored. If they catch it successfully play restarts from the centre.

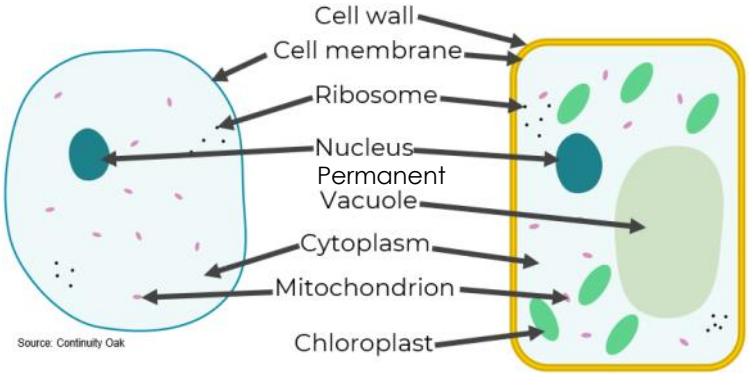


Science - B1 - Cell Biology

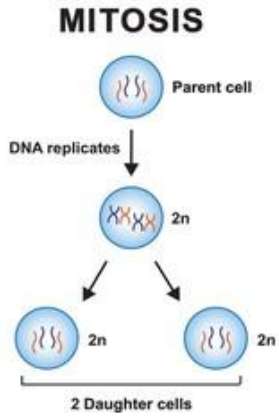
Key words	
DNA	The molecule that holds the genetic information in a cell
Plasmid	A small loop of DNA, only found in prokaryotic cells (bacteria)
Eukaryotic cell	DNA contained within nucleus (plant and animal)
Prokaryotic cell	DNA not contained in nucleus (bacteria)
Cell differentiation	Cells become specialised by developing different sub-cellular structures to help them function
Chromosomes	Found in nucleus of a cell, made of DNA. Usually found in pairs. Humans have 46 chromosomes (23 pairs) in a body cell

Specialised cells		
Specialised cell	**Image**	**How the structure relates to the function**
Nerve cell		Elongated axon to transmit electrical impulses over a distance; large dendrites; fatty sheath covering the axon for insulation, to speed up transmission
Sperm cell		Has a long tail to allow it to swim; contains many mitochondria to release lots of energy; streamlined head containing enzymes
Muscle cell		Lots of mitochondria to release energy for muscle contraction; elastic fibres to allow the muscle to contract and relax
Root hair cell		Has a large surface area and thin cell wall for water and mineral absorption
Xylem cell		Strengthened walls by lignin for the transport of water and dissolved ions
Phloem cell		Sieve plates to allow the transport of dissolved sugars

Sub-cellular structures	Function
Nucleus	Controls the cell's activities and contains genetic material
Cell membrane	Controls the movement of substances into and out of the cell
Cytoplasm	Jelly-like substance where chemical reactions take place
Mitochondria	The site of aerobic respiration
Ribosome	Site of protein synthesis (proteins are made)
Cell wall	Strengthens the cell, made of cellulose
Chloroplast	Site of photosynthesis (contains chlorophyll, a green pigment which absorbs light)
Permanent Vacuole	Filled with cell sap to help keep the cell turgid (stiff) to provide support



Mitosis – cell division	
Stage	**Description**
1	Cell grows, number of sub-cellular structures (e.g. ribosomes and mitochondria) increases and DNA replicates to form two copies of each chromosome
2	Nucleus divides and one set of chromosomes is pulled to each end of the cell
3	Cytoplasm and cell membranes divide to form two identical cells



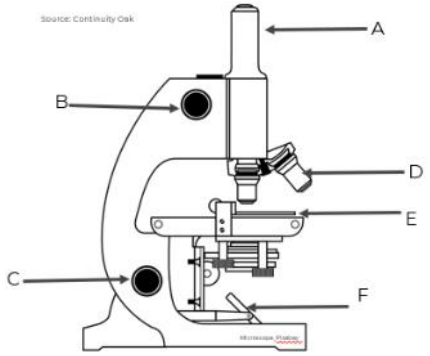
Science - B1 - Cell Biology

Microscopy

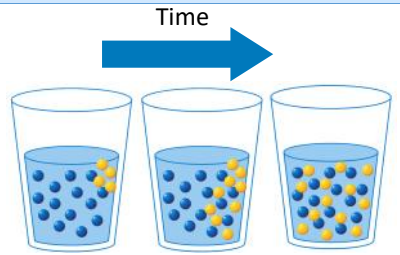
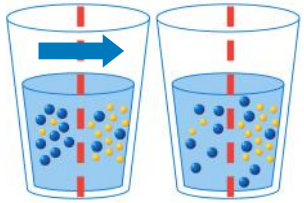
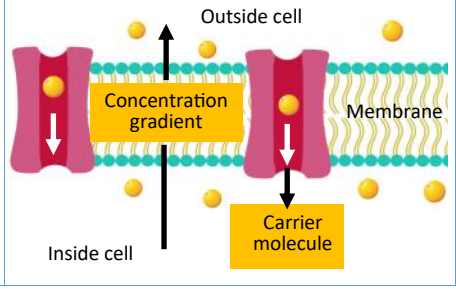
Term	Definition
Magnification	Magnification = size of image ÷ size of actual object
Focus	Start with lowest magnification to focus image
Resolution	This is the measure of the level of detail you can see in the image using a microscope
Light microscope	Device that uses visible light and a series of lenses to produce an enlarged image of an object, maximum magnification of 1500x and low resolution
Electron microscope	Microscope with a much higher magnification and resolution than a light microscope so can be used to study cells in much finer detail and see sub-cellular structures.

Microscopes

A	**Eyepiece lens**	Where the viewer looks through to see the specimen
	Clips	Keep the specimen secure on the stage
B	**Coarse focus**	Moves the stage up and down
C	**Fine focus**	Used to make the image clearer
D	**Objective lens**	Changes the magnification of the image
E	**Stage**	Where the specimen is placed
F	**Light**	Produces light to see the specimen



Transport across membranes

Process	Definition	Image	Uses
Diffusion	The net movement of particles from an area of higher concentration to an area of lower concentration. Occurs in solutions and gases.		Movement of oxygen and carbon dioxide in gas exchange (lungs - alveoli; leaves – spongy mesophyll and stomata), and of the waste product urea from cells into the blood plasma for excretion in the kidney.
Osmosis	The diffusion of water from a dilute to concentrated solution, across a partially permeable membrane (shown in red)		Movement of water across cell membranes into and out of cells.
Active Transport	The movement of particles from a low concentration to a high concentration, using energy from respiration.		Absorption of mineral ions into plant root hairs from very dilute solutions in the soil. Absorption of sugar molecules from lower concentrations in the gut into the blood which has a higher sugar concentration.

Stem cells

A stem cell is an undifferentiated cell of an organism which is capable of giving rise to many more cells of the same type, and from which certain other cells can arise from differentiation. Stem cells may be able to help conditions such as diabetes and paralysis.

Embryo	Adult	Meristem
Can be cloned and made to differentiate into most different types of human cells	Adult bone marrow can form many types of cells including blood cells	Can differentiate into any type of plant cell, throughout the life of the plant

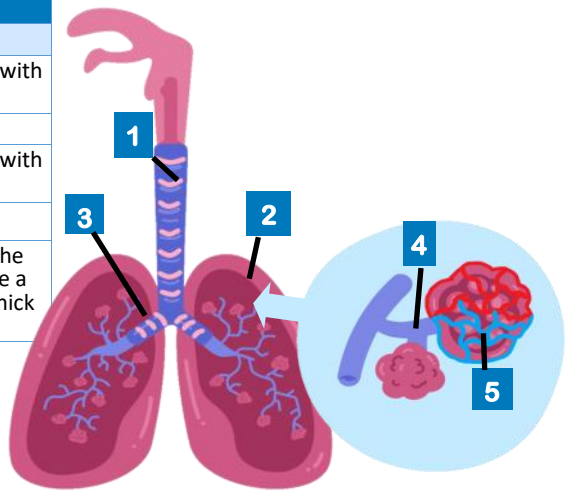
In therapeutic cloning an embryo is produced with the same genes as the patient

Science - B1 - Organisation

Levels of organisation: Cell → Tissue → Organ → Organ System → Organism	
Cell	The smallest unit for building all organisms e.g., muscle cell
Tissue	A group of cells with a similar structure and function, which work together to do a particular job e.g., muscle tissue
Organ	A group of different tissues, which all work together to do a particular job e.g., heart
Organ system	A group of different organs, which all work together to do a particular job e.g., circulatory system
Organism	A living thing (capable of the 7 life processes)

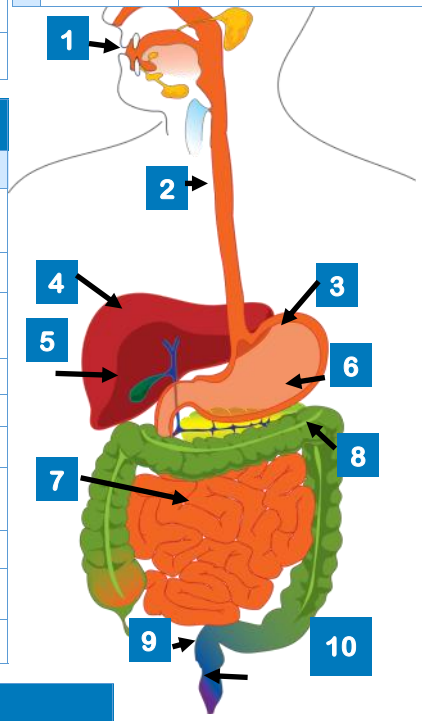
Structure of the lungs

#	Name	Adaptations
1	**Trachea**	Tubes through which gases move. Lined with cartilage so they do not collapse
2	**Lung**	Organ where gas exchange occurs
3	**Bronchus**	Tubes through which gases move. Lined with cartilage so they do not collapse
4	**Bronchiole**	Tubes not lined with cartilage
5	**Alveoli**	Small sacs where gas exchange occurs. The alveoli are surrounded by capillaries, have a large surface area and are only one cell thick



Parts of the digestive system

#	Organ	Function
1	**Mouth**	Mechanical digestion by chewing. Saliva from salivary glands, contains the enzyme amylase
2	**Oesophagus**	Muscular tubing where peristalsis takes place
3	**Stomach**	Mechanical digestion by churning. Cells in the lining of the stomach release acid to kill bacteria and produce the enzyme protease
4	**Liver**	Produces bile
5	**Gall bladder**	Stores bile
6	**Pancreas**	Produces digestive enzymes
7	**Small intestine**	Chemical digestion: larger molecules are broken down into small soluble molecules which are absorbed into the blood
8	**Large intestine**	Absorbs water from waste back into the bloodstream
9	**Rectum**	Stores faeces
10	**Anus**	Ring of muscle allowing faeces to exit the body



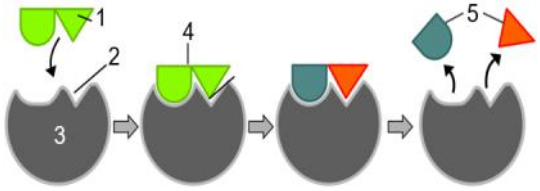
Components of the blood

Component	Function
Red blood cells	Transports oxygen in the blood.
White blood cells	Cells in the blood that fight infection caused by pathogens.
Platelets	Fragments of cells that cause clotting of blood at a wound.
Plasma	The liquid part of the blood, with dissolved substances like glucose, proteins, ions and carbon dioxide

Digestive enzymes

Enzyme	Site of production	Site of action	Substrate	Product
Carbohydrase - e.g., amylase	Salivary glands, pancreas and small intestine wall	Mouth, small intestine	carbohydrates - e.g., starch	Simple sugars - e.g., glucose
Protease	Stomach, pancreas, small intestine wall	Stomach, small intestine	Proteins	Amino acids
Lipase	Pancreas, small intestine wall	Small intestine	Lipids	Glycerol and fatty acids

Source: Continuity Oak

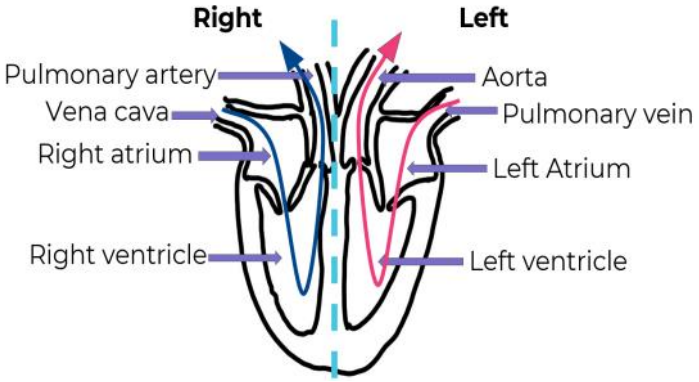


Lock and Key model

#	Organ
1	Substrate
2	Active site
3	Enzyme
4	Enzyme-substrate complex
5	Products

Science - B1 - Organisation

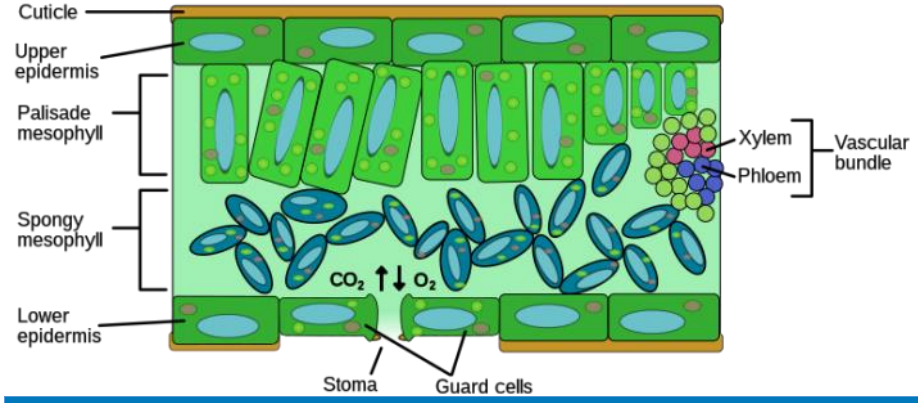
The heart	
Structure	**Function**
Vena cava	Major vein carrying blood back to the heart from the body
Right atrium	Smaller chamber of the heart which fills with blood from the vena cava.
Right ventricle	Large chamber pumps blood to the lungs.
Pulmonary artery	Artery carrying blood from the heart to the lungs.
Left atrium	Small chamber that fills with blood from the lungs.
Left ventricle	Large chamber that pumps blood around the body.
Aorta	Major artery carrying blood away from the heart to the body



Blood vessels	
Artery	Transports blood away from the heart, thick and elastic walls.
Vein	Carries blood to the heart, valves prevent backflow.
Capillary	One cell thick for quick diffusion between blood and cells.

Helping the heart			
Treatment	**How it works**	**Advantage**	**Disadvantage**
Stent	Wire mesh opens a blocked artery.	Keeps artery open. Low -risk surgery.	Fatty material can rebuild.
Statin (drug)	Reduces cholesterol.	Reduces fat being deposited in arteries.	Side effects e.g., liver damage.
Heart transplant	Replacement heart from a donor.	Long-term.	Major surgery. Could be rejected.
Artificial heart	Man-made heart used while waiting for a transplant.	Not rejected. Keeps patient alive.	Short lifetime. Limited activity.

Organisation in plants		
#	**Term**	**Function**
1	**Waxy cuticle**	Physical barrier to infection that prevents water loss.
2	**Epidermis**	Type of plant tissue that covers the surface of a plant allowing light through.
3	**Palisade mes-ophyll**	Tightly packed cells in leaf where photosynthesis takes place. Contains many chloroplasts.
4	**Spongy meso-phyll**	Tissue in the leaf with air spaces between cells – specialised for gas exchange.
5	**Stomata**	Opening that allows CO_2 water vapour and O_2 to diffuse in and out of the leaf.
6	**Guard cells**	Cells that open and close stomata to allow gas exchange to enter the leaf for photosynthesis.



Transport in plants	
Transpiration	The loss of water vapour from the leaves by evaporation from cells and then out through the stomata.
Translocation	The movement of dissolved sugar around the plant.

Factors Affecting Transpiration	
Factor	**Effect on the rate of transpiration**
Temperature	Increasing temperature increases the rate as water evaporates quickly.
Humidity	Increasing humidity decreases the rate as water evaporates slowly.
Wind speed	Increasing wind speed increases the rate as water evaporates quickly.
Light	Increasing light increases the rate as stomata open.

Science - B1 - Infection and response

Key terms	
Communicable	A disease spread from person to person caused by a pathogen
Pathogen	Micro-organism that causes disease. The four types of pathogen are bacteria, virus, fungus and protist.
Bacteria	Causes disease by reproducing rapidly inside the body, and releasing toxins which damage tissues and make us feel ill
Virus	Causes disease by living and reproducing inside cells, causing cell damage
Vector	An organism which carries something e.g. a disease but isn't affected by it such as a mosquito

Diseases

Disease	Pathogen	Symptoms	Transmission	Method of reducing transmission
Measles	Virus	Fever, red skin rash	Inhalation of infected droplets from sneezes and coughs	Vaccination
HIV	Virus	Flu-like symptoms. Develops into AIDS over time which damages the body's immune system.	Sexual contact, exchange of bodily fluids, sharing needles	Condoms, do not share needles
Tobacco mosaic virus (TMV) - plant only	Virus	Distinctive mosaic pattern of discolouration on leaves, affects growth of plant by reducing photosynthesis	Spread through the use of infected tools on healthy plants (direct contact)	Removing infected areas of the plant, sterilising gardening tools
Salmonella	Bacteria	Fever, abdominal cramps, vomiting, diarrhoea	Bacteria ingested in food prepared in unhygienic conditions, undercooked food	Vaccination of poultry, ensure food cooked thoroughly, especially poultry
Gonorrhoea	Bacteria	Thick yellow or green discharge from the penis or vagina, pain when urinating	Sexual contact	Treatment with antibiotics, use of a barrier method of contraception e.g. condom
Rose black spot—plant only	Fungus	Purple or black spots on leaves. Effects growth of plant due to reduction of photosynthesis	Air, water or direct contact	Use of fungicides and/or removing and destroying the affected leaves
Malaria	Protist	Recurrent episodes of fever	Mosquito (vector)	Preventing mosquitoes breeding: mosquito nets and insect repellent

Treatment	
Antibiotic	Drug which cures bacterial disease by killing pathogenic bacteria
Painkiller	Drug which reduces pain, does not cure a disease but relieves symptoms

Non-specific defence systems	
Skin	Acts as a barrier
Nose	Hairs and mucus trap pathogens before entering lungs
Trachea and bronchi	Cilia cells (small projections from cells) and mucus (produced by goblet cells) trap pathogens
Stomach	Contains hydrochloric acid to kill pathogens that have been eaten

Vaccination key terms	
Vaccines	Dead or weakened form of a pathogen injected into the body
Antigen	Protein on the surface of a pathogen which the body recognises as a foreign body
Antibody	Protein produced by white blood cells which binds to the antigens on pathogen and helps them be destroyed
Herd immunity	The protection given to a population against an outbreak of a specific disease when a very high percentage of the population have been vaccinated against it

Stages of vaccination

Stage	Effect
1	Dead or weakened pathogen injected into the body
2	Antigens in the vaccine stimulate white blood cells to make antibodies
3	Memory cells (type of white blood cell) can be used to make the correct antibody for that pathogen
4	If the pathogen re-enters the body the while blood cells will respond quickly to produce the correct antibodies, preventing infection. The person is immune

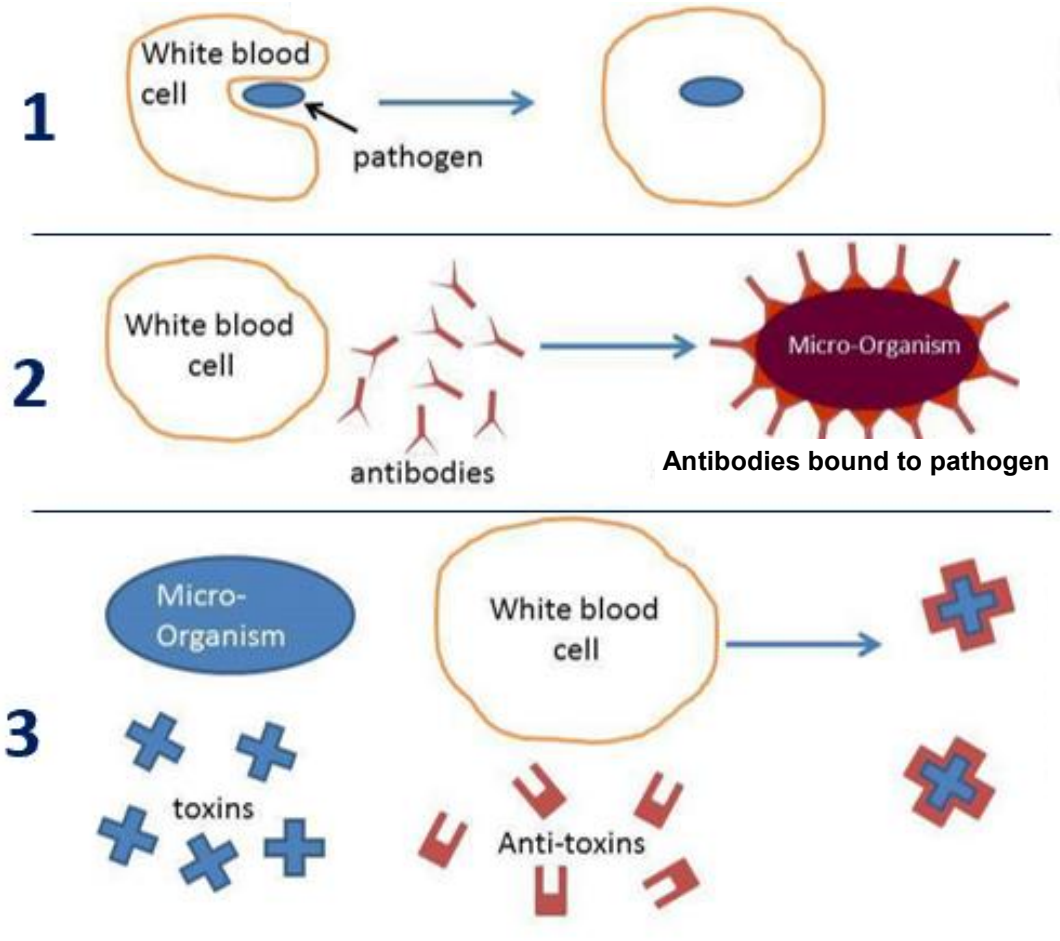
Science - B1 - Infection and response

Drugs	
Drug	**Origin**
Digitalis	Heart drug from foxgloves originally
Aspirin	Painkiller from willow trees
Penicillin	Antibiotic originally from fungus. Discovered by Alexander Fleming

Drug trials key terms	
Key term	**Definition**
Efficacy	Whether the drug works
Dose	How much of the drug to use
Toxicity	If the drug has harmful side effects
Placebo	A fake drug
Double blind trial	Neither the doctor nor the patient know if they have the placebo or the real drug, to avoid bias

Stages in drug trials	
Pre-clinical trials	1. Tested on cells and tissues for toxicity and side effects 2. Tested on animals for toxicity and side effects
Clinical trials	3. Low dose tested on healthy volunteers to check for side effects and toxicity 4. Test on small group of patients with the illness to find optimum dose (best dose with fewest side effects). Patients will go through double blind trails, to avoid bias 5. Large scale testing 6. Peer review, to avoid bias

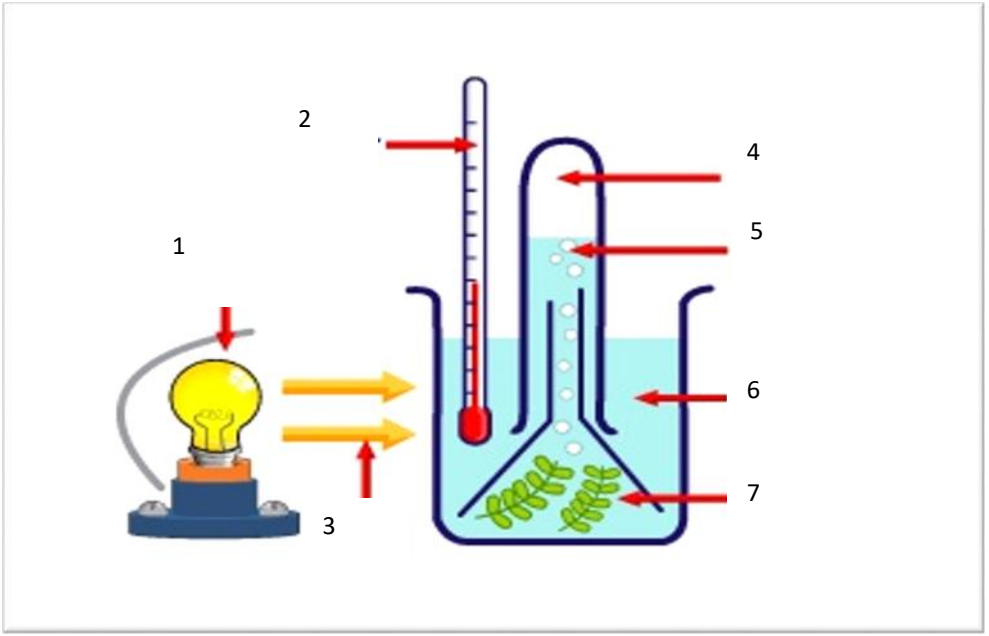
White blood cells		
1	**Phagocytosis**	engulfing and breaking down the pathogen
2	**Produces antibodies**	specific to the antigen
3	**Produces antitoxins**	to neutralise toxins



Science - B1 - Bioenergetics (Photosynthesis)

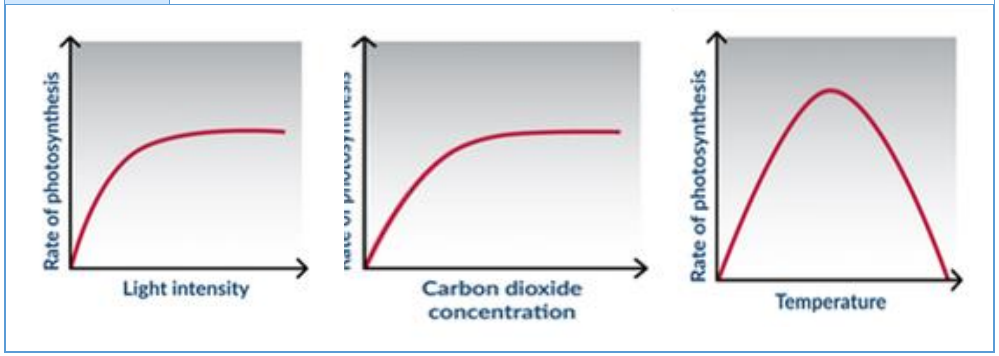
Photosynthesis
Endothermic chemical reaction that takes place in chloroplasts in leaves that produces glucose and oxygen from carbon dioxide and water
Carbon dioxide + water —> glucose + oxygen
$6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$

Required practical	
Number	**Label**
1	Lamp (LED to control temperature)
2	Thermometer
3	Distance from light
4	Collected oxygen
5	Bubbles of oxygen (count number of bubbles produced per minute)
6	Water with sodium hydrogencarbonate
7	Pond weed



Uses of glucose from photosynthesis
Converted into starch for storage
Used to produce fats and oils for storage
Used to produce cellulose, which strengthens the cell wall
Used to produce amino acids for protein synthesis (to produce proteins, plants also use nitrate ions that are absorbed from the soil)
Used for respiration

Limiting factors:	
1	Concentration of carbon dioxide
2	Light intensity
3	Amount of chlorophyll
4	Temperature



Light intensity (HT only)	
Inverse square law	As distance from the light source increases, the light intensity decreases in a non-linear relationship.

Science - B1 - Bioenergetics (Respiration)

Respiration	
Term	**Definition**
Respiration	A chemical process in all cells that releases energy from glucose.
Aerobic respiration	Respiration that uses oxygen to release large amounts of energy from glucose, occurs in the mitochondria.
Anaerobic respiration	Respiration that does not use oxygen and releases less energy from glucose, occurs in the cytoplasm.
Oxygen debt (HT only)	The amount of extra oxygen the body needs after exercise to react with accumulated lactic acid and remove it from the cells.

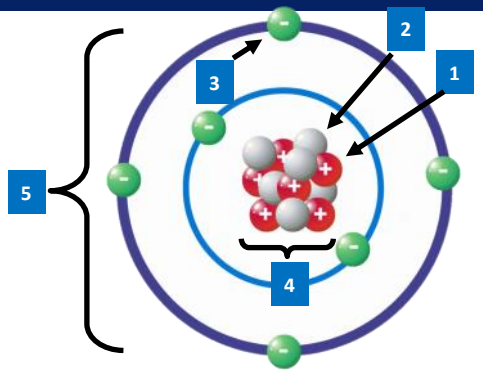
Respiration equations	
Aerobic respiration	Glucose + oxygen —> carbon dioxide + water $C_6H_{12}O_6 + 6O_2$ —> $6CO_2 + 6H_2O$
Anaerobic respiration (muscles – animals)	Glucose —> lactic acid
Anaerobic respiration (plants and yeast)	Glucose —> Carbon dioxide + ethanol

Uses of anaerobic respiration	
Fermentation	Ethanol produced from anaerobic respiration in plants and yeast is used to make alcoholic drinks such as beer, wine, cider and spirits.
Baking	Carbon dioxide produced from anaerobic respiration in yeast is used to make bread rise.

Effect of exercise	
Effect	**Reason**
Increased heart rate	To deliver more oxygen and glucose to muscle cells and remove waste carbon dioxide.
Increased breathing rate	To get more oxygen into the blood quickly
Increased breath volume	Get more oxygen into blood per breath and remove waste carbon dioxide
Heart beats harder	more blood is pumped with every beat

Metabolism is the sum of all the reactions in a cell or body. Including:	
1	Conversion of glucose to starch, glycogen and cellulose
2	Formation of lipids from fatty acids and glycerol.
3	The use of glucose and nitrate ions to form amino acids which are turned into proteins
4	Respiration
5	Breakdown of excess proteins to form urea for excretion.

Science - C1 - Atomic structure and the Periodic table



	Name	Relative Mass	Relative Charge
1	Proton	1	+1
2	Neutron	1	0
3	Electron	very small	-1
4	Nucleus	A	+ Z
5	Atom	A	0

Term	Definition
Element	Substance that contains only one type of atom
Mixture	Two or more elements and/or compounds not chemically combined together
Compound	Contains two or more different elements chemically combined
Group	Columns on the periodic table, informs us of the number of electrons in the outer shell of the atom. Contain 'families' of elements with similar properties
Period	Rows on the periodic table, informs us of the number of electron shells in an atom
Reactants	The substances that take part in a chemical reaction
Products	The substances that are made in a chemical reaction
Electronic structure	Pattern of electrons in shells. Shells fill from the inside; 1st shell max 2, 2nd shell max 8, 3rd shell max 8, 4th shell max 2
Ion	An atom with an overall positive or negative charge due to the loss or gain of electrons

Term	Definition	
Atom	A neutral particle consisting of protons, neutrons and electrons. Number of protons = number of electrons	
Mass number, A	Total of number of protons and neutrons in the nucleus of an atom	23 Na
Atomic number, Z	Number of protons in the nucleus of an atom; determines the identity of the element	11
Atomic radius	Distance from the centre of an atom's nucleus to the electrons (approx. 10^{-10}m or 0.1nm)	
Isotopes	Atoms of the same element (i.e. same number of protons) with different number of neutrons	
Nanometre	$1x10^{-9}$m = 0.001µm = 0.000 001mm = 0.000 000 001m	
Nucleus	The positively charged centre of an atom made of protons and neutrons. Approximately 10 000 times smaller than the atom (approx.10^{-14}m)	
Subatomic	Smaller than the size of an atom	

Method	For separating mixtures of…	Requirements	Example
Filtration	insoluble solids from liquids/solutions	Filter funnel, filter paper	Sand from water
Crystallisation	soluble solids from solvents	Heat energy for evaporation	Copper sulphate crystals from solution
Simple distillation	two liquids of different boiling points	Heat energy, condenser	Ethanol (alcohol) from water
Fractional distillation	many liquids of differing boiling points	Heat energy, condenser or fractionating column	Crude oil fractions
Chromatography	different coloured compounds	Solvent, chromatography paper	Pigments in ink/dye

		Determined by….
a	**Relative atomic mass**	mean mass of nucleus taking into account relative abundance of isotopes
b	**Element symbol**	element name
c	**Element name**	number of protons
d	**Atomic number**	Number of protons

Scientist	Contribution
Rutherford	Disproved 'plum pudding' model. Replaced with 'Nuclear model' Atom mostly empty space, nucleus positive where almost all the mass is concentrated
Bohr	Modified the 'Nuclear' model: central nucleus with orbiting electrons at specific distances.
Chadwick	After the proton was discovered, provided experimental evidence for existence of neutrons.

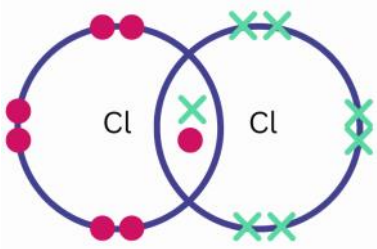
Science - C1 - Bonding, structures and properties of matter

Key Terms	
Term	**Definition**
Ionic bond	Between a metal and non-metal. Involves the transfer of electrons.
Covalent bond	Between non-metals only. Involves the sharing of electrons.
Ion	charged particles formed through the loss or gain of electrons. Metals and hydrogen form positive ions. Non-metals form negative ions.
Metallic bond	Between metal ions. Neat rows of positive metal ions surrounded by a sea of delocalised electrons.
Alloy	Harder than a pure metal. Different sized atoms distort the layers meaning they cannot slide
Simple covalent structures	Small molecules with low melting and boiling points as they have weak intermolecular forces, so it doesn't take much energy to overcome these forces.
Molten	Melted (in the liquid state)
Aqueous	Dissolved in water (aq)

State symbols	
Symbol	**Meaning**
(s)	Solid
(l)	liquid
(g)	Gas
(aq)	Aqueous (dissolved in water)

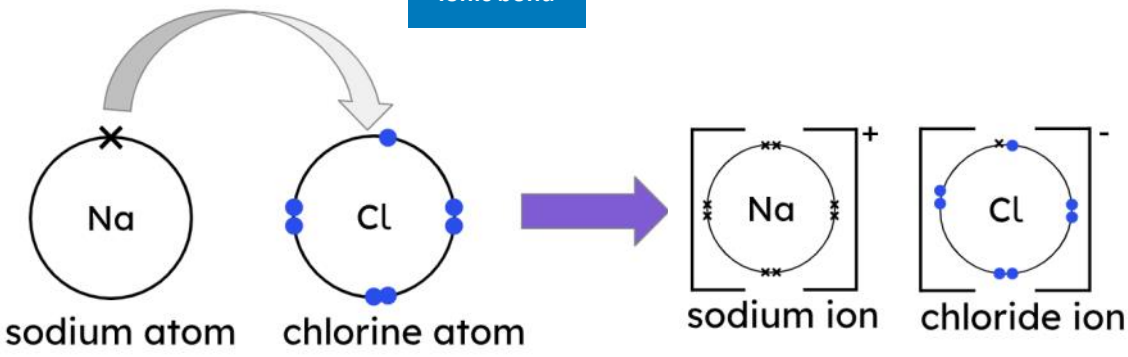
Giant structures	
Key term	**Facts**
Giant covalent structures	High melting and boiling point as has strong covalent bonds between many atoms which take a lot of energy to break e.g. Diamond, graphite and silicon dioxide
Diamond	Four covalent bonds from each carbon atom to neighbouring carbon atoms. Does not conduct electricity as no free electrons. Hard and high melting and boiling point
Graphite	3 bonds between each carbon atom Conducts electricity as has free electrons (delocalised electrons) Soft as layers can slide
Giant ionic lattice	High melting and boiling point as has strong electrostatic forces between many ions, so takes a lot of energy to overcome forces. Does not conduct when solid Conducts electricity when molten or aqueous as ions are free to move
Polymer	Made of many repeating units. Large molecules with strong covalent bonds linking monomers. Strong intermolecular forces so solid at room temperature
Graphene	Single layer of graphite. Useful in electronics and composites
Fullerenes	Molecules of carbon atoms with hollow shapes
Buckminsterfullerene	First fullerene to be discovered. Made of 60 carbons (C_{60}). Spherical shape
Carbon nanotubes	Hollow carbon tubes. very high strength to weight ratio

Covalent bond



Diamond

Ionic bond



Science - C1 - Quantitative Chemistry

Key Terms	
Term	**Definition**
Conservation of mass	Mass cannot be created or destroyed, the mass of the products equals the mass of the reactants
Relative formula mass (Mr)	The sum of the relative atomic masses of the atoms (in the numbers shown) in the formula
Relative atomic mass (Ar)	The relative mass of one atom of a substance, i.e. the big number in periodic table
In excess	More of the reactant is present in the reaction than is needed
Uncertainty	The range of measurements about the mean i.e. for a repeated measurement, equal to (maximum – minimum)/2
Avogadro's constant (HT only)	The number of atoms, molecules or ions in a mole of a given substance. The value of the Avogadro constant is 6.02×10^{23} per mole
Limiting reactants (HT only)	The reactant that is completely used up is called the limiting reactant because it limits the amount of product made , because the other reactant was in excess

Equations	
Quantity	**Calculation**
Mr	Ar + Ar + Ar… Eg CO_2 Mr = 12 + (2x16) = 44
Concentration (g/cm^3)	Mass (g) Volume (cm^3)
Moles of a substance (HT only)	Mass Mr (remember Mr Mole lives under mass)
Concentration (mol/dm^3) (HT only)	Moles Volume (dm)

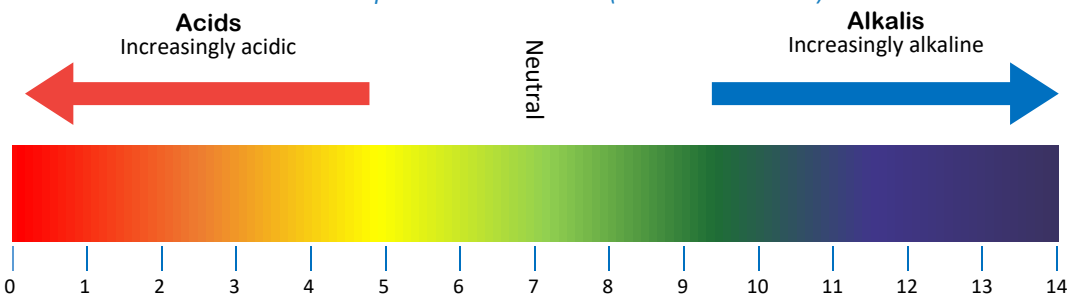
Concentration	
Key terms	**Definition**
Concentration	Mass of dissolved substance in specific volume (eg dm^3)
Mass	The quantity of matter a substance is made up of. Measured in kilograms
Volume	A measure of the amount of space that matter occupies

HT only	
Skills needed	**How to do it**
Big numbers show moles	$2Mg + O_2 \rightarrow 2MgO$ Means 2moles of Mg react with 1 mole of O_2 to form 2 moles of MgO
Balancing equations when given masses	Take the mass of each substance and divide by Mr. Write as a ratio. Simplify the ratio

Science - C1 - Chemical Changes

Acids and alkalis	
Key Term	**Definitions**
Acids	Contain H+ ions, have a pH of less than 7
Alkalis	Contain OH- ions, have a pH of more than 7 (max 14)
Neutral	pH = 7
Neutralisation	Reaction between acid and alkali which produces a salt and water
Half equation	H^+ (aq) + OH^- (aq) —> H_2O (l)
Indicator	Changes colour in acids or alkalis. E.g. universal indicator
Crystallisation	Separation of salt from solution. Evaporate water partially to concentrate solution. Leave to cool to form crystals.
Strong/weak acid (HT only)	Strong Hydrogen ions fully dissociate e.g. nitric, hydrochloric and sulphuric acids / weak hydrogen ions only partially dissociate e.g. ethanoic, citric and carbonic acids
Concentration (HT only)	Amount of solute dissolved in a given volume (dilute/concentrated). Measured in g/dm^3 or mol/dm^3

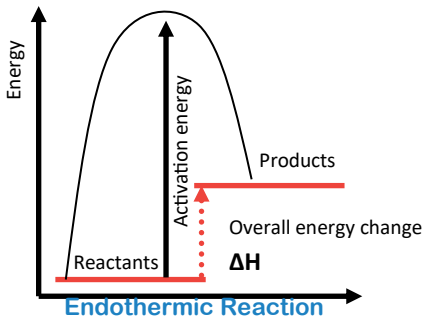
Universal pH value colour scale (universal indicator)

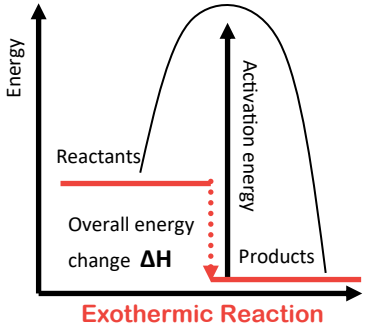


Common salts	
Acid	**Salt**
Hydrochloric acid	_____ chloride
Sulphuric acid	_____ sulphate
Nitric acid	_____ nitrate

Electrolysis	
Key Term	**Definitions**
Electrolysis	The breaking down of a substance using electricity. Used if element is more reactive than carbon
Electrolyte	The solution which is being broken down during electrolysis. Must be molten (melted) or aqueous to allow ions (charged particles) to move.
Aqueous	Dissolved in water (contains H^+ and OH^- ions)
Oxidation	The loss of electrons or gaining of oxygen
Reduction	The gain of electrons or the loss of oxygen
Anode	The positive electrode
Cathode	The negative electrode
Anion	Ion that goes to anode (- ion)
Cation	Ion that goes to cathode (+ ion)
Rules of electrolysis	**Negative electrode:** Least reactive of hydrogen or metal (hydrogen unless copper, silver or gold present) **Positive electrode:** Group 7 halogen if halide present, oxygen from OH^- if not

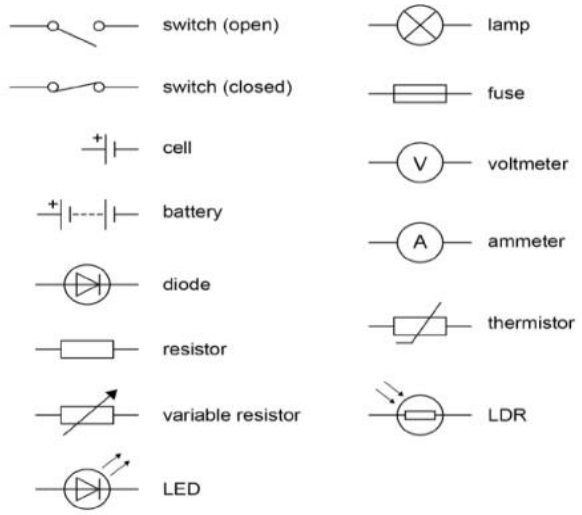
Reaction profiles	
Key term	**Definition**
Exothermic	Releases energy to the surroundings. Feels hot
Endothermic	Takes in energy from the surroundings. Feels cold
Chemical reaction	Occurs when particles collide with sufficient energy
Activation energy	Minimum amount of energy needed for reaction to occur



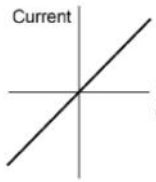


Science - P1 - Electricity

Circuit diagram symbols

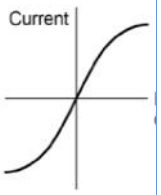


Resistors



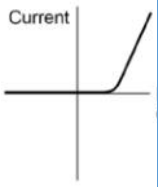
Fixed Resistor (Ohmic Conductor)

Current and potential difference are **directly proportional**. **Resistance is constant**.



Filament Lamp

Resistance of a filament lamp is **not constant**. As temperature increases, resistance increases.



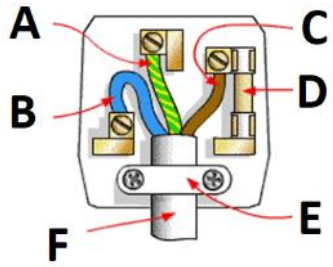
Diode/ LED

The **current** through a diode flows in **one direction only**. The diode has a **very high resistance in the reverse direction**.

V, I and R in Series and Parallel

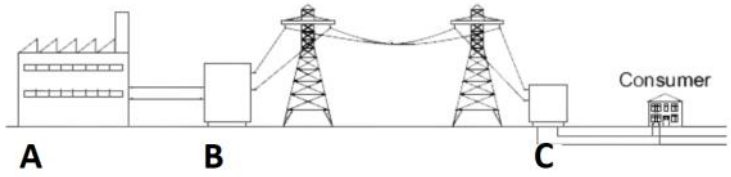
	Current	Potential Difference	Resistance
Series	The current is the same through each component	The total potential difference of the power supply is shared between the components	The **more resistors, the greater the resistance**. The total resistance of two components is the sum of the resistance of each component. $R_{total} = R_1 + R_2$
Parallel	Current through the whole circuit is the sum of the currents through the separate branches	The potential difference across each branch is the same	The **total resistance** of two resistors is **less than the resistance of the smallest individual resistor**.

3 core cable



A	**Earth**	Yellow and green colour. Potential difference of 0V. Carries charge to Earth if live wire touches the metal casing of an appliance (faulty).
B	**Neutral**	Blue colour. Completes the circuit. Potential difference should be 0V.
C	**Live**	Brown colour. Current flows to the appliance. Potential difference between this and other wires should be 230V.
D	**Fuse**	A safety device consisting of a strip of wire that melts and breaks an electric circuit if the current exceeds a safe level.
E	**Cable grip**	**F** **Cable**

National grid



Definition:

A series of **cables** and **transformers** linking power stations to consumers

A	**Power station**	Non-renewable power stations burn fossil fuels to boil water, which turns a turbine and generator, transferring chemical energy to electrical.
B	**Step up transformer**	Increases the potential difference for transmission across power cables. This reduces the current and therefore less heat is lost from the cables. This makes the National Grid efficient.
C	**Step down transformer**	Reduces the potential difference from the cables to 230V for use by consumers.

Science - P1 - Energy

	Types of Energy Stores	
	Term	**Definition**
Stores	**Kinetic**	Energy stored in a moving object
	Gravitational potential	Energy stored in an object in a gravitational field.
	Internal	Energy stored in all materials; due to the motion of particles (thermal) and forces between particles (chemical).
	Elastic potential	The potential stored in a spring or something stretchy that will spring back after being released
	Nuclear	Energy stored in nuclei of atoms, released through nuclear fission or fusion.
	Magnetic	The potential energy stored in a magnetic field
	Electrostatic	The energy stored when like charges are moved closer together/unlike charges are pulled
Transfers	**Mechanical**	A force moving an object through a distance
	Electrical	When an electric current flows through a device
	Heating	By conduction, convection, or radiation
	Radiation	Energy transferred by electromagnetic radiation (e.g. light)

Energy Resources

Name of Resource	Production	Advantages	Disadvantages
Coal	Burning coal heats water, producing steam which turns turbines to generate electricity	Readily available – reliable	Non-renewable, inefficient, high water use, produces greenhouse gases
Crude oil	Burned to heat water into steam to turn turbines to generate electricity	High energy density, vast quantity of other products also made from oil	Produces greenhouse gases, non-renewable, expensive
Natural Gas	Piped to consumer and burned on site	Energy efficient, less greenhouse gases than coal	Non-renewable, not available everywhere, limited applications
Solar	Energy converted to electricity using photosynthetic cells	Abundant, free, renewable, no greenhouse gas	Not yet available everywhere, expensive to set up – unreliable
Tidal/Wave	Waves power turbines which generate electricity	Readily available, renewable, close to cities	Difficult and expensive to harness wave power effectively – unreliable
Wind	Wind causes turbines to turn, which generate electricity	Free, clean, no greenhouse gas emissions	Expensive to set up, can endanger birds - unreliable
Hydroelectric	Running water turns turbines to generate electricity	Renewable, readily available	Set-up generate greenhouse gases and damages environment
Biofuel	Plant matter burned to power electricity generators	Potentially renewable, recycles agricultural waste – reliable	Cultivation and burning of fuel can yield low level pollutants

Energy Stores and Systems

System	Energy Transfer
An object projected upwards 	**Kinetic** energy decreases. **Gravitational potential** increases
A moving object hitting an obstacle 	**Kinetic** energy **transferred** to the obstacle. (Sound, heat, deformation of the object)
A vehicle slows down 	**Kinetic** energy decreases as it is **transferred** to internal energy (**thermal**) e.g. in brakes.
Water boiling in an electric kettle 	Waters internal energy increases as energy is transferred from electrical energy

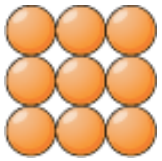
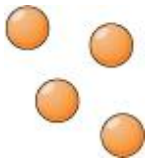
Unwanted energy transfers

Energy transfers can be reduced through lubrication and the use of thermal insulation.

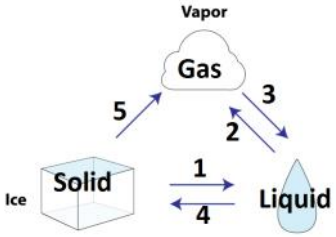
Key Term	Definition
Renewable	A resource which can be replenished as it is being used
Non-renewable	A resource that will run out, as it is being used at a greater rate than it can be replaced

Science - P1 - Particle Model

Particle model

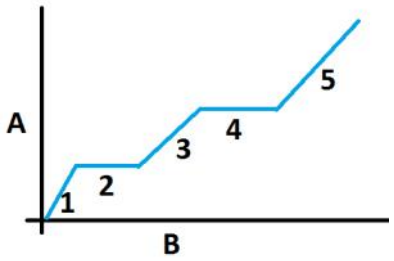
			
Organisation (Pattern)	Regular pattern	No pattern, random arrangement	No pattern, random arrangement
Spacing (Touching?)	All touching, close together	Close together but may still be touching	Wide spaces between, far apart
Motion (Movement of molecules)	Vibrate in a fixed position	Move and slide around each other	Move quickly in all directions

1. Melt
2. Boil
3. Condense
4. Freeze
5. Sublimate



1. Solid
2. Melting
3. Liquid
4.Boiling
5. Gas

A. Temp.
B. Heat absorbed

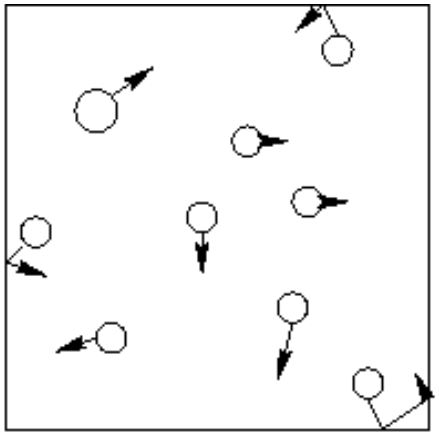


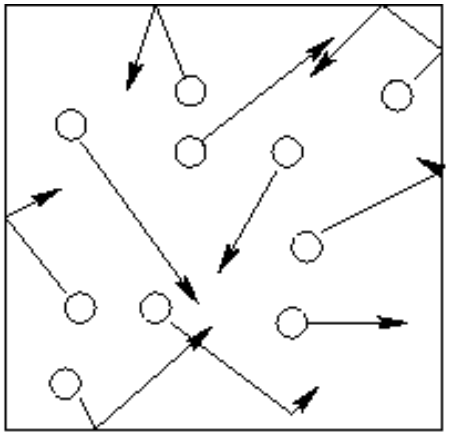
Key Terms

Term	Definition
Internal energy	The total kinetic energy and potential energy of all the particles (atoms and molecules) that make up a system
Changes of state	Physical changes, the material recovers its original properties if the change is reversed
specific heat capacity	The amount of energy required to raise the temperature of one kilogram of the substance by one degree Celsius
specific latent heat	The amount of energy required to change the state of one kilogram of the substance with no change in temperature
Specific latent heat of fusion	Change of state between solid and liquid
Specific latent heat of vaporisation	Change of state between liquid and gas / vapour
Pressure	Pressure is caused by the force exerted by particles in a gas when they collide with the walls of a container
Density	The mass per unit volume
Mass	The amount of matter

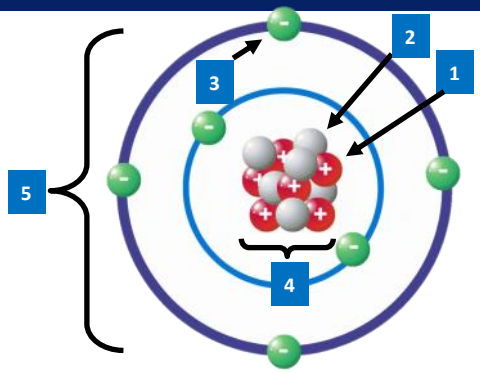
Pressure in gases

Particles in a gas are constantly moving – so they store **kinetic energy**. They collide with the walls of their container, and exert a force when they do. The total force exerted on a certain area of the wall is the **gas pressure**.





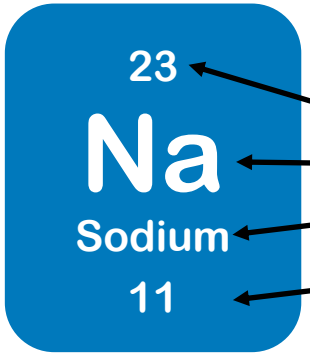
Science - P1 - Atomic structure



	Name	Relative Mass	Relative Charge
1	Proton	1	+1
2	Neutron	1	0
3	Electron	very small	-1
4	Nucleus	A	+ Z
5	Atom	A	0

Term	Definition
Atom	A neutral particle consisting of protons, neutrons and electrons. Number of protons = no. of electrons
Mass number, A	Total of number of protons and neutrons in the nucleus of an atom
Atomic number, Z	Number of protons in the nucleus of an atom; determines the identity of the element
Atomic radius	Distance from the centre of an atom's nucleus to the electrons (approx. 10^{-10}m or 0.1nm)
Nanometre	$1x10^{-9}$m = 0.001µm = 0.000 001mm = 0.000 000 001m
Nucleus	The positively charged centre of an atom made of protons and neutrons. Approximately 10 000 times smaller than the atom (approx.10^{-14}m)
Subatomic	Smaller than the size of an atom

Term	Definition
Isotopes	Atoms of the same element with the same number of protons and a different number of neutrons
Positive ion	Formed when a metal **atom loses electron**
Negative ion	Formed when a non-metal **atom gains electron**
Electron shells	Electrons, in atoms that ***absorb*** electromagnetic radiation, can 'jump' to higher energy levels (electron shells) Electrons in atoms that ***emit*** electromagnetic radiation, can fall to lower energy levels (electron shells)



		Determined by….
a	**Relative atomic mass**	mean mass of nucleus taking into account relative abundance of isotopes
b	**Element symbol**	element name
c	**Element name**	number of protons
d	**Atomic number**	number of protons

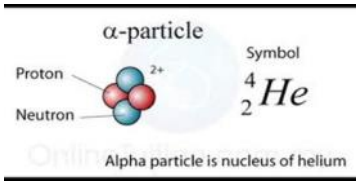
Development of the model of the atom

Model	DETAILS OF THE MODEL	EVIDENCE
Plum Pudding model	Atoms were thought to be spheres of positive charge containing scattered electrons	Discovery of the **negatively charged electron** led to the **Plum Pudding model**
The Nuclear Model	Atoms were then known to have: - a small positively charged nucleus - most of the mass concentrated in the nucleus - negatively charged electrons orbiting the nucleus	**Rutherford's alpha particle scattering** (gold leaf) (gold leaf) experiment showed positively **alpha particles deflected** significantly from **concentrated centres** of **positive charge** in atoms
(Neils Bohr's addition to the Nuclear model)	Niels Bohr predicted that electrons orbit the nucleus in specific energy levels (electron shells). This was later proven by experimental evidence.	Niels Bohr discovered that electrons can: - move **away** from the **nucleus** when they **absorb** electromagnetic radiation - move **closer** to the **nucleus** when they **emit** electromagnetic radiation
Discovery of the neutron	Later we discovered the nucleus is made from small positively charged particles called protons. James Chadwick later discovered the neutron	Experimental evidence revealed the existence of protons in the nucleus. **Chadwick** discovered **neutrons** 20 years after the discovery of the nucleus.

Science - P1 - Atomic structure (radiation)

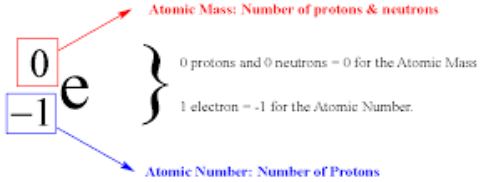
Term	Definition
Radioactive Decay	Unstable nuclei release ionising radiation to become more stable
Activity	This is the rate at which unstable nuclei decay releasing radiation
Becquerel (Bq)	The unit for measuring activity. 1Bq = 1 nucleus decay per sec
Geiger-Muller Tube	A detector used to measure radioactivity

Alpha Particle (α)



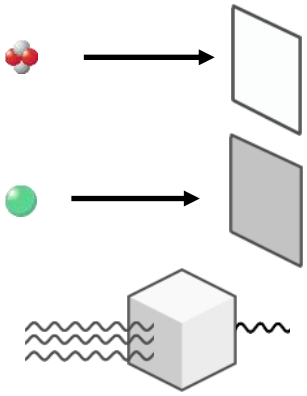
Consists of 2 neutrons and 2 protons, making it the same as a helium nucleus.

Beta Particle (β)



A high speed electron ejected from a nucleus as a neutron turns into a proton

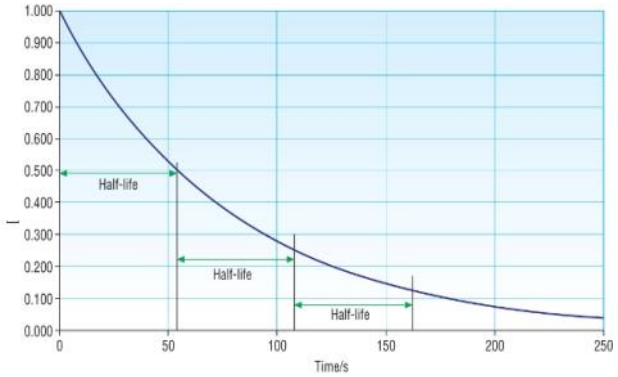
Gamma Ray (γ)	High frequency electromagnetic radiation emitted from a nucleus



α	**Alpha**	Fast moving helium nucleus stopped by skin or paper
β	**Beta**	High energy electron, stopped by aluminium plate
γ	**Gamma high energy**	Photons, stopped by dense material

CHARACTERISTIC	HIGHEST		LOWEST
Weight	**α**	**β**	γ
Ionising power	**α**	**β**	γ
Range in air	**γ**	**β**	α
Penetration	**γ**	**β**	α

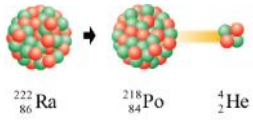
Term	Definition
Half Life (There are 2 definitions)	a) The time taken for the *number of nuclei* in a radioactive isotope to randomly decay *to half* the original number. b) The time taken for the *activity/ count rate* to *halve*.
Calculating Half Life	You need to use a graph like the one below to work out the time it takes for the radioactive count to halve



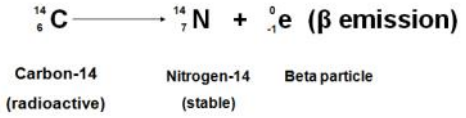
Radioactive Contamination	**a**) Radioactive contamination is the *unwanted presence of radioactive atoms* on other materials. b) The *hazard* is caused by *radioactive decay* of these atoms c) The *hazard* depends on *the type of radiation* emitted d) Suitable *precautions* must be taken against any *hazard* presented by radioactive materials
Peer Review	It is important that scientific studies that have been published into the effects of contamination, are *shared and checked* by other scientific teams.

Nuclear equations

Alpha particle decay: The original element loses '2' off the proton number and '4' off the atomic mass as it becomes a new element:

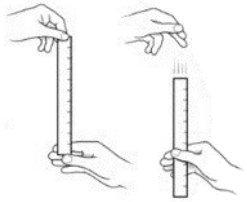


Beta particle decay:
The original element gains 1 x proton number as it decays to form new element:



Science - B2 - Homeostasis and response

Nervous system	
Term	**Definition**
Homeostasis	Regulating the internal conditions of the body (temperature, water levels, blood glucose) to maintain optimum enzyme activity
Central nervous system	Made up of brain and spinal cord
Synapse	Gap between 2 neurons. Signal passes between 2 neurons chemically as a neurotransmitter
Reflex response	Fast response that by passes the brain, to protect us from harm
Receptor	Eyes (light), skin (temperature and pressure), ears (sound), nose (smell), tongue (taste)
Effector	Muscles (contract) or gland (releases chemical)

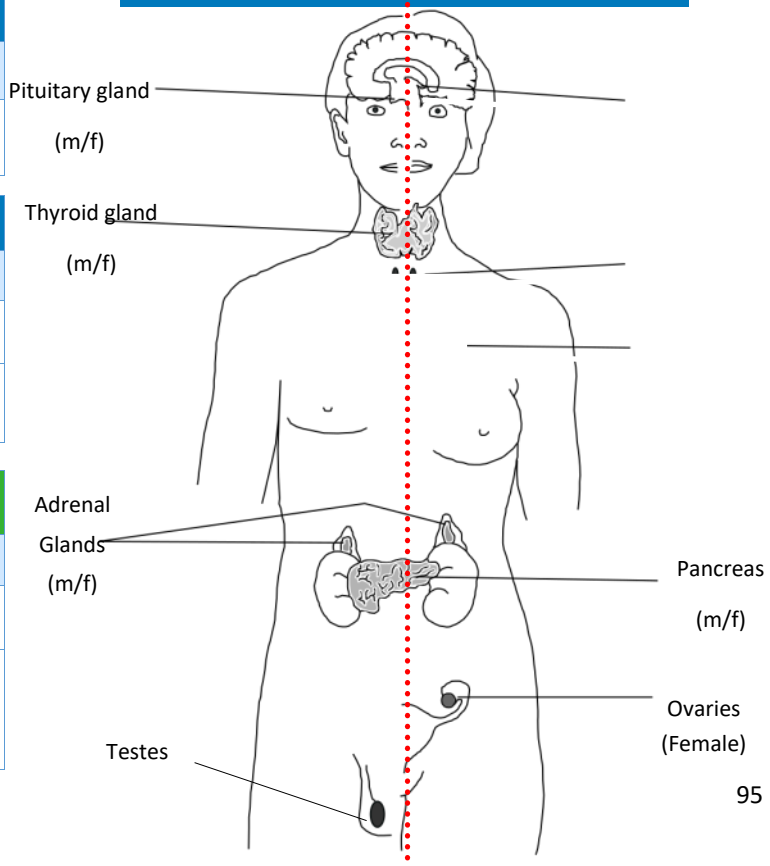
Reaction time required practical	
Term	**Definition**
Reaction time	Typically 0.2-0.9 seconds
Factors affecting reaction time	Caffeine consumption, hours of sleep, alcohol consumption, amount of practice
Ruler drop test method 	1.Person A holds out hand with a gap between thumb and finger 2.Person B holds ruler with the zero at the top of person A's thumb 3.Person B drops ruler randomly and Person A must catch it 4.The distance on the ruler level with the top of person A's thumb is recorded 5.Repeat this three times. 6.Repeat steps 1-5 after a factor has been changed 7.Use conversion table to convert ruler measurements into reaction time.

Reflex arc
Stimulus → receptor → sensory neurone → relay neurone → motor neurone → effector → response
Hot pan → pain receptors → sensory neurone → relay neurone → motor neurone → hand muscles → release pan

Endocrine system	
Term	**Definition**
Endocrine system	Hormonal system - involves glands, hormones and blood vessels
Hormones	Chemical messengers released by glands that travel in bloodstream

Negative feedback (HT only)	
Key term	**Definition**
Thyroxine	Stimulates the basal metabolic rate. Plays an important role in growth and development
Adrenaline	Produced in times of fear or stress. Increases the heart rate (more O_2 and glucose delivery to brain and muscles). Prepares you for 'flight or fight'

Major glands in body



Science - B2 - Homeostasis and response

Blood glucose

Pancreas **monitors** glucose level

If level too high, pancreas releases INSULIN

INSULIN causes uptake of glucose by cells that convert glucose to GLYGOGEN (in liver and muscles)

HT ONLY - If level too low, pancreas releases GLUCAGON

HT ONLY - GLUCAGON causes glycogen to be converted into glucose

Glucose levels return to normal

Diabetes

Type 1	Type 2
Pancreas fails to produce enough insulin	Cells can no longer respond to insulin
	Treated with carbohydrate controlled diet and exercise
Treated with insulin injections	Risk factor - obesity

Menstrual cycle

Key term	Definition
Menstruation	Uterus lining sheds
Ovulation	Egg is released from ovary
Fertilisation	Egg and sperm join

Hormone	Gland	Function
FSH	Pituitary gland	Matures the egg
Oestrogen	Ovaries	Thickens uterus lining. Inhibits FSH
LH	Pituitary gland	Releases the egg (ovulation)
Progesterone	Ovaries	Maintain uterus lining

Contraceptives

Hormonal	Non-hormonal
Oral contraceptive (the pill) – contains oestrogen to inhibit FSH and stop egg maturing	Barrier methods (condom/ diaphragm) – prevent sperm reaching egg
Skin patch, injection, implant – contains progesterone to inhibit maturation and release of egg for several months/ years	Abstaining from intercourse when egg may be in oviduct
	Surgical methods - sterilisation
	Spermicidal agents – kill/ disable sperm
Intrauterine device – prevents implantation of egg into uterus/releases hormone	

Fertility treatment (HT only)

Key term	Definition
Fertility drug	FSH/LH given to mature and release more eggs
IVF (in vitro fertilisation)	Fertility drug given → eggs collected and fertilised artificially → fertilised eggs develop into embryos → implanted into mother's uterus
Problems with IVF	• Emotionally and physically stressful • Success rates are low • Can lead to multiple births which are a risk to both the babies and the mother

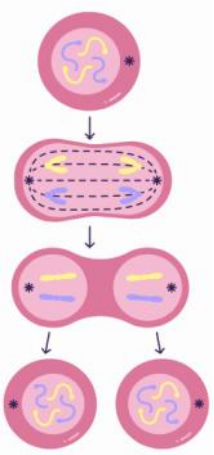
Science - B2 - Inheritance, variation and evolution

Reproduction and genetics	
Term	**Definition**
Sexual reproduction	2 parents, genetic variation in offspring
Asexual reproduction	Only one parent, produces clones (genetically identical offspring)
Gamete	Sex cell e.g. sperm/pollen and egg
DNA	Polymer, made up of two strands forming a double helix
Gene	Small section of DNA on a chromosome, that code for a particular protein
Genome	Entire genetic material of an organism
Chromosomes	Humans have 46 chromosomes in each cell, except gametes have 23 (half)
Sex chromosomes	Females – XX, males - XY

Inheritance	
Term	**Definition**
Allele	A version of a gene
Dominant	Only 1 copy of allele is needed for condition to be expressed (e.g. DD or Dd)
Recessive	2 copies of the allele are needed for condition to be expressed (e.g. ff)
Homozygous	Same alleles present (e.g. FF or ff)
Heterozygous	Different alleles present (e.g. Ff)
Genotype	The combination of alleles
Phenotype	The characteristic expressed
Polydactyly	Condition where individual has extra fingers and toes – caused by a dominant allele
Cystic fibrosis	Disorder of cell membranes – caused by recessive allele
Characteristics controlled by a single gene	Fur colour in mice, red-green colour blindness in humans

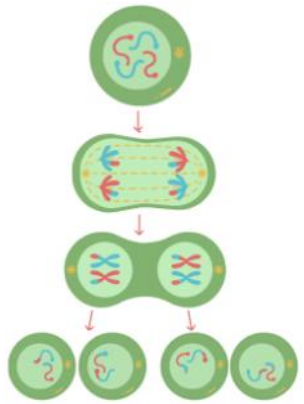
Mitosis	
Produces all body cells (except gametes)	
A	Chromosomes in nucleus are **duplicated**
B	Cell divides into two genetically identical daughter cells. Same number of chromosomes as parent cell

Meiosis	
Produces GAMETES ONLY	
A	Chromosomes are duplicated
B	The cell divides twice to form four daughter cells, each with half chromosomes of parent cell



Mitosis

Each daughter cell is identical to the parent cell



Meiosis

This results in 2N daughter cells (gametes)

Variation and evolution	
Term	**Definition**
Causes of variation	Genetics (inherited e.g. eye colour), environment (developed characteristics e.g. scar), combination (both e.g. weight)
Evolution	Theory of Charles Darwin. Caused by natural selection. All organisms have evolved from simple life forms. Started billions of years ago
Evidence for evolution	Fossil records and antibiotic resistance in bacteria
Fossil formation	• Hard parts being replaced by minerals • Parts of organism not decaying (e.g. preserved in ice) • Traces of organisms preserved (e.g. footprints)
Gaps in fossil record	Many organisms soft bodies so no fossilisation, some fossils have not been discovered yet, and some destroyed by geological activities
Opposition to evolution	Ideas not originally accepted: • Not enough evidence • Didn't know mechanism of inheritance (genes) • People believed in God
Evolutionary tree	Method used to show how scientists believe organisms are related

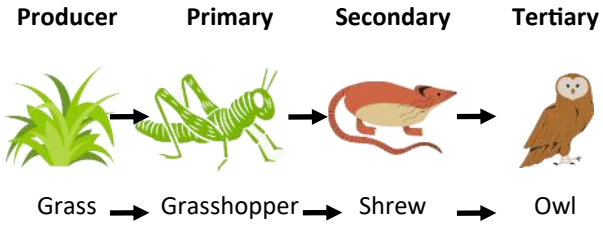
Science - B2 - Ecology

Ecosystems	
Term	**Definition**
Habitat	The area in which an organism lives.
Individual	Single organism
Population	Collection of organisms of the same species in a habitat
Community	Collection of populations in a habitat
Ecosystem	The interaction of a community of living organisms (biotic) with the non-living (abiotic) parts of the environment.
Competition	Plants compete for light, space, water and mineral ions. Animals compete for food, mates and territory.
Interdependence	Within a community each species depends on other species for food, shelter, pollination etc.
Adaptations	A feature an organism has that allows it to survive in its ecosystem.

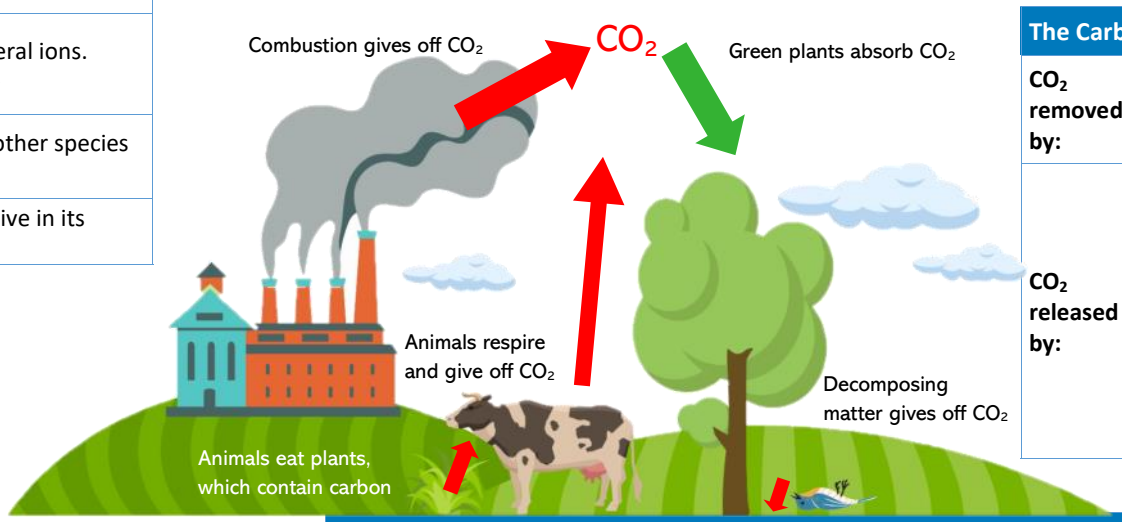
Biodiversity	
Biodiversity	The variety of all the different species of organisms in an ecosystem.
Factors that reduce biodiversity	Destruction of peat bogs, destroying habitats, releasing carbon dioxide into atmosphere (global warming), pollution, deforestation
Maintaining biodiversity	Breeding programmes, protection and regeneration of habitats, keeping hedgerows in farmers' fields, reduction of deforestation and carbon dioxide emissions, recycling rather than using landfill

Biotic and Abiotic Factors	
Biotic factors	Availability of food, new predators, new pathogens, other species outcompeting each other.
Abiotic factors	Light intensity, temperature, moisture levels, oxygen levels, wind intensity, carbon dioxide levels, soil pH.

Food chain



Pollution	
Water	From sewage, fertiliser or toxic chemicals
Air	From smoke and acidic rain
Land	Landfill and from toxic chemicals



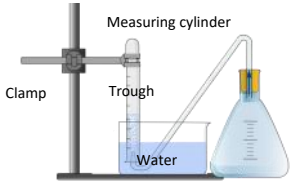
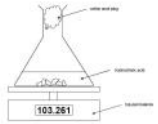
The Carbon Cycle	
CO_2 removed by:	Photosynthesis (plants)
CO_2 released by:	Respiration (plants and animals), combustion (of fossil fuels), Decay and decomposition, destruction of peat bogs

Sampling techniques

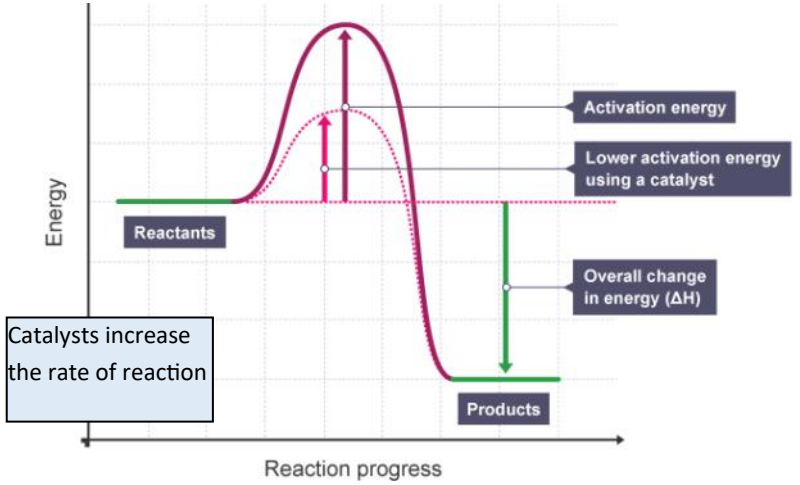
	Random sampling	Transect line
Use	• Used to count total number of organisms in an area	• Used to see pattern of organisms e.g. through a forest/across a river
Method	• Randomly place quadrat (to avoid bias) and count number of organisms. • Repeat 10 times and calculate a mean. • Work out area of field and area of quadrat. • Calculate total organisms by multiplying mean by number of quadrats that could fit in field	• Place a transect line using a 30m tape measure • Place the quadrat at 0m and count organisms. Record distance and organism number in table • Move quadrat to 5m and repeat, moving 5m each time • Plot a graph to see pattern of results

Science - C2 - Rate of Reaction

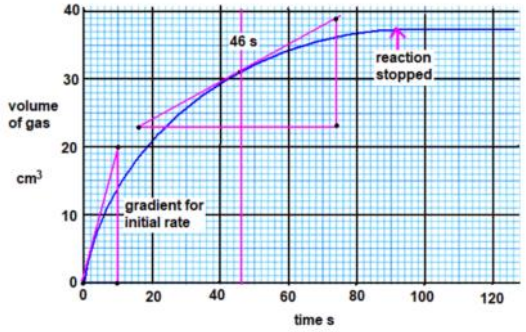
Key concepts	
Key term	**Definition**
Rate of reaction	mass/volume of product formed or used up per unit time
The rate of reaction depends on (collision theory)	1. frequency of collisions between reacting particles 2. energy transferred during successful collisions 3. activation energy – the minimum energy that particles must have to successfully collide and form bonds
Mean rate of reaction	$\frac{\text{quantity of reactant used}}{\text{time taken}}$ OR $\frac{\text{quantity of product formed}}{\text{time taken}}$
Factors affecting rate of reaction	1) concentrations of reactants in solution 2) pressure of reacting gases 3) surface area of solid reactants 4) temperature of the reactants 5) presence of catalysts

Methods		
Measure the volume of gas produced. e.g. magnesium metal & dilute hydrochloric acid produces hydrogen gas	**Timing the formation of product**, e.g. sodium thiosulfate & hydrochloric acid makes a cloudy yellow precipitate, which is turbid (opaque).	**Measure the change in mass** e.g. calcium carbonate in dilute acid will release CO_2 into air
		

The effect of changing conditions on equilibrium—Le Chatelier's principle (HT only)		
CONCENTRATION	**TEMPERATURE**	**PRESSURE**
If the concentration of a reactant is increased, more products will be formed until equilibrium is reached again.	If the temperature is increased the relative amount of products at equilibrium increases for an endothermic reaction and decreases for an exothermic reaction.	An increase in pressure causes the equilibrium position to shift towards the side of the equation with fewer molecules.



Reversible reactions (products of the reaction can react to produce the original reactants)	
$A + B \rightleftharpoons C + D$	Equilibrium is reached when the forward and reverse reactions occur at exactly the same rate in a closed system
If it is exothermic in one direction, it will be endothermic in the other direction	The direction of reversible reactions can be changed by changing the concentration



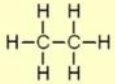
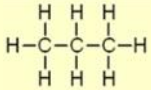
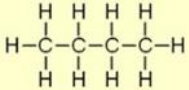
Calculate the rate of a reaction by dividing the change in quantity of reactant (or product) by time taken.
steeper gradient means faster rate of reaction.

Science - C7 - Organic Chemistry

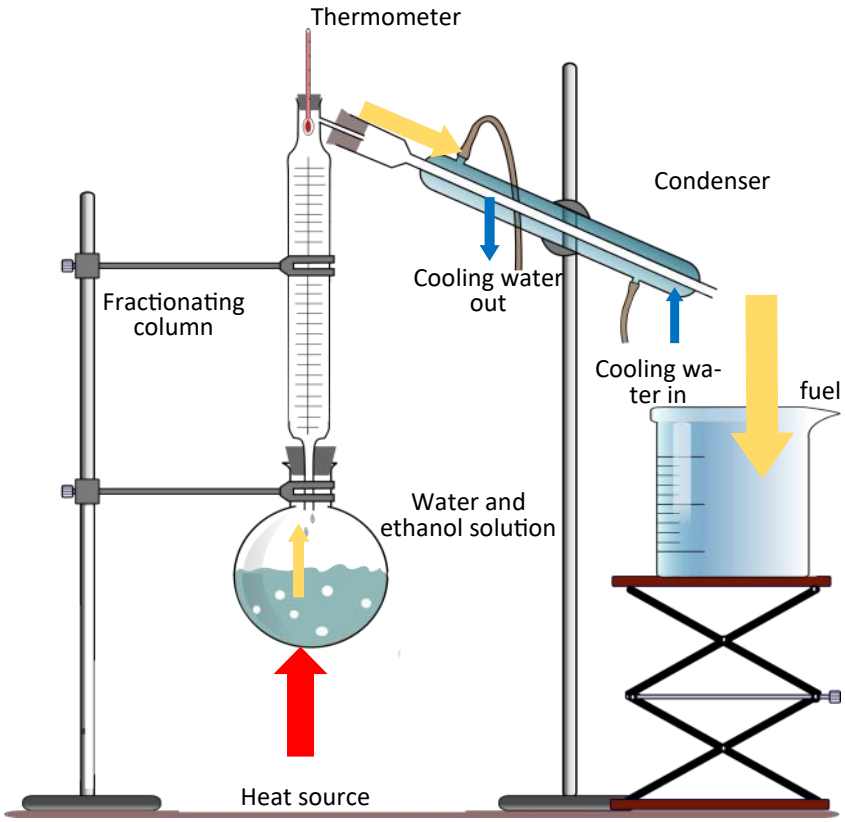
Key words	
Term	**Definition**
Crude oil	Crude oil is a mixture made up of mostly hydrocarbons from the remains of plants and animals from millions of years ago, mostly plankton
Hydrocarbon	A compound made from hydrogen and carbon atoms **only**
Fractional distillation	A process that separates crude oil into different fractions depending on its boiling point by evaporation and allowing to condense at different temperatures
Alkane	A saturated hydrocarbon, single bonds between carbon atoms (used mainly as fuels)
Alkene	An unsaturated hydrocarbon, containing a double bond between two adjacent carbon atoms (used mainly to make polymers, e.g. plastics)
Cracking	The breakdown of a long chain alkene into a shorter chain alkane and a shorter chain alkene, by using steam or a catalyst
General formula for an alkane	C_nH_2n+2

Combustion	
Complete combustion	Hydrocarbon + oxygen —> carbon dioxide + water
Incomplete combustion	Hydrocarbon + (lack of) oxygen —> carbon monoxide + carbon + water

The properties of hydrocarbons	
Property	**Definition**
Flammability	The ability of a chemical to burn or ignite
Viscosity	A measure of a fluid's resistance to flow
Boiling point	The temperature at which a liquid changes into a gas

Alkanes			
	Name	**Formula**	**Structure**
1	**Methane**	CH_4	
2	**Ethane**	C_2H_6	
3	**Propane**	C_3H_8	
4	**Butane**	C_4H_{10}	

Testing for alkanes and alkenes	
Alkanes	Bromine water will remain orange
Alkenes	Bromine water changes from orange to colourless

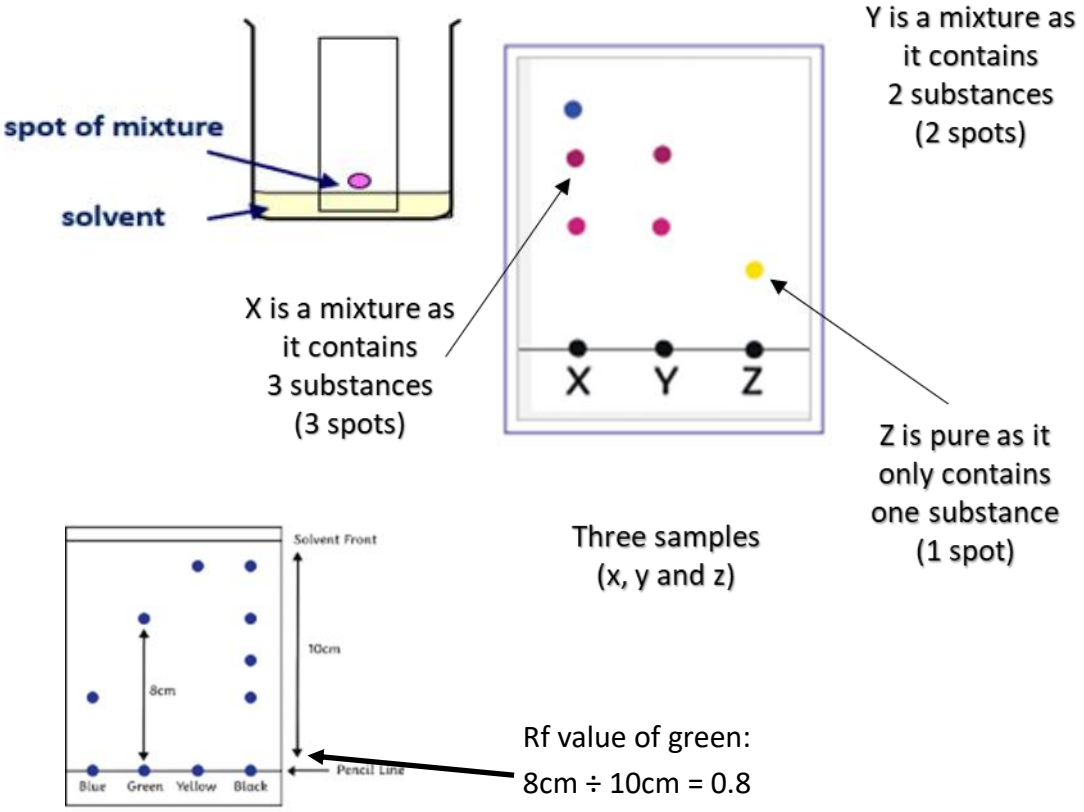


Science - C2 - Chemical Analysis

Key words	
Term	**Definition**
Pure substances	Made up of one compound or element only
Impure substances	Made up of more than one element and/or compound
Formulation	A mixture that has been designed as a useful product
Chromatography	Technique used to separate mixtures of soluble substances
Solvent	Liquid part of a solution
Solute	Solid part of a solution
Solution	A dissolved solute in a solvent
Soluble	Can dissolve in a solvent
Insoluble	Cannot dissolve in a solvent

Chromatography	
Term	**Definition**
Mobile phase	• **Solvent** is the mobile phase**.** The substances dissolve in the Solvent. • The solvent then moves through the stationary phase.
Stationary phase	• Does not move • The paper is the stationary phase
Rf Value	This is the ratio of the distance moved by a substance to the distance moved by the compound, and can be calculated using: Rf = distance travelled by the substance ÷ distance moved by the solvent
Solubility	How easy it is for a substance to dissolve. How soluble a substance is determines how far it travels across paper.

5.8.2 Gas tests	
Oxygen, O_2	Place a glowing splint inside a test tube. The splint will relight in the presence of oxygen.
Hydrogen, H_2	Place a burning splint at the opening of a test tube. If hydrogen gas is present, it will burn with a squeaky-pop sound.
Chlorine, Cl_2	Damp litmus paper is held over the of gas. If the tube contains chlorine, the litmus paper becomes bleached and turns white.
Carbon dioxide, CO_2	Bubble the gas through the lime water. If the gas is carbon dioxide, the limewater turns cloudy.



Science - C7 - Chemistry of the atmosphere

Proportions of gases in today's atmosphere (last 200 million years)

1	78% nitrogen
2	21% oxygen
3	1% other gases including carbon dioxide, water vapour and noble gases (argon most common)

The Earth's early atmosphere (from 4.6 billion years ago)

1	Intense volcanic activity released gases, mainly CO_2, that formed the early atmosphere and water vapour that condensed to form the oceans. (Atmosphere was similar to Mars and Venus today)
2	Volcanoes produced nitrogen and small proportions of methane and ammonia
3	When oceans formed, CO_2 dissolved in the water and carbonates were precipitated as sediments, reducing CO_2 in the atmosphere.

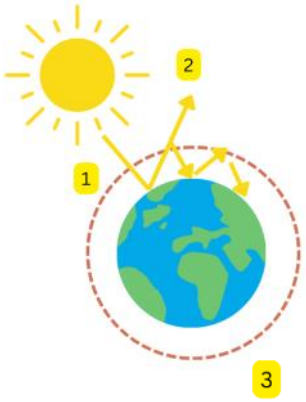
How oxygen increased

1	Algae and plants produced the oxygen that is now in the atmosphere by photosynthesis.
2	$6\ CO_2 + 6\ H_2O \longrightarrow C_6H_{12}O_6 + 6\ O_2$ Carbon dioxide + water —> glucose + oxygen
3	Algae first produced oxygen about 2.7 billion years ago; oxygen levels have gradually increased to a level that allowed animals to evolve.

How carbon dioxide decreased

1	Algae and plants decreased the percentage of carbon dioxide in the atmosphere by photosynthesis
2	Carbon dioxide was also decreased by the formation of sedimentary rocks, such as limestone, and fossil fuels, such as coal oil and natural gas, that contain carbon.

Enhanced greenhouse effect



1	Short wave electromagnetic (EM) radiation from the sun, penetrates the atmosphere
2	Earth absorbs energy and re-emits longer wave EM radiation (infra-red)
3	Greenhouse gases in the atmosphere absorb EM radiation
4	Atmosphere maintains more heat; temperature remains higher than it would otherwise be

Global climate change

Increasing global temperature is **causing** climate change.

Effects of climate change include:
Melting ice caps
Rising sea levels
More severe storms
Disruption to migrations patterns

Carbon footprint

Carbon footprint	Total amount of carbon dioxide and other greenhouse gases emitted over the full life cycle of a product service or event
How to reduce carbon footprint	An individual's impact on carbon footprint may be limited to cutting their own use of fossil fuels

Common atmospheric pollutants and their sources

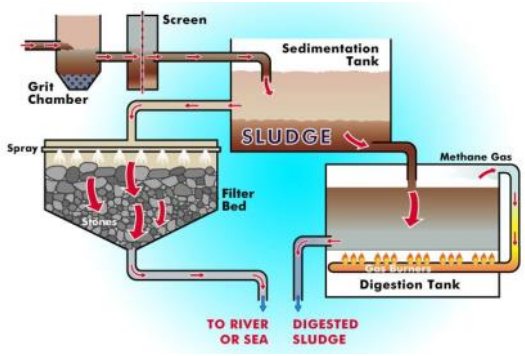
Pollutant	Source	Effect
Carbon monoxide (CO)	Incomplete combustion of fossil fuels (colourless and odourless)	TOXIC: Carried in the blood instead of oxygen
Sulfur dioxide and oxides of nitrogen (SO_2 / NO_x)	Fossil fuels and the internal combustion engine	Acidic gases: respiratory problems and acid rain.
Particulates	Unburned hydrocarbons and other solids (soot)	Global dimming and health problems for humans.

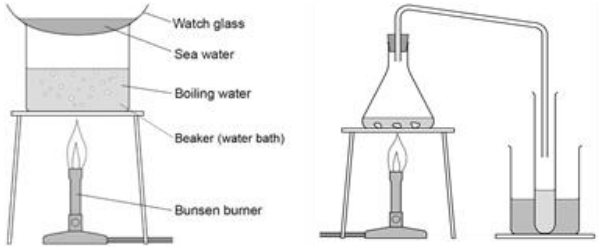
Carbon Dioxide and Methane as Greenhouse Gases

Greenhouse gases	Carbon dioxide (CO_2), methane (CH_4), water vapour (H_2O)
Human activities increasing greenhouse gases	Combustion of fossil fuels, livestock, farming

Science - C7 - Using resources

Earth resources	
Natural resources are sources of…	Food, building material (timber), clothing and fuel for warmth
Sustainable	Development that meets the needs of current generations without
Finite	Will eventually run out
Potable water	Water that is safe to drink (Sufficiently low levels of dissolved salts and microbes)
HT only – alternative methods of extracting metals	
Phytomining	Plants to absorb metal compounds. The plants are harvested and
Bioloeaching	Bacteria oxidise metals to produce metal ions; metal compounds now present in leachate solutions
Displacement	Using waste iron to displace copper from its compounds
Electrolysis	Using an electric current to separate ions from solution

Waste water treatment	
1) **Screening** and **grit removal** 2) **Sedimentation to produce sewage sludge** (solid settles out) and effluent (liquid part at the top) 3) **Anaerobic digestion of sewage sludge** (microbes do not need oxygen) 4) **Aerobic biological treatment of effluent** (microbes breaking down liquid waste)	
Sewage and waste water	Requires treatment before being released into the environment (see 4 stages above)
Sewage and agricultural waste	Requires removal of organic matter and microbes
Industrial waste water	Requires removal of organic matter and harmful chemicals

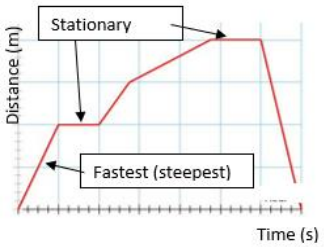
Potable water	
Potable water	Water that is safe to drink (sufficiently low levels of dissolved salts and microbes)
Most potable water is produced by…	1) choosing an appropriate source of fresh water 2) passing the water through filter beds 3) sterilising (killing microbes using; ozone, chlorine, or UV light)
Desalination is used when freshwater is limited, and only salty (e.g. sea) water is available.	Distillation or reverse osmosis; both require large amounts of energy
REQUIRED PRACTICAL: Investigate three water samples from different sources for pH and the presence of dissolved solids; using distillation/evaporation, measuring mass before and after evaporation to detect dissolved solids.	

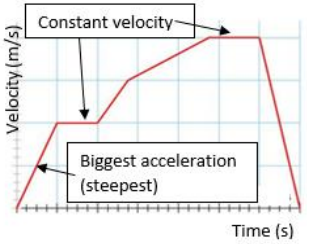
Life Cycle Assessments	
Life cycle assessments (LCA)	Carried out to assess the environmental impact of a product at all stages of its development
Stages of a product's life (all to be assessed for their environmental impact)	• Extracting and processing raw materials • Manufacturing and packaging • Use and operation during its lifetime • Disposal at the end of its useful life • Transportation and distribution at each stage
Limited raw materials produce…	Metals, glass, building materials, clay ceramics and most plastics, and the energy required to make them
Ways of reducing the use of resources	• Recycling, re-using, reducing use, e.g. glass bottles • Scrap iron added to a blast furnace to reduce extraction of iron ore

Science - P2 - Forces and motion

Forces and motion	
Key term	**Definition**
Scalar	A scalar quantity has a magnitude (size) only
Vector	A vector quantity has both a magnitude (size) and a direction
Contact force	A force caused by objects physically touching each other
Non-contact force	Forces where the objects are separated, they do not need to be physically touching.
Resultant force	Result of forces interacting (sum or difference)
Weight	The force acting on an object due to gravity (caused by Earth's gravitational field)
Centre of mass	Point at which an object's weight is considered to act
Newton-metre	Device to measure weight in Newtons (N)
Free fall	Acceleration when free falling = 9.8 ms/^{2}
Terminal velocity	When air resistance and weight are equal, no resultant force acts so object reaches a constant velocity

Momentum	
Conservation of momentum	Momentum before and after a collision/ explosion is the same





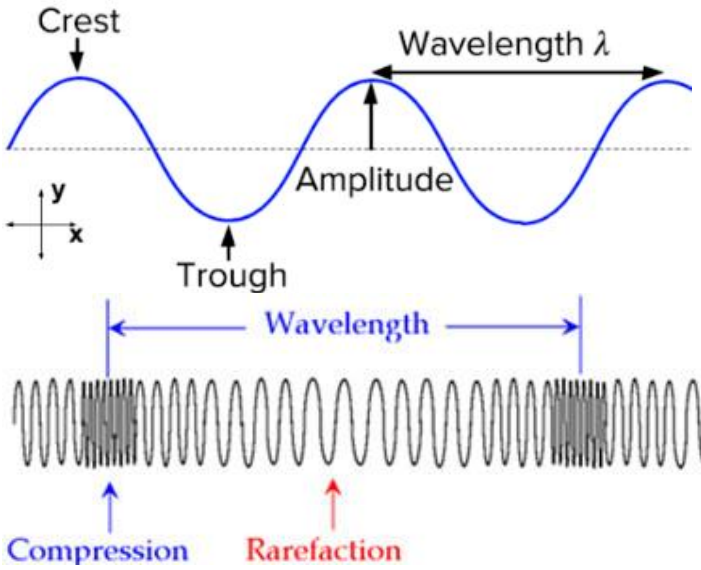
Newton's Laws of Motion	
First Law	If no resultant force is acting on an object, it will continue to move at same speed in same direction
HT ONLY – Inertia	The tendency of objects to continue in their state of rest or of uniform motion
Second law	Force = mass x acceleration
HT ONLY – Inertial mass	A measure of how difficult it is to change the velocity of an object ($interial\ mass = \frac{Force}{acceleration}$)
Third law	For a pair of interacting objects, the forces they exert on each other are equal but opposite
~	Approximately equal symbol

Speed	
Walking	1.5 m/s
Running	3 m/s
Cycling	6 m/s
Speed of sound	330 m/s
Speed of light	300,000,000 m/s (300 million)
Factors affecting speed	Age, terrain, fitness and distance travelled

Stopping distance	
Stopping distance	The sum of the distance travelled during the reaction time plus the distance travelled under the braking force (Thinking distance + braking distance)
Reaction time	Typically 0.2 to 0.9s
Factors that affect thinking distance	Speed, tiredness, drugs and alcohol. Distractions may also affect a driver's ability to react
Factors that affect braking distance	Speed, adverse road and weather conditions (wet/ icy) and poor condition of the vehicle (worn brakes/ tyres)
Dangers	Rapid deceleration can lead to overheating of brakes and/or loss of vehicle control

Science - P2 - Waves

Describing waves	
Term	**Definition**
Amplitude	distance from rest position to maximum displacement
Wavelength	The distance from a point to the same point on the next wave
Frequency	The number of waves passing a point per second. Unit: Hz
Period	The time for one wave to pass a given point
Oscillation	Movement back and forth
Wave	Transfer of energy with no transfer of matter
Transverse wave	Oscillations perpendicular to direction of energy transfer (e.g. EM wave, ripples on water)
Longitudinal wave	Oscillations are parallel to direction of energy transfer (e.g. sound). Show areas of compression and rarefaction (spread out)



Transverse

Longitudinal

Electromagnetic (EM) spectrum

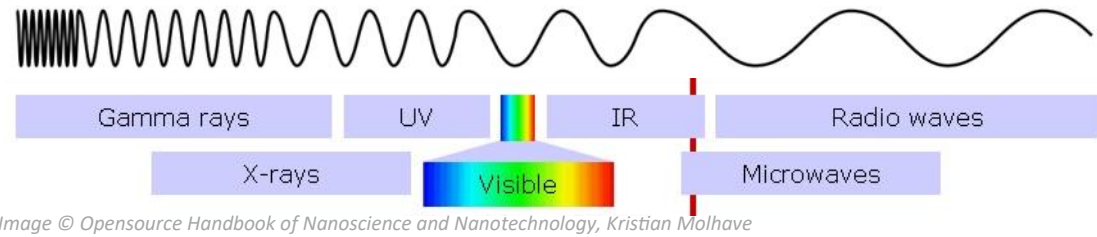


Image © Opensource Handbook of Nanoscience and Nanotechnology, Kristian Molhave

Short wavelength
High frequency
High energy

Long wavelength
Low frequency
Low energy

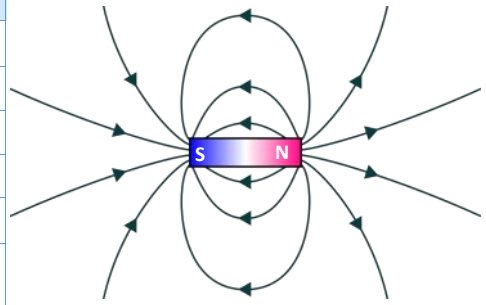
Properties of EM Waves and Sound Waves		
Property	**EM Wave**	**Sound Wave**
Speed	300,000,000 m/s	330 m/s in air
Medium it can travel through	Can travel through anything, even a vacuum (space)	Solids, liquids, gases
Type of wave	Transverse	Longitudinal
Risk	UV, x-rays and gamma rays are ionising (damage cells)	Hearing damage

Uses and Risks of EM Radiation		
EM Wave	**Use**	**Why it's suitable (HT ONLY)**
Radio Waves	Television and radio	Reflected by ionosphere so can broadcast over long distances
Microwaves	Satellite communications, cooking food	Able to pass through the atmosphere to satellites. Has a heating effect
Infrared	Electrical heaters, cooking food, infrared cameras	Has a heating effect. Emitted by objects so can be detected
Visible Light	Fibre optic communications	Able to pass along a cable by total internal reflection
Ultraviolet	Energy efficient lamps, sun tanning	Increases amount of melanin (brown pigment) in skin
X-Rays	Medical imaging and treatments	Absorbed by bone but transmitted through soft tissue
Gamma Rays	Medical imaging and treatments	Able to pass out of body and be detected by gamma cameras. Can kill cancerous cells

Science - P2 - Magnets and Electromagnets

Magnets	
Term	**Definition**
Magnetic field	Where magnetic force is experienced. Always goes N to S
Poles	The ends of a magnet, where magnetic force is strongest
Repulsion	Force between two like poles (N to N or S to S)
Attraction	Force between two unlike poles (N to S)
Permanent magnet	Produces its own magnetic field
Induced magnet	A material that becomes magnetic when placed in a magnetic field. Temporary magnet. Cannot be repelled
Magnetic materials	Iron (steel), cobalt and nickel

Field around bar magnet



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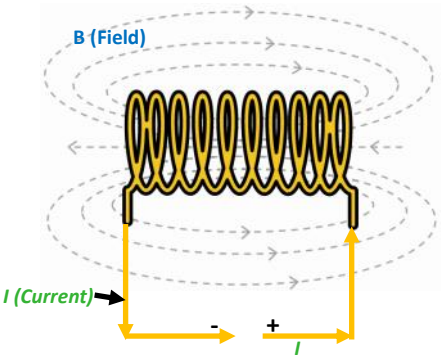
Field around solenoid



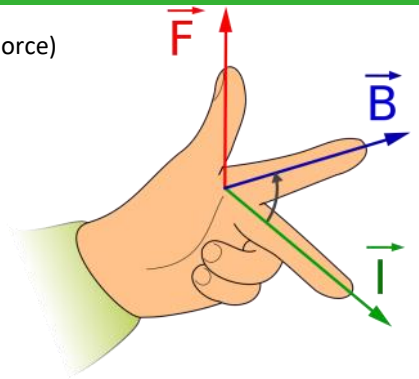
Electromagnets	
Term	**Definition**
Electromagnet	Created by a flow of charge through a wire (current flows + to -)
Solenoid	Coil of wire. Magnetic field similar to bar magnet
Increasing strength	3 C's: Coil the wire, or add more coils Increase the current Add an iron core

HT ONLY - Motors	
Term	**Definition**
Motor effect	When a wire carrying a current is placed in a magnetic field, the field interact causing a force to be exerted
Electric motor	A coil of wire carrying a current in a magnetic field rotating
Fleming's left hand rule	Used to determine direction of rotation of motor

HT ONLY - Fleming's Left Hand Rule

Motion (Force)

(ThuMb)



Magnetic Field

(First finger)

Current

(seCond finger)

Im-

Notes

Notes

Notes

Prefix	General meaning	Examples
Agri	Land	Agriculture
Audi	To hear	Audible, auditorium
Bi	Two	Bicycle, bilateral
Bio	Life	Biology, biodiversity
Broncho	Relating to breathing	Bronchitis
Cent	Hundred	Century, centipede
Chrono	Time	Chronology, chronicle
Co/con/com/col	With, together	Congregation, communication
Contra/contro, counter	Against/opposite	Controversial, contradiction, counterbalance
Demo	People/nation	Democracy
Di	Two	Diverge
Eco	Home	Ecosystem, ecology
Em, en, endo	In	Empower, encourage, endothermic
Homo	Same	Homophone, homogenous, homosexual
Hydro	Water	Hydroelectricity, hydrotherapy
Cardio	Heart	Cardiology, cardiac, cardiovascular
Chroma	Colour	Chromatography, chromosome
Dec	Ten	December, decade, decimal
Demi, hemi, semi	Half	Demigod, hemisphere, semicircle
Omni	All/every	Omnipresent, Omnipotent, Omniscient
Phone/phono	Sound	Phonological, Homophone
Photo	Light	Photograph, Photosynthesis
Sept/hept	Seven	Heptagon, September
Hex	Six	Hexagon, Hexapod
Dict	Talk	Dictation, contradiction
Nate	Birth	National, native
Spir	To breathe	Respiration, transpiration
Terra	Earth	Terrestrial, Mediterranean
Therm	Heat	Thermometer, geothermal

Command words	Word types	Connectives
Describe	Verb	Firstly
Analyse	Adverb	Secondly
Explain	Noun	Finally
Identify	Proper noun	Similarly
Evaluate	Adjective	However
Discuss		Whereas
Justify		On the other hand
Define		But
To what extent		For
Infer		So
Calculate		No
Suggest		Yet
State		Also