Knowledge Organiser
Year 11

Term 2

Name _____

Tutor Group _____

This document is part of your compulsory equipment and must be taken to every lesson (with the exception of practical PE).

Table of contents

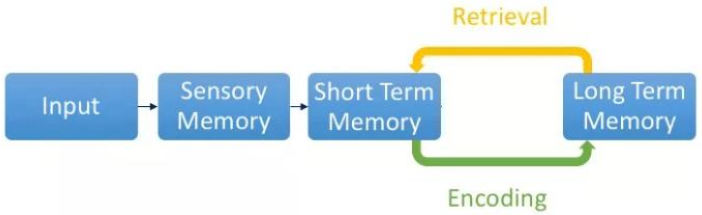
What is a Knowledge Organiser?

Your knowledge organiser summarises all the key facts and knowledge that you will need to have learned on a particular subject onto one side of A4. This information might include,

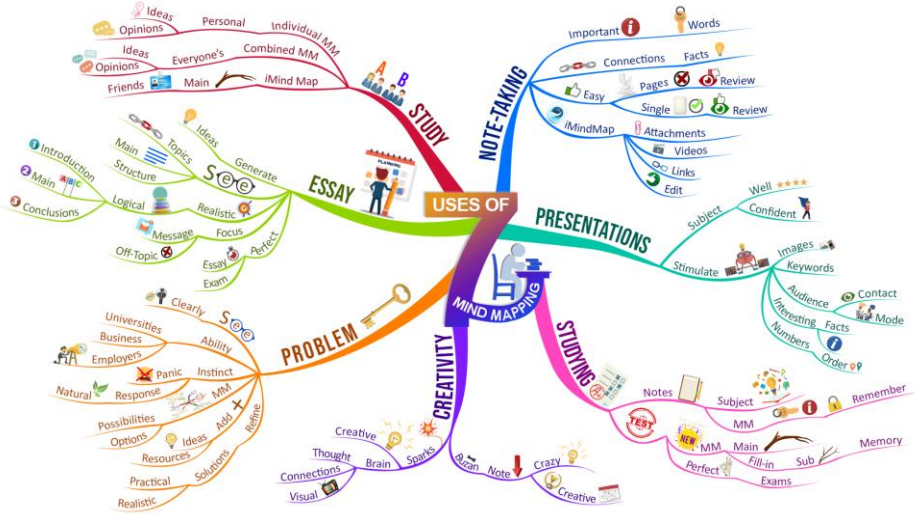
- key vocabulary
- key places and people
- useful diagrams
- key dates for a subject like history
- key themes
- important quotes
- stem sentences for a subject like Maths

How can you use your Knowledge Organiser most effectively?

1. Use it as a **checklist** to make sure you have notes and resources in your books or folders on each area. If you have a gap, talk to your teacher.



2. Use it to help get the information and knowledge into your **long-term memory**. Just reading over the pages does not help. You will need to put your knowledge organiser away and see how much you can remember. You could get a family member or carer to help test you on what you have remembered.



3. Knowledge organisers have already broken the knowledge down into chunks for you so they can be used to create **flashcards, revision posters or mind maps.**

4. Use your knowledge organiser **to get ahead on a topic**. Reading about what you are going to study and looking up any new or difficult words means that you are better prepared for your learning in the next lesson.

5. It is best to use your knowledge organiser for **short periods of time but regularly.** Choose a small part of a topic and practice writing it out with your organiser closed every day for 10 minutes.

THE KING SOLOMON STANDARD

Come to class fully prepared with correct equipment (Black / Blue Pen, pencil, glue stick, scissors, ruler, calculator, protractor and compass, exercise / text books). Form Tutors will check your equipment on a regular basis.

Presentation

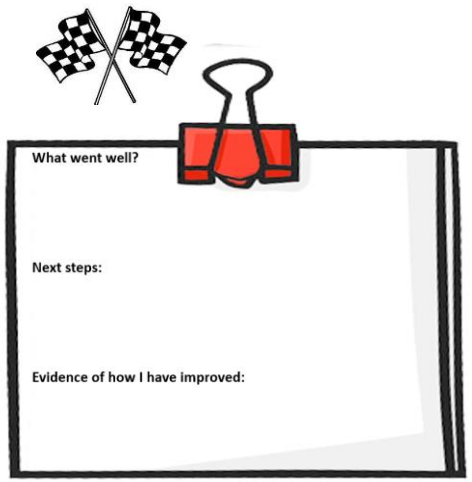
- Students write in black or blue inked pen only unless allowed by teachers to use another colour.
- Students ensure that all work has a Title and Hebrew and English dates, which are all underlined.
- Students take care of their exercise books and folders. There is no graffiti in, or on, books. All books must be covered and labelled clearly.
- Worksheets and Pit Stops slips must be stuck in or stapled.
- Pages must not be torn out of books.
- Work will be returned if it represents a significant lack of effort and students will be expected to resubmit the work.
- **PEEL** paragraphs must be labelled clearly and easy to spot.

Literacy marking symbols

Your teachers will be using the symbols below to mark your work.

S	Spelling mistake.
P	Punctuation mistake – either punctuation has been omitted, or has been used incorrectly.
??	Does not make sense/is not clear.
//	Start a new paragraph.
^	A word or sentence is missing.
C	Capital letter is needed.
DW	Choose a different word.

- *Correct all your class work and homework errors using a different coloured pen.*
- C3B4ME (See three before me; i.e. first try independently, check your class notes/resources or ask one of your peers before you ask your teacher ☺).



How to complete my Pit Stop slips

What went well….

Completed by your teacher or by you after receiving some guidance from your teacher.

Next steps….

Completed by your teacher or by you after receiving some guidance from your teacher.

Evidence of how I have improved:

Completed by student stating clearly where the work can be found. This is not a promise of what you will do but a clear indication of where to find the work of what you have done already in order to improve and following the advice from next steps.

THE PEEL PARAGRAPH

PEEL

***Point*: Your argument in one line.**

I think that ….. It is clear that…… In my opinion ….. The point is that….

***Evidence*: Reasons or evidence that back your argument up.**

This is because …… This is evidenced by ….. For instance ….. We can see that...

***Explanation*: Explain how your reasons or evidence prove your point.**

Therefore, this proves that….. because …… This shows that ….. This demonstrates…..

***Link*: Mini conclusion answering the question.**

In conclusion …… Overall …… To conclude ….. Finally…… To summarise…

How can I improve my writing?

Point

- I have included a point in my paragraph.
- The reader will be able to understand my entire argument just by reading the point.

Evidence

- My paragraph has at least two pieces of evidence.
- My evidence is in full sentences, carefully chosen and clearly helps prove my argument.
- My evidence is specific and detailed (includes quotes/facts/names/events/key words).

Explanation

- I explain how my evidence proves that my argument is right.
- My explanation is at least two or three sentences long.
- I have added some balance to my argument and shown how there may be other reasons or arguments to the question.
- I have explained why my answer is the right one rather than any of the other reasons, ideas or arguments.

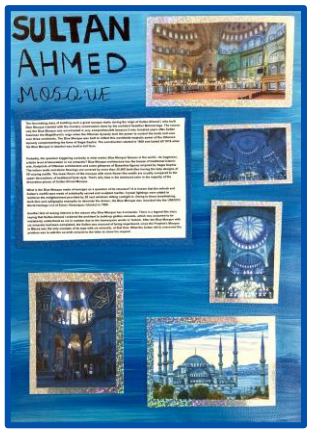
Link

- I have included a link sentence in my paragraph.
- My link sums up my argument.
- My link uses the information I have used in my paragraph.

YEAR 11 - SPRING 1 AND 2/SUMMER 1

EXAM (40%)

- Title set by Edexcel and released January 1.
- Research period from January 1st - May , where students explore the set theme, covering the four Assessment Objectives.



1. **AO1**: Develop ideas through investigations, demonstrating critical understanding of sources.

2. **AO2**: Refine work by exploring ideas, selecting and experimenting with appropriate media, materials, techniques and processes.

3. **AO3**: Record ideas, observations and insights relevant to intentions and demonstrates understanding of visual language.

4. **AO4**: Present a personal and meaningful response that realises intentions and demonstrates understanding of visual language.

Design and technology - Materials and their properties – Paper & Boards

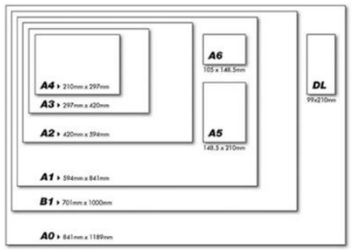
What you need to know:

- Know the primary sources of materials for producing papers & boards
- Be able to identify a range of papers & boards.
- Understand their properties and the functions they provide and how they are used?

Papers and boards are used for a variety of purposes from writing, drawing, packaging and model making. They are made from cellulose fibres found in wood or grasses which are all renewable.

Paper & boards can be plain, textured and can be laminated with other materials like plastic to make them waterproof.

Paper and board is measured is sizes from A0 to A6 and in weight by grams per square metres (gsm). Boards (card or cardboard) are always greater the 200gsm



Processing paper & card:

This involves turning raw materials into usable products. In the case of paper, the raw material is usually **wood**.

In the first stage of paper manufacture, the wood is mashed up to make **wood pulp**.

This is done in one of two ways.

By machine

The wood is physically ground up. Paper made from machined pulp is weaker and turns yellow over time. It is used for newspapers.

By chemicals

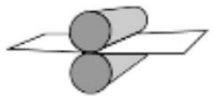
Wood chips are mixed with chemicals that dissolve the bonds between the fibres. Chemical pulp is used for writing and printing paper.

The wood pulp is then bleached to make it white, and fed into a **Fourdrinier** machine. This machine makes the pulp into paper.

1. Firstly, dyes and other chemicals are added to the pulp.

2. The pulp is then spread onto a moving wire mesh conveyer belt.

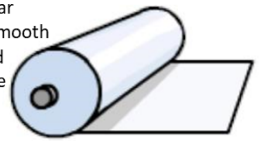
3. The mesh passes through a series of **metal rollers**.



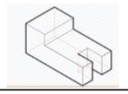
The first rollers squeeze out the water.

The second rollers are heated to dry the paper.

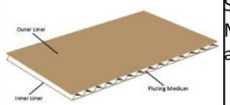
4. The calendar rollers then smooth the paper and determine the thickness.



Types of papers

Papera	Example	Properties	Uses
Bleed proof		A smooth paper often used with water and marker pens which prevents bleed (e.g. when ink runs through the paper).	Presentation drawings
Cartridge paper		Good quality white paper with a slight texture.	Can be used for paints, markers and drawings
Grid		Paper printed with grids as guideline for drawing (e.g. isometric).	Quick model 3D drawings
Layout		Strong and lightweight	Initial sketching and tracing
Tracing		Fluted plastic – light, strong weather resistant material	Tracing copies of drawings

Types of boards

Boards	Example	Properties	Uses
Corrugated card		Strong lightweight material Made from two or more layers and has a fluted middle	Packaging such as pizza boxes, large boxes that are used to protect heavy items
Duplex board		Thin board that often has one side printed. This board can also be coated with wax so it can be used with food and drink	Packaging
Foil lined board		Board covered with one side of aluminum foil making it a good insulator	Packaging such a takeaway and ready meal packaging.
Foam core board		Two pieces of board with a foam core to increase the thickness but retain its light weight property.	Model making such as architectural models.
Solid white board		High quality cardboard, smooth on both sides which makes it good for printing.	Book covers, cards and packaging.

Selecting Papers & Boards

The type of paper & board used to make a product depends on the following factors:

- ❑ Aesthetics
- ❑ Size of product
- ❑ Where and how the product will be used?
- ❑ Stability
- ❑ Cost
- ❑ Size
- ❑ Weight
- ❑ Finish required
- ❑ Lifetime of the product
- ❑ Desired properties.

Sustainability

The UK use over 12 million tonnes of paper each year and it takes approximately 25 trees to make one tonne of paper. Trees take in Carbon Dioxide (CO^2) and produces oxygen but it takes a lot of energy to cut them down and make paper.

An alternative is to recycle paper and this is becoming more common as this uses between 40% to 70% less energy to produce.

Design and technology - Materials and their properties– Timbers & Manufactured Boards

What you need to know:

- Know the primary sources of materials for producing papers & boards
- Be able to identify a range of natural timbers & manufactured boards.
- Understand their properties and the functions they provide and how they are used?

Natural Timbers

Hardwood

Hardwoods are usually obtained from **deciduous** trees, which lose their leaves in autumn.

- usually grow in warmer more humid climates, mainly in South America and Asia
- grow slowly (80+ years)
- are more difficult to sustain than softwoods
- are more expensive than softwoods
- are strong and hardwearing.

Softwood

Softwoods are usually obtained from **coniferous** trees, which keep their leaves in winter and are also known as evergreens. These grow quickly which makes them sustainable as they are renewable. This also makes them cheaper when compared to hardwoods.

- Usually grow in colder climates and are mainly grown in Scandinavia and Northern Europe
- Grow thin, needle-like leaves
- Grow relatively quickly (30 years)
- Are easier to sustain than hardwood trees
- Are easy to cut and shape
- Are usually cheaper than hardwoods

Manufactured Boards

Manufactured boards are made from the waste sections of felled trees – the parts which are of little use as planks. The wood is reduced to pulp, particles or thin strips and bonded together using special adhesives or resins. Manufactured boards are made as alternative to natural timber.

- Come in sheet form (usually 1.2 x 2.4m)
- Are extremely stable and of uniform thickness
- Are less expensive than laminating planks of timber
- Can be covered with veneers
- Ae available in a variety of thicknesses (3, 6, 9, 12, 15, 18, 22mm)

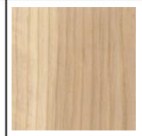
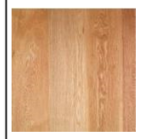
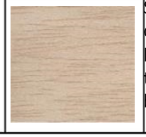
Sustainable Timber

Wood is considered to be sustainable material as trees can be grown to replace those used for timber or fuel. A big issue is in many parts of the world timber is being used faster than trees are being replanted. This causes deforestation which is seen as a key factor to global warming.

To regulate this The Forest Stewardship Council (FSC) are dedicated to ensuring that timber supplies are regulated and sustainably harvested.

FSC®

Types of Hardwoods

	Example	Properties	Uses
Ash		Tough and flexible, wide grained, shock resistant and finishes well	Sports equipment, hand tools and ladders
Beech		Strong, dense close grain but is prone to warping and splitting	Furniture, children's toys, bench tops
Mahogany		Strong and durable, easy to work with finishes well.	High end furniture
Oak		Strong and lightweight	Flooring, furniture and timber framed buildings
Balsa		Strong and durable but very lightweight. If too thin can snap & break.	Model making, floats and rafts

	Example	Properties	Uses
Medium Density Fibreboard (MDF)		This compressed board is rigid and stable and is easy to work with. It has a smooth surface but it is very absorbent.	Flat pack furniture, kitchens and toys
Plywood		This is a laminated board it is stable due to its alternate layering a 90˚. It has good water resistance.	Furniture, shelving, skateboards and exterior fencing
Chipboard		This compressed board not as strong as MDF or plywood is prone to chipping	Flooring, low end furniture kitchen units & cupboards

Types of Softwoods

	Example	Properties	Uses
Larch		Tough and durable, good water resistance and finishes well	Fencing, cladding, decking, furniture
Pine		Lightweight easy to work with but can be knotty	Interior joinery and furniture and window frames.
Spruce		Easy to work with and is lightweight	Furniture, musical instruments and construction

Finishing Natural Timbers

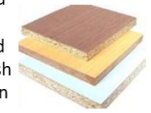
Timbers can be treated with a number of surface finishes these include Paint, Stain, Wax & Varnish. Applying these finishes can:

- Seals the wood to protect the surface from heat and water
- Enhance the grain & surface
- To colour the surface
- To give a specific aesthetic appeal.

Finishing Manufactured Boards

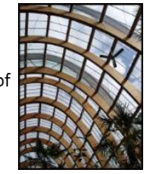
Veneer

A sharp blade cuts very thin layers wood called veneer. A layer of veneer can be glued onto less expensive manufactured board to produce a more attractive finish and imitate natural timbers but maintain the properties of a manufactured board.



Lamination

Laminating involves bonding by gluing strips of materials together in layers to create a strong structure. An example of this is wooden beams. If thinner materials are used for lamination the curves can be more complex.



Design and technology - Materials and their properties– Plastics (Polymers)

What you need to know:

Know the primary sources of materials for producing polymers

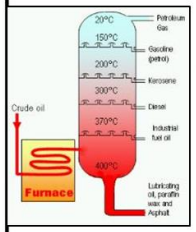
Be able to recognise and characterise different types of polymers

Understand the physical working properties for a range of thermosetting and thermoplastics.

Man made (synthetic) plastics have replaced wood and metal in the manufacture of a wide range of products. The 1st synthetic plastic was celluloid. It was made from cotton and camphor and used for table tennis balls and film.

Commercial production of plastics really started after the 2nd World War. The raw materials used were either coal or oil. They contain a number of different chemicals which can be separated into parts by a process called Fractional Distillation.

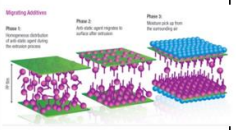
Some of the fractions contain chemicals that are small molecules (Monomers). The monomers are chemically joined together to make longer molecular 'chains' called Polymers



Plasticisers are added to make plastic bendy.

Pigments are added to change colour.

Antistatics are used to reduce static charge



Antioxidants to reduce attack by air

Flame retardants to reduce burning

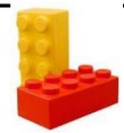
Problems of using plastics

Plastic products have a long shelf life, however it also means that they are difficult to dispose of

- Because they do not rot or corrode they are difficult to dispose of
- If burnt they produce black choking gasses
- When molten they are sticky and can cause severe burns
- Thermoplastics can be recycled by melting them down and reforming their shape, but usefulness can be become limited with frequent heating
- Plastic production itself can be polluting
- PVC contains many nasty pollutants and it is one of the most difficult plastics to recycle.

There are many different types of plastic and can be split into four groups:

THERMOPLASTICS are made from long chain polymers, joined by weak chemical bonds. When the plastic is softened by heat the bonds break making the plastic 'semi fluid' and able to be shaped. As the plastic cools, new weak bonds form and the shape will be fixed. Because no chemical reaction has taken place this process can be repeated many times, making them recyclable, however excessive heat will permanently damage the chemical structure.



THERMOSETS or thermosetting plastics are plastics which are converted into their final form by heat. Once set, they cannot be softened by further heating as they undergo a chemical change. They have strong chemical bonds that hold the long chains together. These make thermosets heat resistant but not recyclable. It is difficult to make products by extrusion or injection moulding as they harden as soon as heated. Manufacturing methods include casting, moulding and laminating.

ELASTOMERS are a type of thermoset. The bonds between the chains are 'springy' giving them a rubbery quality. Natural rubber is an example it can be vulcanised to make a rigid (ebonite). Latex is a stretchy elastomer used to make surgical gloves. Lycra is an elastomer used to make stretchy clothing.

Ebonite is an early form of plastic that was used to simulate ebony and is hard and used for bowling balls

COMPOSITES are when materials are combined to achieve specific advantages. Examples of composites are Kevlar, GRP (Glass reinforced plastic), Graphite and Carbon Fibre. These are used extensively for sporting uses e.g Bike parts, motor racing car bodies and tennis rackets.

Thermoplastics

Acrylonitrile Butadiene Styrene (ABS) is strong, tough, scratch resistant and resists heat and chemicals. It is injection moulded to make Lego bricks and is used extensively for household appliances like Kettles, vacuum cleaners and housings for cameras and telephones.

Polystyrene (PS) is used to make vending cups and model kits. It is light, transparent but quite brittle. It is vulcanised to make High Impact Polystyrene (HIPS) This is used for Vacuum forming in thin sheets, which are cheap and easy to work with. Expanded Polystyrene (EPS) is used as thermal insulation for packaging and food cartons. It is 90% air.

High Density Polythene (HDPE) is tough and can be blow moulded (bottles for bleach and shampoo) injection moulded (toys and buckets) and extruded (piping)

Low Density Polythene (LDPE) is Made into thin film (Carrier bags, wiring insulation and squeezy bottles)

Thermosetting plastics

Polyester Resins which are combined with fibreglass to produce GRP

Phenol Formaldehyde is tough and heat resistant often black in colour. (Used for saucepan handles)

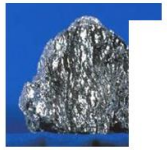
Epoxy Resins which are mixed with a hardener and left to set. They can be used to make adhesives and flooring.

Design and technology - Materials and their properties– Metals and Alloys

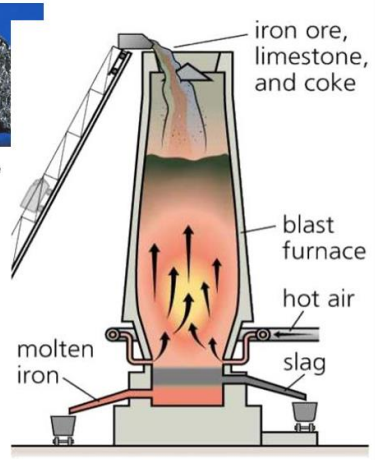
What you need to know:

- Know the primary sources of materials for producing metals and alloys
- Be able to recognise and characterise different types of metals and alloys
- Understand how the physical working properties of a range of metals and alloys affect their performance

Metal bearing rocks are called ORES, these are mined or quarried from the earth's surface. Metals are obtained from raw ores by a process called smelting. Raw ore is mixed with charcoal and other chemicals, and air is blown into a furnace. The molten metal trickles from the bottom of the furnace and this can be cast or extruded into shapes.



Iron Ore



The more the reactive the metal the higher the temperature needed to extract it from its ore. Copper needs 1100°C but iron requires 1500°C. A metal like aluminium cannot be extracted by smelting. It is dissolved in a 'cryolite solution' and electrolysed (electricity is passed through) at a temperature of around 650°C.

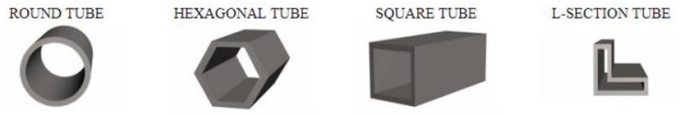
A few metals can be mined from the earth as pure metals. These include gold and some small amounts of copper and silver

Recycling Metals

Metal ores are either mined or quarried which has an environmental impact. Metal extraction from ore demands a lot of energy, a great deal of which is lost as heat to the surroundings. The high cost has meant that recycling is becoming more and more important. Today the scrap metal industry has a vital role in the provision of metals for the future. Automated disassembly lines for recycling of metal parts for cars are coming ever closer. At present vehicles are collected sorted and shredded, and then materials are collected from them.

It takes 95% less energy to recycle aluminium cans than it does to produce new cans from aluminium ore. It is possible that future cans will be made from recycled material. Stainless steel can be made from as much as 70% of recycled material. Recycled copper can be refined to be as pure as new. Copper and its alloys have a high scrap value as they are relatively easy to recycle.

SECTIONS – Solids and tubes available



Ferrous Metals:

FERROUS METALS are those which are iron based. They contain Iron and carbon in varying amounts. As iron is extracted from its ore in a furnace it contains a relatively high amount of carbon. This makes the iron hard but brittle this is known as cast iron. It resists compression but may break if dropped, hit or stretched. It is used to make car brake drums, railings and manhole covers. Cast iron has 4% carbon content.

High Carbon Steel is often referred to as Tool steel contains 0.6 - 1.5% Carbon. It is very hard and is used to make tools such as metalwork files and saw blades.

Mild Steel is very tough, can be bent or twisted and can resist strong impacts without breaking. It is easy to weld. Mild steel is used to make washing machines, construction girders, nuts and bolts and nails. It contains between 0.15 – 0.35% carbon.

Stainless Steel Contains about 1% carbon. It also contains other metals, mainly chromium. There are over 200 different types of Stainless Steel. They contain a minimum of 11% chromium and also contain nickel. Manganese is another metal often included. Stainless steel is often used for medical instruments, kitchen surfaces and pots and pans as it resists scratching and biofouling.

Wrought Iron is the most pure iron, containing few imperfections. It is difficult to cast although it makes excellent material for forge work because it is tough. It has less than 0.1% carbon. It is used for gates and railings

Non-Ferrous Metals:

NON-FERROUS METALS do not contain iron. There are many different metals that fall into this group.

Aluminium Pure aluminium is malleable and ductile but has a low tensile strength (aluminium foil). To improve strength it is usually alloyed with copper or magnesium. Because it resists corrosion it is used extensively outdoors in satellite dishes and window frames. Aluminium is very light metal and has a density a 1/3 that of copper and steel. It is a good conductor of heat and electricity. Aluminium alloys are used extensively in the aircraft industry and in motor cars. Approx 150,000 million aluminium cans are produced every year.

Lead is a metal that was once in common use for plumbing, roof flashing and car batteries. It has been replaced by copper, plastics and alloys in many cases but is still used in car batteries. Lead is a soft malleable metal. It is also an accumulative poison.

Alloys:

An **ALLOY** is a material of a mixture of metals or a metal and a non metal intermixed. Metal alloys have advantages. The alloy may contain the properties of two or more metals or other elements.

Brass is an alloy of copper and Zinc. Copper is malleable, resists corrosion and is a good conductor of electricity. Zinc is hard but brittle. Brass is used in musical instruments, Valves and in electrical plugs and sockets.

Different combinations of tin, lead and other metals are used to create solder. The combinations used depend on the desired properties. The most popular combination is 60% tin, 39% lead, and 1% alloys. This combination is strong, has a low melting range, and melts and sets quickly.

Design and technology - Materials and their properties– Textile Fibres & Fabrics

What you need to know:

- Know the primary sources of materials for textile fibres & fabrics.
- To be able to identify a range of textile fibres & fabrics.
- Understand their properties and the functions they provide and how they are used?

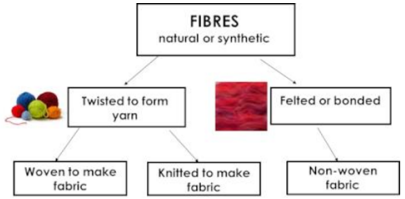
Natural fibres can come from plant or animal sources

	Origins	Example	Properties	Uses
Cotton	Cotton comes from the fine hairs on the seed pod of a cotton plant.		Soft and strong, absorbent, cool to wear and easily washable. Cotton fabrics can be given a brushed finish to increase their thermal properties	Most clothing, especially shirts, underwear and denim can be made from cotton. Also used for towels and bedsheets
Wool	Wool comes from a sheep the coat is known as fleece.		Warm and absorbent, does not crease easily and has low flammability. Has natural resilience to water, but when wet does take a long time to dry. Is difficult to Launder as it can shrink (felt).	Jumpers, coats, suits and accessories worn for warmth. Specialist wools are very soft and expensive. Felt products and carpets
Silk	Silk comes from a cocoon of the silkworm.		Very soft and fine finish, gentle on skin, can feel cool in summer yet warm in winter, drapes well, absorbent, strong when dry (weaker when wet), tricky to wash, can crease easily and is usually expensive	Luxury clothing including nightwear and underwear, soft furnishings, bed sheets, silk paintings and wall hangings

Synthetic fibres are manufactured from oil based chemicals.

	Example	Properties	Uses
Polyester		Tough, strong, hard wearing, very versatile, holds colour well, non-absorbent so quick drying, machine washes well. Often blended with other fibres. Easily coloured	Clothing, fleece garments bedsheets, carpets, wadding, rope, threads, backpacks, umbrellas and sportswear
Polyamide (Nylon)		Good strength, hard wearing, non-absorbent, machine washes well, easily and frequently blended	Clothing, ropes and webbings, parachutes and sports material. Used as a tough thread on garments
Elastane (Lycra)		Added to fabric to enhance working properties, particularly to add stretch. Allows freedom of movement, quick drying, holds colour well, machine washable	Sportswear, exercise clothing, swimsuits, hosiery, general clothing, surgical and muscular supports

Fibres are the starting point from which all fabrics are made.



Blended Fibres
This is a combination of two or more fibres spun together into a yarn.

Mixed Fibres:
This is where two or more types of yarn are used when the fabric is woven.

Reasons for blending and mixing fibres:

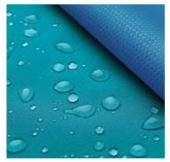
1. Improve the appearance of a fabric in terms of colour or texture.
2. Improve the quality of the fabric e.g. more durable, stronger and longer lasting.
3. Easier to wash and care for the fabric e.g. crease resistance.
4. Improve the feel (handle) of a fabric.
5. Improve the profitability of a fabric so that it is cheaper to produce and is more desirable to consumers.

Fabric Finishes

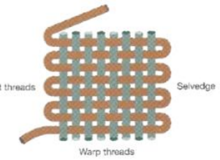
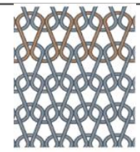
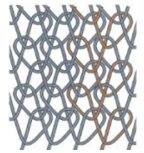
Once a fabric has been produced it often goes through a process to improve its appearance and/or properties. The main fabric finishes are:

Physical – machines are used to change the fabric
Chemical – chemicals used to change the fabric
Biological – bacteria & enzymes used on regenerated fibres
Coating – where fabrics are coated on one side

Why are fabrics finished?
To enhance: colour, pattern, lustre, texture, softer, firmer, drape, care properties, stain resistance, waterproof, flammability, colour fastness.

Types of Fabrics

Fabric	Example	Properties	Uses
Woven fabric (Plain Weave)	 Woven fabric is manufactured on a loom. Weaving is a process where two yarns the warp and the weft are woven together at right angles to each other. The warp threads run the length of the loom with the weft threads being woven across. The edge that is wrapped around is called the selvedge.	Simple and cheaper to produce than more complicated weaves, stronger than other weave patterns	Used on textiles such as cotton calicos, cheesecloth and gingham, found on table cloths, upholstery and clothing
Knitted (Weft knitted)	 Knitted fabrics are produced by hand or by knitting machines. Knitting is produced horizontally. The loops above and below interlock holding the fabric together.	Warm to wear, different knits have different properties such as stretch and shape retention. Weft knits ladder and unravel more easily than warp	Jumpers, cardigans, sportswear and underwear fabrics, socks, tights and leggings, craft items such as soft toys
Warp Knitted	 Warp knitted fabric is produced on industrial knitting machines. Warp knitting has yarns that interlock vertically along the length of the fabric. Warp knitting is an industrial process only.	Fast production system (industrial process only). The fabric has stretch but can keep its shape and is hard to unravel, less likely to ladder. Complicated manufacturing so it is more expensive than weft knitting.	Sportswear, exercise clothing, swimsuits, hosiery, general clothing, surgical and muscular supports.
Non Woven	Non-woven fabrics are made directly from fibres without the production of yarn. There are two types of non-woven fabrics:  **Bonded** – Fibre bonded fabric are produced by either adhesives gluing the fibres together. Or heat bonded which melts the fibr her.  **Felted** – Felted fabri les repeatedly pushing and bonding the fibres together.	**Bonded fabrics** lack strength, they have no grain so can be cut in any direction and do not fray. **Felted fabrics** can be formed with moisture and heat; once dry it has no elasticity or drape, and can pull apart easily. Woollen varieties can be expensive	Disposable products such as protective clothing worn for hygiene purposes, tea bags, dish cloths and dusters Hats, handicraft, pads under furniture to prevent scratching, soundproofing and insulation

The type of fabric used to make a product depends on the following factors:

- ❑ Aesthetics
- ❑ Size of product
- ❑ Where and how the product will be used?
- ❑ Stability
- ❑ Cost
- ❑ Size of material
- ❑ Weight
- ❑ Finish required
- ❑ Lifetime of the product
- ❑ Desired properties.
- ❑ Workability
- ❑ Fabric availability

Design and technology - Materials and their properties– Smart & Modern Materials

What you need to know:

To be able to identify a range of smart & modern materials.

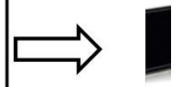
Understand what they do, their properties and the functions they provide.

What is a SMART material?

- *A 'smart material' can be defined as a material whose physical properties change in response to an input e.g. making them simpler or safer to use.*
- *A smart material reacts to external stimulus / changes in the environment without human intervention.*

Designers and manufacturers are utilising SMART materials in a whole range of mass consumer products which often makes them simpler or safer to use.

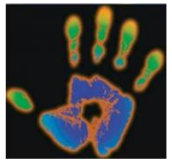
SMART Material	Property
Hydrochromic Ink	Changes colour with water
Thermochromic Pigment/ Paint	Changes colour with heat
Photochromic Material/ Dye	Changes colour with light
SMA - Shape Memory Alloy	Changes shape with heat
Phosphorescent Material	Glows in the dark
QTC – Quantum Tunnelling Composite	Soft Electrical Switch
Polymorph	A thermoplastic use for prototyping which can reheated and reused



Hydrochromic pa s added to the charge socket of the Apple iPhone so apple knows when there has been water damage which voids the warranty.

Phosphorescent Materials absorb day light, store it and release it during periods of darkness. This has been extensively used for safety lighting, signage, watch faces and those glow in the dark stars kids have on their bedroom ceilings.

Thermochromic paints can be added to any surface like these mugs or a textiles or card based product to react to heat.



QTC (Quantum Tunnelling Composite) is a simple soft switch material that allows an electrical current to flow when compressed. We can use it in children's toys or in many textiles products such as the jacket right >

Polymorph is a clever thermoplastic which we can use for prototyping and is especially useful when it comes to modelling ergonomic grips. As it is thermoplastic you can reheat and reuse this material as many times as you wish.

Photochromic pigments react to changes in light. One example is reaction lenses where they darken with sunlight.

What is a MODERN material?

- *Modern materials are technical materials which have been manufactured for function.*

A good designer will utilise and exploit these materials where appropriate and keep up-to-date with the latest technological developments.

Modern Material	Property
Graphene	Is stronger than steel, flexible, conducts heat and electricity
Titanium	Is strong compared to its weight and is anti-corrosive
Metal foams	Are strong, lightweight, electrically & thermally conductive
Nanomaterials	Nanomaterials are between 1and 100 nanometres.
Fibre Optics	A hair like strands of pure glass designed to transmit signals
Corn Starch Polymers	Compostable plastics which are biodegradable

Shape Memory Alloys change shape easily but always return to their original shape when they are heated. There are many applications such as dental braces and unbreakable spectacles.

Titanium is a very versatile metal. It i usually alloyed with other metals to enhance the properties.
Pure titanium does not react to the human body and is used extensively in medical procedures such as artificial joints and dental implants. It is strong compared to its weight and is anti-corrosive.

If it was not for the innovative technology of the **fibre optical** cabling the internet would not be possible. If your parents subscribe to Virgin this is what connects your broadband router or TiVo box to virgin. Without this cable we would not be able to download our music from iTunes or have a Skype conversation with family in Australia.

Thermochromic pigments are added to plastics and react to specific temperatures. One use is enhancing the safety of a babies bowl.

Compostable plastics are biodegradable which are compostable & come from renewable raw materials like starch (e.g. corn, potato or tapioca). Polylactic acid (PLA), is made from fermented sugars, found in sta

PLA

Nanomaterials are between 1and 100 nanometres (A nanometre one thousand-millionth of a metre). Nanomaterials include carbon nanotubes, fullerene and quantum dots. Nanomaterials are used in car manufacturing to create cars that are faster, safer and more fuel efficient. They can also be used to produce more efficient insulation and lighting systems. They are also used as thin films or surface coatings, on computer chips.

Graphene is a 2D material a honeycomb lattice carbon structure only one atom thick (a million times finer than a human hair) It is 200 times stronger than steel, very flexible, conducts heat and electricity, and is almost transparent. It is impermeable to all known substances. Electronics and energy storage could be revolutionised

Metal foams are porous metal structures made from aluminium and titanium. They are strong, lightweight, electrically & thermally conductive and absorb sound well. They are made by injecting gas into the liquid metal but still retain many properties of the original metal including being recyclable.

Design and technology - Materials and their properties– Composite Materials & Technical Textiles

What you need to know:

- To be able to identify a range of composite materials and technical textiles..
- Understand what they do, their properties and the functions they provide.

What is a Composite material?

- *Composite materials are formed when two or more distinctly different materials are combined together to create a new material with improved properties.*

Composite Material	Property
Carbon Fibre	Aa very high strength-to-weight ratio, and is extremely rigid, waterproof but very expensive.
Glass reinforced plastic	A very high strength-to-weight ratio, resists corrosion, water resistant and is light weight.

Carbon fibre components are manufactured by laying up sheets of carbon fibre (fabric) and joining them together with a thermosetting resin (which makes them solid). We use them extensively in the automotive and aviation industries. It has a very high strength-to-weight ratio, and is extremely rigid, waterproof but very expensive.

Glass reinforced plastic (fibre glass) is made from fine glass fibres which are combined with a thermoset plastic resin and is moulded. It has a very high strength-to-weight ratio, resists corrosion, water resistant and is light weight. The fibre glass fibres are soaked in liquid plastic, and then pressed or heated until the material fuses together.

What are Technical Textiles?

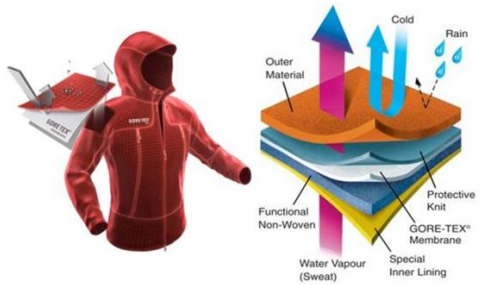
- *Technical textiles are manufactured for a specific use e.g. the function. As this is more important than the aesthetic quality.*

Modern Material	Property
Kevlar®	Is five times stronger than steel, flexible and lightweight.
Nomex®	Can withstand high temperatures (thermal stability) strong & flexible.
Gore-Tex®	Waterproof & breathable as it prevents sweating.
Microencapsulation	Substances are trapped into fibres and are released through friction.
Conductive fabrics	Electrical signals can to pass through them to power devices.

Types of Technical Textiles

Kevlar® can be a woven or knitted structure and has many applications, ranging from bicycle tyres, racing sails to body armour because of its lightweight, has high tensile strength-to-weight ratio; by this measure it is 5 times stronger than steel. It is also used to make components that need to withstand high impact.

Nomex® was developed to withstand high temperatures and reduce combustion when exposed to a naked flame. Nomex has many applications, ranging from protective clothing (fire service & military), racing suits and aerospace applications this is because of its strength, thermal stability, flexibility and resilience.



Gore-Tex® is a waterproof fabric that is 'breathable' it lets water vapour from perspiration (sweat) pass to the outside, but it stops rain drops from passing to the inside. Clothing or footwear made of Gore-Tex® is very useful to people who work or like outdoor pursuits and sports.

Conductive textiles are also known as **e-textiles** these are highly conductive threads and fabrics which allow an electrical signal to pass through them to power LED's headphones and microphones.

Microencapsulation traps liquid or solid substances within the fibres which embedded in to the fabric. When the fabric is rubbed or heated the substances can be released Micro capsules can hold a variety of substances depending on the fabrics intended purpose such as:

- Scents and smells are children's toys fused with a scent of chocolate or scratch and sniff T-shirts.
- Antibacterial solutions are added to fabrics to cuts down on bugs (used in anti-bacterial dressings).
- Insect repellent clothing, chemicals are added to fabrics to prevent mosquito bites.

Design and technology - Energy Generation

What you need to know:

To understand how power is generated from renewable and non-renewable sources and be aware of the arguments for and against.

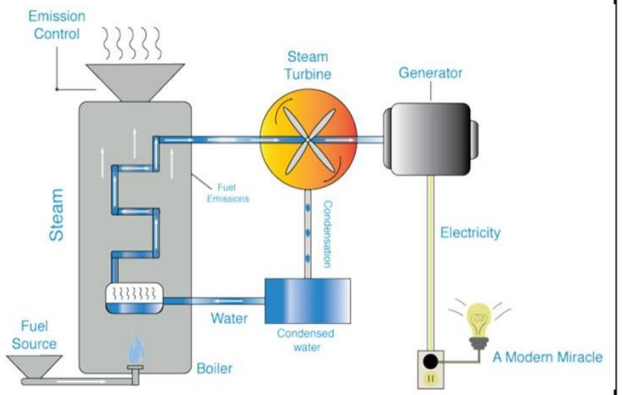
Energy generation

There are many ways to convert energy the two main categories are:

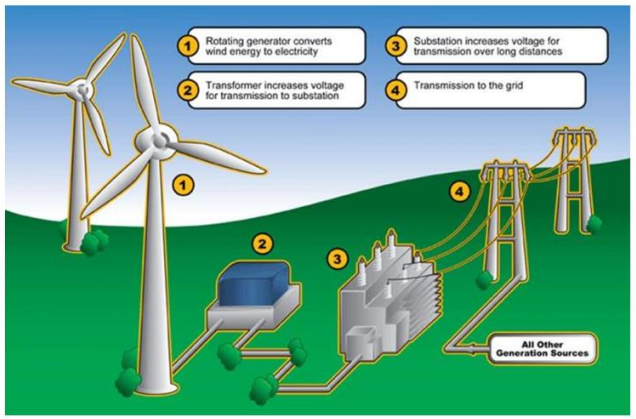
- ***Fossil fuels (finite)***
- ***Renewables (non-finite)***

Turbines & generators

Most forms of electricity production involve a rotating turbine which turns a generator. Fossil fuels are burned, this heats the water resulting in steam which turns the turbine which is linked to a generator to create electricity.



Renewable energy the energy is harnessed from the wind (wind turbines), wave (tidal) or falling water (hydroelectric) is converted into mechanical energy which rotates the turbine. A generator converts the mechanical energy into electricity.



Non-Renewable Resources

Traditionally designers have made products from raw materials that come from non-renewable (finite) resources that are in limited supply. Examples of these include oil, ores and minerals. They are natural materials but they will eventually run out.

WE CAN'T MAKE MORE

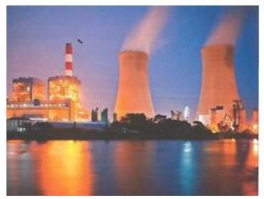
Renewable Resources

Renewable means we can create more as long as they are regrown or replaced this includes materials like paper & wood. Energy that comes from the non-finite resources are considered renewable. This includes wind, wave, solar, geothermal, tidal and biomass.

WE CAN MAKE MORE

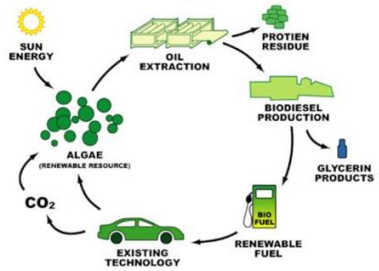
Fossil Fuels

Fossil fuels (coal, oil & gas) are considered finite as they can not be replaced. 55% of Britain's electricity is generated form coal and gas.



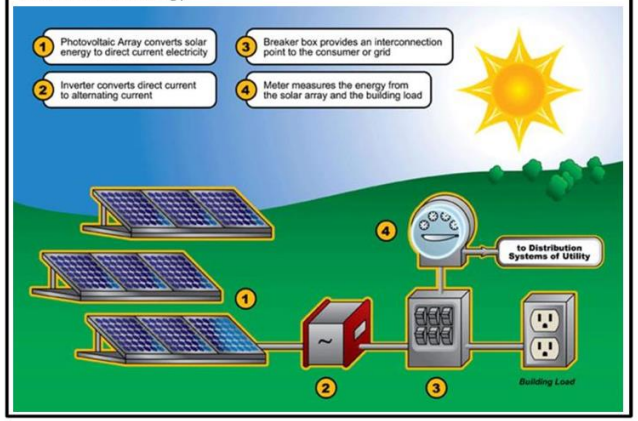
Biofuel

Biofuel is a way of producing energy for transportation & heating. Oli and starch producing crops are grown, harvested and refined into a number of products such as biodiesel. This process is known as biomass energy production. .



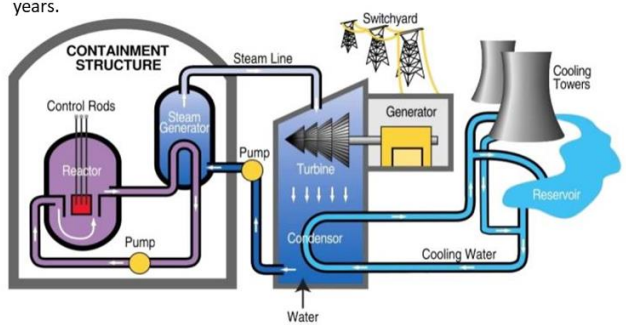
Solar Energy

The photovoltaic effect involves the conversion of solar energy into electrical energy. The solar panel capture the sun's rays and converts them into electrical energy.



Nuclear power

The controversial method of energy, it is considered clean & efficient. The process takes place in the reactor vessel, control rods in and out of the reactors core to regulate the power generated. The reaction generates vast amounts of heat like other methods and generates power to the and generator. The downside to nuclear power is that the waste product produced from the reaction is radioactive and very dangerous to all forms of life. It must be contained and stored correctly so the radiation doesn't leak. This is usually underground and this waste will be radioactive for years.



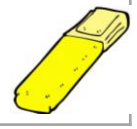
English

Paper 1 Language Exploration in Reading and Creative Writing Knowledge Organizer (1 hour 45 minutes)

The Steps to Success and the methods you need to complete 50% of your Language Paper 1 Exam.

Q1- 5 minutes (4 marks)
List four things question

- Read the question carefully and look at the specific lines it is asking you to look at
- Write one idea per line
- Copy directly from the text (do not paraphrase)



Q2- 8-10 minutes (8 marks)
How does the writer use language to describe

- Read the question and highlight the key words to ensure you understand what the focus of your answer will be.
- Re-read the section of text the question asks you to focus on.
- Highlight key quotations which will help you answer the focus of the question. Consider the use of different language devices. Basic things to look out for: 5 senses, colour, adjectives and verbs. Grade 7+: extended metaphors, semantic fields, assonance.

STRUCTURING YOUR RESPONSE (PEEL):

P – The point/ tone/ mood that the writer is trying to create (**what**)

E – Evidence and terminology **(how)**

E – Explanation and effect of how the writer's method is used to portray their attitude or perspective (**how** the writer does this)

L – Link to the reader and back to the question. (**why**)

Q3 8-10 minutes (8 marks)
How does the writer use structure to interest the reader

- Read the question and highlight the key words. This question is about how the text is put together and organised, rather than the language devices used
- Devices you might want to consider are STOPSEC Setting Time Opening Perspective Shift in focus Ending Character
- Skim through the whole source again. Highlight and label where you see different STOPSEC features, particularly focus on how the opening and ending are effective.
- Top tip: for a really clear response, think about what the writer focuses your attention on at the beginning, what they focus you on at the end-and whether this is similar or different (a cyclical structure). Then ask WHY?
- Aim for 3 PEEL paragraphs: **beginning** and a general overview of the text first of all, then consider how your focus shifts in the **middle** of the extract and why –your analysis isn't focusing on the use of words and phrases, but on the atmosphere/tone created by the different structural (STOPSEC) features used at different points. A final PEA could be written about another interesting structural feature, the ending and consider which devices are used to close. Is there a resolution, cliffhanger or cyclical response?

Q4 20-25 minutes (20 marks)
To what extent do you agree with the statement

- Read the question and highlight the key words, including the section of the text if specified. Think carefully about how far you agree with the statement. Top Tip: Usually it is best to AGREE with the statement. But consider how far you agree. Is there evidence to argue against this opinion? Create a debate in your answer.
- Draw a box around the section of the text if specified.
- Read through and highlight words/phrases/language devices you will use to argue FOR, and maybe against the statement.
- Aim for 3 PEELs. Pick out key words in each and explore their effect. Useful sentence starters (see previous questions too – you can reuse these if appropriate!): To some extent I agree with… I certainly agree that… However, it could also be argued that… Overall I agree that….
- You must use your ideas from Q2 and Q3 to help you with this and state the writers' methods and how they achieve this effect by using language and structural features to support.

Q5 45 minutes (40 marks: 24 for content and 16 for SPAG)
Writing question based on an image stimulus

Planning:

Step 1: Underline key words in questions. Decide which task to complete.

Step 2: Take your image and box it up into five-six smaller boxes.

Step 3: Annotate around your image all of the ambitious vocabulary and language devices to describe each box.

Step 4: Label your boxes in the order that you are going to write about them (1-6). This will inform you on how many paragraphs you should be writing. Consider logically which makes the most sense to begin with. It is always best to start off with something on the outside such as setting and weather (the dark night in this example) and then zoom in to the interior (the café in this example), then the young lady and then the chair opposite or the way she cradles her cup of coffee.

Tips:

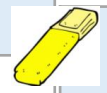
- Vary your sentence openers with verbs, adverbs, prepositions, adjectives.
- Vary the length of your sentences (inc. at least 1 holophrastic phrase) and your paragraphs.
- Variety of language devices
- Be ambitious with your vocabulary

English

Paper 2 Language Writers; Viewpoints and Perspectives
1hour 45 minutes

The Steps to Success and the methods you need to complete 50% of your Language Paper 2 Exam.

Q1- 5 minutes (4 marks)
True or False question



- Read the question carefully.
- Read the focus paragraph underlining points for question focus.
- Consider all statements before shading – write T and F by them.
- Shade when you are certain you have the correct four

Q2- 8-10 minutes (8 marks)
Summary comparison of both texts

Planning Steps
Step 1 - underline and annotate the question.
Step 2 - identify three similarities or differences between the texts in relation to the question.
Step 3 – Underline evidence you are going to use and number quotes
i.e., link quotes between texts by numbering them the same for each one– quotes numbered 1-3 in both texts.
Structuring your Response:
Statement of similarity / difference between the two texts
Evidence from Source 1
Inference linked to evidence and question
Comparison connective
Evidence from Source 2
Inference linked to evidence and question
REPEAT TWICE (3 PARAGRAPHS IN TOTAL)

Q3 12-15 minutes (12 marks)
How does the writer use language

How does the writer use language for effect? This question requires the same skills as your Paper 1 Language Q2 and uses the same mark scheme to award marks, however this time it is worth more. Look out for key words or language devices with a specific effect. Concentrate on what the explicit words/ devices do and the impact they try to have on the reader. Consider what you associate with that word, and further, what it makes you think, feel, and imagine.

Write a PEEL response x3 paragraphs
Useful sentence starters:
In Source… the writer uses language to cleverly build a tone of…
Point: Firstly, the writer uses [insert language device] in order to…
Evidence: For instance, /for example this is seen when…
Analysis: This evokes a sense of… The word/subject term has connotation of … and therefore creates an atmosphere of… We might feel compelled to… The writer helps us to imagine/ realise…

Q4 20-25 minutes (16 marks)
Comparing Writers' perspectives

Planning Steps
Step 1 – Underline and annotate the question. Which attitudes and/or perspectives do you know are already present in both texts in relation to the question? Notes these down (draw out your battery, if this helps, with key words to describe the writer's attitude).
Step 2 – Skim-read the two texts and underline key quotations linking to any previous or new attitudes and/or perspectives that you have identified.
Step 3 – Annotate quotes for method or technique used and their effect (FRESH GRAPES, headings/titles, listing, sentence structures, punctuation, tone i.e., humorous, sarcastic).
Step 4 – Write your response. (16 marks- 20-25 minutes)
STRUCTURING YOUR RESPONSE (DETER/ SETER):

D/S – Difference or similarity of the perspective of both sources
E – Evidence
T – Technique
E – Effect and explain (how the writer's method is used to portray their attitude/perspective)
R – Reader (How you are made to think/feel or imagine and why)

Q5 45 minutes (40 marks: 24 for content and 16 for SPAG)
Writing a non- Fiction Text

Planning:
Identify the FLAP of the task (format, language, audience and purpose).
Dump down all your ideas.
Do any of your ideas link together or have a common theme?
Choose a counter argument and how you will challenge this.
Reread your work at the end.
Techniques for question 5:
FRESH GRAPES
Paragraphs – A range of lengths
Discourse markers and connectives
Visual sentence structures – short sentences, single sentence paragraphs, commas for listing
Punctuation for effect ! ? - : ;

Text type	To include
Letter	Dear Sir/ Madam/ Yours sincerely
Speech	Engaging hook, lots of direct address, rhetorical indicators and a clear sign off
Article	Original title, subheadings, introductory paragraph
Leaflet	Original title, subheadings, introductory paragraph, bullet points
Essay	Introductions and conclusion

Clear paragraphs in all text types needed!

Jekyll and Hyde

Characters

Jekyll	A doctor and experimental scientist who is wealthy and respectable
Hyde	A small, violent and unpleasant- looking man, an unrepentant criminal
Lanyon	A conventional and respectable doctor and former friend of Jekyll
Utterson	A calm and rational lawyer and friend of Jekyll
Enfield	A cousin of Utterson and well-known man about town
Carew	A distinguished gentleman who is beaten to death by Hyde

VOCABULARY

- Apothecary
- Blasphemies
- Brandishing
- Balderdash
- Darwinism
- Diaphanous
- Degeneration
- Evolution
- laboratory
- Letters
- Pathetic fallacy
- Prodigy
- Reputation
- Sinister
- Troglodytic
- Urban terror
- Victorian gentleman

KEY CONCEPTS AND INSIGHTS:

The novel reveals the duality of human nature: we all have the capacity for evil.
Stevenson emphasises how individuals are caught in a stranglehold of Victorian repression; too much repression leads to our desires growing and becoming uncontrollable.

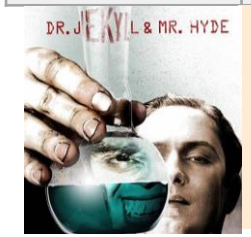
Stevenson exposes the hypocrisy of Victorian society, in which appearances mean everything. Stevenson communicates the horrific consequences of strongly repressing all physical desires; the novel proposes that society needs to allow individuals greater freedom.

Jekyll symbolises the hypocrisy of the duplicitous Victorian gentleman.

Hyde symbolises the primitive animal within. He represents the uncontrollable violence of the repressed side of human nature and the possibility of society regressing.

Themes of Jekyll and Hyde

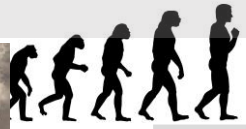
Duality	Many contrasts in terms of setting, character and themes including: reality vs. appearance, Jekyll and Hyde, light and dark, the good and evil side of someone, upper class London and Soho.
Secrecy and silence	The novel's secrets comes out in parts: Enfield shares his story with Utterson, he is only persuaded to share Hyde's name at the end. When Utterson heard Hyde's name he does not reveal that he has heard it before. Most of the story's revelations are through a sequence of letter and documents, addressed, sealed and enclosed in safes, and put together at the end.
Reputation	Each man seems to be isolated from every other, and there is a sense that this masculine world has been hushed by the need to maintain social reputation. The men in the novel avoid gossip.
Religion	Reference to Satan, G-d, religion and charity work. The men discuss religious works. Mr Hyde's evilness is shown as he defaces Dr Jekyll's favorite religious works. Mr Hyde is often likened to Satan.
Gothic	The key feature of the Gothic genre are show through the setting e.g., the alleyway, character and the antagonist of Hyde
Good vs. Evil	Seen through the encounters that Hyde has with other characters, particularly the murder of Danvers Carew.



Links to previous Units:
- Noughts and Crosses and Trash- Dual Narrative
- Miss Havisham- Gothic Horror Setting
- Of Mice and Men- Themes of Friendship and the Moral Compass

English

Jekyll and Hyde



Historical and social information

Robert Louis Stevenson

Born in Edinburgh in Scotland in 1850 and came from a family of scientists, engineers, religious figures and even a professor of philosophy. Because of this, it is possible to explain why Stevenson was so interested in the relationship between science and nature in his novella. As a child, Stevenson was often very ill – including suffering from lung problems – who would often distract himself from his illness by reading about travel and adventures. This later inspired him to write 'Treasure Island' and he would travel the world before dying in the Samoan Islands in the South Pacific in 1894 at the relatively young age of 44. Stevenson's illness meant he would often suffer from nightmares and this influenced his writing in Jekyll and Hyde. Think about how Hyde generally only appears at night and how Utterson has a dream involving both Jekyll and Hyde. The darkness of the city at night provided the perfect backdrop for an evil and notorious character like Hyde to commit his crimes.

Charles Darwin

In 1859 Charles Darwin published his famous On the Origin of Species, which explained Darwin's Theory of Evolution. This introduced the idea of animals changing in response to their environments through mutations at birth or evolving. This theory questioned accepted Christian beliefs that the world was created in seven days. Many people within society also struggled to accept the idea that humans could have evolved from other animals such as chimpanzees. It was this idea of evolution that inspired Stevenson to write Jekyll and Hyde. It's no coincidence that Hyde is referred to as a 'troglodyte' by Utterson in Chapter Two; a 'troglodyte' refers to a pre-historic person who lived in caves, so essentially alluding to the evolution of man. Science and religion are two very important themes in the novella, and at this time many felt science and religion were increasingly at odds with each other – to believe in one meant you could not believe in the other. Characters like Dr Lanyon and Mr Utterson have scientific minds but seem to be very religious in their beliefs as well. Jekyll, by experimenting on himself, seems to 'play G-d' and as such loses his life. Was this Stevenson suggesting only G-d should have this power?

Jack the Ripper

Jekyll and Hyde was published in 1886 and only two years later the Jack the Ripper murders were causing chaos and panic in London. A series of violent attacks took place on prostitutes across the city with five being killed by the mysterious Ripper – whose true identity was never discovered. Rumours were spreading that the serial killer could be middle or upper class, challenging the idea that those high up in society were naturally good and morally strong.

Key Themes

- Science
- Religion
- Duality of man
- Morality
- Repression
- Reputation
- Secrecy and Silence
- Innocence and violence
- Friendship

Chapters

Chapter 1	The Story of the Door
Chapter 2	The Search for Mr Hyde
Chapter 3	Dr Jekyll was Quite at Ease
Chapter 4	The Carew Murder Case
Chapter 5	Incident of the Letter
Chapter 6	Remarkable Incident of Dr Lanyon
Chapter 7	Incident at the Window
Chapter 8	The Last Night
Chapter 9	Dr Lanyon's Narrative
Chapter 10	Henry Jekyll's Full Statement of the Case

Key things to Remember

The novella is set in London, but Edinburgh influenced the setting of the novella
Edward Hyde is not a separate personality living in the same body as Henry Jekyll. Hyde is just Jekyll having transformed his body into something unrecognizable, acting on unspecified urges that would be unseemly for someone of his age and social standing in Victorian London.
When Lanyon witnesses the transformation, he sees Hyde transform into Jekyll.
A typical Victorian gentleman would tend to own their own land and have a generous income. They would be helpful, respectful, secretive and reputable.

English Paper 2 **Literature**: An Inspector Calls

Acts

Act 1	Set in April 1912, Brumley, Midlands, UK. The Birling family and Gerald Croft are celebrating Sheila Birling's engagement to Gerald with a dinner. Mr Birling lectures his son, Eric Birling, and Gerald about the importance of every man looking out for himself if he wants to get on in life. Edna (the maid) announces that an inspector has arrived. Inspector Goole says that he is investigating the death of a young woman, Eva Smith, who committed suicide. Mr Birling is shown a photograph of Eva, after initially denying recognising the woman in the photo, he remembers firing her in 1910 for organising a strike over workers' pay. Sheila recalls also having Eva sacked about her manner when served by her in an upmarket department store. The Inspector reveals that Eva Smith changed her name to Daisy Renton. Gerald reveals to Sheila that he had an affair with Daisy Renton
Act 2	Gerald explains to The Inspector that he had an affair with Eva, but hasn't seen her since he ended their relationship back in Autumn 1911. Sheila gives her engagement ring back to Gerald. The Inspector turns his attention to Mrs Sybil Birling, she confesses that she also had contact with Eva, but Eva gave a different name to Mrs Birling. Eva approached a charity chaired by Mrs Birling to ask for help. Eva was desperate and pregnant but help was refused by Mrs Birling because she was offended by the girl calling herself 'Mrs Birling'. She tells Eva that the baby's father should be made entirely responsible. She also tells Inspector Goole that the father should be held entirely responsible and should be made an example of.
Act 3	Eric is revealed as the father. He stole money from Mr Birling's office to provide money to Eva. The Inspector delivers his final speech. After he leaves, the family begin to suspect that he was not a genuine police inspector. A phone call to the Chief Constable confirms this. Next, they phone the infirmary to be informed that no suicide case has been brought in. Mr Birling, Mrs Birling and Gerald congratulate themselves that it was all a hoax and they can continue as before. This attitude upsets Sheila and Eric. The phone rings. Mr Birling announces to the family that a girl has just died on her way to the infirmary, a police inspector is coming to question them.

Key Terms:

- Stage directions
- Dialogue
- Monologue
- Didactic
- Polemic
- Dramatic irony
- Foreshadowing
- Entrances and exits
- Props
- Sentence moods
- Social expectations
- Cliff-hanger
- Characterisation
- Dramatic device
- Timings
- Interruptions
- Tone
- Irony
- Imagery
- Symbolism
- Euphemism

Key Themes

- Social responsibility
- Truth and lies
- Hypocrisy
- Wealth, power and influence
- Rights and responsibilities
- Morality versus legality
- Young versus old
- Capitalisation versus socialism

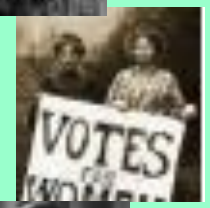
Context:

J.B. Priestley

• 1914-18: WW1, Aged 20, Priestley serves on the front line in France and is wounded.
• 1919: awarded place at Trinity Hall, Cambridge to study Literature, History and Politics.
• 1922: begins to work as a journalist in London.
• 1934: writes 'English Journey' about the poorer parts of Britain. • 1939-45: makes regular wartime radio broadcasts called 'Britain Speaks'.
• 1945: writes An Inspector Calls

1912 England

- Work strikes
- Workers' rights
- Pre WW1
- Suffragette movement
- Class system



1945 England

- Post WW1 and WW2
- Social levelling
- Women's rights
- Workers' rights
- Trade unions
- National Insurance
- Welfare system
- NHS

English

An Inspector Calls

Plot

Set in April 1912, Brumley, Midlands, UK. The Birling family and Gerald Croft are celebrating Sheila Birling's engagement to Gerald with a dinner. Mr Birling lectures his son, Eric Birling, and Gerald about the importance of every man looking out for himself if he wants to get on in life. Edna (the maid) announces that an inspector has arrived. Inspector Goole says that he is investigating the death of a young woman, Eva Smith, who committed suicide. Mr Birling is shown a photograph of Eva, after initially denying recognising the woman in the photo, he remembers firing her in 1910 for organising a strike over workers' pay. Sheila recalls also having Eva sacked about her manner when served by her in an upmarket department store. The Inspector reveals that Eva Smith changed her name to Daisy Renton. Gerald reveals to Sheila that he had an affair with Daisy Renton. Gerald explains to The Inspector that he had an affair with Eva but hasn't seen her since he ended their relationship back in Autumn 1911. Sheila gives her engagement ring back to Gerald. The Inspector turns his attention to Mrs Sybil Birling, she confesses that she also had contact with Eva, but Eva gave a different name to Mrs Birling. Eva approached a charity chaired by Mrs Birling to ask for help. Eva was desperate and pregnant but help was refused by Mrs Birling because she was offended by the girl calling herself 'Mrs Birling'. She tells Eva that the baby's father should be made entirely responsible. She also tells Inspector Goole that the father should be held entirely responsible and should be made an example of. Eric is revealed as the father. He stole money from Mr Birling's office to provide money to Eva. The Inspector delivers his final speech. After he leaves, the family begin to suspect that he was not a genuine police inspector. A phone call to the Chief Constable confirms this. Next, they phone the infirmary to be informed that no suicide case has been brought in. Mr Birling, Mrs Birling and Gerald congratulate themselves that it was all a hoax and they can continue as before. This attitude upsets Sheila and Eric. The phone rings. Mr Birling announces to the family that a girl has just died on her way to the infirmary, a police inspector is coming to question them.

Dramatic Stage Directions

Dramatic Irony	Birling's speeches, Mrs. Birling's witless implication of Eric
Stage Directions	Instructions for the actors; often revealing – such as the lighting change when the Inspector arrives: "Pink and intimate then brighter and harder
Setting	Constant throughout but subtle changes e.g., lighting; characters on/off stage
Tension	Builds up throughout the play ; interrogation of characters, personal relationships, secrecy
Foreshadowing	Symbolism (The Titanic), Mr. Birling's "knighthood", war
Time- Lapse	Set in 1912, written in 1945; audience in a privileged position.
The 4th Wall	The Inspector's final speech addressed directly to audience.

Characters

Inspector Goole	Priestley's mouthpiece; advocates social justice; serves as the Birlings' conscience	Socialist, moralistic, righteous, powerful, intimidating, unconventional, mysterious, imposing, sardonic, omnipotent
Mr Arthur Birling	Businessman; capitalist; against social equality; a self-made man (new-money)	capitalist, arrogant, foolish, Panglossian, emasculate, prejudiced, ignorant, selfish, stubborn, vainglorious
Mrs Sybil Birling	Husband's social superior; believes in personal responsibility	Arrogant, cold-hearted, insincere, prejudiced, naïve, conformist, bitter, controlling, remorseless
Sheila Birling	Young girl; comes to change views and pities Eva; feels regret	Transformative, remorseful, socialist, pseudo-inspector, sensitive, astute, strong-minded, empowered
Eric Birling	Young man, drinks too much; forces himself on Eva Smith; regrets actions	Rebellious, reckless, immature, insubordinate, compulsive, desperate, disgraced, dualistic, irresponsible
Gerald Croft	Businessman; engaged to Sheila; politically closest to Birling	Aristocratic, evasive, secretive, dishonest, disingenuous, oleaginous, chivalric, privileged, pragmatic
Eva Smith	Unseen in play; comes to stand for victims of social injustice (changes her name to Daisy Renton)	Suffragist, victim, emblematic, allegorical, vulnerable, desperate, socialist, moralistic, principled

Links to previous units you have studied:

• Play writing conventions in Richard III (Year 7) Blood Brothers (Year 8)

• Understanding social class and backgrounds in Miss Havisham (Year 8)

Links to other units you are going to study:

• Victorian/Pre- Edwardian society in Jekyll and Hyde (Year 10)

Macbeth

Links to previous units you have studied:

- **Shakespearean play conventions, Richard III (Year 7)**
- **Features of a tragedy, Noughts and Crosses(Year 8)**

Links to other units you are going to study:

- **Macbeth and the super natural (Year 10)**

Character List	
Macbeth	A captain in Duncan's army, Thane (Lord) of Glamis and later Cawdor. When Three Witches predict that he will one day be king of Scotland, he takes his fate into his own hands, allowing his ambition and that of his wife's to overcome his better judgement. .
Lady Macbeth	Macbeth's wife whose ambition helps to drive her husband toward the desperate act of regicide. Subsequently, her husband's tyranny and her own guilt recoil upon her, sending her into a madness from which she never recovers and leads to her suicide.
Banquo	Macbeth's close friend and ally who also receives predictions from the witches. His response, however, is more cautious than Macbeth's.
King Duncan	King of Scotland. His victories against rebellious kinsmen and the Norwegians have made him a popular king. When Macbeth initially decides not to kill the king, he gives Duncan's many qualities as his reasons.
Macduff	The Thane of Fife. He is loyal to Duncan and becomes suspicious of Macbeth early in the play. He leaves Scotland to join Malcolm in England. The witches warn Macbeth to "Beware Macduff" prompting Macbeth to have Macduff's family killed.
Malcolm	Duncan's rightful heir. He leaves for England after his father's murder and enlists the support of the English king and English lords. He is shown as being noble and deserving of the throne. His restoration to the Scottish throne is essential for the Chain of Being/Natural Order to be restored.
The Witches	They directly influence the actions of Macbeth. He did not have to act on their prophecies, but when he did, his death was sealed. This conflict between man and the supernatural runs throughout the play. The witches represent the dangers of the supernatural.

Themes		
Masculinity	**Appearance and Reality**	**Guilt**
Ambition	**Chaos and Disorder**	**Power**





Glossary	
Tragedy	A genre of story in which a hero is brought down by his/her own flaws.
Hamartia	A fatal flaw leading to the downfall of a tragic hero or heroine
Peripeteia	a sudden reversal of fortune or change in circumstances in a story
Catharsis	When the audience or reader experiences the same emotions as a character
Regicide	the action of killing a king.
Tyranny	cruel and oppressive government or rule.
Foreshadowing	When the writer drops clues and hints to what might happen
Aside	a remark or passage in a play that is only heard by the audience
Soliloquy	device in drama to let a character make their thoughts known to the audience. It is longer than an aside.
Pathetic Fallacy	When the weather reflects the mood
Iambic Pentameter	A line of writing that consists of ten syllable, an unstressed syllable followed by a stressed syllable, or a short syllable followed by a long syllable.

Context	
Divine Right	The belief that the King was chosen by God. Thus, to commit regicide meant disobeying the will of God.
Patriarchal Society	A system in which men dominate over others
Natural Order	Also The Great Chain of Being, A religious hierarchy where everything on earth was awarded a 'rank' / status. God was at the top, followed by angels, humans, animals and plants etc. A Jacobean audience believed that if this hierarchy was interfered with then the natural order would be thrown into chaos.
Witchcraft	King James I was obsessed with magic and witchcraft and ordered several witch-hunts during his reign as King, even producing a treatise on witchcraft called Daemonologie ('the Science of Demons').
Religion	A Jacobean audience were extremely religious, believing life to be sacred and God to be the creator of everything. Thus, when Macbeth claims life is 'a tale told by an idiot...signifying nothing' a Jacobean audience would have been greatly shocked.
The Gunpowder Plot	A failed assassination attempt against King James I by a group of provincial English Catholics in 1605. Macbeth was first performed in 1606.

Paper 2 Literature: Unseen Poetry

What you need to know to answer the unseen poetry question

Q1) 24 marks for analysis

Q2) 8 marks comparison with second poem

Steps to Answer the Question:

- Highlight the key words from the question, then read the title and the poem carefully thinking about words and phrases **that are relevant to the question**
- Make sure that you establish what the poem is about and **DON'T PANIC!** Do this before you begin to think about planning an answer to the question

Language	Structure	Form
○ Similes	○ Repetition	○ Ballad
○ Metaphors	○ Stanzas	○ Sonnet
○ Alliteration	○ Rhyme Scheme (irregular, regular?)	○ Free Verse
○ Onomatopoeia	○ Rhythm	○ Humorous
○ Assonance	○ Beat	○ Lyrical
○ Imagery	○ Iambic Pentameter	○ Narrative
○ Hyperbole	○ Caesura	○ Epitaph
○ Oxymoron	○ Enjambment	
○ Personification	○ Rhyming Couplet	
○ Symbolism		

Assessment Objectives (AOs)

AO1	Read, understand and respond to texts. Students should be able to: • maintain a critical style and develop an informed personal response • use textual references, including quotations, to support and illustrate interpretations.
AO2	Analyse the language, form and structure used by a writer to create meanings and effects, using relevant subject terminology where appropriate.

Questions to get you thinking:

- What are the main ideas of the poem?
- What is the tone of the poem? (mood)
- How does the poet feel?
- How does the poet make you (the reader) feel?
- What words and phrases from the poem are relevant to the question?
- Do they include any language or structural devices? If so, highlight them!
- What is the effect of these language and structural devices on the reader?
- Why was the poem written?
- What are the writer's intentions?
- What is the poem's message?

Smile

Structure

Meaning

Imagery

Language

Effect

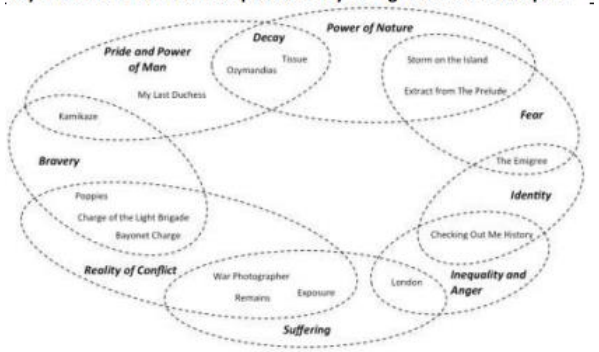
What will the question ask me to do?	5 minutes – 2 tasks – no choice Q1 – 30 mins Q2 – 15 mins The questions will read something like: Q1 – In 'To a Daughter Leaving Home', how does the poet present the speaker's feelings about her daughter? [24 marks] Q2 – In both 'Poem for My Sister' and 'To a Daughter Leaving Home', the speakers describe feelings about watching someone they love grow up. What are the similarities and/or differences between the ways that the poets present those feelings? [8 marks] Both unseen poems will be printed on the question paper.
How do I answer the question?	Q1 – 3x PEARLs Point, Evidence, Analysis, Reader Response, Link (Personal Response) Q2 – 1x PEARL + CC + PEARL Point, Evidence, Analysis, Reader Response, Link (Personal Response) + Comparative Connective + Point, Evidence, Analysis, Reader Response, Link (Reader Response)

Power and Conflict Poetry

This is one of the questions on your paper 2 Literature exam and worth 30 marks. You need to make a comparison between the chosen poem in the exam and another poem of your choice.

Literature: Power and Conflict Poetry

Key themes and connections: poems that you might choose to compare



Checking out me History by John Agard

Represents the voice of a black man who is frustrated by the Eurocentric history curriculum in the UK – which pays little attention to the black history. -Black history is quoted to emphasize how it has been kept separate and to stress its importance.

Language

Imagery of fire and light used in all three stanzas regarding black historic figures: "Toussaint de beacon", "Fire-woman", "yellow sunrise". -Uses non-standard phonetic spelling ("Dem tell me wha dem want", to represent his own powerful accent and mixes Caribbean Creole dialect with standard English.

"I carving out me identity": metaphor for the painful struggle to be heard, and to find his identity.

Form and structure Dramatic monologue. Stanzas concerning Eurocentric history (normal font) are interspersed with stanzas on black history (in italics to represent separation and rebellion). Black history sections arranged as serious lessons to be learned; traditional history as nursery rhymes, mixed with fairytales (mocking of traditional history). The repetition of "Dem tell me" shows frustration.

The Prelude by William Wordsworth

The story of a boy's love of nature and a night-time adventure in a rowing boat that instils a deeper and fearful respect for the power of nature. -At first, the boy is calm and confident, but the sight of a huge mountain that comes into view scares the boy and he flees back to the shore. We should respect nature and not take it for granted.

Language

'One summer evening (led by her)': 'her' might be nature personified – this shows his love for nature. -'an act of stealth / And troubled pleasure': confident, but the oxymoron suggests he knows it's wrong; forebodes the troubling events that follow. -'nothing but the stars and grey sky': emptiness of sky.

Form and Structure First person narrative – creates a sense that it is a personal poem. -The regular rhythm and enjambment add to the effect of natural speech and a personal voice.

Storm of the Island by Seamus Heaney

The narrator describes how a rural island community prepared for a coming storm, and how they were confident in their preparations. -When the storm hits, they are shocked by its power: its violent sights and sounds are described, using the metaphor of war. -The final line of the poem reveals their fear of nature's power.

Language

'Nor are there trees which might prove company': the island is a lonely, barren place. -Violent verbs are used to describe the storm: 'pummels', 'exploding', 'spits'. -Semantic field of war: 'Exploding comfortably' (also an oxymoron to contrast fear/safety); 'wind dives and strafes invisibly' (the wind is a fighter plane); 'We are bombarded by the empty air' (under ceaseless attack).

Form and Structure Written in blank verse and with lots of enjambment: this creates a conversational and anecdotal tone. -'We' (first person plural) creates a sense of community, and 'You' (direct address) makes the reader feel immersed in the experience.

London by William Blake

The narrator is describing a walk around London and how he is saddened by the sights and sounds of poverty. -The poem also addresses the loss of innocence and the determinism of inequality: how new-born infants are born into poverty. -The poem uses rhetoric (persuasive techniques) to convince the reader that the people in power (landowners, Church, Government) are to blame for this inequality.

Language

Sensory language creates an immersive effect: visual imagery ('Marks of weakness, marks of woe') and aural imagery ('cry of every man') -'mind-forged manacles': they are trapped in poverty. -Rhetorical devices to persuade: repetition ('In every..'); emotive language ('infant's cry of fear')

Form and Structure A dramatic monologue, there is a first-person narrator ('I') who speaks passionately about what he sees. -Simple ABAB rhyme scheme: reflects the unrelenting misery of the city, and perhaps the rhythm of his feet as he trudges around the city.

Bayonet Charge by Ted Hughes

Describes the terrifying experience of 'going over the top': fixing bayonets (long knives) to the end of rifles and leaving a trench to charge directly at the enemy. -Steps inside the body and mind of the speaker to show how this act transforms a soldier from a living thinking person into a dangerous weapon of war. -Hughes dramatizes the struggle between a man's thoughts and actions.

Language

"The patriotic tear that brimmed in his eye. Sweating like molten iron": his sense of duty (tear) has now turned into the hot sweat of fear and pain.

"a yellow hare that rolled like a flame. And crawled in a threshing circle": impact of war on nature – the hare is distressed, just like the soldiers.

Form and Structure The poem starts 'in medias res': in the middle of the action, to convey shock and pace. Enjambment maintains the momentum of the charge. Time stands still in the second stanza to convey the soldier's bewilderment and reflective thoughts. Contrasts the visual and aural imagery of battle with the internal thoughts of the soldier = adds to the confusion.

Exposure by Wilfred Owen

Speaker describes war as a battle against the weather and conditions. -Imagery of cold and warm reflect the delusional mind of a man dying from hypothermia. -Owen wanted to draw attention to the suffering, monotony and futility of war.

Language

"Our brains ache" physical (cold) suffering and mental (PTSD or shell shock) suffering. -Semantic field of weather: weather is the enemy.

"the merciless iced east winds that knive us…" – personification (cruel and murderous wind).

Form and structure Repetition of "but nothing happens" creates circular structure implying never ending suffering -Rhyme scheme ABBA and hexameter gives the poem structure and emphasizes the monotony.

Pararhymes (half rhymes) ("nervous / knive us") only barely hold the poem together, like the men.

War Photographer by Carol Ann Duffy

Tells the story of a war photographer developing photos at home in England: as a photo develops, he begins to remember the horrors of war – painting a contrast to the safety of his dark room. -He appears to be returning to a warzone at the end of the poem.

Language

"All flesh is grass": Biblical reference that means all human life is temporary – we all die eventually.

"He has a job to do": like a soldier, the photographer has a sense of duty.

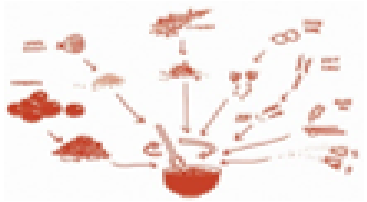
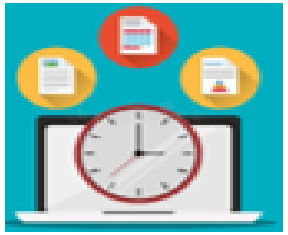
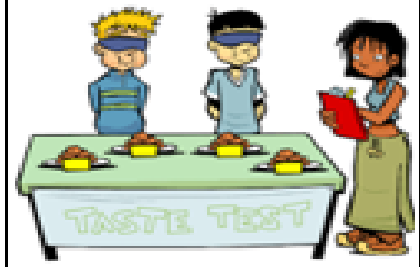
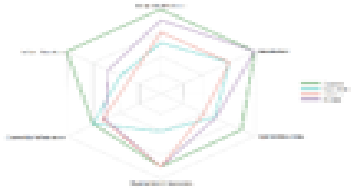
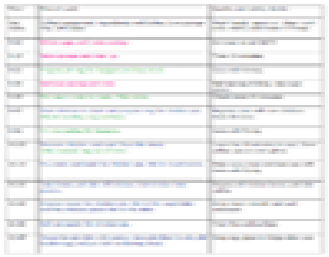
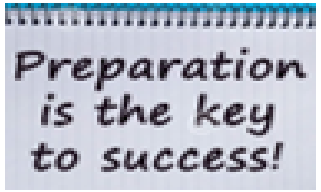
"running children in a nightmare heat": emotive imagery with connotations of hell.

Form and Structure -Enjambment – reinforces the sense that the world is out of order and confused. Rhyme reinforces the idea that he is trying to bring order to a chaotic world – to create an understanding. Contrasts: imagery of rural England and nightmare war zones.

Kamikaze by Beatrice Garland	Remains by Simon Armitage	My Last Duchess by Robert Browning	Ozymandias by Percy Bysshe Shelley
In World War II, Japanese Kamikaze pilots would fly manned missiles into targets such as ships. -This poem explores a kamikaze pilot's journey towards battle, his decision to return, and how he is shunned when he returns home. -As he looks down at the sea, the beauty of nature and memories of childhood make him decide to turn back. **Language** The Japanese word 'kamikaze' means 'divine wind' or 'heavenly wind' and has its origin in a heaven-sent storm that scattered an invading fleet in 1250. "dark shoals of fish flashing silver": image links to a Samurai sword – conveys the conflict between his love for nature/life and his sense of duty. Also has sibilance. **Form and Structure** Narrative and speaker is third person, representing the distance between her and her father, and his rejection by society. The first five stanzas are ordered (whilst he is flying on his set mission). Only full stop is at the end of Stanza Five: he has made his decision to turn back. The final two are in italics and have longer line to represent the fallout of his decision.	Written to coincide with a TV documentary about those returning from war with PTSD. Based on Guardsman Tromans, who fought in Iraq in 2003. Speaker describes shooting a looter dead in Iraq and how it has affected him. to show the reader that mental suffering can persist long after physical conflict is over. **Language** "Remains" - the images and suffering remain. "Legs it up the road" - colloquial language = authentic voice "Then he's carted off in the back of a lorry" – reduction of humanity to waste or cattle "his bloody life in my bloody hands" – alludes to Macbeth: Macbeth the warrior with PTSD and Lady Macbeth's bloody hands and guilt **Form and Structure** Monologue, told in the present tense to convey a flashback (a symptom of PTSD). -First four stanzas are set in Iraq; last three are at home, showing the aftermath.	The Duke is showing a visitor around his large art collection and proudly points out a portrait of his last wife, who is now dead. He reveals that he was annoyed by her over-friendly and flirtatious behaviour. He can finally control her by objectifying her and showing her portrait to visitors when he chooses. **Language** 'Looking as if she was alive': sets a sinister tone. -'Will't please you sit and look at her?' rhetorical question to his visitor shows obsession with power. "My gift of a nine-hundred-years old name / With anybody's gift': she was beneath him in status, and yet dared to rebel against his authority. "I gave commands; Then all smiles stopped together': euphemism for his wife's murder. "'Notice Neptune, though / Taming a sea-horse': he points out another painting, also about control **Form and Structure** Dramatic Monologue, in iambic pentameter. -It is a speech, pretending to be a conversation, he doesn't allow the other person to speak! -Enjambment: rambling tone, he's getting carried away with his anger and is a little unstable.	The narrator meets a traveller who tells him about a decayed statue that he saw in a desert. -The statue was of a long forgotten ancient King: the arrogant Ozymandias, 'king of kings.' -The poem is ironic and one big metaphor: Human power is only temporary – the statue now lays crumbled in the sand, and even the most powerful human creations cannot resist the power of nature. **Language** 'sneer of cold command': the king was arrogant, this has been recognised by the sculptor, the traveller and then the narrator. 'Look on my works, ye Mighty, and despair.': 'Look' = imperative, stressed syllable highlights commanding tone; ironic. **Form and Structure** A sonnet (14 lines) but with an unconventional structure, the structure is normal until a turning point (a volta) at Line 9 (..these words appear). This reflects how human structures can be destroyed or decay. -The iambic pentameter rhyme scheme is also disrupted or decayed.
Charge of the Light Brigade By Alfred Lord Tennyson	**The Emigree by Carol Rumens**	**Tissue by Imtiaz Dharker**	**Poppies by Jane Weir**
Published six weeks after a disastrous battle against the Russians in the (unpopular) Crimean War -Describes a cavalry charge against Russians who shoot at the lightly-armed British with cannon from three sides of a long valley. -Of the 600 hundred who started the charge, over half were killed, injured or taken prisoner. **Language** "Into the valley of Death": this Biblical imagery portrays war as a supremely powerful, or even spiritual, experience. -"jaws of Death" and "mouth of Hell": presents war as an animal that consumes its victims. -"Honour the Light Brigade/Noble six hundred": language glorifies the soldiers, even in death. The 'six hundred' become a celebrated and prestigious group. **Form and Structure** -This is a ballad, a form of poetry to remember historical events – we should remember their courage. -6 verses, each representing 100 men who took part. -First stanza tightly structured, mirroring the cavalry formation. Structure becomes awkward to reflect the chaos of battle and the fewer men returning alive.	'Emigree' – a female who is forced to leave their country for political or social reasons. -The speaker describes her memories of a home city that she was forced to flee. The city is now "sick with tyrants". -Despite the city's problems, her positive memories of the place cannot be extinguished. **Language** "I left it as a child": ambiguous meaning – either she left when she was a child or the city was a child (it was vulnerable and she feels a responsibility towards it). "I am branded by an impression of sunlight": imagery of light - it will stay with her forever. -Personification of the city: "I comb its hair and love its shining eyes" (she has a maternal love for the city). **Form and Structure** -First person. -The last line of each stanza is the same (epistrophe): "sunlight": reinforces the overriding positivity of the city and of the poem.	Two different meanings of 'Tissue' (homonyms) are explored: firstly, the various pieces of paper that control our lives (holy books, maps, grocery receipts); secondly, the tissue of a human body. -The poet explores the paradox that although paper is fragile, temporary and ultimately not important, we allow it to control our lives. **Language** Semantic field of light: ('Paper that lets light shine through', 'The sun shines through their borderlines', 'let the daylight break through capitals and monoliths') emphasizes that light is central to life, a positive and powerful force that can break through 'tissue' and even monoliths (stone statues). **Form and Structure** The short stanzas create many layers, which is a key theme of the poem (layers of paper and the creation of human life through layers) -The lack of rhythm or rhyme creates an effect of freedom and openness. -All stanzas have four lines, except the final stanza which has one line ('turned into your skin'): this line focuses on humans and addresses the reader directly to remind us that we are all fragile.	A modern poem that offers an alternative interpretation of bravery in conflict: it does not focus on a soldier in battle but on the mother who is left behind and must cope with his death. The narration covers her visit to a war memorial, interspersed with images of the soldier's childhood and his departure for war. **Language** Contrasting semantic fields of home/childhood ("cat hairs", "play at being Eskimos", "bedroom") with war/injury ("blockade", bandaged", "reinforcements") -Aural (sound) imagery: "All my words flattened, rolled, turned into felt" shows pain and inability to speak. **Form and Structure** This is an Elegy, a poem of mourning. -Strong sense of form despite the free verse, stream of consciousness addressing her son directly – poignant -No rhyme scheme makes it melancholic -Enjambment gives it an anecdotal tone.

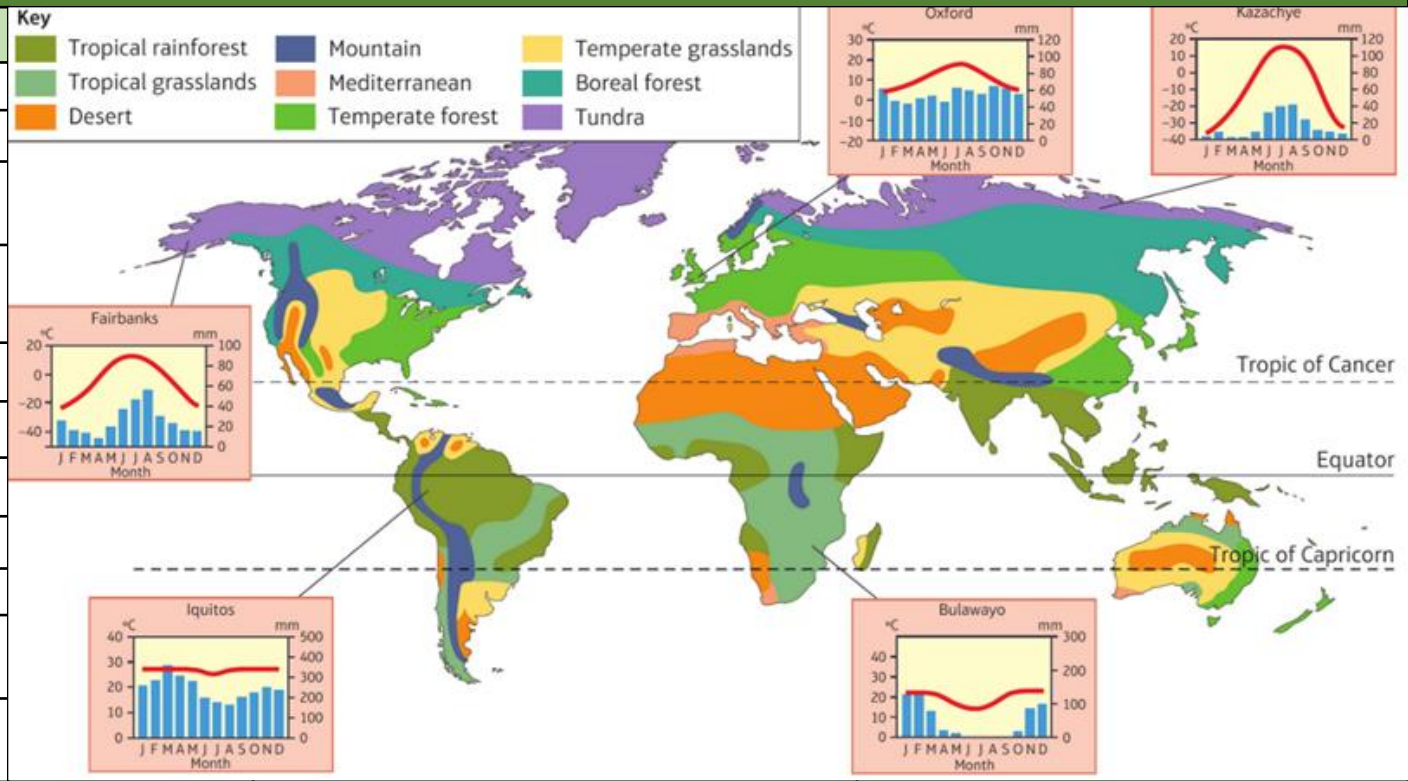
Year 11 Food & Nutrition: Term 2 – NEA 2 (Food Preparation Task)

NEA 2 Food Preparation Task | **Showcase your cookery skills.** | **Plan, prepare, cook and present.**

SECTION A- RESEARCH					
	Analyse the task	Research the task	Select dishes	Analyse Research	Plan skills trials
SECTION B DEMONSTRATING TECHNICA SKILL					
	Complete 3-4 skills trials	Give reasons for choosing each dish	Evaluate each dish	Test and record subjective data	Present information
SECTION C– PLAN THE FINAL MENU					
	Give reasons for choosing final dishes	Link back to the brief and research	Create a dovetailed time plan for final dishes	Prepare, prepare, prepare	Prepare some more!!!

Geography — Paper 3: Topic 7 – People and the Biosphere

Key Term	Definition
Abiotic	Non-living part of a biome, includes the atmosphere, water, rock and soil.
Affluence	Great wealth or abundance.
Afforestation	The plant of trees where there were none before, or they had been cut down.
Altitudinal zonation	Is the change in ecosystems at different altitudes, caused by alterations in temperature, precipitation, sunlight and soil type.
Atmosphere	The layer of gases above the Earth's surface.
Biodiversity	Means the number of different plants and animal species in an area.
Biome	A large-scale ecosystem e.g. tropical rainforest.
Biosphere	The living layer of the Earth between the lithosphere and atmosphere.
Biotic	Living part of a biome, made up of plant (flora) and animal (fauna) life.
Deforestation	The deliberate cutting down of forests to exploit forest resources (timber, land or minerals).
Ecosystem	A localised biome made up of living things and their non-living environment. For example, a pond, a forest, a desert.
Ecosystem services	A collective term for all the ways humans benefit from ecosystems.
Ecosystem stress	Factors, which can be natural or human-produced, which put pressure on ecosystem productivity and processes.
Fauna	Animals
Flora	Plants
Hydrological cycle	The movement of water between its different forms; gas (water vapour), liquid and solid (ice) forms. It is also known as the water cycle.
Indigenous people	Are the original people of a region. Some indigenous groups still lead traditional lifestyles e.g. a tribal system, hunting for food.
Natural resources	Are materials found in the environment that are used by humans, including land, water, fossil fuels, rocks and minerals and biological resources like timber and fish.



Biome	Climate	Vegetation
Tropical rainforests	Hot all year, 25-30˚C, rainfall 200-3000mm	Dense forest, layers of trees, high competition
Tropical grasslands	Hot all year, 25-35˚C, rainfall 500-1000mm	Tall grasses, shrubs, trees e.g. baobab
Deserts	Very hot all year 30˚C, cool nights, less than 250mm rain	Scarce plants, spines not leaves
Temperate grassland	Summer 25˚C, very cold winter -40˚C, 500-900mm rain	Short grasses with very few trees and bushes
Temperate forest	Summers 18˚C, cool winter 5˚C, 1000mm rainfall	Deciduous trees such as oak
Boreal forest	Mild summers 10-20˚, Cold winters below 0˚C, less than 500mm rainfall	Coniferous trees such as pines
Tundra	Below 0˚C most of the year, less than 250mm rainfall	Very few plants mostly lichens and mosses.

Factors affecting location of biomes:

Local factors	Global factors
Altitude	Precipitation
Drainage	Sunshine hours
Soil/rock type	Temperature

Ecosystem good and services

Goods	Services
Food (nuts, fruit)	Education/Tourism
Medicine	Nutrient cycling
Fuel	Hydrological cycle
Building materials	Carbon and oxygen cycle

Factors that are causing the increasing demand for resources:

Increasing affluence (wealth):

•Economic developing means that people are getting more affluent.
•Wealthier people have more **disposable income** this means they can spend money on more food, cars, technology (this uses energy.)

Urbanisation:

•More people are living in urban areas.
•**Urbanisation** increases resource consumption because cities tend to be more **resource intensive** than rural areas
•Food and water are transported long distances to meet the needs of increase demands in cities and waste also needs to be removed – this uses energy.

Industrialisation:

•Manufacturing goods such as cars, chemicals and electrical appliances use a lot of energy. Manufacturing also uses a lot of water.
•As countries **industrialise** – their demand for energy and water increases. Industrialisation also is increasing the production of processed goods. This increases the demand for ingredients such as **palm oil** – forests are destroyed for the growth of palm oil via plantations.

How is the biosphere being exploited for wider global use?

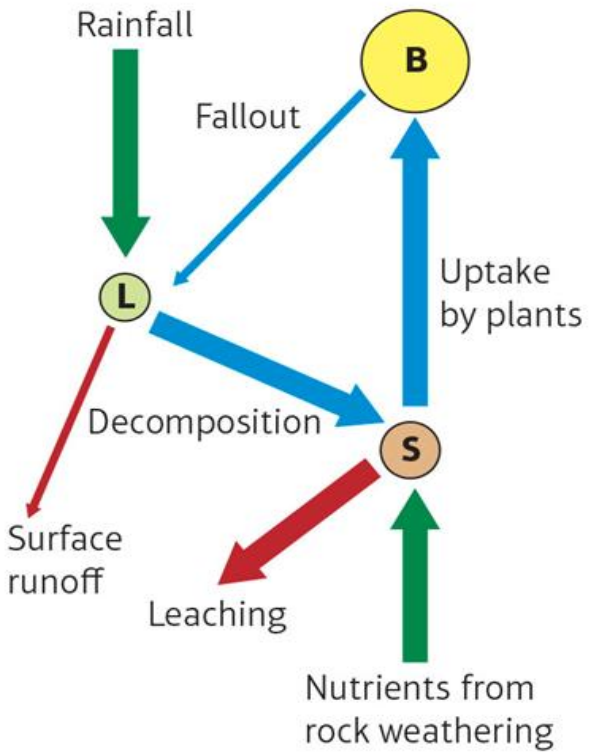
Cause	Explanation
Energy 	• Demand for energy is increasing as the world population increases and so does the **affluence.** • Deforestation is needed to make land for crops that can be used to make **biofuels (palm oil**), or to make way for coal mines or power stations. Some areas of tropical rainforest have been flooded by the building of dams for hydroelectric power **(HEP.)**
Water 	• Demand for water is also increasing because of our rising global population – people use water for washing, drinking and **irrigating** farmland. • Water resources can be **over exploited**, this is happening in **arid areas** like the Sahara desert. This can cause damage to the biosphere as plants and animals no longer have enough water to survive
Mining 	• Minerals such as gold and iron are used in building, scientific instruments and electrical appliances and the demand for them is increasing. • Minerals are often **extracted** by mining. Mines in tropical forests are responsible for deforestation **and toxic chemicals** are washed into streams and rivers, killing wildlife.

What does this mean for the future?

Malthus's Theory (pessimistic)	Boserup's theory (optimistic)
•Population growth increases **geometrically** but food production only increases **arithmetically.** •Population would outgrow food supply. •This meant **famines, wars and diseases** would occur to reduce population size naturally.	•Population growth would force people to be **inventive** to overcome the problems of food shortages and they would find ways to increase food production through **innovation e.g. GM crops.** •Population growth is a good thing and that it is essential to human progress.

Key Term	Definition
Acid precipitation	When industrial air pollution causes water vapour in the atmosphere to become acidic and fall as acid rain.
Arable	The farming of crops like wheat and barley.
Biofuel	Is made from plant oils and waste materials and can be used to generate electricity.
Biomass	The mass (weight) of all the living things in an ecosystem.
Boreal	A type of forest found in high northern latitudes, also called taiga.
Canopy	The continuous layer of tall trees which shades the forest floor.
Carbon sinks	Natural stores for carbon-containing chemical compounds, like carbon dioxide or methane.
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora.
Commercial agriculture	Farming in which crops are grown for sale.
Coniferous	Having needle instead of leaves: most coniferous trees have cones and are evergreen.
Conservation	Means protecting threatened biomes e.g. setting up national parks or banning trade in endangered species.
Deciduous	Having leaves that fall off in the autumn and grow again in spring.
Deforestation	The deliberate cutting down of forests to exploit forest resources (timber, land or minerals).
Direct threat	When there is a direct cause between one thing happening and damage being caused to something else.
Emergent	Very high trees that grow another ten metres or more above the tropical rainforest canopy.

Nutrient cycle in the TR



Plant adaptations	Animal adaptations
Drip tips	Mimicry
Buttress roots	Nocturnality
Epiphytes	Camouflage
Thin/smooth bark	Poison
Leaf angling	Changing size and stature
Lianas	Changing of habitats

Where are Tropical rainforests (TRF)?

- Most tropical rainforests are located between 20° north and south of the **Equator.**
- This zone has an **equatorial climate.**
- This means it is hot all year round with average temperatures of 27-20°C and never falls below 20°C.
- There is **precipitation** all year round with annual precipitation rates of 2000-3000mm a year.
- **Abiotic** components of the TRF such as the atmosphere, soil and water interact closely with all of the biotic characteristics including plants, animals and humans.

What are the direct threats to the TRF? (Deforestation)

Commercial agriculture e.g. cattle ranching, sugarcane and palm oil

Subsistence agriculture e.g. 'slash and burn'

Commercial logging – legal and illegal

Open cast Mining for minerals and road building

Fuelwood and **charcoal.**

Climate change - indirect threat:

Conditions are likely to be hotter and drier with a dry season lasting several months. Animal species are unable to cope with heatwaves and plants are unable to survive forest fires or drought

Global Actions to protect TRF

CITES - The main aim is to prevent the trade of endangered animal and plant species across the world. Especially if it threatens the rainforests biodiversity.

REDD—The is a UN scheme that advises governments on how they can reduce deforestation and promote afforestation.

Local Actions to protect TRF

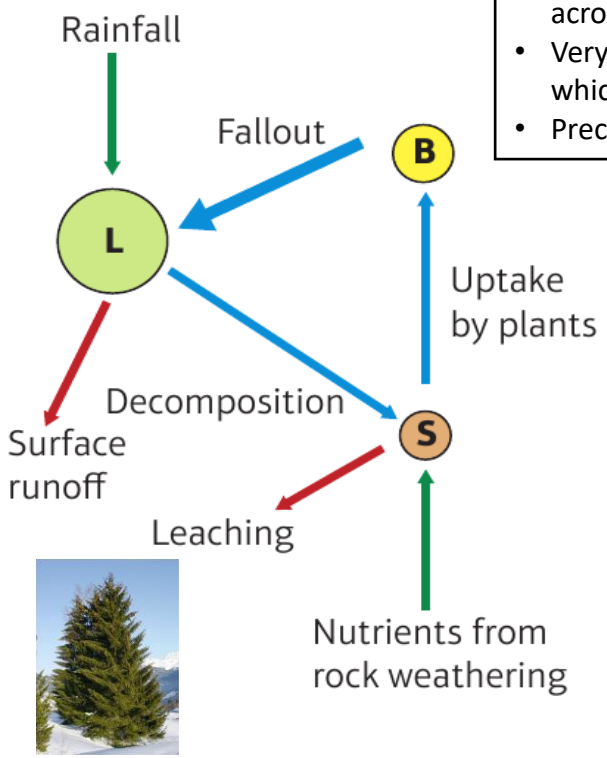
Sustainable rainforest management - This aims to prevent damage to the rainforest so that it benefits local people. This combined with ecotourism can create jobs for locals.

Geography

Paper 3: Topic 8 – Forests under Threat

Key term	Definition
Equatorial climate	The constantly hot and wet climate of regions near the Equator.
Food web	A complex network of overlapping food chains that connect plants and animals in biomes.
Fossil fuels	A natural fuel found underground, buried within sedimentary rock in the form of coal, oil or natural gas.
HEP	Hydro-electric power - The use of fast flowing water to turn turbines which produce electricity.
Indirect threat	When there is not a direct cause between one thing happening and another thing being damaged.
Invasive species	Is a plant, animal or disease introduced from one area to another which causes ecosystem damage.
Leaching	When minerals are washed downwards through the soil by rainwater.
Nutrient	Mineral or chemical that plants and animals need to grow.
Nutrient cycle	Nutrients move between the biomass, litter and soil as part of a cycle which keeps both plants and soil healthy.
REDD	Reducing Emissions from Deforestation and Forest Degradation.
Subsistence farming	Where farmers grow food to feed their families, rather than to sell.
Sustainable forestry	When trees are cut down for timber and they are replaced by new trees.
Sustainable management	Planning ahead and controlling development for a long future.
Wildfire	Uncontrolled burning through forest, grassland or scrub. Such fires can 'jump' roads and rivers and travel at high speed.

Nutrient cycle in the Taiga



Where is the Taiga?

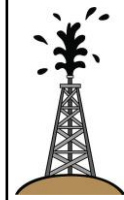
- The taiga is the largest biome on the earths surface stretching about 50˚ to 70˚N across the north of Asia and America in a zone called the subarctic climate.
- Very long and cold winters with average temps –40˚C compared to summers which are short and mild rarely above 16˚C.
- Precipitation is low, less than 500mm.

What are the direct threats to the Taiga?

Commercial developments are the greatest threat to the taiga, some having a greater impact than others.

Logging for softwood which is used for timber in construction

Mining minerals, oil and gas have indirect threats such as oil spills and forest fires.



What are the indirect threats to the Taiga?

Acid rain from sulphur dioxide released from burning fossil fuels

Forest fires from camp fires or gas flares in oil fields

Pests and diseases such as fungus and mould damage confers' needles.

Plant adaptations	Animal adaptations
Conical trees	Thick fur
Shallow roots	Hibernation
Evergreen trees	Camouflage
Pine needles	Small ears/tails
Waxy coating	Winter migration
Grouped together	Layer of fat

Actions to protect the Taiga

Protected Wilderness areas and National Parks - prevent commercial development of the taiga within their boundaries. The aim is to preserve the taiga environment and its biodiversity.

Sustainable Forestry—This is when trees are cut down and are replanted with native taiga species.

What are the conflicting views on protecting the taiga?

Forestry - use it sustainably e.g. Canada or unsustainably e.g. Russia

Mining- 380,000 Canadians emp. in mining.

Indigenous people - desire to maintain traditional activities e.g. hunting.

Tourism - tourists visit the taiga and bring money into local economies

Taiga products - paper, oil, gas comes from the taiga

Key Term	Definition
Biofuels	Any kind of fuel made from living things, or from the waste they produce.
Black gold	A term used for oil, as it is regarded as such a valuable commodity.
Carbon footprint	A calculation of the total greenhouse gas emissions caused by a person, a country, an organisation, event or product.
Energy diversification	Getting energy from a variety of different sources to increase energy security.
Energy security	Having access to reliable and affordable sources of energy.
Flow resource	Resources such as wind, HEP or tidal energy that is used as it occurs and then replaced.
Fossil fuels	A natural fuel found underground, buried within sedimentary rock in the form of coal, oil or natural gas.
Fracking	A process that involves drilling down into the Earth and using a high-pressure water mixture to release gas trapped inside rock.
Geothermal	Heat from inside the Earth.
Greenhouse gases	Gases like carbon dioxide and methane that trap heat around the Earth, leading to global warming.
HEP	Hydro-electric power - The use of fast flowing water to turn turbines which produce electricity.
Natural resources	Are materials found in the environment that are used by humans, including land, water, fossil fuels, rocks and minerals and biological resources like timber and fish.
OPEC	Organisation of Petroleum Exporting Countries - Established to regulate the global oil market, stabilise prices and ensure a fair return for its 12 member states who supply 45% of the world's oil.
Peak oil	The theoretical point at which half of the known reserves of oil in the world have been used.
Reserve	The estimated amount of resources left which can be extracted.
Strip mining	(or open-pit, opencast or surface mining) involves digging large holes in the ground to extract ores and minerals that are close to the surface.
Tar sands	Sediment that is mixed with oil, can be mined to extract oil to be used as fuel.

Classifying energy sources:

We can classify energy sources as **non-renewable, renewable and recyclable:**

Fossil fuels (non-renewable resources) have fuelled economic development since the industrial revolution, whilst causing significant environmental damage. **Non-renewable resources** are finite or stock resources meaning no more are being created and they will eventually run out.

Renewable energy resources are energy sources that will never run out such as wind, solar, tidal, geothermal and hydro-electric power.

Recyclable energy resources can be reused into the future such as biofuels and nuclear power, where the uranium fuel is reprocessed and used again.

The impacts of HEP:

- Flooding
- Landscape scarring
- Deforestation
- Migration patterns impacted

The impacts of drilling:

- Landscape scarring
- Carbon emissions
- Oil spills
- Deforestation
- Migration patterns impacted

The impacts of mining:

- Landscape scarring
- Carbon emissions
- Deforestation
- Migration patterns impacted

The impacts of solar energy:

- Land use
- Potential deforestation
- Landscape scarring

The impact of wind turbines:

- Landscape scarring
- Migration patterns change for birds

The impacts of nuclear:

The creation of radioactive waste materials can remain radioactive and dangerous to human health for thousands of years.

Access to energy resources is not evenly distributed due to….

Geology: Most oil and gas is found in the Middle East. Coal reserves are mostly in Russia, USA and China. Geothermal energy is only accessible in areas close to plate boundaries such as New Zealand and Iceland.

Relief and climate: Regions with high rainfall and suitable relief are often good locations for HEP. Climates are also important to harness the potential of wind and solar power.

Accessibility and Development: How economically developed a region is influences its ability to invest in new technology. Some resources are in remote regions making them expensive to exploit.

Reasons for variations in energy use globally:
Economic development – determines demand and technology access.
Economic sectors – primary, secondary, tertiary, quaternary will have different energy uses.
Traditional methods – biomass fuels used in rural Sub-Saharan Africa

What is the distribution of oil reserves and production?

- The Middle East has the largest reserve with 804bn barrels left enough for 200years.
- Saudi Arabia, USA and Russia are the world's biggest producers (over 10m barrels per day).
- New reserves are often found in more hostile locations such as the Arctic, the tropical rainforests of Ecuador and Venezuela and under seas for example the North Sea.

How has the global consumption of oil changed?

Consumption has been rising since 1990's due to increasing demands for energy and wealthier populations mainly through development and industrialisation in emerging countries such as China.

What are the factors affecting energy supply and prices?

During periods of recession e.g. after 2008, economies slowed down so fewer goods were bought resulting in less demand for oil which saw the price fall.

Oil spills or explosions e.g. 2010 BP oil rig in the Gulf of Mexico

Conflicts e.g. 2013-14 Iran and Saudi Arabia failed to agree production targets, Saudi Arabia produced more and prices fell.

The discovery of new sources in the USA e.g. shale gas/tar sands has reduced imports and lowered global prices.

Who is OPEC?

The Organisation of the Petroleum Exporting Countries is an inter-governmental organisation for oil producers and exporters. Its members have immense power to influence the supply and price of oil to global markets.

Unconventional fossil fuels

Fracking (USA)- The process involves drilling down into shale rock deposits, then injecting water sand and chemicals into the rocks at high pressure, which frees natural shale gas from the rocks allowing it to be collected.

Positives	Negatives
Reduced energy bills for Americans	Releases high concentrations of methane
Jobs created	Groundwater contamination
Self-sufficiency	Loss of habitats
Reduces reliance on coal	Carbon emissions
Energy security	Water intensive

Athabasca tar sands, Canada - Tar sands are a mixture of mostly sand, clay, water, and bitumen. Bitumen is used to produce gasoline. There is approximately 180 billion barrels of bitumen within the sand deposits that can be refined into petroleum

Positives	Negatives
Jobs created for locals	Deforestation of boreal forest
Carbon capture storage can be used	Energy intensive during refining
Very large supply available	Toxic waste leaks into rivers
Energy security	Very water intensive
Keeps oil prices low	Loss of local habitats

	Costs (Disadvantages)	Benefits (Advantages)
Wind energy	Visual pollution, offshore transmission lines are expensive, 4 bird deaths per turbine	Clean, no air pollution, huge generating capacity esp. offshore, cheapest source of energy to the consumer
Solar energy	Take up farm land, manufacturing of panels are made of toxic metals, desert habits are damaged	Creates 1000's jobs, little maintenance once installed, no noise pollution in energy creation
HEP	Expensive, visual pollution, impact habitats altering river flows, displaced farms/villages	Reliable, flexible to meet consumption patterns, dams can help conserve/regulate water supplies
Biofuels	Large amounts of water needed, competition for land growing food crops, increased deforestation	Fewer CO2 emissions than FF's, cheaper option as demand grows, can use by-products otherwise wasted
Hydrogen	FF's still required to generate hydrogen, difficult to store safely	Clean, no greenhouse gases, made form water, very efficient

Key Terms	
CORE	Congress of Racial Equality – led by James Farmer.
NAACP	National Association for the Advancement of Coloured People – Created in the early 1900s.
SCLC	Southern Christian Leadership Conference – A group led by Martin Luther King.
Ku Klux Klan	A white supremacist group based in the south who used violence against African Americans.
Boycott	A planned group refusal to do something. E.g. Boycott the bus would mean people would refuse to use the bus.
Constitutional	The written law followed in the USA.
Supreme Court	The highest court in USA.
Senate	The upper house of the US government.
Deep South	The Deep South is a region in Southern USA, referring to states most dependent on slaves during the pre-Civil War period and became a major site of racial tension.
Ghettos	Name given to black neighbourhoods in USA with segregated conditions and widespread poverty.
Inequality	The state of being unequal in status, rights, or opportunities.
Discrimination	The unjust or prejudicial treatment of different categories of people.
Segregation	The action of making someone or something apart from others. For example separating toilet facilities for different racial groups.
Integration	The bringing together of people from the different groups.
Jim Crow Laws	State and local laws that enforced racial segregation in Southern USA between 1876-1965.
Southern Manifesto	Was a document written in February and March 1956 in government that was opposition to racial integration of public places.

History

Paper 3 USA: Conflict at home and abroad

Key Topic 1: The development of the civil rights movement, 1954-60

By the early 1950s, slavery had long been abolished and, by law, black Americans were equal to white Americans and had the **same rights**. However, black Americans were **not actually treated as equal**. All over the USA, most black Americans lived in the worst parts of towns and cities, with the worst hospitals, schools and other facilities. They did the least desirable jobs and were often the 'last hired, first fired'. Many jobs were beyond their reach because training for these jobs was not given to black people.

The situation was **worse in the South**. In most southern states, **local laws** meant that black Americans could not use the same toilets as white people, swim in the same swimming pool, ride in the same part of the train or eat in the same restaurant. This system of **segregation** kept black and white communities **separate**. Black Americans had the right to vote but were stopped from doing so by a system that deliberately discriminated against them. They were also stopped by threats and violence.

The reaction of black Americans depended on where they lived and what their circumstances wee. Some black Americans, especially in the South, tried to improve their lives inside the system enforced by white people. Others joined **civil rights organisations** to campaign for **equality**. Whilst this was successful to some degree, they faced a lot of **opposition**.

Key events:

1896 - Supreme Court decision of Plessy vs. Ferguson – 'separate but equal'

1940 - NAACP set up the Legal Defence Fund

1954 - Brown V Topeka case makes segregation in education illegal

1955 - Murder of Emmet Tills

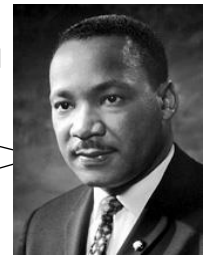
1955-1956 - Montgomery Bus Boycott

Nov 1956 - Supreme Court decides segregation on buses is illegal

Jan 1957 - Founding of SCLC

Sept 1957 - Little Rock High School

Sept 1957 - Civil Rights Act



Key Terms	
Sit-in	A method of peaceful protest where black Americans sat in white only cafes and restaurants and refused to leave.
SNCC	Student Nonviolent Coordinating Committee.
Freedom Riders	Civil rights activists who rode interstate buses into segregated southern United States from 1961 onwards.
Propaganda	A way of controlling public attitudes. Propaganda uses things like newspapers, posters, radio and film, to put ideas into people's minds and therefore shape attitudes.
Attorney General	The head of the US Department of Justice.
Nation of Islam	An African American and Religious movement. This was the group Malcolm X belonged to.
Separatism	Keeping people completely separate based on race/religion/gender etc.
Black Power	A movement that aimed for self-determination of black Americans in the 1960s and 1970s.
Kerner Report	A report by the National Advisory Commission on Civil Disorders. It was named after Otto Kerner, the Chair of the Commission.
The Anti-Vietnam War Movement	A small anti-war movement that grew into an unstoppable force, pressuring American leaders to reconsider its commitment.

History Paper 3 USA: Conflict at home and abroad

Key Topic 2: Protest, progress and radicalism, 1960-75

Key events:

1960 – Greensboro sit-in

1960 – SNCC set up

1961 – Freedom Riders

1962 – James Meredith case

1963 - Campaign 'C'

1963 – MLK 'I have a dream' speech

1963 – Kennedy assassinated

1964 – Freedom Summer

1964 – Civil Rights Act

1965 – Assassination of Malcom X

1965 – Selma

1965 – Voting Rights Act

1966 – March against fear

1966 – Black Panthers set up

1968 – Assassination of MLK

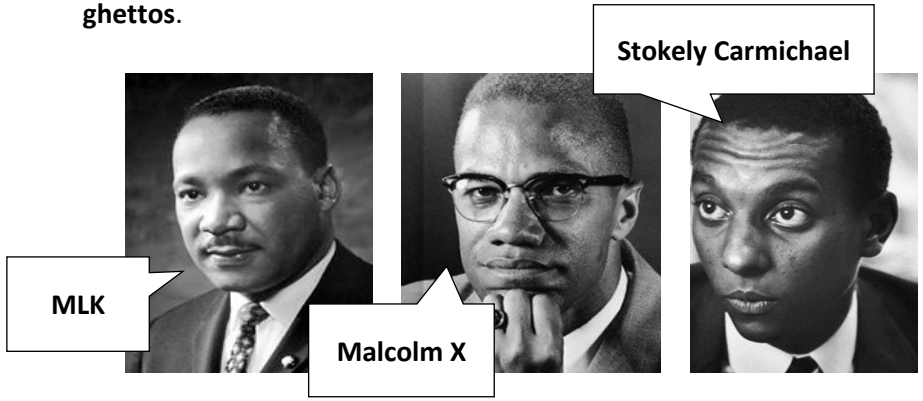
1968 – Kerner reports

1969 – Nixon becomes president

From 1960, **support** for the civil rights movement grew. The different civil rights groups worked together to plan and carry out larger and larger **non-violent** direct action protests in the **South**. However, while methods of protest changed, the reaction of white people in the South did not. The resulting **violence** from white people inspired disgust around the country and the world. Images such as police setting dogs on black children showed America in a shocking light. The USSR was able to score points in the **Cold War** by pointing out that while the US claimed it supported democracy and freedom, it could not even protect its black citizens from violence.

This **criticism**, from both inside and outside the US, forced the **federal government** to act decisively. By 1966 there was both a **Civil Rights Act** and a **Voting Rights Act** in place to protect the rights of black Americans. However, at this point, many white supporters of civil rights felt that their work was done; that the struggle was over. In reality, equality was still a long way off.

In the late 1960s there were very different images of black Americans on TV screens. Black Americans were **rioting** in the streets of cities across the country, especially in the **North**. In the minds of many Americans in 1975, the image of the civil rights movement was not of a defenceless black person being attacked by a white policeman, but of a young black man throwing bricks or even petrol bombs in one of the nation's many **ghettos**.



Key Terms	
Colony	A place controlled by another country, politically and economically.
Communist	A communist government owns all businesses and land in the country it controls. Everyone works for the government. In return, the government provides everyone in the country with everything they need, such as food, homes, healthcare and education.
Vietnam	Southeast Asian country that boarders China, Laos and Cambodia.
Vietminh	Group fighting for independence for Vietnam from French rule .
Ho Chi Minh	Leader of the Vietminh, he was a communist and wanted independence for Vietnam.
Bao Dai	Leader of Vietnam, who was supported by the French, he was anti-communist.
Accord	A formal agreement.
ARVN	Army of the Republic of Vietnam – they supported the government in the South and were closely aligned with the USA.
The Ho Chi Minh Trail	A series of dirt paths and smaller trails, which ran mainly through Laos and Cambodia from North Vietnam into South Vietnam. North Vietnam used it to send troops and supplies to support the Vietcong in South Vietnam. It was later paved.
Vietcong or VC	Fighters who fought against the government in South Vietnam.
Ngo Dinh Diem	The leader of South Vietnam, the government was weak and supported by the USA.
Strategic Hamlet Programme	Supported by the US, the setting up of new villages for the people of South Vietnam, with heavy protection from the Vietcong.
Green Berets	US Special Forces, sent to train villagers to protect their villages.
Guerrillas	Fighters who avoid big battles and attack their enemy by blowing up roads and bridges, ambushing them and striking them with sudden 'hit and run' attacks.
Rolling Thunder	A bombing campaign over North Vietnam by the US, it targeted the Ho Chi Minh Trail to stop supplies coming South and any industry.
Chemical Warfare	A variety of herbicides were used to kill jungle plants and crops in farmland around villages.
Nixon Doctrine	A speech saying the USA would honour any treaty commitments it had made, the USA would help any ally against nuclear threat and would provide aid and training against non-nuclear threats – but not troops.
Vietnamisation	The application of the Nixon Doctrine in Vietnam. The USA would withdraw troops and shift responsibility for fighting to the ARVN.

History Paper 3 USA: Conflict at home and abroad

Key Topic 3: US involvement in the Vietnam War 1954-75

After the Second World War, Vietnam remained a **colony** in **French Indochina**. It was a poor country with very little industry, but became one of the **biggest conflicts** within the Cold War. The USA supported ideas or democracy while the USSR supported ideas state control, equality and economic restriction. Rather than fighting directly the two superpowers **supported different sides** in other conflicts in order to win conflicts to their side. Vietnam was one of these conflicts, the **North** was **supported by China** and the **USSR with the South** being **supported by the USA**.

The USA tried to fight a limited war by **sending supplies** and **training troops** but not sending troops to fight, but **over time** the USA became increasingly sucked into the war, **sending hundreds of thousands of troops** in an effort to **stop Vietnam becoming communist**.

Under the presidencies of **Kennedy** and **Johnson** the involvement increased, **Operation Rolling Thunder** was a bombing campaign aimed to try and weaken the North. The American struggled to take the upper hand and in 1968 the North launched the **Tet Offensive**. This shocked the Americans and there was growing **anti-war feeling** at home however they managed to recapture any cities taken by the North. After the election of Nixon the Americans begin a slow **withdrawal** from Vietnam **conceding** that they will not defeat the North.

Key events:

1954 – Defeat at Dien Bien Phu leads to French withdrawal from Vietnam

1956 – Ngo Dinh Diem refuses to hold elections

1959 – Ho Chi Minh begins sending troops and weapons into the south of Vietnam

1961 – President Kennedy increases US involvement in Vietnam

1963 – Quang Duc, a Buddhist monk, sets fire to himself in Saigon

1964 – Gulf of Tonkin incident

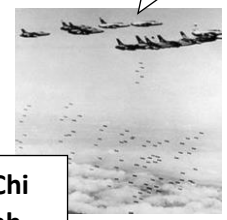
1965 – Operation Rolling Thunder launched

1968 – Tet Offensive / My Lai Massacre

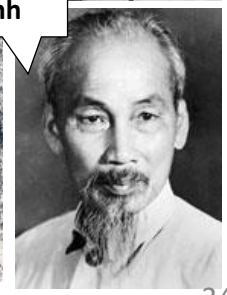
1973 – Paris Peace Accords

1975 – Saigon falls to the North

Operation Rolling Thunder



Ho Chi Minh



Strategic Hamlets

Key Terms	
Opinion Polls	A test of public opinion where the same questions are asked of a large number of people. The answers are analysed to show public feeling.
Counter Demonstration	A demonstration held to show opposition to a demonstration taking place at the same time.
SDS	Students for a Democratic Society – a student group with significant support that protested against the Vietnam war.
The Draft	Compulsory service in the military forces.
The My Lai Massacre 1968	US troops were sent to battle with VC forces however in the village of My Lai there were only women and children, they were still killed.
Congress	The elected group of people in the US who are responsible for making the law.
Red Scare	'Red' was a term applied to communists. The 'Red Scare' was when many Americans feared US communists would start a revolution.
Patriots	Patriotism is the love of one's country, many Americans were fiercely patriotic. This meant that they supported the government and therefore the war in Vietnam.
The 'silent majority'	Nixon refers to people who mainly supported his polices, but did not actively campaign either for or against the war.
Paris Peace Accords	Agreement signed by USA, North Vietnam, South Vietnam and the Provisional Revolutionary Government.
The Kent State Shooting	National Guardsmen shot dead four unarmed students during a protest on the Kent State University campus against the Vietnam war.

History Paper 3 USA: Conflict at home and abroad

Key Topic 4: Opposition to the war

Before 1965 there was broad support for US involvement in Vietnam, although some **anti-war groups** did speak up from the start. Once military involvement in the war increased, the **media** and **public** quickly became more concerned. **Opposition** came from people of every race, class, age and religious belief.

The media coverage of the **My Lai Massacre**, where US soldiers killed women and children in a Vietnam village, sparked outrage among the American public and fuelled further protest against the war. At home the **Kent State Shootings**, where American students were shot after protesting against the war again created further anti-war feeling.

Many Americans supported the war because they **feared** that **communism** would spread, however it became clear that the US were **spending** too much money and loosing too many lives to remain in the war with Vietnam.

After the **Paris Peace Accords** the Americans began a **slow withdrawal**, much to the delight of many Americans. It was the first war that America had been involved in where large sections of the population did not accept the need for the war.

Key events:

1965 – Students for Democratic Society gives statement against the war

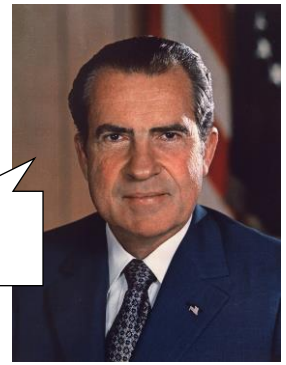
1968 – The My Lai Massacre

1969 – Nixon 'silent majority' speech

1970 – Calley's trial

1970 – The Kent State shooting

1973 – Paris Peace Accords



Richard Nixon

Anti-war protests

Kent State Shooting

Religious Studies GCSE AQA 8062 A- use with your revision guides

Paper one I hour 45 minutes: Judaism beliefs and practices. Islam beliefs and practices.

Each section has the following question types:

1 mark multiple choice eg

Which one of the following is the belief that God allows people to make decisions for themselves? [1]

A Charity B Free will C Mitzvot D Shekhinah

2 mark short question requiring key evidence of your subject eg

Give two of the Ten Commandments [2]

4 mark question needing two ' mini PEELS'- two explanations eg

Explain two ways in which belief in the future Messiah influences Jews today [4]

5 mark question needing an expanded explanation with key evidence such as sources or quotations eg

Explain two ways in which Jews understand the belief that G-d is One. Refer to sacred writings or another source of Jewish belief and teaching in your answer [5]

12 mark question- this sometimes also carries an extra 3 SPAG marks for excellent spelling punctuation and grammar. This needs two clear, explained points agreeing and disagreeing with a statement or question. You must use evidence from religious sources eg

'The moral principle of justice teaches Jews all they need to know about the way they should live.'[12]

Test yourself with some past questions papers here: https://www.aqa.org.uk/subjects/religious-studies/gcse/religious-studies-a-8062/assessment-resources

Jewish Studies – Judaism Beliefs. Term Two- use together with your revision guides

Nature of G-d

Jews believe in one G-d. This belief is called **Monotheism.**

1

G-d is the **Creator** of everything – He made the Universe and everything in it from nothing. He created it in 6 days and rested on the seventh, Shabbat. G-d is a single, whole, indivisible entity, beyond the full understanding of humankind. G-d **sustains** the world. He is everywhere and in everything. G-d is the source of all Jewish morality, beliefs and values. **'Shechinah'** is the word used to describe the 'presence' of G-d. Whilst G-d cannot be seen, His presence can be felt through experiences such as prayer or wonder at the beauty of nature. People can bring the shechinah into their homes by lighting shabbat candles or having a mezuzah on the door. G-d has given Jews laws to follow and will judge them on how well they follow them. G-d is the only one Jews should pray to and praise.

'In the beginning G-d created the heavens and the earth' (Torah)

'Here Oh Israel, the Lord our G-d, the Lord is one (Shema)

Life After Death

There is no one belief about life after death that all Jewish people hold. Judaism does not place too much emphasis on the next life **(Olam Habah).** They focus more on this life **(Olam Hazeh)** and living according to G-d's mitzvot. Jews believe in the idea of reward and punishment. The most righteous souls will go directly to **Gan Eden** – a place close to G-d. Most people will go to **Gehenna** – a place where the soul is cleansed before going to Gan Eden. By following G-d's commandments, a person will enjoy a relationship with G-d in the next world. Jews believe G-d gives every person a body and a soul. The body is created from dust and returns there after death. The soul is unique, breathed in by G-d and lives on after death.

Some Jews believe in reincarnation. Some Orthodox Jews believe in resurrection at the coming of the **Messiah**. The world to come is also open to all people who observe the 7 Noachide laws.

'This world is a passageway to the world to come'
'According to the effort is the reward' (Ethics and the Fathers)

Key Moral Principles

Pursuing **Justice** is a sacred duty. Justice is bringing about what is right and fair. **Tikkun Olam** is Healing the world.

Jews can heal the world by engaging in actions that bring them closer to God. Tikkun Olam motivates Jews to get involved in social justice work. **Chessed** is loving kindness and **Tzedakah** is charity. Both of these are connected to justice. The Torah commands Jews to give one tenth of their earnings to charity and to do acts of kindness. **Sanctity** of life. Life is holy; it is a gift from God and only He can give it or take it away. It should be respected. **Pikuach Nefesh** is the obligation to preserve/save life which overrides all other **Mitzvot.**

'The highest form of charity is to help a person to help themselves' (Maimonides)

Messiah

Messiah means 'anointed one'. He will be the future leader of the Jews, a future King of Israel, and a descendant of King David. He will rule in the 'Messianic Age'. The Messiah will uphold the law of the Torah, rebuild the Temple in Jerusalem and unite humanity as one, ushering in world peace.

There is debate about what the Messianic age will look like. Some say the dead will be resurrected, others say it will be a time of peace and harmony. Jews focus on the coming of Messianic age in prayer. The idea of Messiah offers hope in troubled times. Reform Jews reject the idea of there being a person Messiah, but rather think that everyone should work together to make the world a better place.

'There shall be war no more' (Isaiah)

Covenants

Covenant means agreement and is a two way promise that can never be broken.

Abraham was the first **monotheist; a belief in only one G-d.** G-d made a covenant with Abraham; he would be the father of the Jewish people; his descendants would follow G-d and were promised the Land of Israel.
Sign of the covenant is circumcision.
G-d also made a covenant with Moses at Mount Sinai. The terms were: G-d would look after the people, as long as they obeyed his laws. G-d gave Moses the 10 commandments at Mount Sinai as part of the 613 which the Jews had to follow. Shabbat is the sign of this covenant.
Both of these covenants established a special relationship between G-d and the Jewish people.

'I am the Lord Your G-d' (first commandment)

Jewish Diversity

Jews in the UK are linked by a shared history and tradition.
In the 21st century, Jews have had a different approach to belief and observance.

Orthodox Jews believe that **the Torah is the literal word of G-d** and observe the mitzvot. They may live in close communities, go to Shul on Shabbat, observe all festivals and pray daily.

Secular Jews may not believe in G-d and **may reject some or all of the mitzvot** for this reason. They may still connect to aspects of Jewish tradition such as a Passover Seder or a traditional Friday night meal. They will also put **value on ethical commandments** such as giving charity or social justice.

Reform or Liberal Jews will feel a need to **adapt Judaism for modern times**. They may believe that the **Torah is inspired by G-d**, but may see some ritual mitzvot as outdated or no longer relevant. For example, men and women will sit together in Shul, they may have a woman Rabbi and may conduct same sex marriages in their synagogues. They see ethical mitzvot such as 'tikkun olam' as very important.

Mitzvot And Free Will

Mitzvot literally means commandments.
The **10 commandments** are the 'headline' mitzvot, given to Moses and all the Jewish people at Mount Sinai, when they received the Torah. Jews are guided by Holy Books, the Torah, the Prophets and the writings make up the collection of Holy Books, known as the '**Tenach**'.
The 10 commandments are part of the **613 mitzvot** Jews are obligated to keep. These cover all aspects of life and show faith, belief, self-control; keeping mitzvot adds holiness into thought, word and action.
The mitzvot in the Torah have been explained over time, originally through word of mouth - the **Oral Law**.
The mitzvot and their explanations teach Jews how to live a Jewish life as G-d requires; the **halachah** is the term for the whole collection of Jewish law.
The 10 commandments cover mitzvot that show us how to interact with one another (ethical) and those that concern our relationship with G-d (ritual).
They are:

1) Belief in one G-d
2) No idol worship
3) Do not use the name of G-d disrespectfully
4) Observe shabbat
5) Honour parents
6) Do not murder
7) Do not commit adultery
8) Do not steal
9) Do not give false evidence
10) Do not be jealous; do not want what belongs to someone else

In the Torah, G-d promises reward for good choices and punishment for bad choices; this shows that we have free will to make these choices.

Key Words

Creator	The entity that brought the Universe into existence	**Incorporeal**	G-d has no body or physical form.	**Omnibenevolent**	Possessing perfect or unlimited goodness, kindness and compassion
Monotheism	Belief that there is only one God	**Justice**	Fair behaviour or treatment	**Tzedakah**	Charity
Omnipotent	G-d having unlimited power	**Chessed**	Loving kindness	**Immanent**	G-d is permanently within and sustaining the universe
Omnipresent	G-d is present everywhere at the same time.	**Tikkun Olam**	Repairing/healing the world	**Transcendent**	G-d is beyond our understanding, space and time
Omniscient	G-d is all knowing	**Messiah**	Future King and leader of the Jewish people.	**Shechinah**	Feeling of the divine presence; can be felt wherever you bring G-d into your life.
Pikuach Nefesh	The principle that the preservation of human life overrides any Mitzvot	**Covenant**	A binding agreement; a two-way promise that can never be broken	**Judgement**	Deciding the morality of thoughts and actions
Sanctity	The state of being holy or sacred	**Mitzvot**	613 Commandments of Jewish law	**Noachite Laws**	7 universal, moral laws, including no murder or theft; also to establish courts of justice
Halachah	Body of Jewish law	**Free Will**	People are free to make choices in the way we act and speak, without being controlled by G-d	**Torah**	The Jewish Holy Book, the five books of Moses
Tenach	Torah, the prophets and the writings - the collection of the Holy Books	**Shema**	Important daily prayer proclaiming a belief in one G-d	**Oral Law**	Explanations of the mitzvot, passed down by word of mouth until they were written down in around 300
Ethical	Connected to the way we act and behave with one another	**Ritual**	Connected to serving G-d	**Gehena**	A place where the soul is cleansed before going to Gan Eden
Olam Hazeh	This world	**Olam Habah**	The world to come	**Gan Eden**	Garden of Eden - Heaven

Judaism Practices Term Two

The Synagogue

The **Synagogue** is the House of Assembly for Jews. Place of prayer, worship and study, a community focal point.

Jews can pray anywhere, but the Synagogue is the centre for Jewish worship. There are prayers, such as the Amidah/Torah reading that can only be said in the presence of a **Minyan** (10 Jewish adult males) in Synagogue. Synagogues contain Jewish symbols like the Star of David and **menorah**. The second of the 10 commandments forbids worshipping idols, so no images or statues of people or animals. Also called 'Shul' which means school, as it is a place of learning.

Interior of a Synagogue

Seats face towards the **Bimah** (platform where the Torah is read). The focal point is the **Ark**

(Aron Hakodesh), where the Torah scrolls are kept. It represents the Ark in the Temple. It faces Jerusalem. It is only opened during prayers and services. It is covered with a curtain and often has lions and the ten commandments on the top. The **Ner Tamid** is the ever-burning light. It is in front of and above the Ark. It symbolises G-d's presence and is a reminder of the menorah that was lit every night in the Temple in Jerusalem.

Shabbat, the Jewish day of rest

Friday sundown to Saturday sundown. G-d created the world in 6 days and rested on the 7th making this a holy day that Jews are commanded to observe; it is the 4th of the ten commandments.

Keeping Shabbat is a reminder of the covenant between G-d and Jews at Mount Sinai. Shopping, cooking and cleaning is done beforehand as work (**melachah**) is forbidden. Jews dress smartly in honour of shabbat. Shabbat begins with the lighting of 2 candles in the home, to represent remembering and observing Shabbat. Wine and two loaves of Challah are also on the table. Drinking the wine (**kiddush**) symbolises holiness. The two loaves represent food (**mannah**) that G-d provided in the desert. Shabbat is about quality time with those we care about and connecting to G-d. On Friday night and Saturday morning there are special synagogue services. The Torah is read on shabbat morning. **Havdallah** is the special ceremony to mark the end of shabbat.

Bar and Bat Mitzvah

Boys have a Bar Mitzvah aged 13 and girls have a Bat Mitzvah aged 12. It is a coming-of-age ceremony as they are considered adults in Jewish law and responsible for keeping the mitzvot.

A Bar Mitzvah ceremony takes place in shul, usually on Shabbat. The boy reads from the Torah, wears a **Tallit** and may give a speech. He will have put on tefillin already. Girls may research and deliver a talk on any day in a venue of their choice. Reform Jewish girls will have a Bat Mitzvah at 13, in synagogue and in similar format to a bar mitzvah. They believe men and women should have full equality in worship; orthodox see men's and women's roles as equal but different.

Dietary Laws

Jews can only eat '**Kosher**' food; 'fit for purpose'. Non-kosher food is called '**Trefah**'. Following the laws helps develop self-control and is a daily reminder of faith. Kosher animals have split hooves and chew the cud eg cow. Kosher fish have fins and scales eg tuna. Jews cannot eat insects or blood. Animals must be

slaughtered in a special way by a shochet. Dairy and meat cannot be eaten at the same time. Food that is neither meat nor dairy is called '**Pareve**' and can be eaten with either (e.g. vegetables). A kosher kitchen must be adapted to have storage, cutlery, crockery, pots and pans for milk and meat. Food should be approved as kosher or have a sign called a **hechsher** to show it is approved by the **Beit Din**.

These mitzvot are in the Torah and explained in the Oral Law; they are all about having faith and belief as there is no rational explanation for them.

Jewish Studies

Festivals

To think about- are they all important or is one more important than another?

Rosh Hashanah - the Jewish New Year; 1st and 2nd Tishrei. A time of renewal and refection. A holy day commanded in the Torah. The beginning of a process of **teshuvah** (repentance, saying sorry and making amends for mistakes). Festival meals with **kiddush** and **challa**h eaten at home. Customs: eating apple and honey/round challah to represent the circle of life and a sweet year. Pomegranate seeds represent the 613 **mitzvot** (commandments). Greeting is shanah tovah- have a good year.
Families and communities come together in special synagogue services. The shofar is sounded 100 times on each day.

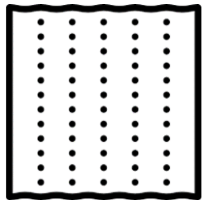
Yom Kippur

Rosh Hashanah begins the **10 days of return**, when Jews confess any wrongdoings and ask for forgiveness from each other and from G-d. A time of reflection and introspection.
This leads to **Yom Kippur** (the day of Atonement), 10th Tishrei.

Commanded in the Torah and the holiest day in the Jewish Year. It has all the restrictions of shabbat plus no eating/drinking/ wearing leather for 25 hours. The day is spent in prayer; many wear white as a symbol of purity. The day focuses on asking for forgiveness, confessing wrongdoing and promising to make amends. A day of judgment. Many Jews who keep no other festivals fast on Yom Kippur. Book of Jonah is read.

Pesach

An eight day festival starting on 15th Nissan. Commanded in the Torah, it commemorates the exodus from Egypt; G-d setting the Jewish people free from slavery. Jews can appreciate G-d's omnipotence and omnibenevolence.



Additionally, it teaches Jews that they have experienced slavery and should therefore stand up against persecution and prejudice.
Jews must not eat any food that is **chametz**; food such as bread or pasta containing wheat that has risen. A key food is **matzah**, a hard cracker that the Jews ate when they were slaves. Houses are completely cleaned out to remove any chametz. The **seder** service takes place at home on the first two nights of Pesach. Families and friends read the story of the festival from a **Haggadah** and eat foods symbolising freedom and slavery; examples are salt water for tears and bitter herbs.
Everyone takes part and children are encouraged to ask questions.

Oral And Written Law

Jewish law, **halachah,** is important to every aspect of Jewish life; guides Jews on how to live/shows them what G-d expects. Keeping the laws brings Jews closer to G-d and each other.

The Written Law has three parts:
Torah -the five Books of Moses given directly to the Jewish people through revelation at Mount Sinai.
Neviim - the book of prophets such as Isaiah and Jonah. Stories about wise and holy people who received messages for the people from G-d through dreams or visions. They lived after the time of the Torah.
Ketuvim - the writings. Inspiring books such as the psalms and the story of Esther.
The mitzvot of the Torah contains headings such as 'do not cook a kid in its mother's milk'. How do Jews know how to use this in a practical way in life?

The Oral Law

The Oral Law explains the detail of the written law and shows how to keep the mitzvot in a practical way; began with discussions between wise people and Rabbis – the first explanations were given at Mont Sinai with the written Torah. **Reform Jews** have rejected this belief.

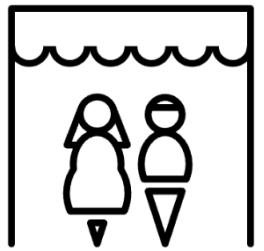
These were first written down in the **Mishnah** in the third century and the further explanations in the **Gemara**. Mishnah and Gemara are printed together in the **Talmud**.
You may be asked whether the written law is more important than the Oral Law? Or the other way round? or are they both as important?

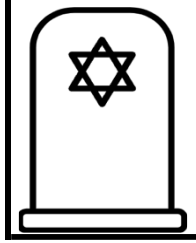
Birth Ceremonies

The naming ceremony is a blessing in the synagogue on the first Shabbat after their birth. The father recites a blessing and asks G-d for the good health of wife and baby. A girl's name will be announced then, but a boy will be named eight days later at the circumcision. Brit Milah is the circumcision, which recalls the covenant with Abraham, a lifelong reminder of membership of G-d's chosen people. Boys have the ceremony when they are 8 days old. The mohel (circumciser) removes the foreskin in a simple operation.

Marriage

Marriage is a spiritual bond between a man, woman and G-d. It is seen as an ideal, holy relationship in orthodox Judaism. A wedding contract (Ketubah) is drawn up outlining the responsibilities a man has towards his wife. Weddings take place under a Chuppah (canopy) that represents the couple's home and place in the community. During the ceremony the groom faces Jerusalem under the Chuppah; the bride circles the groom 7 times. They recite two blessings over wine, and then the groom places a ring on the right forefinger of the bride. After the ceremony, the marriage contract is signed. The rabbi recites 7 blessings and then the groom breaks a glass to represent the destruction of the Temple in Jerusalem symbolising hardship in life as well as joy.





Mourning the Dead All Jews are equal in death as in life; when a person passes way, their body is treated with respect, washed and dressed in a plain, white shroud and buried in a simple wooden coffin. Jewish funerals take place as soon after death as possible. Mourners are children, parents, spouse and siblings. They have a corner of their clothes cut to show their grief. Shiva (seven days of intense mourning) begins straight after the burial. During Shiva mourners do not shave cut hair, wear leather shoes or work. They are visited at home by friends and relatives who bring them food and comfort. Prayers are said each day. Full mourning period for parents is 11 months; daily memorial prayer (kaddish) is said, no parties or live music during this time. A round stone is placed on a grave when visiting, symbolising the circle of life. A memorial stone is set, up to one year after the passing.

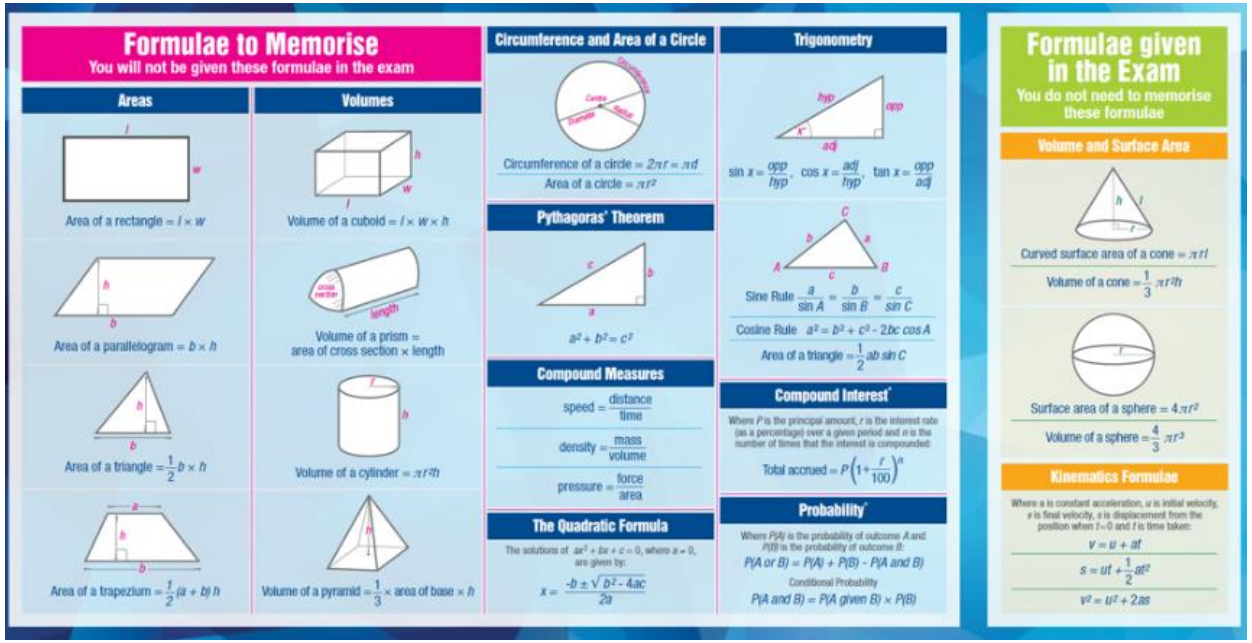
KEY TERMS

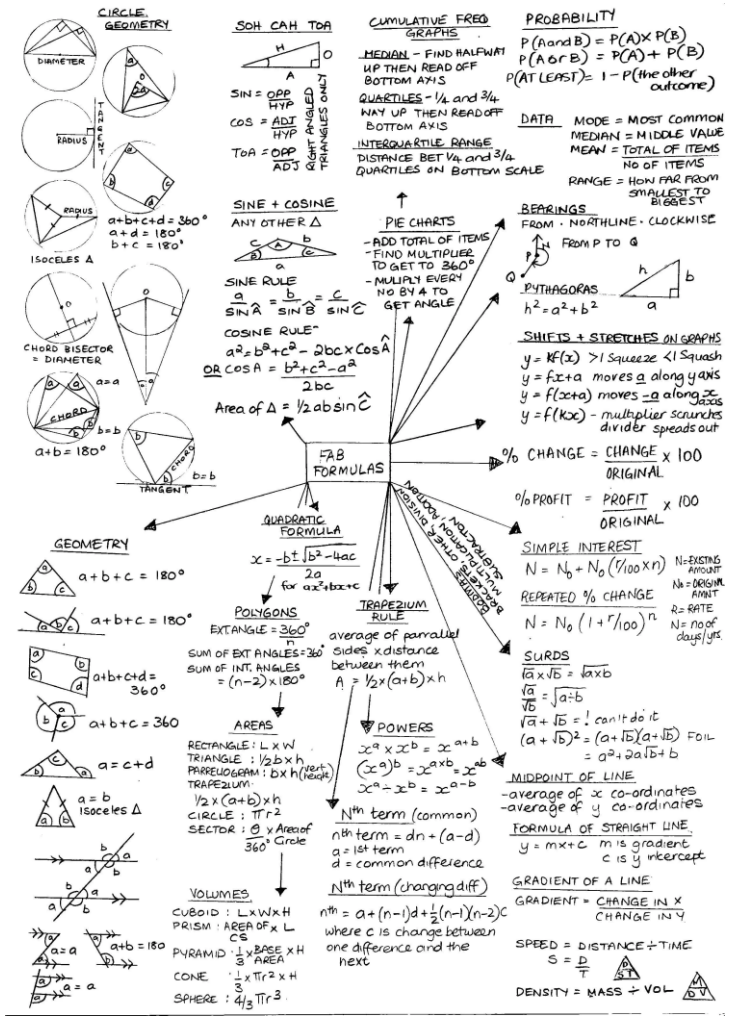
Synagogue	The Jewish place of worship	**Ner Tamid**	Perpetually burning light above the Ark in the Synagogue	**Tishrei**	First month of the Jewish year
Bar/Bat Mitzvah	Coming of age ceremony for boys/girls	**Shabbat**	The Jewish holy day of rest	**Kosher**	Foods that conform to Jewish dietary requirements; literally 'fit for purpose'
Minyan	Group of 10 or more Jewish adult males	**Melachah**	The 39 forbidden categories of work on Shabbat	**Trefah**	Foods that do not conform to Jewish dietary requirements
Menorah	Seven branched candelabra in the Temple	**Mannah**	Food provided to the Jews in the desert by G-d	**Pareve**	Food that contains neither meat nor milk
Bimah	The platform in the Synagogue from which the Torah is read	**Kiddush**	Blessing over wine to show holiness of shabbat/festivals	**Orthodox**	Judaism which adheres faithfully to traditional Jewish principles and practises
Ark/Aron Hakodesh	Cabinet in the Synagogue that houses the Torah scrolls	**Covenant**	A two-way agreement between G-d and the Jews	**Reform**	Judaism which has moved away from traditional practises to adapt to modern life
Shiva	Seven-day mourning period	**Kaddish**	Memorial prayer	**Chuppah**	Wedding canopy
Brit Milah	Circumcision	**Ketubah**	Marriage contract	**Mohel**	Person who carries out Brit Milah
Seder	Service held on first two nights of Pesach, in the home	**Chametz**	Food not eaten on Pesach such as bread	**Haggadah**	Book used at seder service
Pesach	Eight-day festival to remember exodus from Egypt	**Rosh Hashanah**	Jewish New year	**Yom Kippur**	Day of Atonement
Shofar	Rams' horn blown on Rosh Hashanah	**Teshuvah**	Repentance; saying sorry and making amends for mistakes and wrongdoings	**Challah**	Special plaited bread eaten on Shabbat/festivals
Havdallah	Ceremony to mark end of shabbat	**Tallit**	Prayer shawl	**Tefillin**	Boxes containing holy scripture worn by boys over the age of 13
Mishnah	First writing down of the Oral Law	**Gemara**	Explanations of the Mishnah	**Talmud**	Mishnah and Gemara together

GCSE Mathematics Revision notes

Common General Algebraic Errors:

- $(a+b)^2 \rightarrow a^2+b^2$. Writing out the bracket twice we actually find $(a+b)(a+b) = a^2+2ab+b^2$
- Similarly $\sqrt{a^2+b^2} \rightarrow a+b$. You can see this is not true when $a=3, b=4$ for example.
- $\frac{x^2+3x+2}{x^2-4} \rightarrow \frac{3x+2}{-4}$. When 'cancelling' fractions, we can only divide, whereas in this example we've incorrectly *subtracted* x^2. If we factorised the example, it would be OK to cancel $\frac{(x+1)(x+2)}{(x+2)(x-2)}$ to $\frac{x+1}{x-2}$ because we have indeed *divided* by $x+2$.
- $x(x-1) \rightarrow x^2-1$. Oops!
- $\frac{x}{3}+a=y \quad \rightarrow \quad x+a=3y$. The a hasn't been multiplied by 3.
- $c-b(a-b) \quad \rightarrow c-ab-b^2$. Sign error at the end.
- $x(x+1)-(x+2)^2 \rightarrow \; x^2+x-x^2+4x+4$. A lack of brackets when subtracting expanded expression leads to sign errors. See (53i).
- $a+3x=b \quad \rightarrow \quad 3x=b+a$ Sign not changed when a moved to other side of equation.
- $\frac{x+2b}{3}=y \rightarrow \frac{x}{3}=y-2b$ or $\sqrt{x+2b}=y \rightarrow \sqrt{x}=y-2b$ ($2b$ is trapped inside fraction/root so we have to deal with the $\div 3$ and $\sqrt{}$ first)
- $\sqrt{x}=2x \quad \rightarrow \quad x=2x^2$ When $2x$ is squared, you get $4x^2$ not $2x^2$ as $2x \times 2x = 4x^2$





General Tips:

1. You MUST show full workings for each answer. 'Method marks' can usually be obtained when your answer is wrong, but not if there are no workings.
2. Do not give answers to anything less than 3 significant figures. Note that 0.0043 is only to 2 significant figures.
3. Be wary about copying errors when going from one line of working to the next. Has a 'minus' accidentally become a 'plus'?
4. Spot when different units have been used in the same problem, and ensure they are converted to the same unit.
5. Don't ever use 'trial and error' for questions where an algebraic approach is expected – you won't get any credit.
6. Take special care when punching numbers into a calculator and copying results off the display.
7. Check your answer looks 'plausible' given the context. If it costs £11500 to seed a garden you've probably gone wrong.
8. Check that you've actually answered the question. Often, once you've calculated the correct value, some 'conclusion' is needed, e.g. "Therefore Bob will not have enough money. He is 50p short."

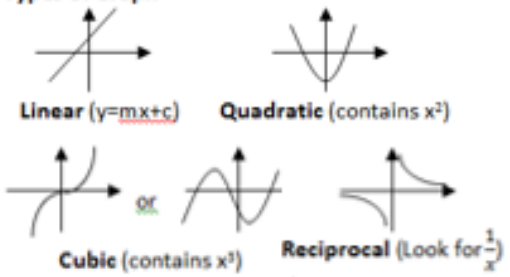
GCSE MATHS FOUNDATION REVISION SHEET

Laws of Indices

$y^a \times y^b = y^{a+b}$ $\quad y^a \div y^b = y^{a-b}$ $\quad y^0 = 1$

$(y^a)^b = y^{ab}$ $\quad y^{-n} = \frac{1}{y^n}$

Types of Graph



Linear (y=mx+c) **Quadratic** (contains x^2)

or

Cubic (contains x^3) **Reciprocal** (Look for $\frac{1}{x}$)

Estimating Mean from a table

Intervals	Frequency	Midpoint x F
	Sum of this	Sum of this

Mean = $\frac{sum\ of\ (mid \times freq)}{sum\ of\ freq}$

*if there are no intervals, just multiply the numbers by the frequency

Parts of a circle

Area of a circle is πr^2

*for sectors $\times \frac{\theta}{360}$

Circumference is πd

*for arcs $\times \frac{\theta}{360}$

Speed is distance÷time $\frac{D}{S|T}$

Density is mass÷volume $\frac{M}{D|V}$

Angle Facts

Sum of interior angles in polygon = $(n-2) \times 180$

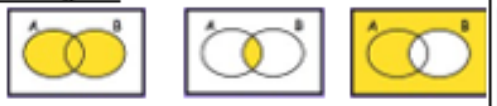
One exterior angle of a regular polygon = $\frac{360}{n}$

(Z-angles) Alternate angles are equal

(F-angles) Corresponding angles are equal

(C-angles) Co-interior angles add to 180

Venn Diagrams



$A \cup B$ A or B Union

$A \cap B$ A and B Intersection

B' not B Complement

Standard Index Form

To write in SIF, put the point after the first significant number (the first non-zero number):

$4538 = 4.538 \times 10^3$ $\quad 0.0006 = 6 \times 10^{-4}$

Straight Line Geometry

Gradient = $\frac{change\ in\ y}{change\ in\ x}$

Or from a diagram, count the units up/down, for every 1 square across to the right

Midpoint = add the x-coordinates and divide by 2
add the y-coordinates and divide by 2

$y = mx + c$ (m is gradient, c is y-intercept)

Pythagoras' Theorem – for right-angled triangles

Square, add and square-root for the longest side

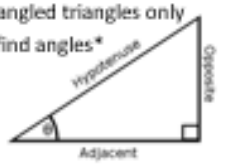
Square, subtract and square-root for a shorter side

Basic Trigonometry – for right-angled triangles only

SOH $\frac{Opp}{\sin\theta \mid Hyp}$ *press shift to find angles*

CAH $\frac{Adj}{\cos\theta \mid Hyp}$

TOA $\frac{Opp}{\tan\theta \mid Adj}$



Trig Exact Values

$\sin\theta = \frac{\sqrt{Opp}}{2}$ e.g. $\sin 30° = \frac{\sqrt{1}}{2} = \frac{1}{2}$

$\cos\theta = \frac{\sqrt{Adjac}}{2}$ e.g. $\cos 90° = \frac{\sqrt{0}}{2} = \frac{0}{2} = 0$

$\tan\theta = \frac{\sqrt{Opp}}{\sqrt{Adjac}}$ e.g. $\tan 45° = \frac{\sqrt{2}}{\sqrt{2}} = 1$

Upper Bounds & Lower Bounds

Margins = ± half what it has been rounded to

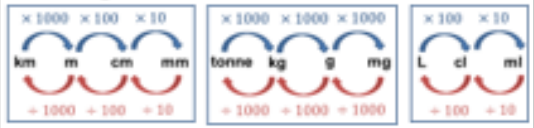
Error interval for:

200 (x rounded to 1 s.f.) $150 \le x < 250$ $\quad (\pm 50)$

23.1 (y rounded to 1 d.p) $23.05 \le y < 23.15$ $\quad (\pm 0.05)$

Converting Units

1 Litre = 1000 cm^3



$1m^3 = (100\ cm)^3 = 1000000\ cm^3$

Simultaneous Equations

$3x - 2y = -5$ $(\times 2)$ $\quad 6x - 4y = -10$

$2x - 4y = 2$ $(\times 3)$ $\quad 6x - 12y = 6$

Minus to eliminate x: $\quad 8y = -16$ so $y = -2$

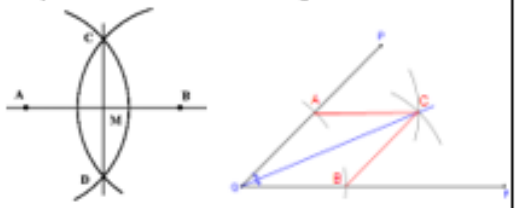
Subtitute y into $2x - 4y = 2 \rightarrow 2x - 4(-2) = 2$

So $2x + 8 = 2 \rightarrow x = -3$

1. Multiply to get one of the letters to match
2. Add or minus the two equations to eliminate the matching letters
3. Find the remaining letter (this is the first solution)
4. Substitute this into the smallest equation
5. Find the second letter (now you're done)

Constructions

Perpendicular Bisector **Angle Bisector**



* to construct from a point, start with compass on that point and mark onto the line first.

Common loci

Equidistant between two points = connect them with a line and construct the perpendicular bisector

Equidistant between two lines = angle bisector

Within 5m of point A = circle of radius 5m

Within 5m of a rectangle = draw circles of radius 5m from each corner and make a rounded rectangle

Congruent triangles have the same SSS, SAS, SAA, RHS

Congruent = identical (same sides, same angles)

Similar shapes are enlargements of each other (different sides, same angles)

Percentages

The **multiplier** always goes with the change

Increase = higher multiplier (interest)

Decrease = lower multiplier (depreciation)

New price = original × multiplier

(Reverse) Original = new ÷ multiplier

Compound interest

New amount = original × $multiplier^{years}$

Simple interest

Work out the % and add it on for each year

Percentage profit

Profit = Revenue (from sales) – Costs (of buying goods)

% Profit = $\frac{Profit}{Costs} \times 100$

The Nth Term

e.g. 3,7,11, ... goes up in 4 so is related to $4n$, comparing the 4 times table, it is one less so $4n - 1$

Geometric sequence (e.g. 2,3,18,54,...)

times/divide by **the common ratio** to get the next term

Fibonacci sequence (e.g. 1,1,2,3,5,8, ...)

add last two numbers to get the next term

HCF and LCM

HCF = common prime factors

LCM = HCF × leftovers

Prime numbers = 2,3,5,7,11,13,17,19,23,29, ...

Division and Multiplication

$0.8 \times 0.12 = 0.096$ (3 decimal places in total)

$\frac{0.8 \times 100}{0.12 \times 100} = \frac{80 \div 4}{12 \div 4} = \frac{10}{3} = 3\frac{1}{3}$

Quadratics

To factorise, check the sum-product

$x^2 - 5x + 6$ sum = -5 and product = 6

$-3 \times -2 = 6$ and $-3 + -2 = -5$

$(x-3)(x-2)$

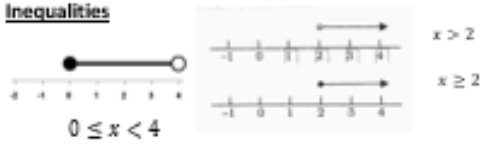
To solve $x^2 - 5x + 6 = 0$, use the inverse of each number in the bracket, so $x = 3, x = 2$ (two solutions)

The difference of two squares

$x^2 - 64 = (x+8)(x-8)$

$4x^2 - 9y^2 = (2x+3y)(2x-3y)$

Inequalities



Transformations of shapes

Rotation from a point, 90° (anti)clockwise or 180°

Reflection through a line *look out for $y = x$ or $y = -x$

Translation through a vector $\begin{pmatrix} x\ direction \\ y\ direction \end{pmatrix}$

Enlargement from a point, by a scale factor

* if fraction: shape gets smaller

Stratified Sampling

Sample = $\frac{interested\ group}{population} \times sample\ size$

Pie Charts

Angles = $\frac{interested\ group}{population} \times 360°$

Fractions

Make improper first $3\frac{4}{5} = \frac{5\times3+4}{5} = \frac{19}{5}$

Add/subtract – make the denominators the same

Multiply – go across and just do it

Divide – keep change flip

GCSE MATHS HIGHER REVISION SHEET

Laws of Indices

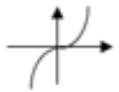
$y^a \times y^b = y^{a+b}$ $\quad y^a \div y^b = y^{a-b}$ $\quad y^0 = 1$

$(y^a)^b = y^{ab}$ $\quad y^{-a} = \frac{1}{y^a}$ $\quad y^{\frac{a}{b}} = \sqrt[b]{y^a}$

Types of Graph

Linear (y=mx+c)

Quadratic (contains x^2)



or

Cubic (contains x^3)

Reciprocal (Look for $\frac{1}{x}$)

Circle ($x^2+y^2=r^2$)

Surds

$\sqrt{a} \times \sqrt{a} = a$ $\quad \sqrt{a} \times \sqrt{b} = \sqrt{ab}$ $\quad \sqrt{a} \times b = b\sqrt{a}$

Rationalise the denominator $\frac{4}{\sqrt{2}} \frac{\times\sqrt{2}}{\times\sqrt{2}} = \frac{4\sqrt{2}}{2} = 2\sqrt{2}$

Converting recurring decimals to fractions -

Let x = the decimal written out ...

$\times$ 10, 100 *or* 1000 (check how many digits recur)

Subtract by aligning the decimal points

Direct/Inverse Proportion

$y = kx^2$ ↔ y is (directly) proportional to x^2

$y = \frac{k}{x^2}$ ↔ y is inversely proportional to x^2

Don't forget to re-write this after finding k

Upper Bounds & Lower Bounds

Margins = ± half what it has been rounded to

UB	LB
UB	LB

Go across the table when dividing or subtracting.

Go down the table when adding/multiplying.

Histograms – the area of the bars represents the frequency. Frequency Density is $\frac{Freq}{FD \mid CW}$

Cumulative Frequency - plot the upper bound of the class interval and the frequency.

Box Plots

Estimating Mean from a table

Intervals	Frequency	Midpoint x F
	Sum of this	Sum of this

Mean = $\frac{sum\ of\ (mid \times freq)}{sum\ of\ freq}$

Frequency Polygons – plot the midpoint and the frequency/

Comparing datasets – comment on an average (median or mean) and the spread (IQR or range).

Pythagoras' Theorem – for right-angled triangles

Square, add and square-root for the longest side

Square, subtract and square-root for a shorter side

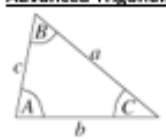
Basic Trigonometry – for right-angled triangles only

SOH $\frac{Opp}{\sin\theta \mid Hyp}$ *press shift to find angles*

CAH $\frac{Adj}{\cos\theta \mid Hyp}$

TOA $\frac{Opp}{\tan\theta \mid Adj}$

Advanced Trigonometry – for any triangle



Sine Rule – for sides/angles opposite each other.

Cosine Rule

(i) two sides and angle between them is given.

(ii) re-arrange to make cos the subject to find an angle given three sides.

Angle Facts

Sum of interior angles in polygon = $(n-2) \times 180$

One exterior angle of a regular polygon = $\frac{360}{n}$

(Z-angles) Alternate angles are equal

(F-angles) Corresponding angles are equal

(C-angles) Co-interior angles are supplementary

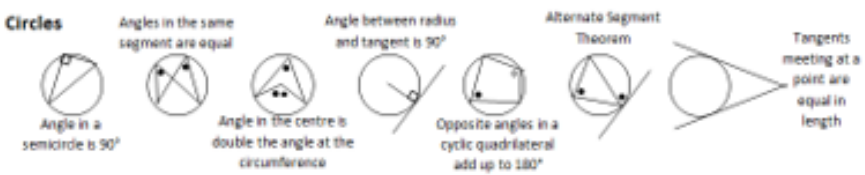
Speed is distance/time $\frac{D}{S \mid T}$

Density is mass/volume $\frac{M}{D \mid V}$

Area of a circle is πr^2 *for sectors $\times \frac{\theta}{360}$

Circumference is πd *for arcs $\times \frac{\theta}{360}$

Circles



Transformations of shapes

Rotation about a point, 90° (anti)clockwise or 180°

Reflection through a line *look out for $y = x$ or $y = -x$

Translation through a vector $\begin{pmatrix} x\ direction \\ y\ direction \end{pmatrix}$

Enlargement from a point, by a scale factor

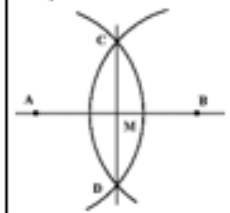
* if fraction: shape gets smaller
* if negative: shape inverted through the centre

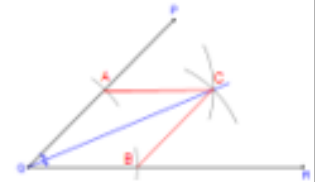
f(x) Transformations of curves

$y=f(x+a)$	Move **left** (minus a from x-coordinate)
$y=f(x)+a$	Move up (add a to y-coordinate)
$y=af(x)$	Stretch s.f. a (multiply a by y-coordinate)
$y=f(ax)$	Stretch s.f. $\frac{1}{a}$ (**divide** x-coordinate by a)
$y=-f(x)$	Multiply y-coordinate by -1 (reflection)
$y=f(-x)$	Multiply x-coordinate by -1 (reflection)

Constructions

Perpendicular Bisector **Angle Bisector**





* to construct from a point, start with compass on that point and mark onto the line first.

Straight Line Geometry

Gradient = $\frac{difference\ in\ y}{difference\ in\ x}$

Midpoint = add the x-coordinates and divide by 2

add the y-coordinates and divide by 2

$y = mx + c$ (m is gradient, c is y-intercept)

Find c by substituting $x, y\ and\ m$

Stratified Sampling

Sample = $\frac{interested\ group}{population} \times sample\ size$

Percentages

The **multiplier** always goes with the change

Increase = higher multiplier and vice versa

New price = original × multiplier

To find an original price, divide by the multiplier

Compound interest

New amount = original × $multiplier^{years}$

The Nth Term

$dn + a$ (coefficient of n is the common difference and add the zero'th term)

HCF and LCM

HCF = common prime factors

LCM = HCF × leftovers

Division and Multiplication

$0.8 \times 0.12 = 0.096$ (3 decimal places in total)

$\frac{0.8 \times 100}{0.12 \times 100} = \frac{80 \div 4}{12 \div 4} = \frac{10}{3} = 3\frac{1}{3}$

Quadratic Equations

To factorise, check the sum-product

$x^2 - 5x + 6$ sum = -5 and product = 6

$(x-3)(x-2)$

For quadratics with a co-efficient of x^2

$3x^2 + 8x - 3$ sum = 8 and product = -9

$3x^2 + 9x - 1x - 3$ split the middle term

$3x(x+3) - 1(x+3)$ factorise the first 2 and last 2

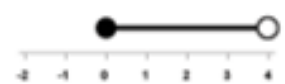
$(3x-1)(x+3)$ factorise again

The difference of two squares

$x^2 - 64 = (x+8)(x-8)$

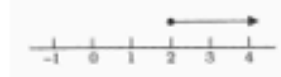
$4x^2 - 9y^2 = (2x+3y)(2x-3y)$

Inequalities



$0 \leq x < 4$

$x > 2$



$x \geq 2$

To draw a region, use a table of values to draw the straight lines.

BTEC LEVEL 2 MEDIA – COMPONENT 2

LEARNING OUTCOMES

A. Develop and apply media pre-production processes, skills and techniques.

B. Develop and apply media production and post-production processes, skills and techniques to create a media product.

STEPS:

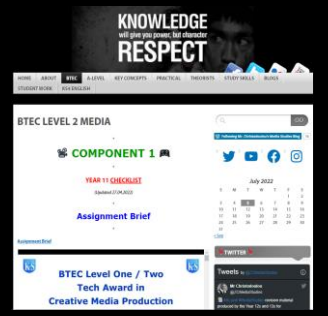
PLAN > PRODUCE > EDIT > EVALUATE

GLOSSARY OF KEY TERMS

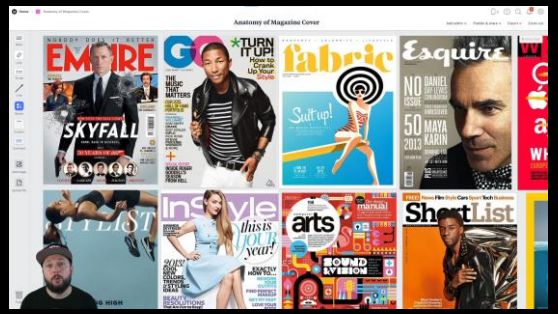
- **AUDIENCE**
- CODE
- **CONVENTION**
- GENRE
- **HARDWARE**
- JUXTAPOSITION
- **MISE-EN-SCENE**
- MODE OF ADDRESS
- **NARRATIVE**
- REPRESENTATION
- **SOFTWARE**
- STEREOTYPE

Magazine Cover Design with Photoshop

BLOG LINK HERE



Magazine Terms and Definitions



MEDIA

FINAL DESTINATION (2000)

Directed by **James Wong** | Distributed by **New Line Cinema**

Alex, an awkward teenager, cheats death after having a premonition of a catastrophic plane explosion. He and several of his classmates leave the plane before the explosion occurs. But, Death later takes the lives of those who were meant to die on the plane...

IMDb RATING

★ 6.7/10
249K

REVIEWS

1. Empire
2. Rotten Tomatoes
3. The Guardian

FACEBOOK
@finaldestinationmovie

INSTAGRAM
@deathiscoming180

IMDb
imdb.com/title/tt0195714

TWITTER
#FinalDestination

YOUTUBE
@WBPictures

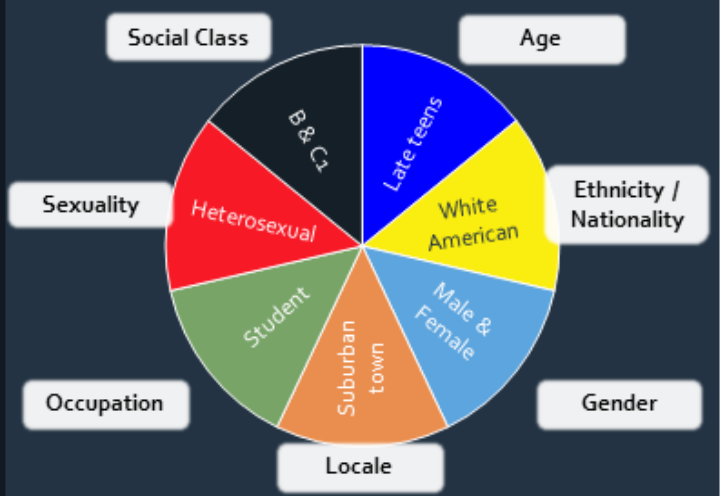
WIKIPEDIA
wikipedia.org/wiki/Final_Destination_(film)

AUDIENCE PROFILING

Demonstrating knowledge and understanding of the target market for a media text, such as a film. Data is collated and turned into a written profile.

DEMOGRAPHICS

Demographic analysis is the collection and analysis of specific personal characteristics about groups of people.



TASK INFORMATION

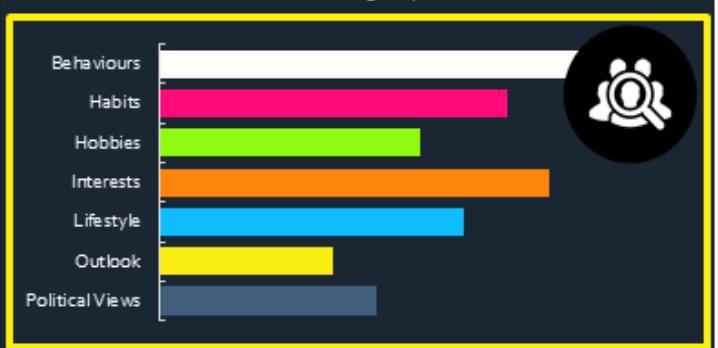
TASK ONE
Audience profiles + pleasures offered by the film.

TASK TWO
Key concepts analysis (Genre; Narrative; Representation; Audience Interpretation).

TASK THREE
Technical elements analysis (Camerawork; Editing; Mise-en-Scene; Sound).

PSYCHOGRAPHICS

Psychographics is the analysis of specific psychological criteria that influences an individual's, or group's, mindset and behaviour.



KEY CONCEPTS

GENRE: The category of the text, based on conventions.

NARRATIVE: The structure of the storyline or plot.

REPRESENTATION: How a particular reality is recreated (people / place / time).

AUDIENCE INTERPRETATION: How the audience interprets, and reacts to, the text.

TECHNICAL ELEMENTS

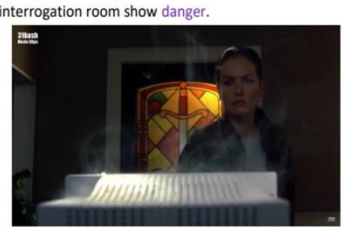
CAMERAWORK:
Angles; Framing; Movements.

EDITING:
Combination of shots; Pace; Parallel editing; Shot-reverse-shots; Transition.

MISE-EN-SCENE:
Characters; Costumes; Décor; Hair & Make-up; Lighting; Props; Setting.

SOUND:
Diegetic; Non-Diegetic; Synchronous; Asynchronous.

We also see some signs about the policemen when they were interrogating Alex. One of them is wearing open colours which could show there's no danger around him. He also wears glasses which normally connotate with wisdom. However, the other policeman is seen as the opposite. He wears dark colours and is seen as a darker character. The lighting is also very dark when Alex is with them to give a mysterious feeling, also, the red lights in the interrogation room show danger.



Also, the dagger behind Miss Lewton was used to foreshadow what will cause the end of her life. This was done purposefully as we know she dies after getting stabbed so the audience will look back and see this clue. A dagger is a weapon which was designed for up close attacks and combat throughout history, it also has associations with assassinations and murders, so this doesn't give the audience a good feeling.

MEDIA

VOGUE MAGAZINE

Edited by **Edward Enninful** | Published by **Condé Nast**

Vogue is a fashion magazine owned and distributed by Condé Nast. A British Vogue editor once claimed that: *"Vogue's power is universally acknowledged. It's the place everybody wants to be if they want to be in the world of fashion"*. Around 85% of its readers agree that *"Vogue is the Fashion Bible"*. The magazine is considered to be one that links fashion to high society and class, teaching its readers how to *"assume a distinctively chic and modern appearance"*.

FACEBOOK
@BritishVogue

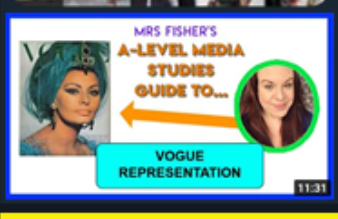
INSTAGRAM
@britishvogue

TWITTER
@BritishVogue

YOUTUBE
@BritishVogue

APP STORE
British Vogue

WIKIPEDIA
wikipedia.org/wiki/Vogue_(magazine)



AUDIENCE PROFILING

Demonstrating knowledge and understanding of the target market for a media text, such as a film. Data is collated and turned into a written profile.

DEMOGRAPHICS

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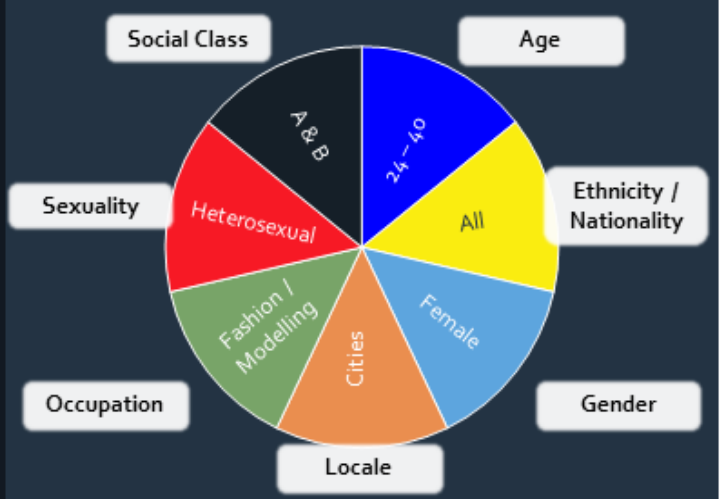


REVIEWS

1. The BBC
2. The NYT
3. The Telegraph

TASK INFORMATION

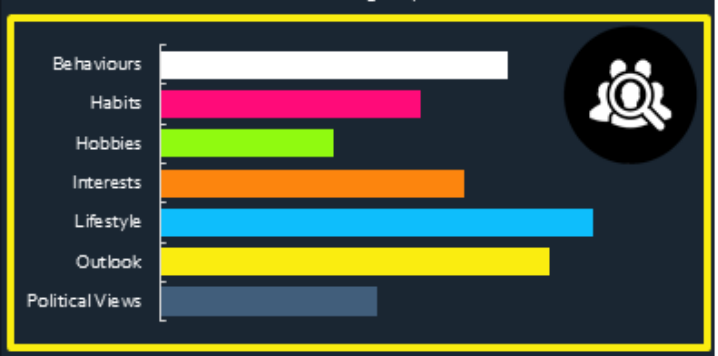
TASK ONE
Audience profiles + pleasures offered by the magazine.

TASK TWO
Key concepts analysis (Genre; Narrative; Representation; Audience Interpretation).

TASK THREE
Technical elements analysis (Layout & Design; Typography; Photography).

PSYCHOGRAPHICS

Psychographics is the analysis of specific psychological criteria that influences an individual's, or group's, mindset and behaviour.



KEY CONCEPTS

GENRE: The category of the text, based on conventions.

NARRATIVE: The structure of the storyline or plot.

REPRESENTATION: How a particular reality is recreated (people / place / time).

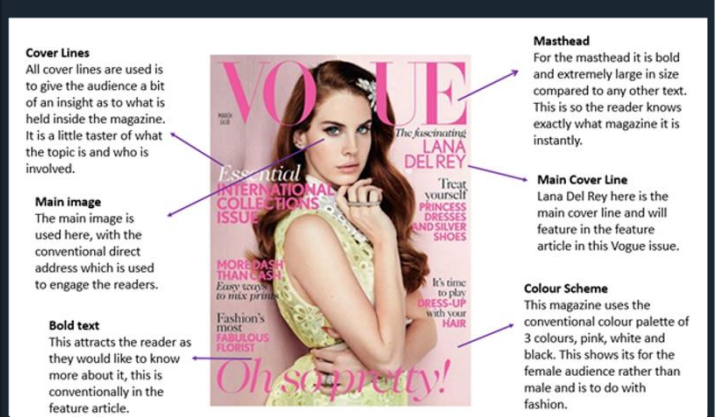
AUDIENCE INTERPRETATION: How the audience interprets, and reacts to, the text.

TECHNICAL ELEMENTS

LAYOUT & DESIGN:
Positioning; Spacing; Design choices; Colour; Graphics.

TYPOGRAPHY:
Font styles; Font sizes; Lexis; Mode of address.

PHOTOGRAPHY:
Models; Camerawork; Lighting; Editing.



THE LAST OF US

MEDIA (2013)

Developed by **Naughty Dog** | Published by **Sony Computer Entertainment**

Set in the [post-apocalyptic] United States, the game tells the story of **Joel** and **Ellie**, who are working together to survive a journey across (what remains of) the country. Their mission... to find a cure for the fungal plague that has devastated the human race.

More than 60 Awards

REVIEWS

1. Eurogamer
2. Forbes
3. The Guardian
4. The NYT

FACEBOOK @naughtydog

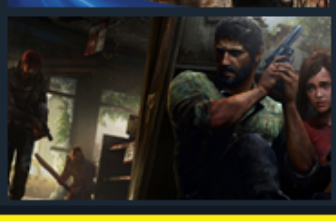
INSTAGRAM @naughty_dog_inc

TWITCH @naughtydog

TWITTER @Naughty_Dog

YOUTUBE @naughtydog

WIKIPEDIA wikipedia.org/wiki/The_Last_of_Us



AUDIENCE PROFILING

Demonstrating knowledge and understanding of the target market for a media text, such as a video game. Data is collated and turned into a written profile.

DEMOGRAPHICS

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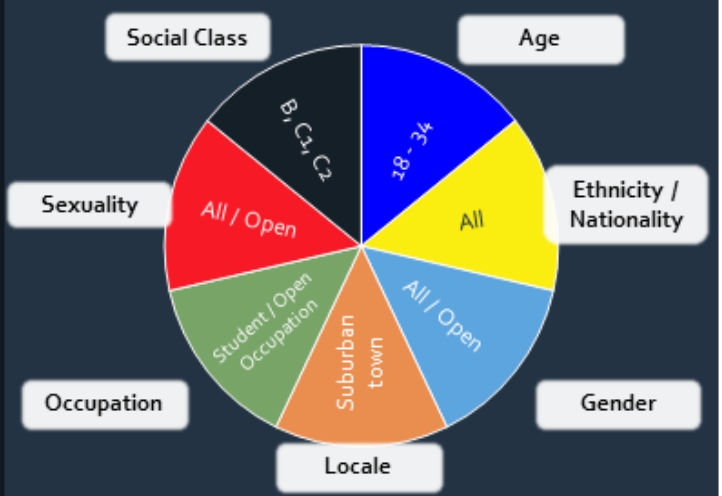


TASK INFORMATION

TASK ONE
Audience profiles + pleasures offered by the game.

TASK TWO
Key concepts analysis (Genre; Narrative; Representation; Audience Interpretation).

TASK THREE
Technical elements analysis (Interactive Features; User Interface; Playability; Mise-en-Scene; Sound).

PSYCHOGRAPHICS

Psychographics is the analysis of specific psychological criteria that influences an individual's, or group's, mindset and behaviour.

KEY CONCEPTS

GENRE: The category of the text, based on conventions.

NARRATIVE: The structure of the storyline or plot.

REPRESENTATION: How a particular reality is recreated (people / place / time).

AUDIENCE INTERPRETATION: How the audience interprets, and reacts to, the text.

TECHNICAL ELEMENTS

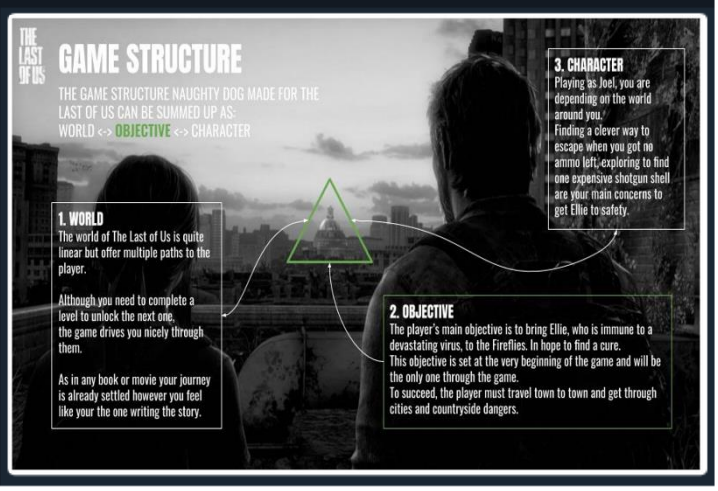
INTERACTIVE FEATURES: Galleries; Menus; Options; Navigation Screens.

USER INTERFACE: Buttons; Graphics; HUD.

PLAYABILITY: Challenges; Game Controls; Navigation; Rules.

MISE-EN-SCENE: Characters; Costumes; Lighting; Props; Setting.

SOUND: Diegetic; Non-Diegetic.



Performing Arts: Drama | Term: 2a | Unit: Scripted Performance

Scripted Performance

A scripted performance requires a performer and designer to use text that has been written by a playwright as the basis of their performance or design. Usually, the character or role is already established for them and sometimes they may also be given specific stage directions. They will also be given specific lines that need to be said.

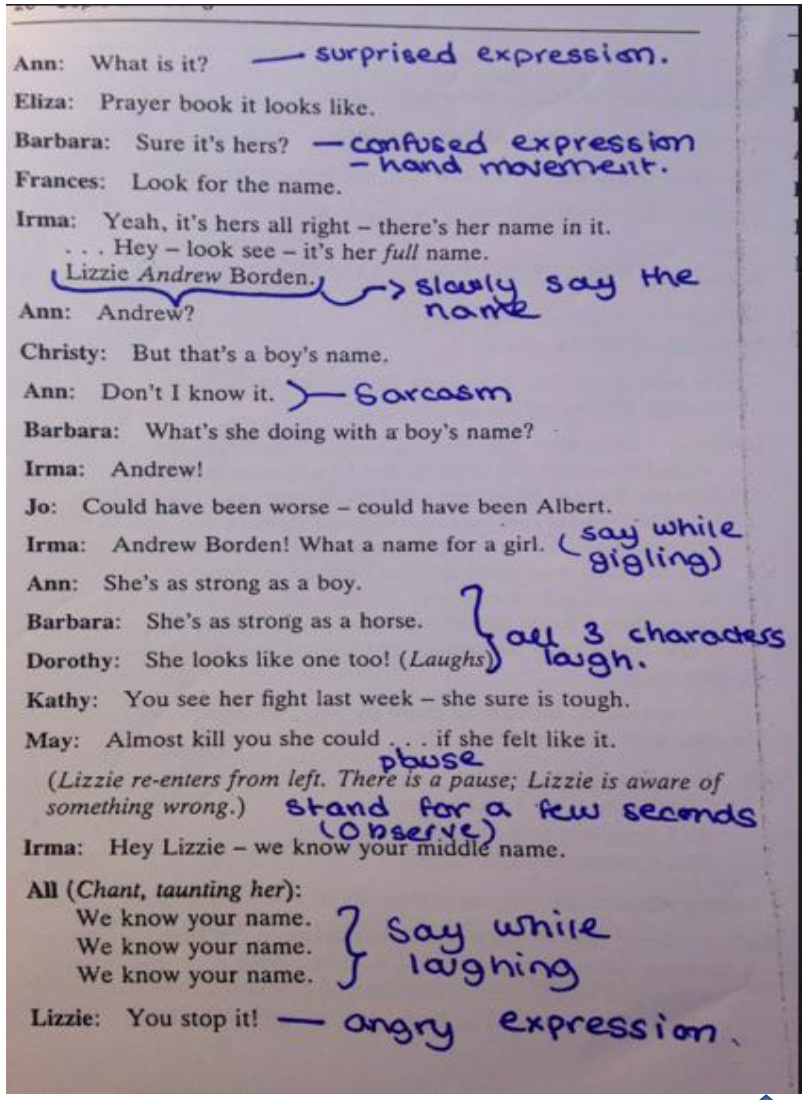
Within this project you will perform or design for two extracts of your own chosen script. You will work in groups and will be required to perform and design for a live audience, external moderator & for a specific amount of time.

Rehearsal Techniques

Are strategies which actors and directors use to develop the performance or their character/role in rehearsal.

- Role On the Wall
- Essence Machine
- Hot seating
- Character Profiling
- Facts and Questions
- Zoomorphism
- Thought tracking
- Elements
- Emotional Memory
- Improvisation
- Archetypes/Stock characters

If you want to learn more about these, check out this quizlet: https://quizlet.com/gb/511135362/rehearsal-techniques-flash-cards/



When working with a script it is important to annotate it with the performance skills and stage directions you will use. This should include where you will use physical skills, vocal skills, areas of the stage and your proxemics. If you need to, also add in why you are using these to ascertain what impact these will have on the audience.

PRINCIPLES OF SET DESIGN

COLOUR

When you create a design, you must look at the colour wheel. Colours can be used to both highlight/illuminate and hide/mask. Some colours are complementary to each other – for example, blue and orange which represent the blue sky and the colour of your skin. These are often used together in TV commercials.

TIP! Think about the colour of costumes. Do not put puppeteers in black, this will not make them disappear. Put them in a colour that contrasts their puppet!

MULTIPLE/PATTERN

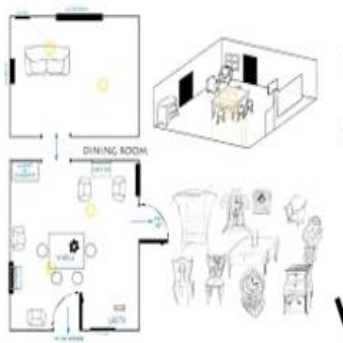
Set Designers often use the 'overload techniques' using lots of multiple shapes and patterns on stage. When there are too many repeated items (e.g. hanging lightbulbs, hanging umbrellas), the brain stops trying to count them, and instead leaves the observer feeling overwhelmed and in awe.

DID YOU KNOW? This technique has been used in several productions including *Matilda* and *Frankenstein*.

SCALE + BALANCE

Consider the size and scale of your set design and the objects you use. Depending on the genre and style of your piece, scale can communicate different meanings to your audience.

DID YOU KNOW? Big objects are associated with fun. They remind us of our childhood, wanting to climb everything around, a sense of adventure. Small objects are cute. They often make the audience feel care towards the object. Scale can show power between characters in a scene/narrative.



DILAPIDATION/ CLEANLINESS

Each set belongs to its own time period, which sometimes relies on items looking dilapidated. For example, the school desks in Willy Russel's *Blood Brothers* need to look worn and graffitied to show the poor educational conditions at the time. However, some sets like *The Curious Incident of the Dog in the Night-time*, need to feel extremely clean and somewhat clinical. This set design represents Christopher's autistic psychological processes.

ANGLES

When creating a set design, experiment with the angles of objects. Can you alter the angle so the audience can see more? Or could you add more abstract angles to the production, to suit its style and genre.

EXAMPLE! If your set includes a door frame, why not angle the door frame to add a surreal effect?

LOCATION(S)

One play can often include several locations which can provide challenges for set designers. If you need to show several locations, think about using the following ideas in your designs:

- Lighting.
- Levels.
- Segregate the stage – have several small sets.

Elements of Lighting Design

Direction

The angle of light as it hits the performer or object.

Intensity

How bright or dimly lit the stage is.

Movement

A transition from one lighting state to another.

Colour

The use of colour to convey a particular mood or atmosphere

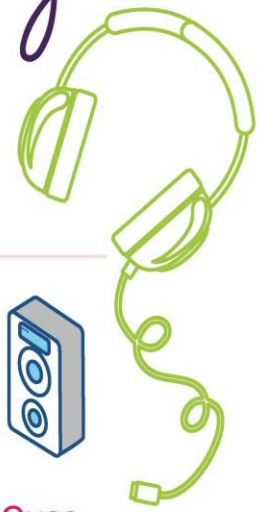
Quality

Whether the beam of a lantern is hard or soft.

Key Elements of Sound Design

Source & Direction

Where is the sound coming from? If it's coming from a speaker, where is the speaker in the performance space? For example, behind the audience or underneath the stage? Are they wall mounted?

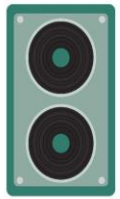


Volume

Is the sound being played at a quiet, medium or loud volume?

Cues

What is the 'trigger' for the sound to be played or performed (e.g. a line of dialogue or visual 'cue')?

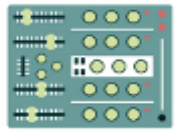


Types of sound

Are the sounds recorded or live (Foley)? Diegetic or non-diegetic?

Editing

How has the sound been manipulated or edited? (e.g. echo/ fades/ loops)



Key Elements of Costume Design

What are the key elements or considerations for a costume designer?

Colour Palette

The colour of a costume can tell you so much about a character. Colour can be used to emotionally manipulate the audience.

Shape & Silhouette

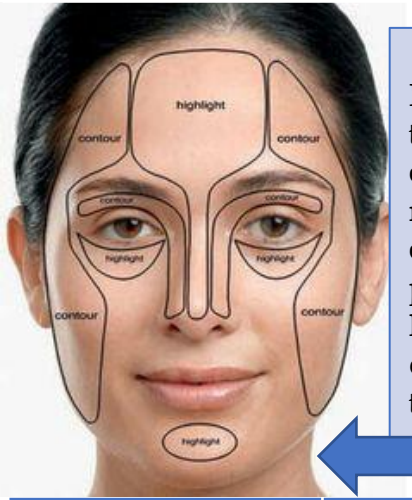
Consideration of the shape of the costume on the performer's body and the silhouette it creates on stage. Silhouettes can indicate specific time periods.

Character/ Personality/ Style

Just as we have our own personal style, so does every character. What are the details in the costume which communicate their unique personality?

Texture & Fabric

Every fabric has a different texture. This refers to how the fabric feels and moves on the actor. For example, is it rough, smooth or soft?



For an audience to see the actors facial expressions, stage make up is used to enhance the performance. Take a look at the following diagram to see how this is done.

Sound

Diegetic

Sound the characters would be able to hear/ where it's source is within the world of the scene

Sound effects, Sound collage, something approaching from off stage, music within the scene (eg Disco)

Non-Diegetic

Sound that is from outside the scene- that the characters would not be able to hear

Underscoring (music/ sound effects to add tension/ atmosphere), voice over

Useful Revision:

Real Acting:
https://www.youtube.com/watch?v=WurazV-KrIQ

Giving the lines meaning:
https://www.youtube.com/watch?v=Ejt4ZUqlg34

Performance nerves:
https://www.youtube.com/watch?v=Be8imkhYt6o

Line Learning:
https://www.youtube.com/watch?v=y8eGuUZSBdA&t=22s

Vocal Skills	Definition	Example
P - Pitch	How high or low you voice sounds.	High squeaky voice or low deep voice.
I – Intonation	How clearly you speak	Mumbling or saying every word clearly
P - Pace	The speed in which you speak	Fast or slow
E – Emphasis	The importance you put on certain words	Using volume or pause to highlight a word. I *(pause)* **AM** right
D - Dynamics	The volume that you are speaking at.	Loudly or quietly
B – Breath Control	How many breaths you take in a sentence.	Do you take lots of breaths or none at all
A - Accent	The way you pronounce words	America, Australian, Jamaican, British
P - Pause	How many breaks you take	I am *(pause)* NOT going to see you again

Physical Skills	Definition	Example
P - Posture	The way you	Hunched back, straight back
E – Eye Contact	Where you are looking	Staring, looking at the floor, quickly looking
T - Tension	How tight or relaxed your body is	Clenched fists, locked knees
F – Facial Expression	How you are modifying your face	Closed Eyes, Wide open mouth
L - Levels	The heights used within the performance.	Standing on toes, crawled up in a ball
A - Action	Movements that have specific meanings	Thumbs up, waving, peace sign
G - Gait	The way you are walking	Skipping, stomping, floating
S - Space	The area that you are using	Are you standing close or far away

Performing Arts: Drama | Term: 2a | Unit: Scripted Performance

Antonin Artaud

1896 – 1948

French playwright, poet, actor and theatre director

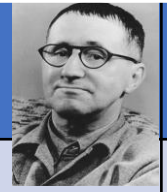
Style: Theatre of Cruelty

Aims for the audience to be "affected", shocked, & involved; wanted to cleanse the audience of their secret fears & desires.

Techniques:

- **Visual Poetry -** movement, gesture and dance instead of words to communicate feelings/context/dramatic elements etc
- **Creating a dream world -** use of ritual and masks, etc; to affect subconscious - like a dream
- **Assaulting the audience -** with lights, music, sound, images to continue to make them feel uncomfortable.
- **Involving the audience -** action would take place all around the audience (to feel a part of it)
- **Sounds –** Groans, screams and breathing used to make the audience feel uncomfortable.
- **Deliberate Cruelty** – Showcasing cruelty on stage to shock them into realising how inhumane and wrong it is.
- **Non-Verbal Language** – Using the body to create meaning and intent.
- **The Plague-** Act with jerky, bizarre movements as if you have the plague, and might infect the audience
- **Rhythmic speaking/Incantation –** speaking syllables or words in time to a regular beat.

Bertolt Brecht



1898 – 1956

German poet, playwright and director (Marxist, political activist)

Style: Epic Theatre

Aims to present a "political message"; educating the audience about an issue.

Techniques:

- **Placards** – signs to get audience to react or to highlight a key message
- **Narrators, music and singers** Used to directly address the audience and provide political comment.
- **Lack of pretence:** set, costume changes, etc. not hidden and done to show visible scene changes.
- **Multi-rolling** – Each actor takes on more than one part.
- **Breaking the fourth wall –** Directly addressing the audience so they know they are watching a performance.
- **Split stage –** Scenes happening on stage at the same time
- **Gestus –** A clear character gesture or movement used by the actor that captures a moment or attitude rather than delving into emotion
- **Speaking in 3rd person –** Using pronouns instead of names.
- **Spass –** Breaking the tension by ensuring your audience is laughing through the use of comic songs, slapstick, physical comedy etc.

Frantic Assembly

1994 – Present

Theatre Company established by Scott Graham, Steven Hoggett & Vicki Middleton

Style: Physical Theatre

Aims to create non-realistic pieces of theatre through the use of movement and music. To emphasize cultural and social themes.

Techniques:

- **Distill to the essence –** Find out what the super objective (what is at stake) is.
- **Alternative Endings** – Finding different ways a scene can end.
- **Sing the Dialogue** – Finding sections of the play that can be sung and ascertain the story that comes from it.
- **Marking the moment** – Using tableaus and soundscape to emphasize a key moment.
- **Happy Accidents** – When you find a special moment through rehearsal.
- **Push Hands** – Leading exercise to explore paired movement, trust, pace and levels.
- **Lifts** – Using your bodies to elevate fellow actors into the air.
- **Chair Duets** – Dance which explores the relationship between two characters.
- **Ensemble Movement** – Moving as one in a group.
- **Improvisation –** Creating and rehearsing pieces in the moment.
- **Three Universes –** this gets the actors to think about the relationship between the touch.

Konstantin Stanislavski

1863 – 1938

Russian theatre practitioner, actor, director

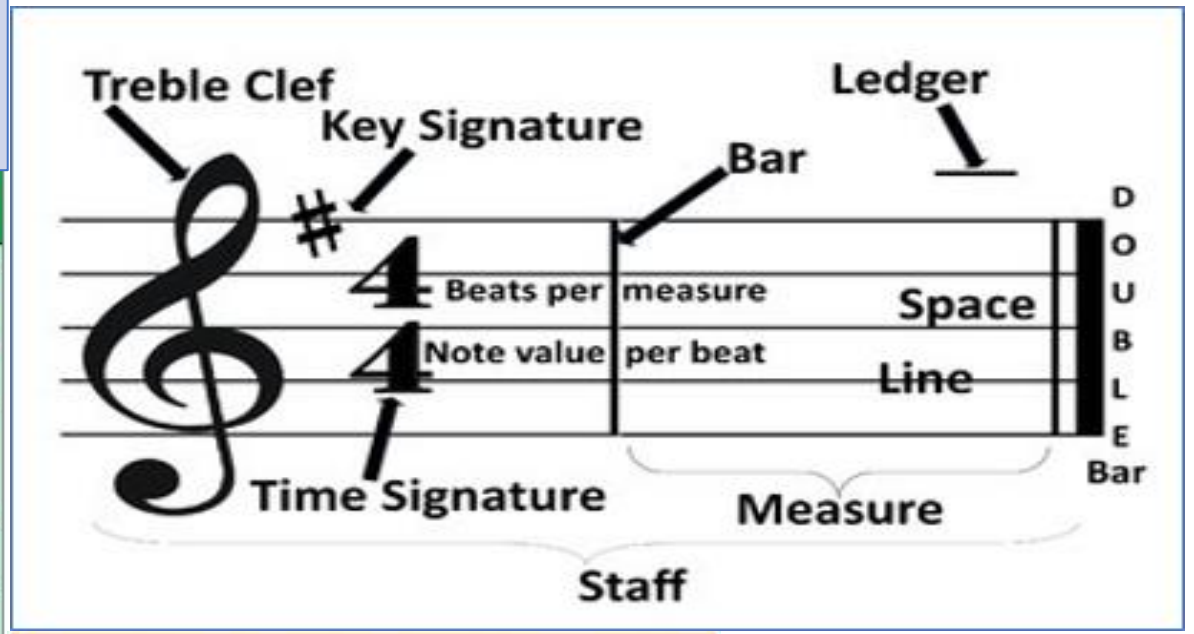
Style: Naturalism

Aims to create an illusion of reality.

Techniques:

- **Emotional Memory** – the actor finds a real past experience where they felt a similar emotion to that demanded by the role they are playing. They then 'borrow' those feelings to bring the role to life.
- **Given Circumstances** – The information about the character that you start off with and the script as a whole.
- **Subtext –** All of the information that is learnt when the actor reads between the lines.
- **Magic If –** this technique means that the actor puts themselves into the character's situation. This then stimulates the motivation to enable the actor to play the role.
- **Objective/Super Objective –** An objective is the reason for our actions in the moment. The super-objective is an over-reaching objective, linked to the overall outcome in the play.
- **Through line –** is the journey from the beginning to the character achieving their super objective.
- **Method of physical actions** – completing everyday actions and then completing them with a character's motive to ascertain emotion needed.

REMEMBER:
DR CAT SMITH are all of the basic musical elements we need to describe music



REMEMBER:

Each note requires the musician to play for a certain amount of beats. Make sure you can remember how many beats each note require you to play for.

REMEMBER:

Singing requires you to produce musical tones by means of the voice. These are the different ranges our voice can fit into.

STRUCTURE

Structure – The order that things happen in.

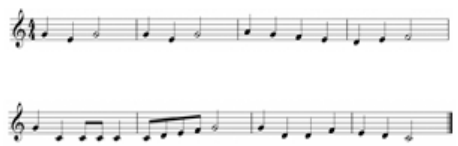
First... then... this is followed by... at the end.

Song Form

Intro Verse Chorus Middle 8 Bridge Outro

Binary Form - Music in two parts

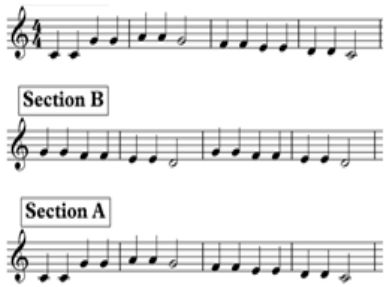
Section A and Section B.



Section B contrasts Section A in some way. Usually both sections are repeated.

Ternary Form - Music in three parts

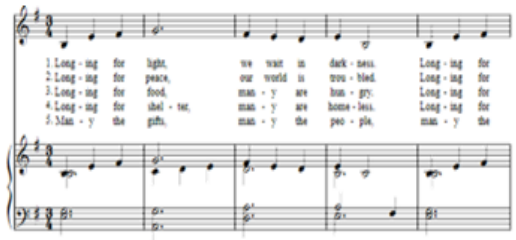
Section A, Section B, Section A.



The 2nd Section A can be an exact repeat of the 1st Section A, or a slightly altered version.

Strophic Form - Same music repeated each section.

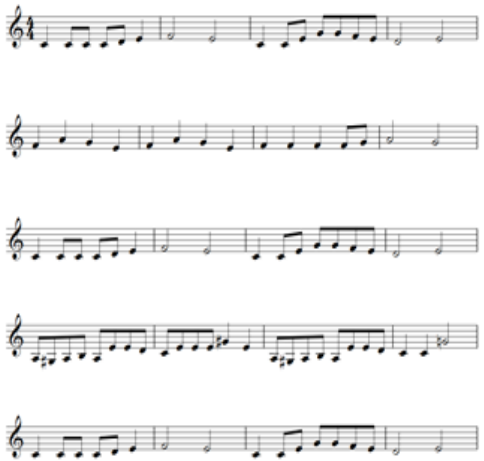
Section A, Section A, Section A.



e.g. Hymns, Folk Songs...

Rondo Form – The opening section keeps returning, with contrasting sections in between.

Section A, Section B, Section A, Section C, Section A.



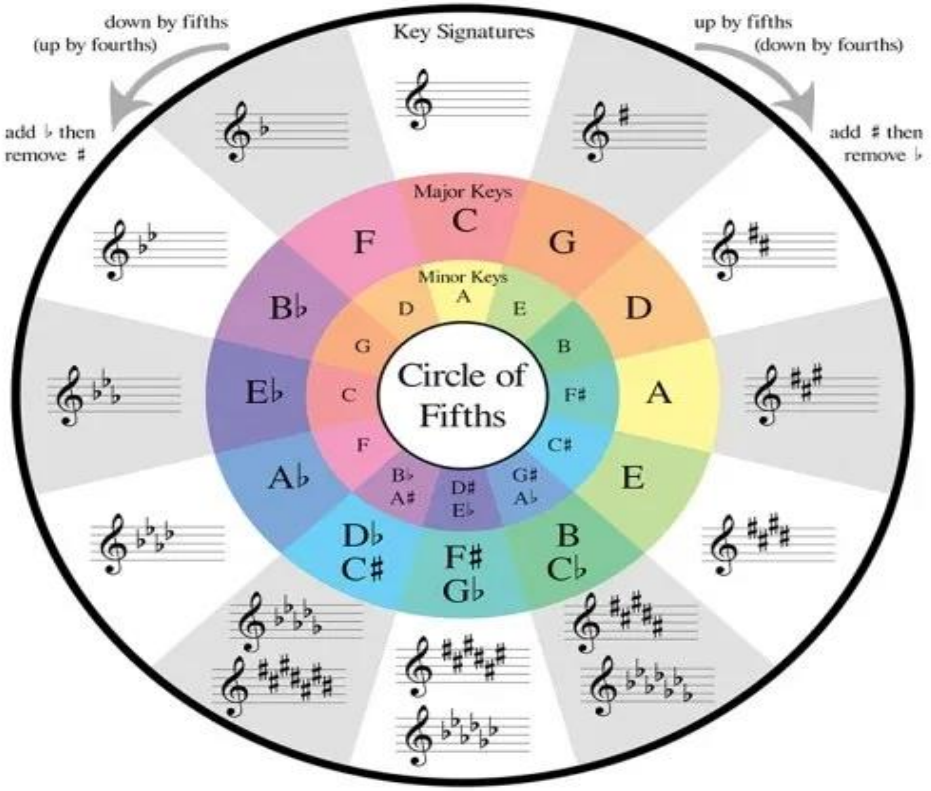
* The contrasting sections are called 'episodes'.

Minuet & Trio – Dance founded in 17th-18th Century Europe. In Triple time and moderato. Both are in binary form. Trio is like a second Minuet but contrasting in some way.

Minuet		Trio		Minuet	
Section A (Repeated)	Section B (Repeated)	Section A (Repeated)	Section B (Repeated)	Section A (No Repeat)	Section B (No Repeat)
In tonic key. Ends with key change.	*In related key. Ends with change back to tonic key.*	*More contrast – new key or change of instruments. Ends with key change.*	*In related key. Ends with key change back to starting key of trio.*	*Keys are same as first time playing Minuet.*	

Variation Form – A theme / section is then followed by other sections (variations), changing and developing the first theme / section in different and imaginative ways.

Theme	Variation 1	Variation 2	Variation 3
The original idea / section	*There are many ways you can transform the theme:* *Change the instrumentation, tempo, key, harmony, metre, rhythm...* *Use imitation, inversion, sequence, diminution, augmentation...* *Developing harmonies without the tune... Introducing new tunes... Varying the style...*		



Useful Revision:

Minor Scales:
https://www.youtube.com/watch?v=a34qYxvRtJU&list=PLKwpCgEsoQRJXEngbSSsOgEuYOajz4kUc

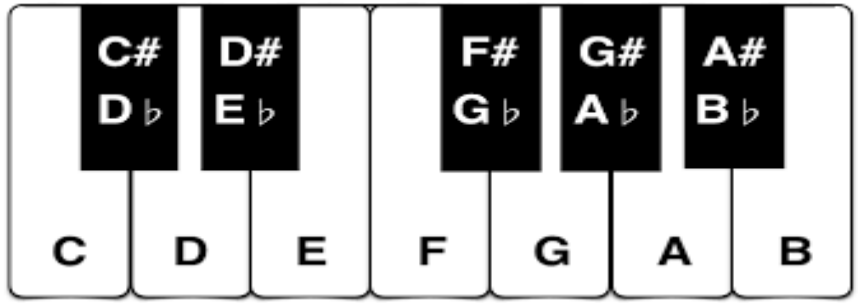
Major Scales:
https://www.youtube.com/watch?v=WWE-xxLzztU&list=PLKwpCgEsoQRJXEngbSSsOgEuYOajz4kUc&index=2

Cadences:
https://www.youtube.com/watch?v=3aRBWDHE4g8&list=PLKwpCgEsoQRJXEngbSSsOgEuYOajz4kUc&index=3

In a traditional Orchestra, the instruments can be grouped into:

- **Strings**
- **Percussion**
- **Brass**
- **Woodwind**

What are the notes on a Keyboard/Piano?



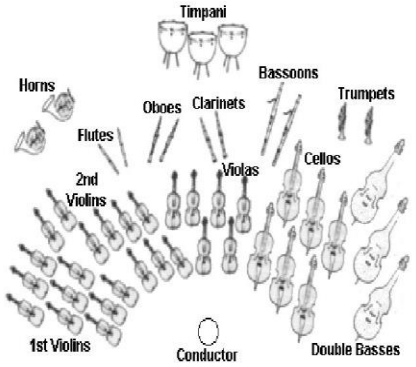
Term	Definition	Example
Key	the selection of notes you can use or not use within a piece of music.	A Piece might start in C major and then modulate into a minor key A minor
Chords	Two or more notes played together.	C E G = C major A C E = A minor
Chord Progression	A chord progression is a series of chords played in a sequence	The Diatonic chords of C major
Instrumentation	The instruments are being played.	In a Pop band typically, you will have; bass guitar, drums, keyboards and vocals.
Texture	How the music is Organized.	Homophonic = All the parts move at the same time. Polyphonic= Two more independent lines of music
Dynamics	The volume of the music.	P = Piano = Quite = Crescendo=Getting louder f = Forte = loud Diminuendo getting quieter
Western Classical Music	The Different periods of music	Baroque 1600-1750 Classical Period 1750-1810 Romantic Period 1810-1910
Articulation	The pay a performer plays	Staccato = short and detached. Legato= play the music smoothly, without brakes between notes.

Performing Arts: Music | Term 2 | Unit: Classical Music

The Classical Period (1750-1830)

- Less complicated texture than Baroque (more homophonic).
- Emphasis on beauty, elegance and balance.
- More variety and contrast within a piece than Baroque (dynamics, instruments, pitch, tempo, key, mood and timbre).
- Melodies tend to be shorter than those in baroque, with clear-cut phrases, and clearly marked cadences.
- The orchestra increases in size and range. The harpsichord fails out of use. The woodwind becomes a self-contained section.
- The piano takes over, often with Alberti bass accompaniment.
- Composers of this period placed much importance on form and structure. Important features include: Symphony, Concerto, Opera, Minuet and Trio, Rondo, Theme and Variations, Cadenza and Scherzo.
- Sonata form was the most important structure design.

Key Composers	
Wolfgang Amadeus Mozart (1756 - 1791) 	Born in Austria . A child prodigy. He composed his first piece at five. By 20 he was considered the most famous composer in Europe. Mozart was only 35 when he died. He composed in different musical forms, operas, symphonies,concertos, masses, and chamber music.
Franz Joseph Haydn (1732 - 1809**)** 	Born in Austria . "Father of Symphony" or the "Father of the String Quartet," Joseph Haydn's pivotal role in birthing the Classical Era is unquestioned. He composed over 340 hours of music.
Ludwig van Beeth (1770 - 1827) 	Beethoven was born in Bonn, Germany. A crucial figure in the transition between the classical and romantic eras in classical music, he remains one of the most recognized and influential musicians.

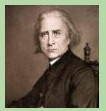


Seating plan for a standard Classical period symphony orchestra

EXPANSION OF THE ORCHESTRA - In the Classical Period the orchestra expanded. The **STRINGS** were still the 'backbone of the orchestra' and played the **MELODY LINE** parts most of the time (1st and 2nd Violins often an octave apart – **OCTAVE DOUBLING**) with the number of strings increasing. The **WOODWIND** became more important and formed its own section. There would usually be **TWO FLUTES, TWO OBOES, TWO BASSOONS** and later, **TWO CLARINETS** – newly invented in the Classical Period – **DOUBLE WOODWIND**. The **BRASS** section would now contain **TRUMPETS** and **FRENCH HORNS** with **TROMBONES** (again invented during the Classical Period) being added later. Classical composers often used the **FRENCH HORNS** and **WOODWIND** section to 'bind the texture of their music together'. The **PERCUSSION** section, as in the Baroque Period, contained just the **TIMPANI**. The **CONTINUO** (Harpsichord) player was now no longer necessary, and the orchestra was, for the first time, directed by a non-instrumental player – the **CONDUCTOR**.
Classical Orchestra: 30-40 players
Romantic Orchestra: 70-120 players

The Romantic Period (1600-1750)

- Emphasis on lyrical melodies
- Starting to explore other cultures and create some fusion with Chinese, Indian and African music
- Folk music fusion – wanted to go back to traditional values and music of the olden days (Nationalism)
- More technical virtuosity – the performer as genius and talented
- Use of recurring themes to give more shape to the pieces
- Highly emotional and intense (hence the name Romantic)
- New Structures: Symphony and Opera – both extended to new, epic lengths
- Programme Music, Piano Concerto and Preludes
- MELODIES become LONGER, less structured and more developed
- MODULATIONS become more frequent and to more UNUSUAL KEYS
- More extravagant, EXTENDED and DISSONANT CHORDS are used

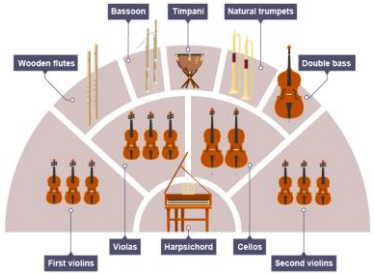
Key Composers	
Pyotr Ilyich Tchaikovsky (1840 –1893) 	He was the first Russian composer whose music made a lasting impression internationally. He wrote melodies which were dramatic and emotional. His compositions include 11 operas, 3 ballets, orchestral music, chamber music and over 100 songs.
Fryderyk Chopin (1810 –1849) 	Chopin was a polish composer and virtuoso pianist of the Romantic era who wrote primarily for solo piano.
Franz Liszt (1811 - 1886) 	Liszt was a Hungarian composer Many of his piano pieces were harder to play than anything that had been written before. He developed piano playing, setting new standards for the future.
Clara Schumann (1819 – 1896) 	German pianist, composer and piano teacher. Regarded as one of the most distinguished pianists of the Romantic era

Performing Arts: Music | Term 2 | Unit: Classical Music

The Baroque Period (1600-1750)

- The **"Baroque"** era is a highly **decorative** and often extravagant style of architecture, music, dance, painting, sculpture and other arts that flourished in Europe.
- Started in the 17th Century, after the "**Renaissance**" period (symmetry, proportion, geometry and the regularity of parts)
- Baroque was encouraged by the Catholic Church to counteract the simplicity and seriousness of Protestant architecture, art and music.
- "**Secular**" instrumental music became popular and came away from "**Sacred**" church music.
- **"Opera"** was also invented as entertainment instead of singing in church.
- Tonality (major and minor keys) was invented (songs were only one mood)
- **"Modes"** were used before the Baroque period
- Polyphonic Texture - Dense, overlapping with lots of interweaving melodies
- **TERRACED** Dynamics – either loud or quiet: Sudden changes in volume
- **Imitation**: a melody in one part is repeated later in a different part.
- **Ornaments** were common in - decorate the music while providing structure and style: trill, mordent, turn

Key Composers		
George F Handel (1685-1759)		Handel was a German/English composer, best known for writing oratorios (an opera without costumes/scenery, singers tell a story with religious text) Messiah is considered to be the greatest oratorio ever written, It is often performed at Christmas
Antonio Vivaldi (1678-1741)		Antonio Vivaldi was an Italian composer, most famous for his composition, *The Seasons.* This is a piece in four movements (sections), named after each season.
J. S Bach (1685-1750)		Johann Sebastian Bach was a German composer who wrote hundreds of pieces of music during his lifetime. Amongst these, he wrote a set of *Brandenburg Concertos*, written for the military commander of Brandenburg in 1721.



STRINGS - VIOLS (older types of string instruments) popular in the early Baroque, but superseded by **VIOLINS, VIOLAS, CELLOS** (and later double basses) forming the backbone of the Baroque Orchestra.

The **LUTE** was also a popular string instrument used mainly for solos or accompanying songs.

WOODWIND – **FLUTES** (wooden), **RECORDERS, OBOES** and **BASSOONS**.

BRASS – **TRUMPETS** (valveless, hence only being able to play a limited amount of pitches) used on special occasions and for dramatic effect only.
PERCUSSION – **TIMPANI** (kettle drums) the only notable percussion instrument used in the Baroque period, again for special effects and dramatic occasions.
ORGAN and HARPSICHORD (its "tinkling" timbre easily identifies Baroque from other types of music!) are the main keyboard instruments, both performed the role of the **CONTINUO** ('filling out the harmonies') performing from **FIGURED BASS** notation. Often the Harpsichord player led the Baroque orchestra
(no conductors (or pianos!)

SET WORK: Badinerie (J.S BACH)

7th Movement of orchestral suite No.2 by J.S Bach (1738-1739)

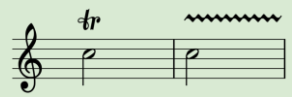
Dynamics: Mostly forte, including terraced dynamics *f*

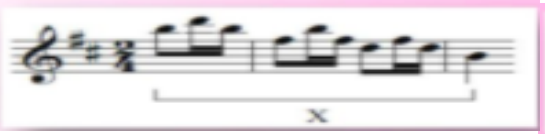
Rhythm: 2/4, Anacrusis, Ostinato, quavers/semi-quavers, Allegro (fast) Tempo

Structure: Binary Form (A,B)

Section A (repeated)	Section B (repeated)
Bars $0^2 - 16^1$ (16 bars)	Bars $16^2 - 40^1$ (24 bars)

Melody: Flute Range (2 octaves pitch range)
2 main musical ideas (X and Y)
Use of ornaments, motifs and sequences
Triadic, disjunct and conjunct movement





Instruments: Flute (transverse), string orchestra (violins, violas, cellos, double basses), harpsichord (basso continuo)

Texture: Homophonic melody (flute) and accompaniment

Harmony: Diatonic: B minor to F# minor (dominant minor)

Popular Music

Pop: Commercial genre with mass audience appeal.

Rock: More aggressive sound, sub-genres: Psychedelic Rock (Pink Floyd), Folk Rock (Bob Dylan), Punk Rock (The Clash), Glam Rock (David Bowie), Heavy Rock (ACDC), Heavy Metal (Metallica), Grunge (Nirvana), Brit Pop (Oasis)

Popular music includes:

- Pop
- Rock
- Rap
- Hip Hop
- Reggae
- Plus, many other genres, e.g., soul, ska, heavy metal, R&B, country, rock'n'roll.

FUSION: When two different styles are mixed together. This can be two styles of popular music e.g., 'rap metal', or could combine a popular music genre with other styles, folk-rock, gospel, world music, classical to create a new and interesting sound. Jazz fusion (jazz and pop) is a popular genre.

Instruments

ELECTRIC GUITAR: Also know as the lead guitar, plays the melody/ solos/riffs
RHYTHM GUITAR: Plays the chords/ accompaniment.
BASS GUITAR: Plays the bass line.
DRUM KIT: Provides the beat.
LEAD SINGER: The main vocalist.
BACKING VOCALS: singers who provide harmony.

Pop/rock groups may also include acoustic (not electric) instruments e.g. trumpet, trombone, saxophone and/or electronic keyboards or synthesizers.

Keyword	Definition
Hammer on	Finger brought sharply down onto string.
Riff	A Short, repeated pattern.
Pitch bend	Altering (Bending) the pitch slightly.
Power chords	A guitar chord using the root and 5th note (no 3rd).
Distortion	An effect which distorts the sound (creates a 'grungy' sound).
Slap bass	A percussive sound on the bass guitar made by bouncing the strings on the fret board.
Fill	A short, improvised drum solo.
Rim shot	Rim and head of drum hit at same time.
Belt	A bright, powerful vocal sound, high in the chest voice.
Falsetto	Male voice in a higher than usual range.
Syllabic	One note sung per syllable.
Melismatic	Each syllable sung to a number of different notes.
Acappella	Voices singing without instrumental accompaniment.

The structure of a pop/rock song may include:

INTRO: Short opening section, usually instrumental.
VERSE: Same music but different lyrics each time.
CHORUS: Repeated with the same lyrics each time (refrain).
MIDDLE EIGHT: A link section, often eight bars, with different musical ideas.
BRIDGE: A link/transition between two sections. OUTRO: an ending to finish the song (coda).

You may also hear a pre-chorus, instrumental interlude or instrumental solo.
Strophic songs, 32 bar songs (AABA) and 12 bar blues are also found in popular music.

A typical rock ballad in verse chorus form could follow the pattern:

- Intro
- Verse 1
- Chorus
- Verse 2
- Chorus
- Middle Eight
- Chorus
- Outro

Technology	
Amplified	Made louder (with an amplifier).
Synthesized	Sounds created electronically.
Panning	Moving the sound between left and right speaker
Phasing	A delay effect.
Sample	A short section of music that is reused (e.g looped, layered).
Reverb	An electronic echo effect.

Form and structure:

The piece is in **strophic** or **verse-chorus** form.

Intro	Verse 1 / Verse 2	Chorus 1 / Chorus 2	Link 1 / Link 2	Instrumental	Chorus 3	Outro
1 – 4	5 – 39 / 14 – 39	40 – 57	58 – 65	66 – 82	40 – 92	93 – 96
4 bars	35 bars / 26 bars	18 bars	8 bars	17 bars	22 bars	4 bars

Metre and rhythm:

Simple duple time – 2/2 (split common time) – with two minim beats in every bar.

Uses distinctive **ostinato rhythms** for both riffs, consisting almost totally of **quavers**, with constant use of **syncopation**.

Vocal rhythm looks complex but follows the natural rhythm of the lyrics.

Background details:

Composed by band members **David Paich** and **Jeff Porcaro**.

Recorded by the American rock band Toto in **1981** for their fourth studio album entitled **Toto IV**.

Released in **1982** and reached number one in America on 5 February **1983**.

Genre: **soft rock**.

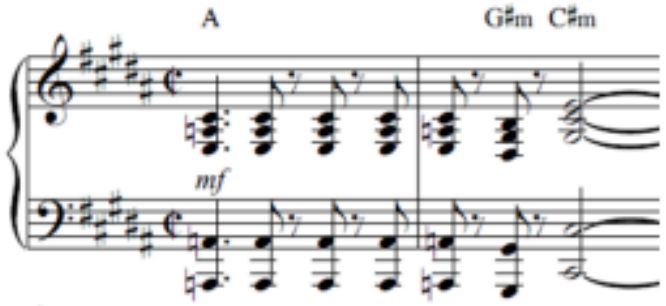
Instrumentation:

Rock band: drum kit with additional percussion, lead and bass guitars, synthesisers, male lead vocals and male backing vocals.

Harmony:

Diatonic; mixture of root position and inverted chords.

Riff a can be heard during the intro, verses, link sections, instrumental and outro. This riff uses a three-chord pattern: **A – G♯m – C♯m**.



Choruses use a standard chord pattern: **vi** (F♯m) – **IV** (D) – **I** (A) – **V** (E).

The **harmonic rhythm** (the rate of chord change) is mostly once per bar.

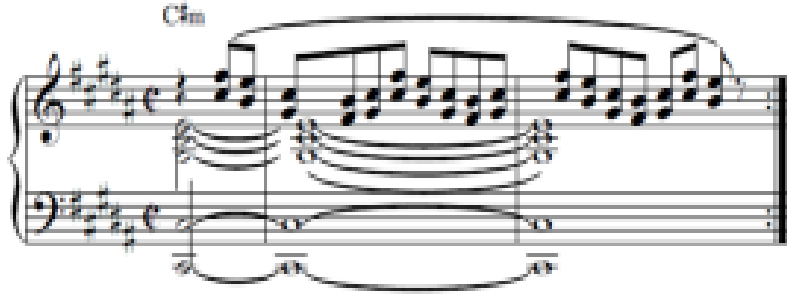
Dynamics:

Most of the song is ***mezzo-forte*** (moderately loud) whilst the choruses are ***forte***.

Melody:

Mostly **conjunct** (moving in step) with a **wide vocal range**.

Riff b uses the **pentatonic scale** (interpreted through E major):



Vocal improvisations occur towards the end of the song.

Texture:

Homophonic: melody and accompaniment.

Tonality:

The majority of the song is in **B major** whilst the choruses are all in **A major**.

Tempo:

The tempo is **moderately fast**.

Film Music

Some film SOUNDTRACKS include specially composed SCORES, either for orchestra (e.g. composers like John Williams, Ennio Morricone) or songs written especially for the film (e.g. Disney films). Other films use pre-existing music e.g. popular songs from the era/place in which the film is set.

Keyboards

- Piano
- Electronic keyboard
- Harpsichord
- Organ
- Synthesizer

Percussion

- Bass drum
- Snare drum
- Triangle
- Cymbal
- Drum kit (untuned)
- Timpani
- Glockenspiel
- Xylophone (tuned)

Strings

- Violin
- Cello
- Viola
- Double bass
- Harp

WOODWIND

- Flute
- Clarinet
- Oboe
- Bassoon
- Saxophone

BRASS

- Trumpet
- Trombone
- French horn
- Tuba

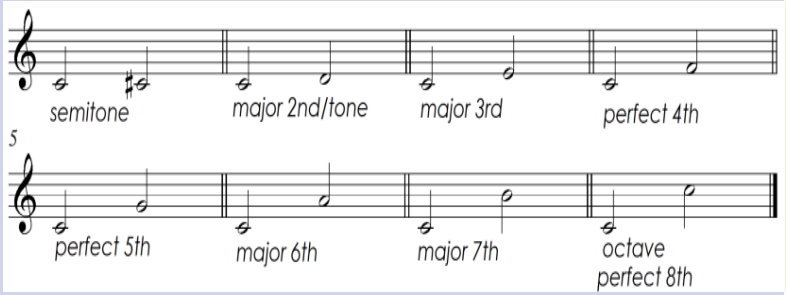
Other

- Electric guitar
- Bass guitar
- Spanish/ classical guitar
- Traditional world instruments

Intervals

Film composers often use intervals to create a particular effect (e.g. a rising perfect 4th sounds 'heroic', and a semitone can sound 'menacing').

An interval is the distance between two notes.



Rising interval: moving upwards (ascending)
Falling interval: moving downwards (descending)

Musical elements

Film composers use the MUSICAL ELEMENTS (Context, articulation, structure, instrumentation, tempo, texture, dynamics, timbre, tonality, rhythm, melody, harmony) to create mood and atmosphere to help to tell the story and enhance the action.

For example: In a sad, reflective scene, a composer might use slow tempo, minor tonality, soft dynamics, legato, homophonic texture, long sustained notes, and a conjunct melody.

An exciting car chase scene in a thriller might have a fast tempo, busy, polyphonic texture, dissonant chords, loud dynamics, syncopated rhythms, a disjunct melody and short riffs.

A scene where the superhero 'saves the day' might use a major tonality, brass fanfares, loud dynamics, accents, 4ths and 5ths (intervals).

Composers will often use CONTRASTS to create effect (e.g. using a wide range of pitch from very high to very low).

Performing Arts: Music | Term 2 | Unit: Film Music

Term	Definition
Pizzicato	Plucking the strings.
Divisi	Two parts sharing the same musical line.
Double stopping	Playing two strings at the same time.
Arco	Using a bow to play a stringed instrument.
Tremolo	A 'trembling' effect, moving rapidly on the same note or between two chords (e.g., using the bow rapidly back and forth).
Tongued	A technique to make the notes sound separated (woodwind/brass).
Slurred	Notes are played smoothly.
Muted	Using a mute to change/dampen the sound (brass/strings).
Drum roll	Notes/beats in rapid succession.
Glissando	A rapid glide over the notes.
Trill	Alternating rapidly between two notes.
Vibrato	Making the notes 'wobble' up and down for expression.

Term	Definition
Theme	The main tune/melody.
Motif	A short musical idea (melodic or rhythmic).
Leitmotif	A recurring musical idea linked to a character/object or place (e.g., Darth Vader's motif in Star Wars).
Underscoring	Underscoring Music playing underneath the dialogue.
Scalic	Scalic Melody follows the notes of a scale.
Triadic	Triadic Melody moves around the notes of a triad.
Fanfare	Short tune, often played by brass instruments, to announce someone/something important; based on the pitches of a chord.
Pedal note	A long, sustained note, usually in the bass/ lower notes.
Ostinato/riff	A short, repeated pattern.
Conjunct	The melody moves by step.
Disjunct	The melody moves with leaps/intervals.
Consonant harmony	Sounds 'good' together.
Dissonant harmony	Sounds 'clashy'.
Chromatic harmony	Uses lots of semitones/accidentals that's not in the home key.
Minimalism	A style of music using repetition of short phrases which change gradually over time.

Form and structure:

The piece is in **strophic** or **verse-chorus** form.

Intro	Verse 1 / Verse 2	Chorus 1 / Chorus 2	Link 1 / Link 2	Instrumental	Chorus 3	Outro
1 – 4	5 – 39 / 14 – 39	40 – 57	58 – 65	66 – 82	40 – 92	93 – 96
4 bars	35 bars / 26 bars	18 bars	8 bars	17 bars	22 bars	4 bars

Metre and rhythm:

Simple duple time – 2/2 (split common time) – with two minim beats in every bar.

Uses distinctive **ostinato rhythms** for both riffs, consisting almost totally of **quavers**, with constant use of **syncopation**.

Vocal rhythm looks complex but follows the natural rhythm of the lyrics.

Background details:

Composed by band members **David Paich** and **Jeff Porcaro**.

Recorded by the American rock band Toto in **1981** for their fourth studio album entitled **Toto IV**.

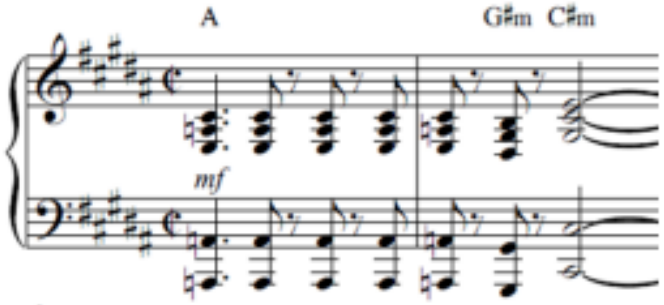
Released in **1982** and reached number one in America on 5 February **1983**.

Genre: **soft rock**.

Harmony:

Diatonic; mixture of root position and inverted chords.

Riff a can be heard during the intro, verses, link sections, instrumental and outro. This riff uses a three-chord pattern: **A – G♯m – C♯m**.



Choruses use a standard chord pattern: **vi** (F♯m) – **IV** (D) – **I** (A) – **V** (E).

The **harmonic rhythm** (the rate of chord change) is mostly once per bar.

Instrumentation:

Rock band: drum kit with additional percussion, lead and bass guitars, synthesisers, male lead vocals and male backing vocals.

Dynamics:

Most of the song is ***mezzo-forte*** (moderately loud) whilst the choruses are ***forte***.

Melody:

Mostly **conjunct** (moving in step) with a **wide vocal range**.

Riff b uses the **pentatonic scale** (interpreted through E major):

Vocal improvisations occur towards the end of the song.

Texture:

Homophonic: melody and accompaniment.

Tonality:

The majority of the song is in **B major** whilst the choruses are all in **A major**.

Tempo:

The tempo is **moderately fast**.

Form and structure:

The piece is in **Binary** form (**AB**).

Section A is 16 bars long.

Section B is 24 bars long.

Each section is repeated (**AABB**).

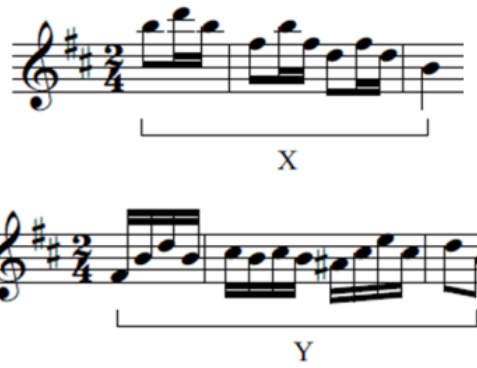
Harmony:

Diatonic; mixture of root position and inverted chords; uses V7 chords and a Neapolitan sixth chord.

Imperfect and perfect cadences are clearly presented throughout. Both sections end with a **perfect cadence**.

Melody:

The movement is based on **two musical motifs**.



Both motifs begin with an **anacrusis**. Motif X is entirely **disjunct** whilst motif Y **combines disjunct and conjunct** movement.

Typical **ornaments and compositional devices** of the period are used including **trills, appoggiaturas** and **sequences**.

Dynamics:

Mostly ***forte*** throughout, although no markings appear on the score.

On some recordings, **terraced dynamics** (sudden changes) are included.

Metre and rhythm:

Simple duple time – 2/4 – with two crotchet beats in every bar.

Uses **ostinato rhythms** which form the basis of two short musical ideas (X and Y), consisting almost totally of **quavers and semi-quavers**.

Background details:

Composed by **Johann Sebastian Bach** (1685 – 1750), one of the main composers of the **Baroque** era in music.

Badinerie is the last of seven movements from a larger piece called **Orchestral Suite No.2**.

The piece was composed between **1738-1739**.

Instrumentation:

Flute, string orchestra and harpsichord.

The score has five parts (flute, violin 1, violin 2, viola and cello). The harpsichord player reads from the cello line and plays the notes with their left hand whilst filling in the chords with their right hand.

Texture:

Homophonic: melody and accompaniment.

The flute and cello provide the main musical material; however, the 1st violin participates occasionally.

The 2nd violin and viola provide harmony with less busy musical lines.

Tonality:

Section A begins in **B minor** (tonic) and ends in **F♯ minor** (dominant minor).

Section B begins in **F♯ minor** (dominant minor) and ends in **B minor** (tonic).

Section A modulates from B minor through **A major** before arriving at F♯ minor.

Section B modulates from F♯ minor through **E minor, D major, G major** and **D major** before arriving at B minor.

GCSE PE Unit 1: Retrieval Practice

ONE: Key Information

1.1 Applied anatomy and physiology	
1.1.a The structure and function of the skeletal system	Location of major bones
	Functions of the skeleton
	Types of synovial joint
	Types of movement at hinge joints and ball and socket joints
	Other components of joints
1.1.b The structure and function of the muscular system	Location of major muscle groups
	The roles of muscle in movement
1.1.c Movement analysis	Lever systems
	Planes of movement and axes of rotation
1.1.d The cardiovascular and respiratory systems	Structure and function of the cardiovascular system
	Structure and function of the respiratory system
	Aerobic and anaerobic exercise
1.1.e Effects of exercise on body systems	Short-term effects of exercise
	Long-term (training) effects of exercise
1.2 Physical training	
1.2.a Components of fitness	Components of fitness
1.2.b Applying the principles of training	Principles of training
	Optimising training
	Warm up and cool down
1.2.c Preventing injury in physical activity and training	Prevention of injury

TWO: Can you...

Identify all areas in each topic?

Produce a mind map with relevant information for each topic?

Define all key terms in each topic?

Answer past paper questions that cover all topics?

THREE: Test your knowledge

Test yourself by logging into your E-Revision account and taking the online tests

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GCSE PE Unit 2: Retrieval Practice

ONE: Key Information

2.1 Socio-cultural influences	
2.1.a Engagement patterns of different social groups in physical activities and sports	Physical activity and sport in the UK
	Participation in physical activity and sport
2.1.b Commercialisation of physical activity and sport	Commercialisation of sport
2.1.c Ethical and socio-cultural issues in physical activity and sport	Ethics in sport
	Drugs in sport
	Violence in sport
2.2 Sports psychology	
2.2 Sports psychology	Characteristics of skilful movement
	Classification of skills
	Goal setting
	Mental preparation
	Types of guidance
	Types of feedback
2.3 Health, fitness and well-being	Health, fitness and well-being
	Diet and nutrition

TWO: Can you...

Identify all areas in each topic?

Produce a mind map with relevant information for each topic?

Define all key terms in each topic?

Answer past paper questions that cover all topics?

THREE: Test your knowledge

Test yourself by logging into your E-Revision account and taking the online tests

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SeparateBioSB3: Genetics

Lesson sequence

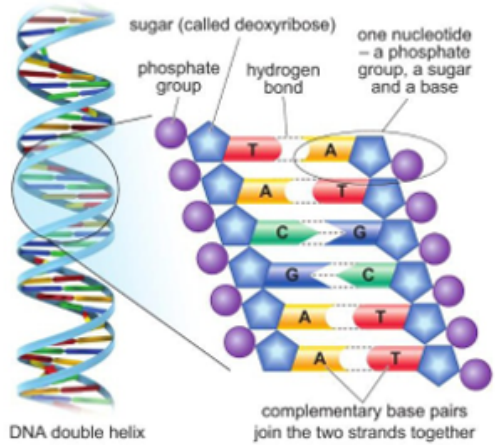
1. Sexual and asexual reproduction
2. Meiosis
3. DNA
4. DNA extraction
5. Protein synthesis
6. Genetic variants and phenotypes
7. Mendel
8. Alleles
9. Inheritance
10. Multiple and missing alleles
11. Gene mutation
12. Variation

1. Sexual and asexual reproduction	
Asexual reproduction	Reproduction which does not involve sex cells or fertilisation.
Sexual reproduction	The production of new living organisms by combining genetic information from two individuals of different types (sexes).
fertilisation	The fusion of male and female gametes to form a zygote.
Vertebrates	An animal that posses a backbone or spinal column.
Invertebrates	An animal lacking a backbone or spinal column.
Mitosis	When one cell divides into two genetically identical daughter cells.
Binary fission	A kind of asexual reproduction. A single organism becomes two independent organisms.
Clones	An organism or cell produced asexually that has the same genes as the original.

variation	Any difference between cells, individual organisms, or groups of organisms of any species.

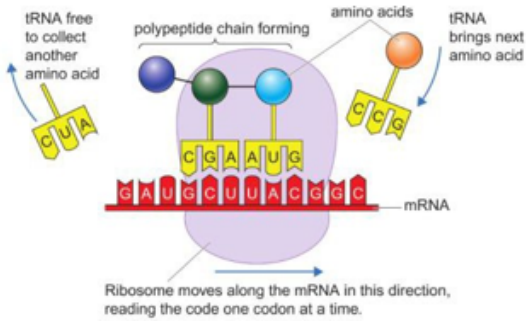
2. Meiosis	
Gametes	Egg cell and sperm cell.
Fertilisation	Sperm cell fuses with egg cell and nuclei combine.
Zygote	Single cell formed by fertilisation.
Gene	Length of DNA coding for a protein. Controls your characteristics.
Genome	All the DNA and genes in an organism.
Protein	Polymer made from amino acids.
Polymer	Long molecule made by chaining together many shorter ones.
Diploid	A cell with 23 pairs of chromosomes (46 in total).
Haploid	A cell with 23 single chromosomes.
Meiosis	Cell division that makes gametes.
Meiosis stages	DNA replicates, cell divides into 2 diploid cells, these divide into 4 haploid daughters.
Why gametes are different	Chromosomes in a pair are slightly different. Different gametes get different combinations of chromosomes.

3. DNA	
Chromosome	Large DNA molecule made into a small package by tightly coiling DNA around a protein.
DNA structure	Two strands, double helix, complementary base pairs, sugar-phosphate backbone.
DNA bases	Adenine, A; thymine, T; cytosine, C; guanine, G
Complementary base pairs	A pairs with T C pairs with G
Hydrogen bonds	Weak force holding the two strands of DNA together.
DNA analysis	Uses small differences in DNA to determine family relationships or link people to crimes.



4. DNA extraction	
DNA extraction: Mix water, salt and detergent.	Salt makes DNA clump together, detergent breaks down cell membranes to release DNA
DNA extraction: Mash fruit/veg and add the solution	Increases the surface area
DNA extraction: Leave in water bath at 60°C	Heat makes it react quicker
DNA extraction: Filter the mixture and collect filtrate	To remove unwanted lumps
DNA extraction: Measure out 10 cm³ of filtrate	It's easier to work with a small amount
DNA extraction: Add two drops of protease solution	Protease breaks down proteins around the DNA
DNA extraction: Gently add ice-cold ethanol	DNA is insoluble in ethanol so precipitates
DNA extraction: Leave for several minutes	So white DNA layer forms

5. Protein synthesis	
Genetic code	The set of rules by which information encoded in genetic material.
Transcription	The process by which the information in a strand of DNA is copied into a new molecule of messenger RNA (mRNA).
RNA polymerase	An enzyme that is responsible for making RNA from a DNA template.
Messenger RNA (mRNA)	A single-stranded **RNA** molecule that corresponds to the genetic sequence of a gene
Uracil	In RNA, thymine is replaced by the base uracil.
Translation	The process in which ribosomes in the cytoplasm synthesize proteins after the process of transcription.
Nuclear pores	Regulates the transportation of molecules between the nucleus and the cytoplasm.
Ribosomes	A structure found in the cytoplasm which translates a genetic code into chains of amino acids.
Transfer RNA (tRNA)	A type of RNA molecule that helps decode a messenger RNA (mRNA) sequence into a protein.
Codon	A sequence of three bases that code for an amino acid.
Triplet code	Another name for a codon. A sequence of three bases.
Polypeptide	A chain of amino acids.
Protein	Made up of one or more polypeptide molecules.



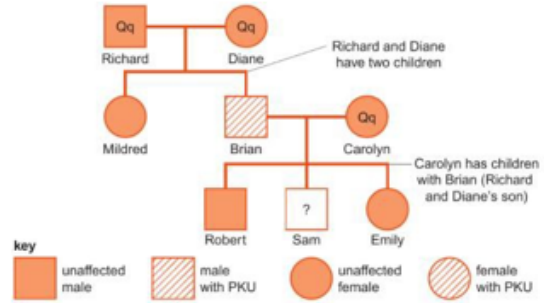
6. Genetic variants and phenotypes	
Mutation	A change to the bases in a gene.
Allele	Different version of the same gene. We have two alleles of each gene.
Phenotype	The characteristics produced by the alleles.
Genetic disorder	A health problem caused by one or more abnormalities in the genome.

7. Mendel	
Inherited variation	Variation caused by genes.
Gregor Mendel	The 'god father' of genetics. He discovered the basics principles of heredity through experiments with garden peas.
Traits	A genetically determined characteristic.
Offspring	The young born of living organisms.
First generation	Subsequent sets of offspring from controlled or observed reproduction.
Second generation	The offspring from allowing the **F1** individuals to interbreed.

8. Alleles	
Homozygous	We have two copies of the same allele.
Heterozygous	We have two different copies of an allele.
Dominant allele	One copy needed for characteristic to show. Written as a capital.
Recessive allele	Two copies needed for the characteristic to show. Written as lowercase.
Genotype	The combination of alleles in an organism.
Punnet square	A graphical representation of the possible genotypes of an offspring arising from a particular cross or breeding event.
Genetic diagram	Shows the likelihood of offspring produced by parents with certain genotypes.

9. Inheritance	
Sex chromosomes	Female: XX Males: XY
Inheriting sex	All eggs are X, 50% of sperm are X and 50% are Y, so 50% of zygotes are XX and 50% are XY.
Punnett squares	Uses the genotypes of male and female gametes to predict the genotypes of the offspring.
Probability and Punnett squares	Punnett squares tell you the likelihood of certain offspring, not what will actually happen.

Cystic fibrosis	Illness caused by a inheriting two copies of a faulty recessive allele.
Family pedigree chart	Chart showing how genotypes are inherited down through a family.



10. Multiple and missing alleles	
ABO Blood group	The classification of human blood (A, B, AB, O)
Codominant	Occurs when two versions, or "alleles," of the same gene are present in a living thing, and both are expressed.
Sex-linked genetic disorders	A trait in which a gene is located on a **sex** chromosome. In humans, the term generally refers to traits that are influenced by genes on the X chromosome.
Haemophilia	A bleeding disorder that slows the blood clotting process.
Colour-blindness	The inability to perceive colours in a normal fashion. The most common forms of colour-blindness are inherited as sex-linked (X-linked) recessive traits.

12. Variation	
Variation	Natural differences between members of a species that affect the chance of survival.
Genetic variation	Variation caused by genes

11. Gene mutation	
Mutation	A change to the bases in a gene.
Effect of mutations	Change the structure of a protein and how it works. Sometimes harmless, normally harmful, very rarely beneficial.
Cause of mutations	Mistakes copying DNA during cell division, DNA damage from chemicals or radiation.
Inheriting mutations	Only if they occur in gametes (egg and sperm).
Human Genome Project	(HGP) Project involving many scientists from many countries to find the order of bases in human DNA.
How is the HGP useful?	To tailor drugs to genes, to design better drugs.
Genetic differences	HGP found 99% of DNA in all people is identical.

12. Variation	
Variation	Natural differences between members of a species that affect the chance of survival.
Genetic variation	Variation caused by genes
Environmental variation	Caused by interaction with the surroundings - such as food, climate etc.
Causes of most variation	A combination of genes and the environment.
Acquired characteristics	Changes caused by the environment during your lifetime, such as losing a leg.
Continuous variation	Can be anywhere within a range, such as height, following a normal distribution.
Discontinuous variation	Can be only one of a few possibilities, such as blood type: A, B, AB, O.

Separate Biology SB4: Evolution

Lesson sequence

1. Evidence of human evolution
2. Darwin's theory (the theory ofevolution)
3. Development of Darwin's theory
4. Classification
5. Breeds and varieties (How tomodify species)
6. Tissue cultures
7. Genes in agriculture and medicine (Problems withmodifying species)
8. GM and agriculture
9. Fertilisers and biological control

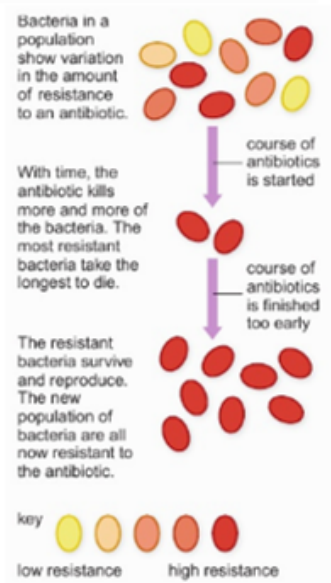
1. Human evolution	
Binomial naming	Two-part names, first part = genus, second part = species. Written in italics.
Homo sapiens	Our species. Evolved about 200,000 years ago. Skull volume 1450 cm^3.
Ardipithecus ramidus	Aka 'Ardi'. 4.4 million years ago, walked upright and climbed trees, 350 cm^3 skull volume.
Australopithecus afarensis	Aka Lucy. 3.2 million years ago, walked upright, skull volume 400 cm^3.
Homo habilis	2.4-1.4 million years ago, walked upright, skull volume 5-600 cm^3.
Homo erectus	1.8 to 0.5 million years ago, walked upright, skull volume 850 cm^3.
Fossil evidence	Many fossils have been found showing a gradual transition from 'ape-like' to 'human-like'.
Stone tool evidence	Older stone tools are simpler requiring less intelligence to make, younger stone tools are more complex requiring more intelligence to make.

The Leakeys	Mary and Louis discovered *Homo habilis*, their son Richard worked on *Homo erectus*.

2 and 3. Darwins theory and development	
Charles Darwin	Develop the theory of evolution.
Evolution	The way that species develop by gradual changes over many generations due to natural selection.
Variation	Natural differences between members of a species that affect the chance of survival.
Mutations and evolution	Changes in DNA cause variation.
Environmental change	Change to factors such as food supply, climate or predators.
Competition	The fight to eat, survive and breed.
Natural selection	Organisms with the best genes and characteristics are more likely to survive, breed and pass on their better genes.
Inheritance	Gaining your genes from your parents.
Well adapted	An organism has features that make it better able to survive and breed.
Evolution and the individual	An individual does not evolve during its lifetime, populations of organisms evolve over many lifetimes.
Human evolution	Humans did not evolve from chimpanzees, we both evolved from a common ancestor.
Pentadactyl limb	A **limb** with five digits, characteristic of tetrapod vertebrates (amphibians, reptiles, birds, and mammals).

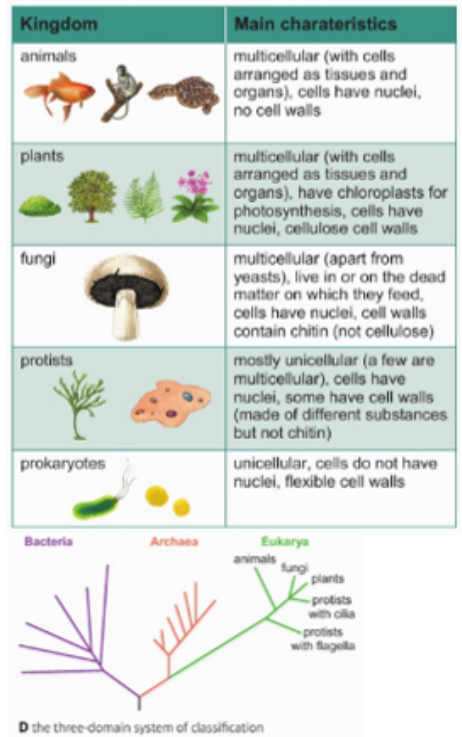
Resistance	The natural ability of some members of a species to survive poisons that would kill the other members.

Evolution of resistance	Evolution of organisms that stops them from being affected by poisons.
Rats and warfarin resistance	Warfarin is used to kill rats. Some rats were naturally resistant, survived the warfarin, bred and passed on their resistance genes.
Antibiotic resistance	Antibiotics are used to kill bacteria. Some bacteria were naturally resistant, survived the antibiotics, bred and passed on their resistance genes.
The problems of resistance	Antibiotic resistance means that many infections that used to be simple to treat may become too resistant to treat, causing major health problems.



4. Classification	
Carl Linnaeus	Developed the modern system of classification.
How to classify	Based on similarities, group things into smaller and smaller groups with fewer and fewer similarities.

Problems with classification	Sometimes organisms that look similar are not actually related.
Kingdoms	Old idea, classifying living things into five kingdoms (including plants, animals and fungi)
Carl Woese	Developed the modern system of classification with three domains.
Domains	Modern idea of classifying living things into three main groups: bacteria, Archae, Eukarya.
Bacteria	Single-celled organisms with no nucleus and no unused sections c DNA.
Archaea	Single-celled organisms with no nucleus but with unused sections of DNA.
Eukarya	(Often) multi-cellular organisms with a nucleus and unused sections of DNA. Includes plants, animals, fungi and protists.



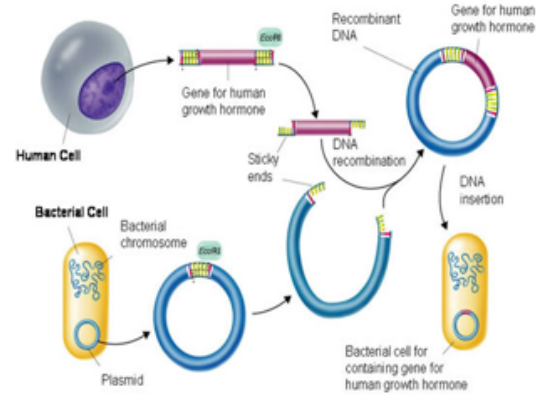
5 Breeds and variety	
Artificial selection	When humans (normally farmers) select the animals/plants to breed with the best characteristics.
Selective breeding	Developing new breeds of plants or animals with better characteristics by selective breeding over many generations.
Selective breeding in practice	Choose parents with the best characteristics, breed them together, choose from their offspring with the best characteristics, breed them together, repeat for many generations.
Genetic engineering	Changing the characteristics of organisms by giving them genes from another organism.
GMO	Genetically modified organism: an organism that has had its genes changed.
Bt corn	Corn containing a gene from *Bacillus thuringiensis* that makes it produce a substance called Bt which kills insects.
Medical GMOs	GM bacteria are used to make insulin (for diabetes) and some antibiotics.
Pros and cons of GM	Quicker than selective breeding and can introduce more different characteristics but is expensive.

6. Tissue culture
an undifferentiated cell of a multicellular organism and has theability to develop into many different cell types.
the growth of **tissue7**or cells in anartificial medium separate from the organism.
The process by which a **cell** becomes specialized in order to perform a specific function.
the termination of a kind of organism or of a group of kinds (taxon), usually a species.
an identical genetic copy of eithera piece of deoxyribonucleic acid (DNA), a cell, or a whole organism.
A microorganism that is smallerthan a bacterium that cannot grow or reproduce apart from a living cell.

7 Problems with modifying species	
Over-selection	Farmers focussing too much on breeding for one characteristic (such as chicken breast size), don't spot problems with other characteristics (such as weak leg bones) causing suffering.
Gene leakage	The concern GMOs could breed with wild relatives, enabling the modified genes to escape into the wild. This could have ecological impacts.
Resistance	The concern that in areas growing Bt corn, insects simply evolve resistance to Bt.
Insulin	Insulin made by GM bacteria is not identical to human insulin, and some people suffer bad reactions to it.

8 Genetic engineering of bacteria (HT)	
Plasmid DNA	Small loops of DNA containing a few genes.
Restriction enzyme	Enzymes that cut DNA, leaving sticky ends at each end of the piece of DNA.
Sticky end	A short sequence of unpaired bases at the end of a piece of DNA.
Ligase	An enzyme that joins two pieces of DNA by matching up the bases on their sticky ends.
Recombinant DNA	DNA produced by combining together two of more pieces of DNA.
Yield	The amount of product obtained.
Pests	Any animal or plant which has aharmful effect on humans, their food or their living conditions.

Insecticides	Are substances used to kill insects
Bt toxin	A naturally occurring bacteria thatproduces a protein toxic to certain types of insects.
How to genetically engineer bacteria	Cut out gene using restriction enzymes, remove plasmids from bacteria and open with restriction enzymes, use ligase to join gene and plasmid together, return plasmids to bacteria.
	9 Fertilisers and biological control
Biological control	A method of controlling pests such as insects, mites, weeds and plant diseases using other organisms.
Weeds	A plant considered undesirable in a particular situation.
Fertilisers	Are chemicals that are added to soil to supply nutrients to make it more fertile. The chemicals in fertilisers contain essential elements required for plant growth.
Pollution	Something introduced into the environment that is dirty, unclean or has a harmful effect.



Separate Biology SB5: Health and disease

Lesson sequence

1. Health and disease
2. Non-communicable disease
3. Cardiovascular disease
4. Pathogens
5. Spreading disease
6. Viruses life cycles
7. Plant defences
8. Plant diseases
9. Physical and chemical barriers
10. Preventing infection
11. The immune system
12. Antibiotics
13. Core Practical: Antibiotics
14. Monoclonal Antibodies

1. Health and disease

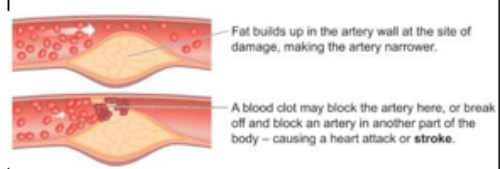
Physical health	Being free from disease, active, fit, sleeping well and no substance abuse.
Mental health	Feeling good about yourself and being free of conditions such as depression and anxiety.
Social health	Having healthy relationships, loving and being loved.
WHO	World Health Organization – part of the UN responsible for monitoring global health.
Disease	Any problem with the body not caused by injury.
Communicable diseases	Diseases caused by pathogens, can be passed on.
Non-communicable diseases	Diseases caused by genes or, lifestyle. Cannot be passed on.
Correlated diseases	Getting one disease increases your chance of another due to diseases weakening organ systems, damaged immune system, weaker defences.

2. Non-communicable disease

Genetic disorders	Diseases caused by inheriting faulty genes from your parents.
Malnutrition	Diseases caused by poor diet.
Anaemia	Lack of iron. Causes fewer and smaller red blood cells and low energy.
Kwashiorkor	Lack of protein. Swollen belly, small muscles, stunted growth.
Rickets	Lack of calcium or vitamin D. Causes weak bones leading to bowed legs.
Scurvy	Lack of vitamin C. Swollen bleeding gums, muscle and joint pain, lack of energy.
Ethanol	The drug found in all alcoholic drinks.
Drugs	Chemicals that change the way your mind and body works.
Cirrhosis	A fatal liver disease caused by drinking too much alcohol over a long period of time.
Social problems of alcohol	Missed work days, increased risk of other diseases, risky sexual behaviour, increased violence.

3. Cardiovascular disease

Obesity	Being overweight to the extent that your health is at risk.
BMI	Body mass index, over 30 = obese.
BMI calculation	$BMI = \frac{mass\ (kg)}{height^2\ (m^2)}$
Problems with BMI	Someone with a lot of muscle could have high BMI without being obese.
Waist:hip ratio	The ratio of waist width to hip width. Over 0.9 (women) or 1.0 (men) = obese.
Calculating waist:hip ratio	$Waist{:}\,hip\ ratio = \frac{waist\ width}{hip\ width}$
Cardiovascular disease	Harmful substances in blood build up in the arteries around the heart. Blockages can form leading to heart attacks.
Stents	Used to treat cardiovascular disease. A tube of metal mesh is fed into the narrowed artery and opened up, holding the artery open.
Treating heart disease with lifestyle	More exercise and a better diet can treat cardiovascular disease, but this takes time.



4. Pathogens

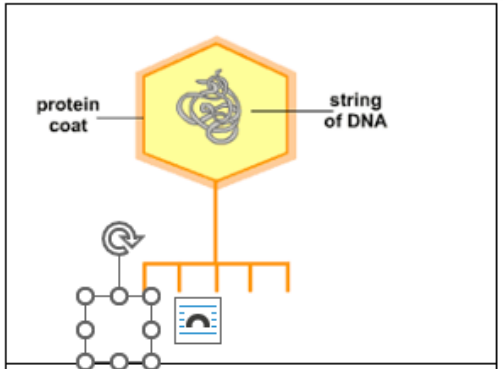
Pathogen	Microorganism that causes disease.
Types of pathogen	Bacteria, virus, protist, fungi.
Tuberculosis	Bacteria. Serious lung damage, bloody cough, fever.
Cholera	Bacteria. Sever life-threatening diarrhoea.
Chalara ash dieback	Fungi. Kills the leaves of ash trees, killing the tree.
Malaria	Protist. Sickness, fever and weakness.
Haemorrhagic fever	Virus, eg Ebola. Liver and kidney damage, internal bleeding.
HIV	Human immunodeficiency virus attacks white blood cells, causing AIDS.
AIDS	Acquired Immunodeficiency Syndrome. Weakened immune system making simple infections deadly. Caused by HIV.
Opportunistic pathogens	Pathogens that live in us causing no harm, but become dangerous when given the opportunity, such as *Helicobacter pylori* which cause stomach ulcers.

5. Spreading disease

Airborne	Spreading through the air, such as colds and flu in infected droplets of saliva, and chalara ash dieback by fungal spores.
Waterborne	Spreading through contaminated water such as cholera.
Oral route	Eating food contaminated with a pathogen.
Vectors	Animals that spread pathogens in their bites, such as malaria that is spread by mosquitoes.
Bodily fluids	Spreading through contact with infected body fluids such as blood or semen, for example, HIV.

6. virus life cycle

Capsid	The virus's protein coat.
Lytic	Viral DNA separate
Lysogenic	Viral DNA combines with host cell DNA
Zone of inhibition	Where the bacteria does not grow
Bacterial lawn	Bacteria grown in a petri dish
agar	Nutrient broth for bacteria to grow in



7. plant defences

Cuticle	A water-impervious protective layer covering the epidermal cells of leaves and other parts.
Pests	An insect that feed on, compete for food with, or transmit diseases to humans and livestock.
Pesticides	Are substances that are meant to control pests, including weeds.
Plant Symptoms	A visible effect of disease on the plant.

8. plant diseases

Yield	The amount of product obtained.
Lesions	Any damage or abnormal change in the tissue of an organism.
Distribution analysis	Looks at where the damaged plant occurs.
Diagnosis	The process of determining which disease or condition explains an organism's symptoms and signs.

9. Physical and chemical barriers

Physical barrier	Provides a physical block against pathogens from entering the plant
Chemical barrier	There are two main chemical barriers to infection, the relatively low pH of parts of the body and antimicrobial molecules.

Lysozyme	An enzyme produced in **tears**, perspiration, and saliva can break down cell walls and thus acts as an antibiotic (kills bacteria).
Mucus membranes	Produce mucus that trap microbes.
Ciliated cells	Cells that line the upper respiratory tract traps and propels inhaled debris to throat.
Hydrochloric acid	The acid found in your stomach that kills microorganisms.
Sexually transmitted infections (STIs)	Are infections you can get by having sex with someone who has an infection.
Chlamydia	A bacterial infection usually spread through sex or contact with infected genital fluids.
Screening	The evaluation or investigation of something as part of a methodical survey, to assess suitability for a particular role or purpose.

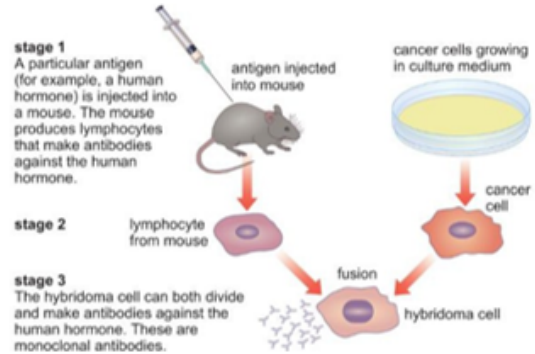
10 Preventing infection	
Chemical defences	Kill pathogens before they can infect us.
Lysozyme	Enzyme found in mucus, tears and sweat that kills *some* bacteria.
Hydrochloric acid	Found in the stomach, kills most bacteria on food.
Physical barriers	Block or trap pathogens so they can't enter the body.
Mucus	Sticky substance in most body openings that traps pathogens.
Ciliated cells	Have hairs that sweep mucus up and out of the body.
Skin as a physical barrier	Blocks pathogens from entering.
STIs	Sexually transmitted infections. Pathogens spread through sexual activity.
Preventing STIs	Use barrier contraception (such as condoms) to prevent mixing of fluids (semen, vaginal lubrication, blood).
Screening for STIs	Large scale testing of people to check if they have an STI so they can be treated. This helps to reduce the spread of STIs.

11. The immune system	
Immune system	Destroys pathogens that manage to infect us.
Primary immune response	How the body responds the first time it meets a new pathogen.
Antigens	Chemical markers on the surface of pathogens (and other cells) that identify them as a pathogen. Antigens are unique to each pathogen.
Lymphocyte	White blood cells that produce antibodies. Each lymphocyte makes a different antibody.
Antibodies	Chemicals with a specific shape that can stick to the antigens on a pathogen and kill it.
Activated lymphocyte	When an antigen sticks to an antibody, it activates the lymphocyte causing it to make many copies of itself that make the same antibodies.
Memory lymphocyte	Lymphocytes left over after an infection that retain the ability to fight the pathogen.
Immunity	When the body has the memory lymphocytes to fight a pathogen, so it can't be harmed by it.
Vaccine	A weakened version of a pathogen that trains the body to fight it, without causing disease.
How vaccines work	Vaccines are harmless versions of pathogen that still have the antibodies on them, so the immune response is triggered without any risk of disease.
Vaccine safety	Vaccines are safe, preventing about 6 million deaths per year.

12. Antibiotics	
Antibiotics	Substances that kill bacteria without harming human cells.
How antibiotics work	They inhibit (stop) an enzyme that maintains bacterial cell walls. This kills the bacteria.
Resistance	Widespread use of antibiotics has led to resistance, meaning many antibiotics don't work as well as they once did.
Drug development	Developing new medicines involves many stages that take a of time and money.
Discovery phase	Developing new chemicals that might work as medicines.
Pre-clinical testing	Testing on cells grown in the lab, or on animals, to see if the chemical has any useful effect.
Small clinical trial	Testing on a few healthy people to check for safety.
Large clinical trial	Testing on many patients to discover how effective the drug is and determine the dose.
Side effects	Unwanted effects of the medication, that can be quite harmful.

CORE PRACTICAL antibiotics

https://www.youtube.com/watch?v=Cl6EMg0zA-A



14. Monoclonal antibodies	
Monoclonal antibodies	An antibody produced by a single clone of cells.
Hybridoma cells	A hybrid cell used as the basis for the production of antibodies.
Cancer cells	A disease caused by an uncontrolled division of abnormal cells in a part of the body.
Platelets	Found in large numbers in the blood and involved in clotting.
PET Scan	Positron emission tomography (**PET**) **scan** is an imaging test that uses a special dye containing radioactive tracers.
Chemotherapy	An aggressive form of chemical drug therapy meant to destroy rapidly growing cells in the body.
Radiotherapy	A cancer treatment that uses high doses of radiation to kill cancer cells and shrink tumours.

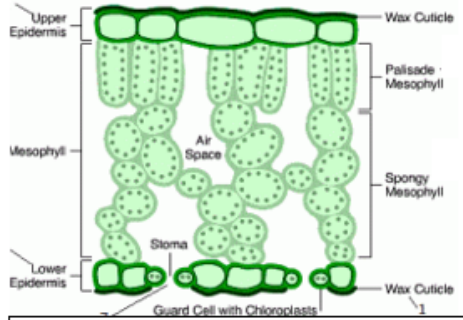
Separate Biology B6: Plants

Lesson sequence

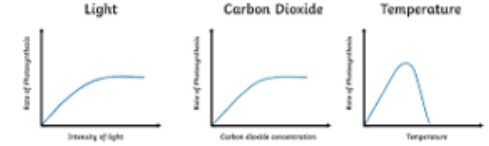
1. Photosynthesis
2. Leaves
3. Factors affecting photosynthesis
4. Core practical – effect of light intensity on photosynthesis
5. Roots
6. Transpiration and translocation

1. Photosynthesis	
Photosynthesis	How plants produce glucose using the energy from light.
Photosynthesis equation	Carbon dioxide + water → glucose + oxygen
Chloroplast	Part of a plant cell where photosynthesis happens.
Chlorophyll	A green pigment that enables photosynthesis by trapping the energy in light.
Forming starch	As soon as they are made, glucose molecules are joined together into long chains to form starch.
At night	Starch is converted into a sugar called sucrose which is easy to move around the plant.
Uses of sucrose	Sucrose is converted into: - Glucose for respiration - Starch for storage - Other molecules for growth
Biomass	The total mass of materials in an organism (except water). Photosynthesis is the main source of biomass.

2. Leaves	
Job of leaves	To conduct as much photosynthesis as possible as quickly as possible.
Leaf adaptations	To do more photosynthesis, leaves have: a large surface area, a waxy cuticle, palisade cells, a spongy layer, stomata.
Large surface area	Allows the leaf to absorb more light.
Waxy cuticle	A waxy coating that stops water evaporating from the leaf.
Palisade cells	Tall cells in a leaf with many chloroplasts for lots of photosynthesis.
Spongy layer	A layer of cells with lots of gaps that allows gases to move around inside the leaf.
Stomata (singular = stoma)	Holes in the bottom of the leaf that allow carbon dioxide in and oxygen and water vapour out.
Stomata structure	Each stoma is surrounded by two cells called guard cells that can swell to open it or shrink to close it.
How stomata work	During the day, the stomata open to allow gas exchange. At night the stomata close. Stomata also close during dry spells to stop water loss.



3. Factors affecting photosynthesis	
Limiting factor	A factor that holds back the rate of photosynthesis when in short supply.
The limiting factors	Carbon dioxide concentration, light intensity, temperature.
Limiting factor graphs	The line slopes up when the factor is limiting, the line levels out when the factor is not limiting.
Carbon dioxide and light intensity	To start with, increasing them will increase the rate of photosynthesis because they are limiting. Eventually increasing them further has no effect as they are no longer limiting.
Temperature and photosynthesis	Increasing temperature towards the optimum increases the rate as particles move faster and collide more. Increasing past the optimum decreases rate as enzymes denature.
Inverse square law (HT)	$I_{new} = \frac{I_{orig} \times d_{orig}^2}{d_{new}^2}$



4. Core practical – effect of light intensity on photosynthesis (CP4)	
CP4 – Key question	How does light intensity affect the rate of photosynthesis?
CP4 - Set up equipment	Place some pondweed in a beaker of water with a glass funnel over it and place it 10 cm away from a lamp and wait three minutes for it to settle.
CP4 - Recording results	Count the number of bubbles produced in a minute.
CP4 - Vary the light intensity	Repeat the experiment lowering the light intensity by moving the lamp 10 cm further away each time until it is 50 cm away.
CP4 - Results	As the light intensity decreases, the number of bubbles per minute decreases because the rate of photosynthesis decreases.

5. Roots	
Role of roots	To absorb water and nutrients from the soil.
Root hair cells	**Role:** To quickly absorb water and minerals from soil **Adaptations:** A long hair which increases their surface area, thins cell walls to ease water absorption.
Movement of water	Water enters roots by diffusion and osmosis and travels to the xylem in the centre.
Diffusion in roots	Water diffuses along the cell walls around the outside of each cell until it reaches the xylem.
Osmosis in roots	Water travels from cell to cell across cell membranes by osmosis until it reaches the xylem.
Minerals in the soil	Plants absorb minerals from soil such as nitrates, phosphates and potassium.
Absorbing minerals	Plants absorb minerals by active transport because their concentration is low.

6. Transpiration and translocation	
Transpiration	The movement of water into a plant's roots, up its stem and evaporating out of the leaves.
Xylem	Hollow tubes that carry water from the roots, up the stem to the leaves.
Xylem cells	**Role:** To carry water from the roots to the leaves. **Adaptations:** Hollow to let water pass, no walls between neighbours to allow water through, rings of lignin to make them strong.
Factors increasing transpiration	Air movement (wind), dryer air (low humidity), higher temperatures
Translocation	The movement of sucrose (sugar) around a plant through the phloem.
Phloem	Tissue that transports sucrose around plants, made of sieve tubes and companion cells.
Sieve tubes	Cells in phloem with a large channel running through them to carry sucrose solution.
Companion cells	Cells in phloem that sit next to the sieve tubes and pump sucrose into the sieve tubes.

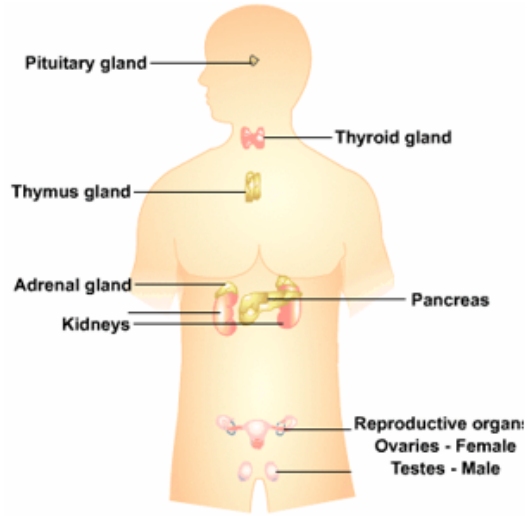
- CORE PRACTICAL – Light Intensity & Photosynthesis (https://www.youtube.com/watch?v=rWiPzWvw-qc) or (https://www.youtube.com/watch?v=f9MD2Qnq0-U)

Separate Biology SB7: Hormones

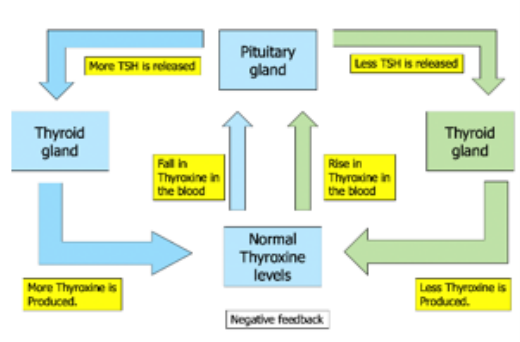
Lesson sequence

1. Hormones
2. Hormonal control of metabolic rate (thyroxine and adrenalin)
3. The menstrual cycle
4. Hormones and the menstrual cycle
5. Contraception and fertility treatment
6. Controlling blood glucose
7. Diabetes
8. Thermoregulation
9. Osmoregulation
10. The kidneys

1. Hormones	
Hormone	A chemical messenger that changes the way a part of the body works.
Important hormones	Insulin, glucagon, adrenalin, oestrogen, progesterone, testosterone, thyroxine, LH, FSH, ACTH, growth hormone.
Endocrine gland	Parts of the body that produce hormones
Important endocrine glands	Pituitary gland, thyroid gland, pancreas, adrenal glands, ovaries and testes.
Target organ	The part of the body affected by a hormone.
Important hormones	Insulin, glucagon, adrenalin, oestrogen, progesterone, testosterone, thyroxine, LH, FSH, ACTH, growth hormone.
Sex hormones	**Women:** oestrogen and progesterone **Men:** testosterone

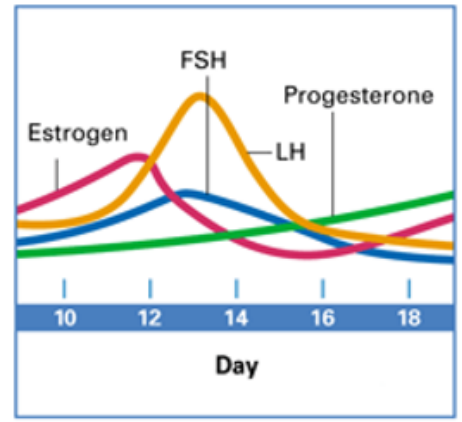


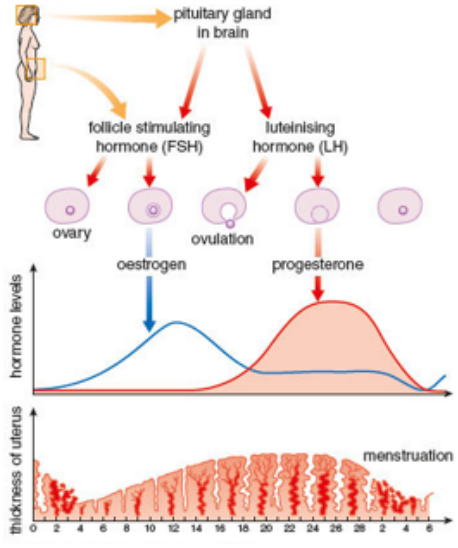
2. Thyroxine and adrenaline (HT)	
Metabolic rate	The rate at which the bod uses the energy stored in food.
Thyroxine	**Role:** To control your metabolic rate. **Endocrine gland:** Thyroid gland **Target organ:** Most of the body
Negative feedback	The way the body responds to high levels of something by bringing them down, and low levels by bringing them up.
Negative feedback and the metabolic rate	1) Low levels of thyroxine stimulates production of TRH in hypothalamus 2) This causes the release of TSH from the pituitary gland 3) TSH causes the thyroid to produce thyroxine 4) Normal levels of thyroxine inhibits the release of TRH and the production of TSH
Adrenaline	**Role:** To prepare the body for fight or flight **Endocrine gland:** Adrenal glands **Target organ:** Heart (beats faster and stronger), blood vessels going to muscles (get wider), blood vessels going to organs (get narrower), liver (releases glucose)



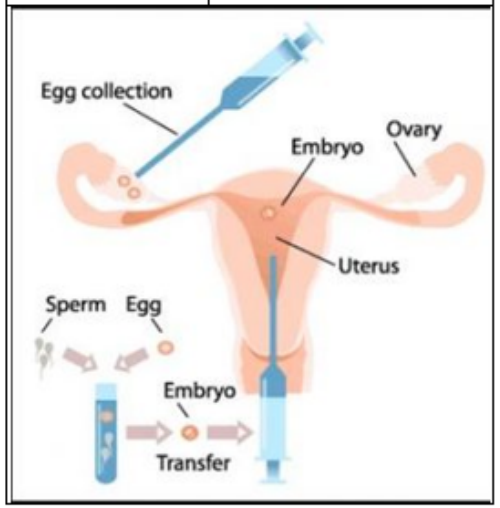
3. The menstrual cycle	
Menstrual cycle	A (roughly) 28 day cycle that prepares a woman's body for pregnancy.
Ovulation	The release of an egg cell by an ovary
Fertilisation	When a sperm cell fuses with an egg cell to form a zygote.
Days 1-5	Menstruation (a period): the lining of the uterus breaks down and leaves the body through the vagina.
Days 6-12	The uterus lining begins to thicken again.
Days 13-15	Ovulation happens
Days 16-28	The uterus lining continues to thicken and would be able to accept an embryo if fertilisation happens.
Control of the cycle	The menstrual cycle is controlled by the sex hormones: oestrogen and progesterone.

4. Hormones and the menstrual cycle (HT)	
Egg follicle	A layer of tissue surrounding each of the immature eggs in the ovaries.
Oestrogen	Causes the release of FSH and the thickening of the uterus lining. High oestrogen levels cause LH release.
FSH	Causes one follicle to develop and mature the egg cell within it.
LH	Causes ovulation when the egg is released from the follicle.
Corpus luteum	The follicle becomes a corpus luteum after ovulation, and releases progesterone. It breaks down over two weeks.
Progesterone	Maintains the thickness of the uterus lining, inhibits FSH release. Falling progesterone levels trigger ovulation.





5. Contraception and fertility treatment	
Contraception	Preventing sexual intercourse from leading to fertilisation and pregnancy.
Condom	Worn on the penis, they prevent sperm from entering the vagina. Also prevent STDs.
Diaphragm or cap	Placed over the cervix at the top of the vagina. Prevent sperm entering uterus, do not prevent STDs.
Contraceptive pill / implant	Uses hormones to prevent ovulation. Does not prevent STDS.
Assisted reproductive technology (ART)	Using hormones and other methods to increase the chance of pregnancy.
Clomifene therapy	Clomifene increases the levels of FSH and LH to make egg successful ovulation more likely.
In vitro fertilisation (IVF)	Sperm is extracted from a man, and eggs from a woman. The eggs are fertilised in a laboratory and one or more is placed into the uterus.



6. Controlling blood glucose	
Homeostasis	Maintaining constant conditions in the body, such as temperature or blood glucose concentration.
Blood glucose concentration	The concentration (amount) of glucose in the blood. Both too high and too low are dangerous.
Glycogen	A stored form of glucose made by joining glucose molecules together in long chains.
Insulin	**Role:** To reduce blood glucose concentration **Endocrine gland:** Pancreas **Target organ:** Liver and muscles which convert glucose into glycogen.
Glucagon	**Role:** To increase blood glucose concentration **Endocrine gland:** Pancreas **Target organ:** Liver and muscles which convert glycogen back into glucose.

9. Osmoregulation	
Osmoregulation	Controlling water and salt concentrations
Dialysis	Using a machine to filter the blood a few times a week
donation	Giving an organ to someone else who needs a transplant.
Urea	Nitrogenous breakdown of protein

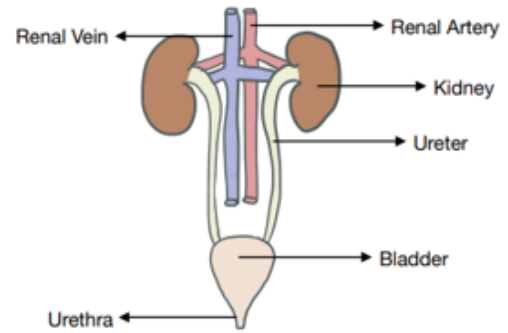
8.Thermoregulation	
Thermoregulation	Contolling your body internal body temperature
Shivering	Muscles begin to shake to create metabolic heat
Erector Muscle	A muscle which causes goosebumps

7. Diabetes	
Diabetes	A disease in which the body cannot quickly reduce blood glucose concentrations after eating.
Type 1 diabetes	Diabetes caused when a person's pancreas can't produce insulin.
Treating type 1 diabetes	Insulin injections.
Type 2 diabetes	Diabetes caused when a person does not produce enough insulin (because of very high glucose levels) or stops responding to insulin.
Risk factors for type 2 diabetes	Obesity and inactivity (lack of exercise).
Treating type 2 diabetes	Low-sugar diet, increased exercise, medication to make the body more sensitive to insulin.
Measuring obesity	Body mass index above 30: BMI = mass in kg / height in metres^2 High waist:hip ratio Waist:hip ratio = waist / hip

Vasodilation	The dilatation of blood
Vasoconstriction	The constriction of blood
Sweating	This causes heat loss through evaporation.

10. The kidneys	
Nephrons	Is the basic structural and functional unit of the kidney
Glomerulus	A cluster of capillaries around the end of a kidney tubule.
Bowman's capsule	A cup-like sack at the beginning of the tubular component of a nephron.
Ultrafiltration	It is the non-specific filtration of the blood under high pressure Bowman's Capsule

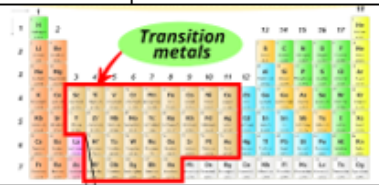
Selective Reabsorption	The absorption of some of the substances back into the blood
Loop of Henle	Part of the nephron where water and salt is reabsorbed
Collecting duct	Where urine is collected from the distal convoluted tubule
ADH	Hormone that controls the level of water reabsorption



Separate Chemistry SC13: Transition metals, alloys, and corrosion

Lesson sequence

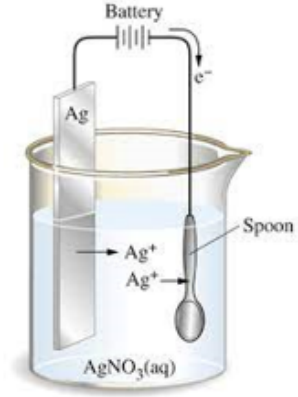
1. Transition metals
2. Corrosion
3. Electroplating
4. Alloying
5. Uses of metals and their alloys

1. Transition metals	
Transition metals	Metal element in the block between groups 2 and 3 in the periodic table.
	
Physical properties	Transition metals have typical properties of metals: malleable, ductile, high melting points, high densities
Malleable	A substance that can be hammered or rolled into shape without shattering.
Ductile	A substance that can be stretched out to make a thin wire.
Chemical properties	Transition metals form metal compounds that are coloured and show catalytic activity
	

Catalyst	A substance that speeds up a process, without itself being used up.

2. Corrosion	
Corrosion	The gradual deterioration of a substance when it reacts with substances in the environment, for example when a metal oxidises in air.
Desiccant	A substance that absorbs water or water vapour.
Oxidise	To gain oxygen in a chemical reaction, or to lose electrons.
Rusting	The corrosion of iron or steel. (Water and oxygen must be present for rusting to occur.)
Sacrificial protection	Using a more reactive metal to protect iron from rusting.
	
Tarnish	A thin layer that forms on a metal due to oxidation. A metal is also said to tarnish as this layer forms.

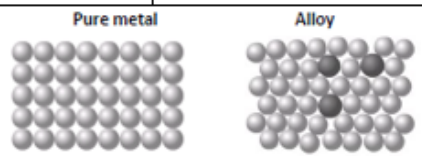
3. Electroplating	
Anode	The positive electrode.
Cathode	The negative electrode.
Electrolyte	An ionic compound that is molten or dissolved in water.
Electroplating	Using electricity to coat one metal with a thin layer of another metal.

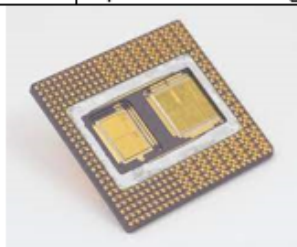


Anode – Ag → $Ag^+ + e^-$

Cathode – $Ag^+ + e^-$ → Ag

Galvanising	Coating iron or steel with a thin layer of zinc to improve its resistance to rusting.

4. Alloying	
Alloy	A metal with one or more other elements (usually metals) added to improve its properties. They are harder than pure metals because atoms of different sizes disrupt the layers so they cannot slide over each other.
	
Stainless steel	Alloy steel containing elements such as chromium, to resist rusting.
Alloy steel	Iron with other elements added to make an alloy.

5. Uses of metals and their alloys	
Properties	The uses of a metal or alloy depend upon its chemical and physical properties.
Copper	Used for electrical wiring as it resists corrosion, is a very good conductor and is malleable and ductile.
Gold	Used in tiny amounts to connect microprocessors as like copper it is a very good conductor but is too expensive for wiring.
	
Aluminium	Also a good conductor and due to it's low density is used for overhead electrical cables
	
Brass	An alloy of copper and zinc. Used for plug pins as stronger than copper.
Magnalium	An alloy of aluminium and magnesium. Used for aircraft parts, it is less dense than aluminium alone and stronger.

Separate Chemistry SC14-16
Quantitative analysis, equilibria, gas calculations and chemical and fuel cells

Lesson sequence

1. Yields
2. Atom economy
3. Concentrations
4. Titrations and calculations
5. Core practical – titration
6. Molar volumes of gases
7. Fertilisers and the Haber process
8. Factors affecting equilibrium
9. Chemical cells and fuel cells

2. Yields	
Actual yield	Amount of product obtained in a reaction
Theoretical yield	The maximum mass of product that can be formed
Percentage yield	% yield = $\frac{\text{actual yield}}{\text{theoretical yield}} \times 100$
Why is yield less than 100%?	-the reaction may be incomplete -some product is lost -side reactions

3. Atom economy	
Atom economy	A method of showing how efficiently a reaction makes use of the reactant atoms
Atom economy = $\frac{\text{Mr of the useful product}}{\text{Sum of Mr of all the products}} \times 100$	

By-product	Substance produced in a reaction in addition to the desired product Manufacturers will try to find uses for by-products so they are not wasted e.g. CO_2 in fizzy drinks
Reaction pathways	Chemists often have a choice of reaction pathway. Chemists will choose pathways with high percentage yields and high atom economies where possible. They will also consider energy consumption, rate of reaction and raw materials.

4. Concentrations	
Concentration	The amount of solute dissolved in a solution. Units can be g/dm³ or mol/dm³
Concentration (g/dm³) = $\frac{\text{mass of solute (g)}}{\text{volume of solution (dm}^3\text{)}}$	
Concentration (mol/dm³) = $\frac{\text{mass of solute (mol)}}{\text{volume of solution (dm}^3\text{)}}$	
Volumetric flask	Used to make a solution with an accurate concentration.

5. Titrations and calculations	
Titration calculation	The concentration of one of the solutions in a titration can be calculated if the concentration of the other solution is known.
Mole ratio	The ration in moles of the substances in a balanced equation.
Concordant	Titres within 0.2cm³
Mean titre	Average of the concordant titres

Example: To find the concentration of some dilute sulphuric acid, titrate 25cm³ of sodium hydroxide solution of concentration 0.2 mol/dm³. The mean titre of acid is 25.5cm³.

Step 1: Calculate the moles of the solution with known concentration

Moles = conc x vol = 0.2 x 0.025 = 0.005

Step 2: calculate the moles of the reactant with unknown concentration from the mole ratio

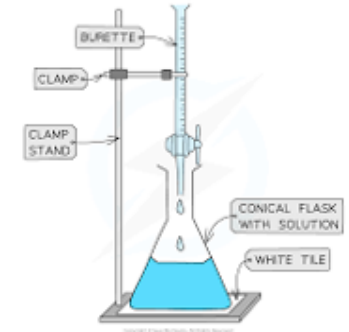
$H_2SO_4 + 2NaOH \rightarrow Na_2SO_4 + 2H_2O$

1:2 moles of NaOH = 0.005 x 2 = 0.01

Step 3: Calculate the concentration of the solution with unknown concentration

Conc = mol/vol = 0.01/0.0255 = 0.39 mol/dm³

5. Core practical – Acid alkali titration	
Link to video of practical	https://www.youtube.com/watch?v=DBeotrAAFQE
Aim	To find the concentration of a solution

Diagram	
Method	Rinse the burette with acid and fill it up to 0.00 with acid Rinse pipette with alkali and use it to measure 25cm³ into a conical flask. Add a few drops of indicator Add acid into the conical flask, whilst swirling, until the indicator changes colour. Repeat, this time add acid dropwise near end point. Repeat until you have concordant results.
Indicator	Do not use universal indicator as it does not have a sharp colour change Methyl orange – yellow in alkali red in acid Phenolphthalein-pink in alkali colourless in acid

6. Molar volume of gases	
Avogadro's law	If the temperature and pressure are the same, equal volumes of different gases contain the same number of molecules

e.g.

$N_{2(g)} + 3H_{2(g)} \rightarrow 2NH_{3(g)}$

The ratio of gases is 1:3:2

This means 100cm³ of nitrogen reacts with 300cm³ of hydrogen producing 200cm³ of ammonia.

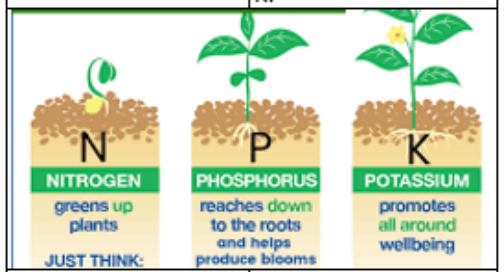
Molar gas volume	One mole of any gas at room temperature and pressure has a volume of 24dm³ or 24000cm³

Moles of gas = $\frac{\text{volume of gas(dm}^3\text{)}}{24}$

or $= \frac{\text{volume of gas(cm}^3\text{)}}{24000}$

7. Fertilisers and the Haber process

Fertilisers	Replace the mineral ions needed by plants for growth. N, P and K.



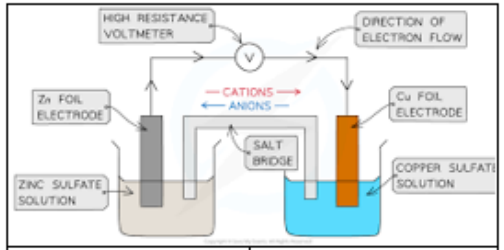
Ammonium nitrate	Soluble, nitrogen rich fertiliser made by reacting ammonia with nitric acid $NH_3 + HNO_3 \rightarrow NH_4NO_3$
Ammonium sulfate	A nitrogenous fertiliser made in the laboratory by reacting ammonia with sulfuric acid $NH_3 + H_2SO_4 \rightarrow (NH_4)_2SO_4$
Batch process	The laboratory preparation of ammonium sulfate is a batch process. This is where a small amount is made, the apparatus cleaned, and then another small amount made.
Continuous process	Industrial preparation is a continuous process, in which reactants are constantly fed into the reactors and products are removed.

8. Factors affecting equilibrium

Dynamic equilibrium	The point at which the rate of the forwards reaction and backwards reaction are equal, so the concentrations of reactants and products stop changing.
Increasing temperature	Equilibrium shifts in the **endothermic** direction (to cool it down)
Decreasing temperature	Equilibrium shifts in **exothermic** direction (to heat it up)
Increasing pressure	Equilibrium shifts in the direction that forms fewer gas molecules (to reduce pressure)
Decreasing pressure	Equilibrium shifts in direction that forms more gas molecules (to increase pressure)
Increasing a concentration	Equilibrium shifts in direction that uses up the substance that has been increased
Decreasing concentration	Equilibrium shifts in direction that forms more of the substance that has been decreased.
Add a catalyst	No effect on equilibrium
Industrial processes	Chemists choose reaction conditions to produce an acceptable yield in an acceptable time. This may mean there is a compromise between increasing rate and increasing yield

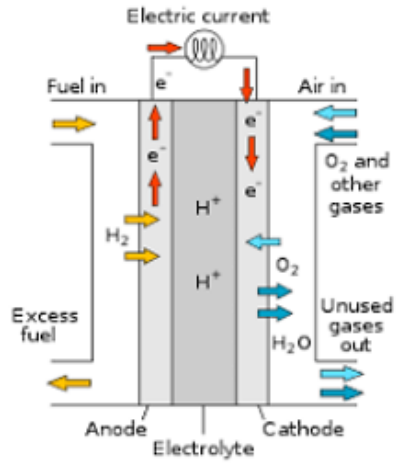
9. Chemical cells and fuel cells

Chemical cell	Everyday batteries are chemical cells. They consist of two different metals, dipped in a solution of their salts connected by a salt bridge.



Fuel cell	Fuel cells are supplied with fuel and oxygen from outside. They do not go flat, as they produce a voltage for as long as reactants are supplied

Hydrogen oxygen fuel cell



At anode: $2H_2 \rightarrow 4H^+ + 4e^-$

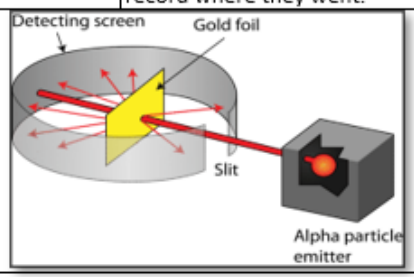
At cathode: $4H^+ + 4e^- + O_2 \rightarrow 2H_2O$

Separate physics SP6: Radioactivity

Lesson sequence

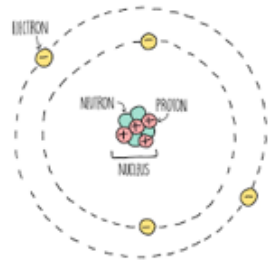
1. Atomic models
2. Inside atoms
3. Electron orbits
4. Background radiation
5. Types of radiation
6. Radioactive decay
7. Half-life
8. Using radioactivity
9. Dangers of radioactivity
10. Radioactivity in medicine
11. Nuclear energy
12. Nuclear fission
13. Nuclear fusion

1. Atomic structure	
Atom	Smallest stable particle.
Size of atoms	2.5 x10^{-10} m in diameter
Element	Pure substance made of a single type of atom.
John Dalton	Pictured atoms as tiny hard round balls, with different elements having atoms of different sizes.
J.J Thomson	Discovered negative particles smaller than atoms called electrons.
Plum-pudding model	Atoms as a sphere of positively charged matter with negative electrons scattered throughout.
Rutherford's experiment	Fired alpha particles at thin gold leaf and used a special screen to record where they went.



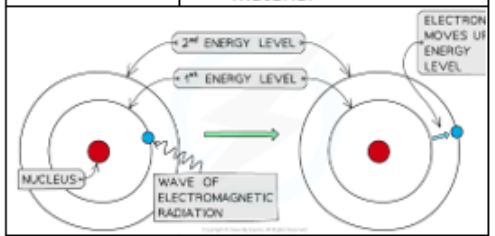
Rutherford's results	Most alpha particles went straight through, some scattered (changed path).
Rutherford's explanation	Scattered particles hit a nucleus. Nucleus must be small because most went straight through without hitting it.

2. Inside atoms	
Subatomic particle	Particles smaller than atoms: protons, neutrons and electrons.
Protons	+1 charge, mass = 1, located in the nucleus
Neutrons	0 charge, mass = 1, located in the nucleus
Electrons	-1 charge, mass = 1/1835, located around nucleus in shells

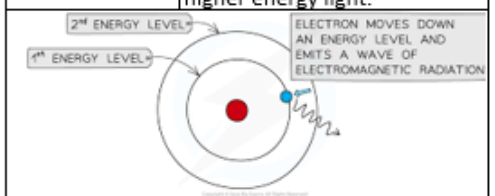


Relative mass	Not the actual mass because no units. Protons and neutrons have same relative mass: their mass is 1.
Nucleons	Subatomic particles found in the nucleus: protons and neutrons.
Determining the element	The number of protons determines which element an atom is.
Atomic number	The number of protons in an atom. (same as electrons in an atom)
Mass number	The number of nucleons (protons and neutrons) in an atom.
Number of neutrons	Mass number – atomic number
Isotopes	Versions of an element with the same number of protons, but different number of neutrons.
Naming isotopes	Name followed by mass, e.g. carbon-13, or symbol preceded by mass, e.g. ^{13}C.

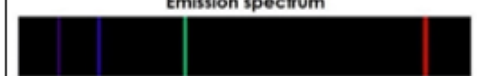
3. Electron orbits	
Orbits	The shells of electrons around an atom.
Orbits and energy	Higher orbit = higher energy
Excited electrons	When an electron has absorbed energy and jumped to a higher orbit.
How to excite electrons	- When atoms absorb light - When electricity is passed through gases - Strongly heating a material



Emitting light	Electrons emit light when they drop back down an orbit. A bigger drop down releases higher energy light.



Absorbing light	Light absorbed at specific wavelengths corresponds to energy gap in orbits: jumping up one orbit = redder light, jumping up several orbits = bluer light.
Emission spectrum	Pattern of bands of light at specific wavelengths caused by exciting a gaseous element.



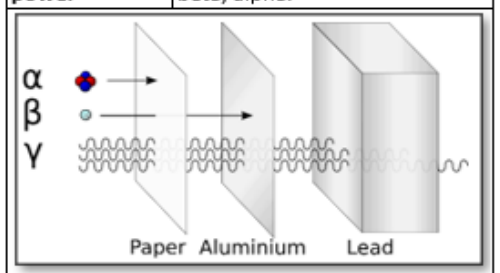
Absorption spectrum	Pattern of dark band in a 'rainbow' spectrum caused by a gaseous element absorbing some of the light passed through it.

Forming ions	When an electron is given so much energy it leaves the atom entirely creating a positive ion.
Ionising radiation	Radiation that causes ionisation: (high energy) UV, x-rays, gamma rays.

4. Background radiation	
Background radiation	Low levels of ionising radiation that we are constantly exposed to.
Radon gas	The biggest source of background radiation: a radioactive gas produced by some rocks in the ground
Other sources	Food, hospitals, nuclear power industry, space (cosmic rays)
Geiger-Müller (GM) tube	Used to measure radioactivity, produces a click each time radiation passes through it.
Count-rate	The number of times a GM tube detects radiation each second.
Measuring background radiation	Use a GM tube to take several readings and then calculate the average (mean).
Measuring the activity of a source	Measure the source, subtract the background radiation.
Dosimeter	People who work with radiation wear a dosimeter. A badge that changes colour in response to radiation exposure.
Dose	The amount of radiation received.

5. Types of radiation

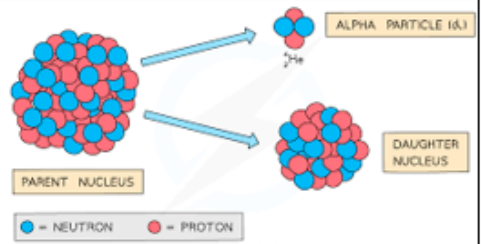
Unstable atom	An atom whose nucleus contains too much energy becomes unstable.
Decay	When an unstable atom releases its excess energy by changing. Releases ionising radiation.
Alpha radiation	Made of alpha particles: two protons and two neutrons. Symbol: α or ^4_2He.
Beta-minus radiation	Made of beta particles: a fast-moving electron. Symbol: β^- or $^0_{-1}e$.
Beta-plus radiation	Made of positrons: particles with same mass as electrons but a positive charge. Symbol: β^+ or ^0_1e.
Gamma radiation	Extremely short wavelength / high frequency / high energy electromagnetic radiation. Symbol: γ.
Neutron radiation	Fast-moving neutrons. Symbol: n.
Ionising power	From most to least is alpha, beta gamma.
Penetrating power	From most to least is gamma, beta, alpha.



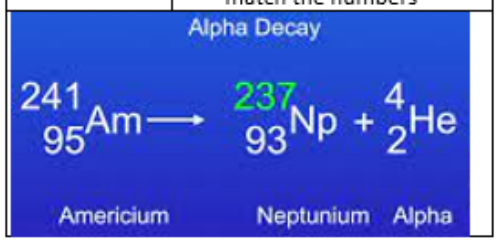
Ionising vs penetrating power	When the radiation ionises an atom it loses some of its energy. Alpha ionises particles most easily so loses it energy most quickly, and vice versa for gamma.

6. Radioactive decay

Alpha decay	Atomic number decreases by two, mass number decreases by four.



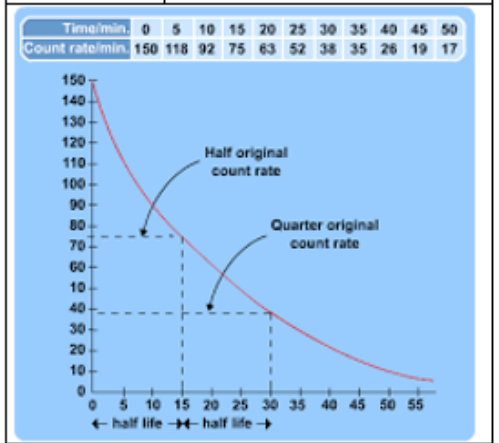
Beta- decay	Atomic number increases by one, mass number stays the same.
Beta+ decay	Atomic number decreases by one, mass number stays the same.
Gamma decay	Atomic number and mass number unchanged.
Neutron decay	Atomic number stays the same, mass number decreases by one.
Writing nuclear equations	- Write in what you know - Balance the mass and atomic number - Work out the symbols to match the numbers



7. Half-life

Half-life	The time taken for half of the undecayed atoms in a sample to decay. Stays constant for each isotope.
Half-life and stability	Less stable → shorter half-life More stable → longer half-life
Half-life and radioactivity	Shorter half-life → more active Longer half-life → less active

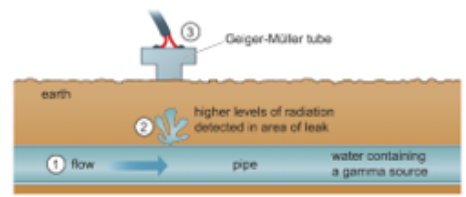
Becquerels, Bq	The unit of radioactivity: 1 Bq = one decay per second.
Half-life graph	x-axis = time, y-axis = radioactivity. The line curves downwards but never touches the x-axis.
Determining half-life from a graph	Pick two points on the y-axis, one half of the other, trace along to the line and down to the time. Half-life is the difference in the time.

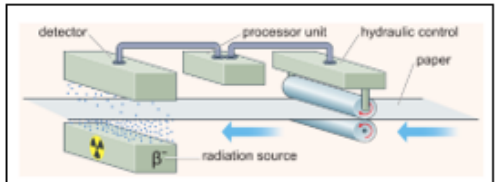


Calculations with half-life	- Divide time by half-life to give a number of half-lives - Forwards in time: halvings - Back in time: doublings

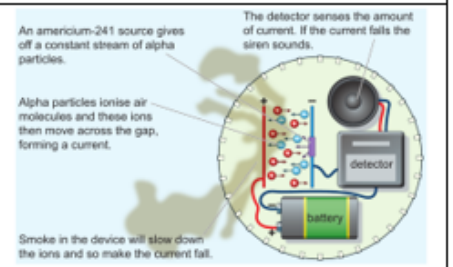
8. Using radioactivity

Irradiate	- Expose to ionising radiation
Sterilise	- Destroy microbes on or in an object
tracer	- Injected into body or water- to track movement of a substance using emitted radiation





C A beta particle detector is used to control the thickness of paper during its manufacture.



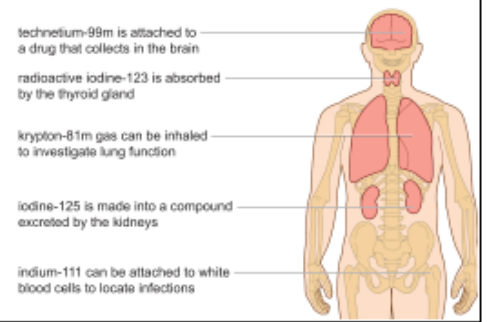
D How a smoke alarm works

9. Dangers of radioactivity

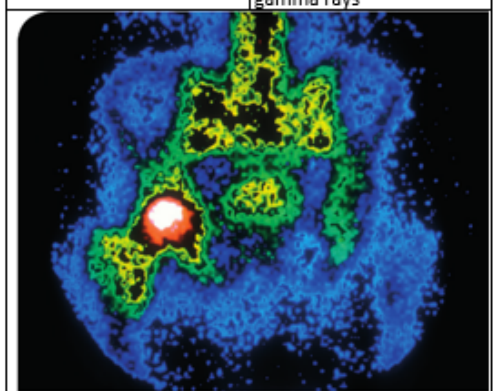
Mutations	DNA damage caused by ionising radiation, can lead to cancer.
Repairing damage	Cells contain proteins that can repair DNA damage as long as the radiation dose is low enough.
Minimising radiation risk	- Wear protective clothing - Handle with tongs - Don't point at people - Limit time - Use protective shielding - Wear dosimeter badges
Nuclear power risks	There is a small chance of accidents causing radioactive sources to escape
Irradiation	Exposure to radiation, stops when the source of radiation is removed.

Contamination	When particles of radioactive substances are on or in the body.
Risks in perspective	Using radioactivity carries serious risks, but so do many other things, so it is safe to use as long as it is treated with caution.

10. Radioactivity in medicine	
External radiotherapy	Treatment of cancer outside body

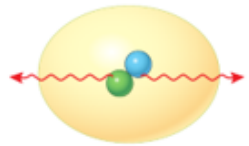


Internal radiotherapy	Treatment by placing radioactive source inside body
Gamma camera	Camera that detects gamma rays



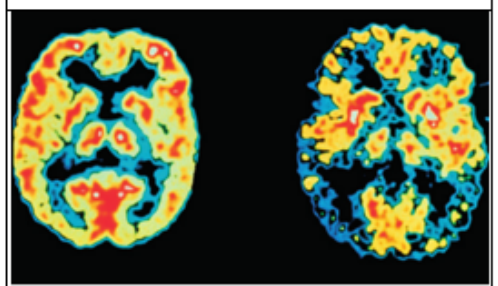
B This gamma camera scan shows a bone tumour. The brighter the colour, the more radiation has been detected.

tumour	A lump made by cancer cells



C The electron-positron annihilation causes two gamma rays to be emitted in opposite directions.

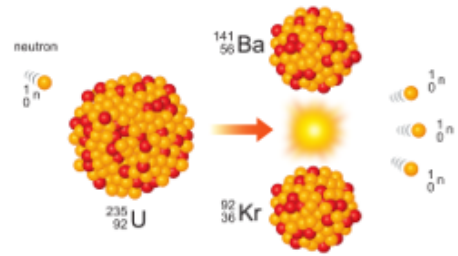
PET scanner	A medical scanning technique that detects gamma rays caused by the interaction of a positron from a radioactive source with an electron



PET scans showing the activity in a healthy brain (left) and one with Alzheimer's

11. Nuclear Energy	
climate change	Changes that will happen to the weather as a result of global warming, which is caused by the increase in the amount of carbon dioxide in the atmosphere
decommission	Dismantle safely
Fossil fuel	A fuel formed from the dead remains of organisms over millions of years (e.g. coal, oil or natural gas).
Non renewable	Any energy resource that will run out because it cannot be renewed, such as oil

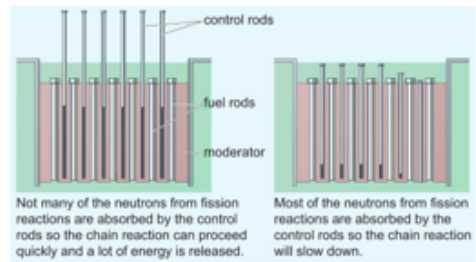
Nuclear fission	The reaction in which the nucleus of a large atom, such as uranium, splits into two smaller nuclei.



A one example of the fission of uranium-235 (other daughter nuclei can be formed)

Nuclear fusion	The reaction in which nuclei of light atoms, such as hydrogen, combine to make the nucleus of a heavier atom

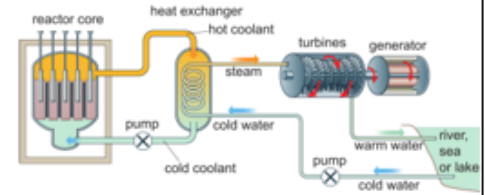
12. nuclear fission	
Chain reaction	The sequence of reactions produced when a nuclear fission reaction triggers one or more further fissions



B controlling the chain reaction in a reactor core

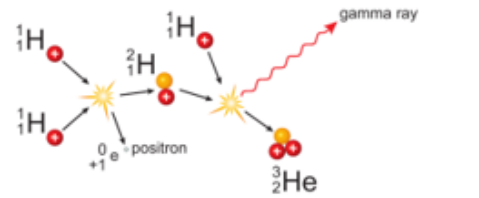
Control rod	A rod that can be lowered into the core of a nuclear reactor to absorb neutrons and slow down the nuclear chain reaction.
Core	Innermost part of reactor
Daughter nucleus	A nucleus produced when the nucleus of an unstable atom splits into two during fission or when a radioactive nucleus decays by emitting an alpha or beta particle.

Fuel rod	A rod containing the nuclear fuel for a nuclear reactor
moderator	A substance in a nuclear reactor that slows down neutrons, so that the nuclear fuel can absorb them more easily

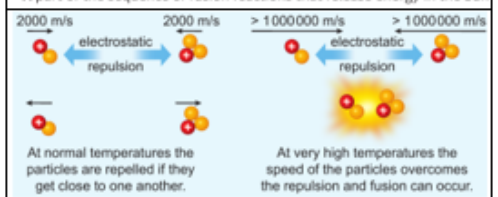


D Radioactive fuels are used to generate electricity in nuclear power stations.

14. Nuclear Fusion	
electrostatic repulsion	A force between two electrical charges that have the same sign, which pushes them apart.



A part of the sequence of fusion reactions that release energy in the Sun



C Electrostatic repulsion can be overcome if the nuclei are moving very fast.

Separate Physics SP7: Astronomy

Lesson sequence

1. The solar system
2. Gravity and orbits
3. Life cycles of stars
4. Red shift
5. Origin of the universe

1. The solar system

Planet	A large body in space that orbits a star. The Earth is a planet.
star	A huge ball of gas that radiates energy.
Orbit	The path taken by a planet around Sun or a satellite around a planet.
geocentric	Earth centred
heliocentric	Sun centred
Telescope	An instrument that is used to gather light from distant objects and make them look bigger.
Dwarf planet	A rocky body orbiting the Sun that is not quite big enough to be called a planet (e.g. Pluto).
asteroids	A small lump of rock orbiting the Sun.
Natural satell	Anything that orbits a planet and has not been made by humans.
moon	A natural satellite of a planet.
comet	A small lump of dirty ice orbiting the Sun

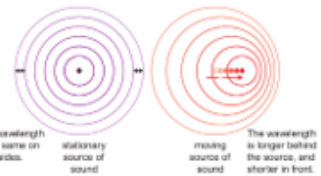
2. Gravity and orbits

Weight	The force pulling an object downwards. It depends on the mass of the object and the gravitational field strength. The units are newtons (N). Weight is a vector quantity.
Gravitational field strength	A measure of how strong the force of gravity is somewhere. The units are newtons per kilogram.
Artificial satellite	A satellite made by humans.
Polar orbit	A low satellite orbit over the poles – used for weather and spying
Geostationary orbit	A high orbit that moves at the same speed as Earth – used for communications
elliptical	Shape like a squashed circle
vector	A quantity that has both a size and a direction.

3. Life cycles of stars

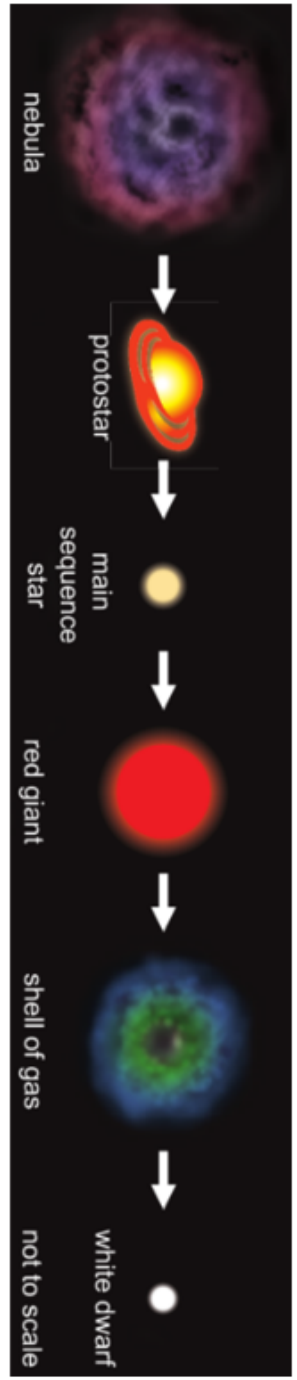
nebula	A cloud of gas in space. Some objects that look like nebulae are actually clusters of stars or other galaxies. The plural is nebulae
protostar	A cloud of gas drawn together by gravity that has not yet started to produce its own energy.
Fusion	The reaction when the nuclei of light atoms, such as hydrogen, combine to make the nucleus of a heavier atom
Main sequence	A star during the main part of its life cycle, when it is using hydrogen fuel.
Red giant	A star that has used up all the hydrogen in its core and is now using helium as a fuel. It is bigger than a normal star.
White dwarf	A very dense star that is not very bright. A red giant turns into a white dwarf.
Red supergiant	A star that has used up all the hydrogen in its core and is now using helium as a fuel. It has a mass much higher than the Sun
Supernova	An explosion produced when the core of a red supergiant collapses. The plural is supernovae
Black hole	Core of a red supergiant that has collapsed. Black holes are formed if the remaining core has a mass more than three or four times the mass of the Sun
Neutron star	Core of a red supergiant that has collapsed. Neutron stars are formed if the remaining core has a mass less than three or four times the mass of the Sun.

4. Red shift

Pitch	Whether a sound is low or high
Doppler effect	The change in the pitch of a sound heard when the source of sound is moving relative to the observer.
red-shift	Waves emitted by something moving away from an observer have their wavelength increased and frequency  decreased compared to waves from a stationary object

5. Origin of the universe

Big bang theory	The theory that the Universe began from a tiny point with huge energy and has been expanding ever since.
Steady state	The theory that the Universe is expanding but new matter is continually being created, so the Universe will always appear the same.
Cosmic microwave background radiation	Microwave radiation received from all over the sky, originating at the Big Bang

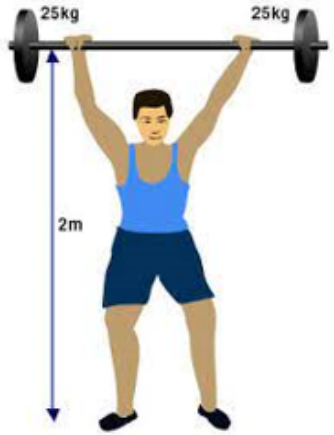


Separate Physics SP8-9: Energy and forces and their effects

Lesson sequence

6. Work and power
7. Objects affecting each other
8. Vector diagrams (HT)

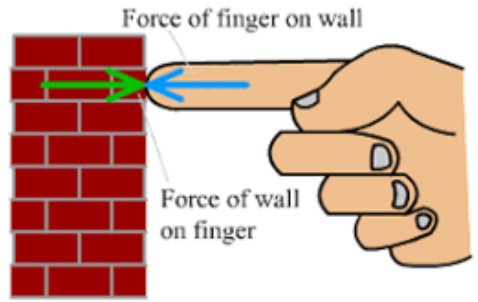
1. Work and power	
Energy	The capacity to do work.
Joules	The units of energy, symbol = J.
Kilojoules	1000 J, symbol = kJ.
Work done	The energy transferred by a force.
Calculating work done	Work done = force x distance E = F x d Work done = joules Force = newtons Distance = metres



Work done = force x distance
= 25 x 2 = 50J

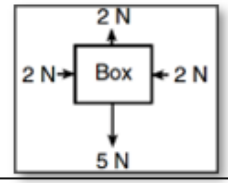
Power	The rate of energy transfer.
Watts, W	The unit of power: 1 W = 1 joule per second
Calculating power	Power = work done / time P = E / t Power = watts Work done = joules Time = seconds

2. Objects affecting each other	
Contact force	A force that acts when two objects touch.
Contact force examples	Normal force, normal reaction force, friction, upthrust, air resistance.
Non-contact force	A force that acts at a distance.
Non-contact force examples	Gravity, magnetism, electrostatic force.
Action-reaction forces	If, A applies an action force to B, B applies a reaction force of same size and opposite direction to A.

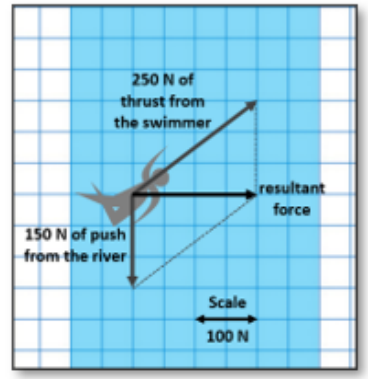


Force field	The area around an object where its force can affect other objects.
Magnetic field	The area of magnetic force around a magnet.
Electric field	The area of electrostatic force around an object charged with static electricity.

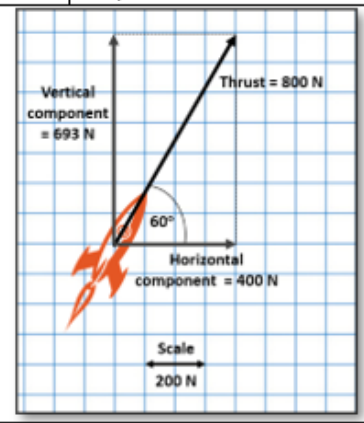
3. Vector diagrams (HT)	
Vectors	Arrows that show size and direction.
Free body diagram	A diagram showing all the forces on an object.



Vector diagram arrows	Arrows showing the size and direction of a force – must be drawn to scale.
Scale diagram	Diagram drawn on graph paper to find the size of forces.
Resultant force	The force left over when forces acting in opposite directions are cancelled out.
Resultant force diagram	Draw correct arrows for two forces, add lines to make a parallelogram. Resultant force = the diagonal of the parallelogram.



Resolving forces	Breaking a force up into its horizontal and vertical components.
Resolving forces diagram	Draw a correct force arrow, add arrows for vertical and horizontal component forces.

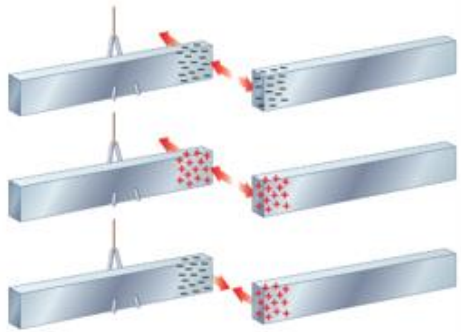
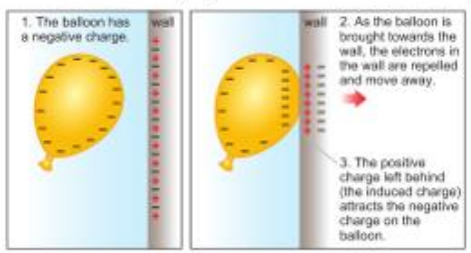


Component forces	The vertical and horizontal forces that a diagonal force is made from.

Separate Physics SP11 : Static Electricity

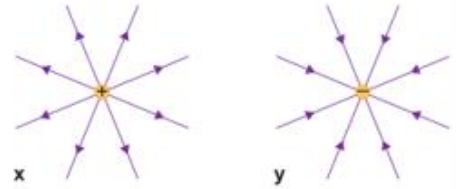
Lesson sequence

9. Charges and static electricity
10. Dangers and uses of static electricity
11. Electric fields

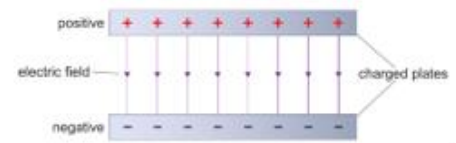
1. charges and static electricity	
Charge	Electron is negative, proton is positive
	
Induction	Eg. Positive charge made by a negatively charged object brought near to a neutral object
	
Insulator	Will not allow electrons to freely flow
Static electricity	Electric charges on the surface of an object

2. dangers and uses of static electricity	
discharge	Removal of electric charge by conduction
earthing	When charges flow to the Earth through a conductor
Electrostatic spraying	Droplets of liquid spray are given a charge
	

3 Electric fields	
Electric field	Space around electrically charged object where it affects other objects



Electrostatic field	Another term for electric field
Field lines	Show where forces are weaker or stronger and direction of the field
Force field	Space around something where a non contact force has an effect (magnetic, gravitational or electric)
Point charge	Charge with a very small volume, uniform sphere concentrated at centre
uniform	Same in all places



Combined Biology B9: Ecology

Lesson sequence

1. Ecosystems
2. Core practical – quadrats and transects
3. Abiotic factors and communities
4. Biotic factors and communities
5. Parasitism and mutualism
6. Effect of humans on biodiversity
7. Preserving biodiversity
8. Water cycle
9. Carbon cycle
10. Nitrogen cycle

Ecosystems	
Ecosystem	An area in which the interactions between all the living organisms and the all the physical factors forms a stable relationship needing no external input.
Habitat	A particular area within an ecosystem.
Community	All the organisms living in an ecosystem.
Interdependence	The way in which the organisms in an area depend on each other, for food, shelter, protection and so on.
Population	The members of one particular species within an ecosystem.
Abundance	The number of members of one species in an ecosystem.
Quadrat	A metal square used to help find the number of small organisms living in an area.

Random sampling	Estimating the population of organisms in an area by randomly dropping a quadrat several times, finding the average number of organisms present and scaling up your answer.
Population size calculation	Population size = number of organisms in quadrat x (total area / quadrat area)

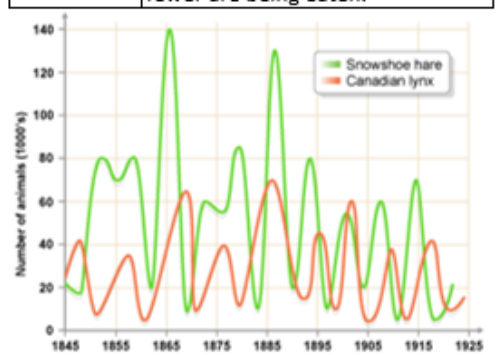
Core practical – quadrats and transects (CP6)	
Belt transect	A way to study how the population of a species changes as you move through an area but counting the organisms in a quadrat at regular intervals.
CP6 – Key question	How does the number of daises vary as you move away from the base of tree?
CP6 – Collecting data	Place a quadrat so it is touching the base of a tree and record the number of daisies. Repeat, moving the quadrat 1 m away each time until it is 10 m away. Repeat with three different trees.
CP6 – Calculate averages	Calculate the average number of daisies 1 m away, 2 m away and so on.
CP6 - Results	The number of daisies increases as you move away from the tree, and levels out at about 6 or 7 m.

- CORE PRACTICAL – Quadrats and Transects (https://www.youtube.com/watch?v=ipTvsEVjuQQ). Or https://www.youtube.com/watch?v=I8PrPEZ_5qU

3. Abiotic factors and communities	
Abiotic factor	A non-living factor that influences what can live where.
Important abiotic factors	Temperature, light intensity, rainfall, type of landscape, soil pH, soil nutrients, pollution.
Pollutants	Substances produced by human activities that can poison some or all of the organisms living in an area.

Adaptation to abiotic factors	Features of plants and animals that are suited to the abiotic factors where they live.
Changes to abiotic factors	If an abiotic factor changes – such as temperature increasing due to global warming – organisms may no longer be well adapted to where they live and may die out.

Biotic factors and communities	
Biotic factor	A living factor that influences what can live where.
Important biotic factors	The presence of food organisms, predators, competing organisms and disease.
Competition	Often two or more different organisms may compete for the same resource such as food, water or light.
Effects of reducing competition	Reduced competition when a species goes extinct can lead to unpredictable effects on other species with some benefiting from reduced predation, and others benefitting.
Predator-prey cycles	As the number of prey animals increases, the number of predators increase. The predators over-predate the prey leading to a fall in prey numbers which causes the number of predators to go down as there is less food. The number of prey increases again because fewer are being eaten.



Parasitism and mutualism	
Parasitism	A feeding relationship in which a parasite feeds off its host, causing harm to the host but (normally) not killing it.
Examples of parasites	Fleas and leeches sucking blood, tapeworms living in animals' intestines, mistletoe burrowing its roots into tree branches.
Mutualism	Organisms that live together in a relationship where both benefit.
Examples of mutualism	Cleaner fish that swim into sharks mouths to feed without being eaten. Algae that live inside coral polyps gaining shelter and providing food.

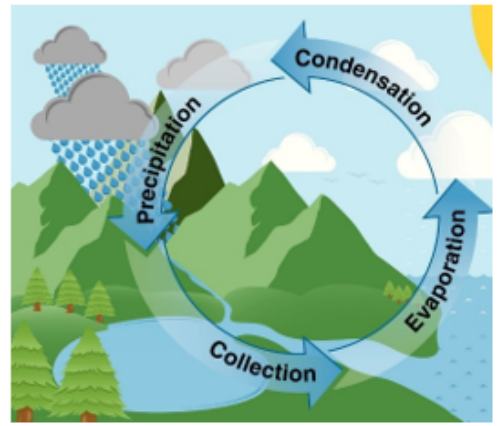
Effect of humans on biodiversity	
Biodiversity	The number of different species living in an area. High biodiversity is good.
Fish farms	Farms based in water where fish are farmed in pens to reduce the need to catch them in the wild.
Effect of fish farming on biodiversity	The waste produced by the fish sinks to the sea floor, changing the conditions and harming the organisms living there.
Introduced species	Organisms introduced by humans – intentionally or accidentally – into a new ecosystem.
Effect of introduced species on biodiversity	Many introduced species upset natural ecosystems by changing the food web. Introduced species often lack predators that can control their numbers.
Eutrophication	Fertiliser used on farmland gets washed into lakes and rivers by rain. It causes algae to grow out of control and when the algae dies, it sinks to the bottom and rots which uses up the oxygen in the water.

Effect of eutrophication on biodiversity	With less oxygen in the water, many species die, and biodiversity is reduced.

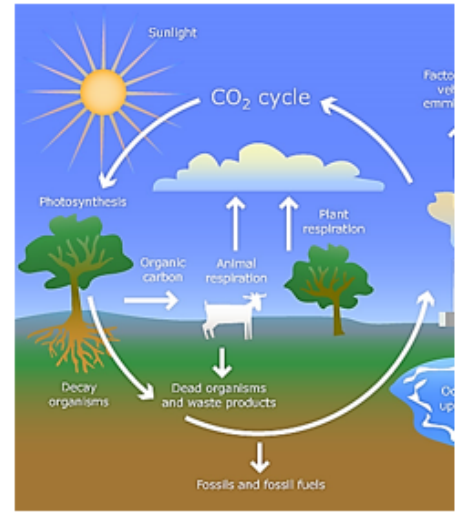
Preserving biodiversity	
Importance of biodiversity	Areas with high biodiversity recover more quickly from disasters such as floods and droughts. Many plants and animals are useful for new medicines and products.
Endangered	When a species is at risk of dying out, usually because it has been over-hunted or its habitat has been destroyed.
Conservation	When an effort is made to protect rare or endangered species or their habitat.
Importance of conservation	Conservation can make the difference between a species dying out or surviving. It increases biodiversity.
Reforestation	Planting trees or allowing trees to regrow on old farmland. It increases biodiversity by increasing the range of habitats in an area.
Captive breeding programmes	Breeding animals in zoos – where they are protected from danger – in order to be able to release them into the wild.

The water cycle	
Water cycle	The way in water is continuously moved around different parts of the environment.
Water cycle stages	Precipitation, surface run-off and infiltration, evaporation, condensation.
Precipitation	Water falls to the ground as rain, snow and hail.
Surface run-off and infiltration	Water soaks into the ground (infiltration) or runs off into streams and rivers into lakes and oceans.

Evaporation	Water evaporates as water vapour from oceans, lakes and rivers.
Condensation	Water vapour condenses into tiny droplets to form clouds.
Desalination	Producing potable (drinking water) from salty water, for example by distillation. Useful in areas with low rainfall.

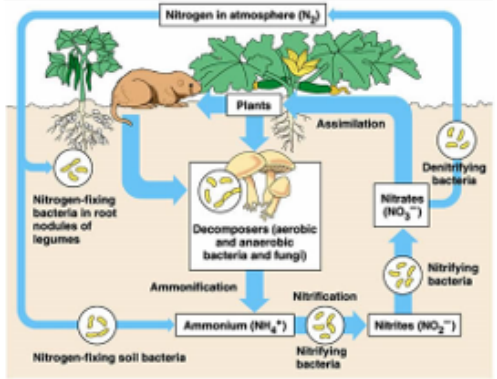


Carbon Cycle	
Carbon cycle	The way carbon is continuously moved between different stores in the environment.
Carbon cycle - photosynthesis	Carbon is transferred from the carbon dioxide in the air into plants.
Carbon cycle - feeding	Carbon is transferred from plants into animals, and from animals into other animals.
Carbon cycle – death and excretion	Carbon in waste (urine and faeces) and dead bodies is transferred to decomposers or to fossil fuels.
Carbon cycle - respiration	Plants, animals and decomposers transfer carbon back to the air as carbon dioxide by respiration.
Carbon cycle - combustion	Humans transfer carbon back to the air by burning fossil fuels.



Nitrogen cycle	
Importance of nitrogen	Nitrogen is used to make amino acids which are used to make the proteins needed for growth and repair.
Nitrogen cycle	The way nitrogen is continuously moved between different stores in the environment.
Nitrogen cycle – nitrogen fixation	Nitrogen in the air is converted to nitrates in the soil by nitrogen fixing bacteria.
Nitrogen cycle - plants	Plants absorb nitrates from the soil and convert them into amino acids and proteins.
Nitrogen cycle - feeding	Animals eat plants (and other animas) transferring nitrogen into them in the form of protein.
Nitrogen cycle – death and excretion	Nitrogen in the form of urea and protein is transferred to decomposers in the soil by death and excretion.
Nitrogen cycle – decomposers	Decomposers convert nitrogen in urea and proteins into nitrates.

Nitrogen cycle - denitrification	Denitrifying bacteria in the soil convert nitrates back into nitrogen gas in the air.



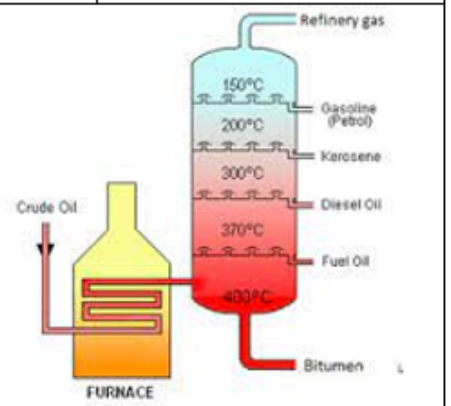
Combined Chemistry C16-17: Fuels and the atmosphere

Lesson sequence

1. Hydrocarbons
2. Fractional distillation of crude oil
3. The alkanes
4. Complete and incomplete combustion
5. Fuels and pollution
6. Cracking
7. The early atmosphere
8. The changing atmosphere
9. The atmosphere today
10. Climate change

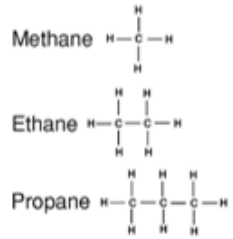
1. Hydrocarbons	
Hydrocarbon	A compound containing only hydrogen and carbon.
Crude oil	A thick brown liquid made of a mixture of many different hydrocarbons found in deposits underground.
Properties of hydrocarbons in crude oil	Most of the hydrocarbons in crude oil are liquids, but each of them has a different boiling point.
Hydrocarbons in crude oil	Mostly alkanes.
Uses of crude oil	Fuel, feedstock (supply of basic chemicals) for the chemical industry.
Crude oil as a finite resource	There is a limited amount: at some point it will run out.
Non-renewable	A resource that will eventually run out.

2. Fractional distillation of crude oil	
Fractional distillation	A type of distillation used to separate mixtures of two or more liquids.
Separation in fractional distillation	Fractional distillation separates compounds according to their boiling point.
Separating crude oil in a fractionating column	Crude oil is passed through a heater to heat it to about 400°C so that nearly everything is a gas. The hot gases rise up the fractionating column until cool enough to condense.
Fractions of crude oil	The separated liquids and gases collected at different temperatures.

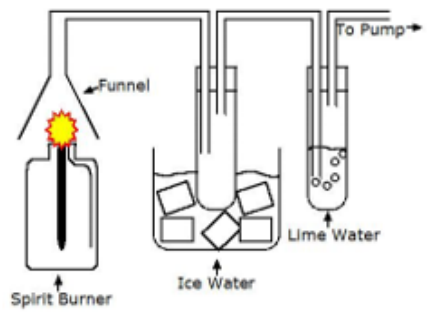


Fractions in order	Gases, petrol, kerosene, diesel, fuel oil, bitumen: - Smallest to biggest molecules - Lowest to highest boiling point - Lowest to highest viscosity - Easiest to hardest ignition
Viscosity	How easily a fluid flows – higher viscosity = runnier.
Ease of ignition	How easily a substance catches fire.
Gases	Used for domestic heating and cooking.
Petrol	Used as a fuel for cars.
Kerosene	Fuel for aircraft
Diesel oil	Fuel for larger vehicles such as lorries and trains
Fuel oil	Fuel for ships and power stations
Bitumen	Surfacing roads and roofs

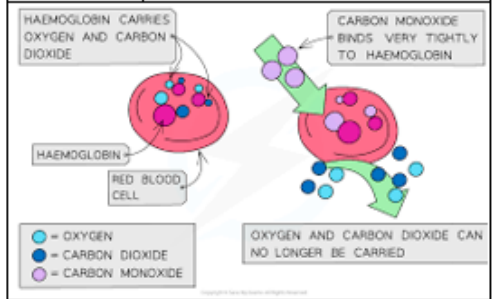
3. The alkanes	
Homologous series	A family of closely related compounds with molecular formulae that differ only in the number of 'CH_2's.
Physical properties in a homologous series	Vary gradually, for example the boiling point gradually increases.
Chemical properties in a homologous series	Very similar.
General formula	Describes the number of each atom in any member of a homologous series. Alkanes = C_nH_{2n+2}
Alkanes	Hydrocarbons containing only single bonds. The names end with '-ane'.
First three alkanes	Methane – CH_4 Ethane – C_2H_6 Propane – C_3H_8



4. Complete and incomplete combustion	
Combustion	When a compound reacts with oxygen producing energy.
Complete combustion	Combustion that produces only water and carbon dioxide and releases the most possible energy.
Complete combustion equation	Fuel + oxygen → carbon dioxide + water $2C_2H_6 + 7O_2 \rightarrow 4CO_2 + 6H_2O$



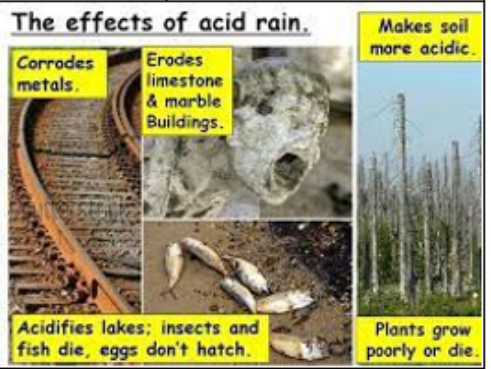
Incomplete combustion	Combustion that produces a mixture of carbon dioxide, carbon monoxide, carbon and water and produces less energy.
Why incomplete combustion happens	When there is not enough oxygen for all of the reactants to be fully oxidised.
Carbon monoxide	CO. A colourless odourless a highly toxic gas.
How carbon monoxide kills	It sticks to haemoglobin in the blood which prevents it from carrying oxygen.



Soot	The small particles of carbon produced by incomplete combustion.
Problems with soot	- Causes lung problems when breathed in. - Blackens and dirties buildings
Preventing incomplete combustion	It is important that boilers at home have a good air supply to prevent incomplete combustion. For this reason a boiler's flue pipe should be checked for blockages every year.

5. Combustible fuels and pollution	
Sulfur	An impurity that is naturally present in small amounts in oil and coal.
Sulfur dioxide	SO_2. A gas formed from the sulfur in oil and coal when it is burnt.
Acid rain	Rain with a pH lower than 5.2

Formation of acid rain	Sulfur dioxide dissolves in water in clouds to form sulfurous acid (H_2SO_3) which oxidises to become sulfuric acid (H_2SO_4)

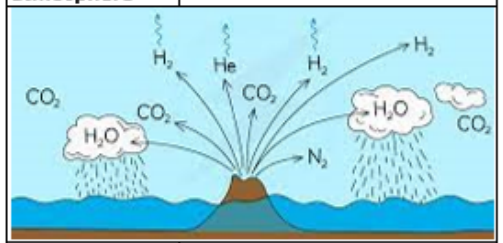


Nitrogen oxides	NO_x. Various gases formed at high temperatures inside internal combustion engines.
Problems of nitrogen oxides	- Can dissolve in clouds to form acid rain - NO_2 causes lung damage - NO_x can cause smog to form

6. Cracking	
Cracking	Breaking down longer less useful hydrocarbons into shorter more useful ones.
How to crack hydrocarbons	Heat the hydrocarbons and pass the vapours over an aluminium oxide catalyst heated to 650^{O}C.
Products of cracking an alkane	An alkane and an alkene. Hexane → butane + ethene $C_6H_{14} \rightarrow C_4H_{10} + C_2H_4$
Alkene	A hydrocarbon containing a C=C double bond.
Usefulness of cracking	There is more demand for shorter hydrocarbons – such as petrol and gas – than longer ones such as bitumen. Cracking turns the less useful ones into more useful ones.
Hydrogen gas as a fuel	H_2. Hydrogen has the potential to be used as a fuel for cars.

Advantages of hydrogen as a fuel	- It only produces H_2O when burnt so does not directly contribute to global warming - It can be produced using renewable energy
Disadvantages of hydrogen as a fuel	- Most of it is currently produced in ways that also produce CO_2 which contributes to global warming - It is difficult to store

7. The early atmosphere	
The early Earth	4.5-3.5 billion years ago the Earth was extremely hot and there were many volcanoes.
The early atmosphere	Little or no oxygen, a lot of carbon dioxide, water vapour, small amounts of other gases such as nitrogen.
Origin of the early atmosphere	Gases from volcanoes.



Evidence for a lack of oxygen	The oldest rocks on Earth contain compounds such as iron pyrite that cannot form in the presence of oxygen.
Formation of the oceans	As the Earth cooled, water vapour in the air condensed, forming the oceans.

8. The changing atmosphere	
Changes to the atmosphere	The amount of carbon dioxide decreased, water vapour decreased, oxygen increased.
Photosynthesis and the atmosphere	Photosynthesis – by cyanobacteria and plants – consumes carbon dioxide (decreasing it) and produces oxygen (increasing it).

Oceans and carbon dioxide	Carbon dioxide dissolves in the ocean and is used by sea creatures to make their shells, enabling even more CO_2 to dissolve.
Test for oxygen	A glowing splint (stick) placed in oxygen will relight.

9. Global warming	
Greenhouse effect	Infrared radiation (heat) from the sun travels through the atmosphere and warms the ground. The ground re-emits slightly different infrared radiation that is not able to pass back through the atmosphere and is trapped by gases called greenhouse gases.

Greenhouse gases	Gases that trap re-emitted infrared radiation – including carbon dioxide, methane and water vapour.
Importance of the greenhouse effect	The greenhouse effect is extremely important; without it the average global temperature would be 32 ^{O}C lower and most life could not exist.
Increased greenhouse effect	Human activities are increasing the concentration of greenhouse gases such as carbon dioxide and methane, meaning the greenhouse effect is strong and traps more heat.

Global warming	An increase in global temperatures caused by the increased greenhouse effect.
Climate change	Change in global weather patterns caused by global warming.
Correlation between carbon dioxide and temperature	In Earth's history, every time CO_2 concentrations have been high, the temperature has also been high. This makes scientists think that the current increase in CO_2 is what is increasing the temperature.

10. Impact of climate change	
Two main causes of climate change	- Carbon dioxide produced by burning fossil fuels - Methane produced by farming (especially cows)
Effects of climate change	- Rising average global temperature - Increased sea level from melting ice - Increased drought in some areas and flooding in others - Increase in dangerous weather
Effect of climate change on life	Living organisms are adapted to the conditions where they live. If these conditions change they may struggle to survive. Climate change is causing many species to struggle and some to go extinct.
Ocean acidification	The carbon dioxide we produce dissolves in the oceans, lowering the pH making it harder for many sea-creatures to build their shells.
Limiting climate change	- Reduce emissions of greenhouse gases by using renewable energy and eating less meat. - Geoengineering – perhaps placing giant mirrors in space to reflect some of the sun's heat.

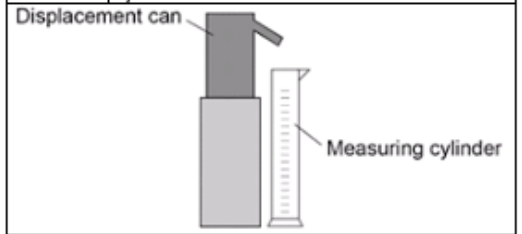
Combined Physics P12-13: Particle model, forces and matter

Lesson sequence

1. Particles and density
2. Core practical – investigating densities
3. Energy and state changes
4. Energy calculations
5. Core practical – investigating water
6. Gas temperature and pressure
7. Bending and stretching
8. Core practical – investigating springs
9. Extension and energy transfers

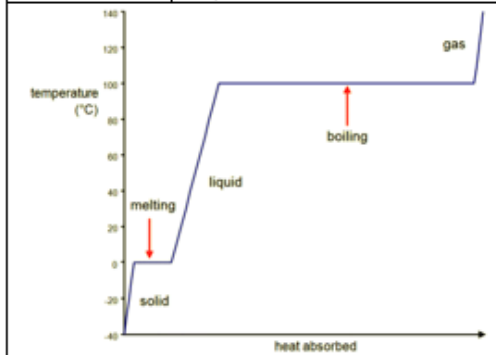
1. Particles and density	
State of matter	Solid, liquid or gas.
Changes of state	Melting: solid → liquid Freezing: liquid → solid Evaporation: liquid → gas Condensation: gas → liquid Sublimation: solid → gas Deposition: gas → solid
Solid	Particles touching, neatly ordered, vibrating around a fixed point.
Liquid	Particles touching, random order, moving slowly.
Gas	Particles widely spaced, random order, moving fast.
Forces of attraction	Forces holding particles close to each other: strong in solids, weak in liquids, gone in gases.
Changing state	Increasing temperature gives particles more (kinetic) energy, allowing them to break the forces of attraction.
Density	The mass of 1 cm^3 of a substance. Units = kg / m^3
Density and state	Solid > liquid > gas, due to particles being closer together.

Density calculations	Density = mass / volume $\rho = m / v$ Density = kilograms per cubic metre Mass = kilograms Volume = metres cubed

2. Core practical – investigating densities	
Video link to practical	https://www.youtube.com/watch?v=_h48C4VJMro
Aim	To measure the density of some solids and liquids
Density of liquids	Place a measuring cylinder on a balance and zero it. Add some liquid and record the mass and volume, Repeat with different liquids.
Density of solids	Record the mass of a solid object. Fill a displacement can and place the object in it, catching the water in a measuring cylinder. Record the volume collected.
	
Density calculations	Divide the mass by the volume.

3. Energy and changes of state	
Thermal energy and motion	The hotter an object is, the faster its particles are moving.
Temperature	A measure of the average kinetic energy of the particles.
Temperature vs thermal energy	A very small hot object has less thermal energy than a very large cold object, because thermal energy is the energy of all the particles added up.
Thermal energy depends on…	Temperature, mass, material.

Specific heat capacity, Q	The amount of energy required to increase the temperature of 1 kg of a substance by 1 ^{O}C.
Specific latent heat of evaporation	The amount of energy required to change 1 kg of a substance (at its boiling point) from liquid to gas.
Specific latent heat of melting	The amount of energy required to change 1 kg of a substance (at its melting point) from solid to liquid.
Heating curve	As you heat a substance, the temperature rises steadily, with flat sections on the graph first as it melts, and later as it evaporates.



The temperature stays constant whilst melting and boiling as energy is being used to break forces between particles.

4. Energy calculations	
Temperature change calculations	Thermal energy change = mass x specific heat capacity x temperature change $\Delta Q = m \times c \times \Delta T$ Thermal energy change = J Mass = kg Specific heat capacity = J / kg Temp change = ^{O}C

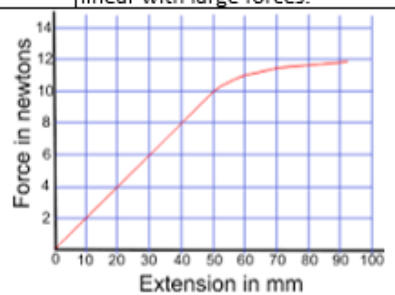
State change calculations	Thermal energy = mass x specific latent heat $Q = m \times L$ Thermal energy = J Mass = kg Specific latent heat = J / kg

5. Core practical – investigating water (CP17)	
Video link to practical	https://www.youtube.com/watch?v=_SP_3i9-5Go
Aim	To investigate the temperature change as ice melts, and measure specific heat capacity of water.
Melting ice	Place some ice in a boiling tube, measure the temperature then place the tube in a beaker of hot water from a kettle, kept warm by Bunsen, and measure temperature every 60s until fully melted.
Melting ice results	Temperature rises steadily at first but levels out during melting.
Specific heat capacity of water	Place a polystyrene cup on a balance, zero it, mostly fill with water then measure the mass. Measure the temp. Use an immersion heater connected to a joulemeter to warm the water for 5 minutes and measure the temperature again.
SHC calculations	SHC = change in thermal energy (J) / mass(kg) x temp change(^{O}C)

6. Gas temperature and pressure	
Temperature	A measure of the average kinetic energy of the particles.
Gas pressure	Every time a gas particle hits a surface it pushes with a small force; gas pressure is the sum of these forces.
Increasing gas pressure	Gas pressure increases with temperature and number of particles.
Pascals, Pa	The unit of pressure: 1 Pa = 1 N / m^2

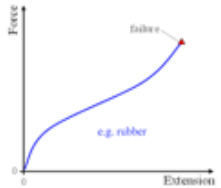
Absolute zero, 0K	The coldest possible temperature when particles completely stop moving.
Kelvins	Measures temperatures relative to absolute zero: 0 K = absolute zero.
Kelvins and degrees Celsius	A kelvin is the same size as a degree Celsius, but 0 K = -273^{O}C, 273 K = 0 ^{O}C
Converting K to ^{O}C	Subtract 273 (add 273 to convert ^{O}C to K)
Gas pressure and Kelvins	Gas pressure is directly proportional to temperature in K.
Absolute zero and gas pressure	Pressure is 0 Pa at 0 K because the particles are not moving.

7. Bending and stretching	
Elastic	When something returns to its original shape after force is applied.
Inelastic	When something doesn't return to its original shape after force is applied.
Elasticity and force size	Some objects are elastic when a small force is applied, but inelastic when a large force is applied.
Extension	The increase in length of a spring when a force is applied.
Direct proportion	Doubling A doubles B, a graph of B vs A goes through the origin.
Metal spring extension	The relationship between force and extension is linear and directly proportional, but becomes non-linear with large forces.

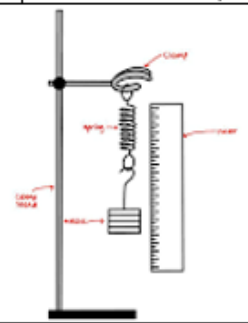


From 0-10N the extension is directly proportional to force.
After 10N the relationship becomes non-linear as the spring is stretched too far.

Rubber band extension	The relationship between force and extension is non-linear.



8. Core practical – investigating springs (CP18)	
Video link to practical	https://www.youtube.com/watch?v=g5d7-ZufMus
Aim	To explore how increasing the force affects the extension of a spring.
Setup	Suspend a spring or rubber band from a clamp stand and fix a metre ruler in place so the '0' is level with the bottom of the spring/band.



Measurements	Hang a 100 g (1 N) mass from the rubber band / spring, and measure the extension. Repeat up to 1 kg.
Variations	Repeat with different springs.
Calculating work done stretching spring	Energy transferred in stretching = ½ x spring constant x (extension)^2 (N/m) (m^2) Spring constant = force/extension (N/m) (N) (m)

9. Extensions and energy transfers	
Spring constant	A measure of the strength of a spring: units = N/m

Spring constant and graphs	The spring constant is the gradient o a graph of force vs extension.
Force and extension calculations	Force = spring constant x extension F = k x X Force = N Spring constant = N/m Extension = m
Extension is greater when…	Force is higher, spring constant is lower
Work done	The energy transferred by a force.
Spring energy calculations	Energy transferred in stretching = ½ spring constant x extension^2 E = ½ x k x X^2 Energy = J Spring constant = N / m Extension = m

Sociology

Social Stratification knowledge Organiser

Four Types of social stratification :

1. **Social class** is seen as the main source of stratification in Britain. Based on economic factors such as occupations and income. Social mobility is deemed to be possible.
2. **Feudalism:** ascribed, little to no chance of moving to the next strata.
3. **The caste system in India:** ascribed, closed and little movement
4. **Apartheid:** ascribed, little social mobility

Ascribed status: social position is fixed at birth and unchanged over time.

Achieved status: social position is earned on merit e.g. education, promotion.

Social Stratification: Describes the way society is structured in a hierarchy, shaped like a pyramid. Each layer is smaller but more powerful than the one below it.

Social inequality: Refers to the uneven distribution of resources such as money & power, life chances or opportunities related to education, employment and health.

Distribution of wealth and income
Wealth refers to assets such as houses, land, art, jewellery. **Income** refers to wages, benefits etc. Wealth is usually distributed more unevenly than income.

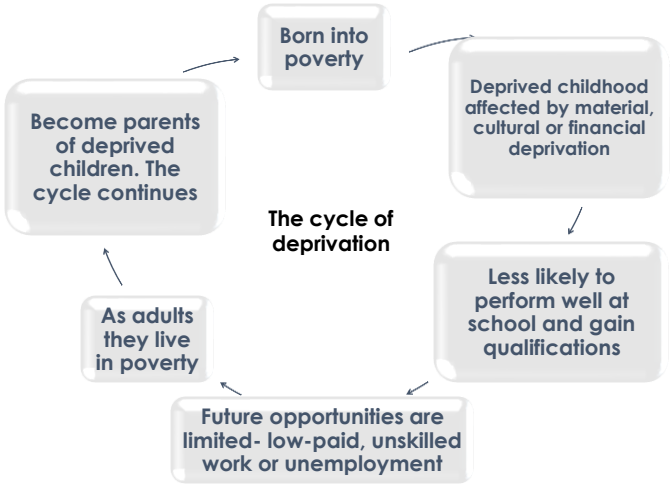
Karl Marx and social class (1818-1883)

- The bourgeoise (the ruling class)- owned the means of production.
- The proletariat (working class) forced to sell their labour. Experience **alienation** and lack of control.
- The bourgeoise exploit the proletariat.
- **Ruling- class ideology** and **false class consciousness.**

Life chances:
Peoples chances of achieving positive or negative outcomes as they progress through life. These are not distributed equally between groups. Affected by factors such as: ***religion, social class, gender, ethnicity, sexuality, age, disability***

Social mobility: moving between social classes.
Intra-generational social mobility- movement of their lifetime e.g. promotion.
Inter-generational social mobility- movement between generations of a family e.g. when a child enters a different social from their parents.

The culture of poverty:
People from the poorest section of society are socialised within the subculture of poverty. As a result they are unable to break free from poverty.
The cycle of deprivation:
The policy to remove poverty involves employing social workers and using local authority provision to help break children out of the cycle of deprivation.
Material deprivation:
Having insufficient money to be able to afford goods and services. As a result people may not have a balance diet. Poverty may lead to ill health during childhood and inadequate housing.



Embourgeoisement thesis
Working-class families are becoming middle-class. Their **norms** and **values** are changing as their standards of living and income improves. Affluence has led to privatised lifestyles centred on the home and family- based on consumerism.

Key Sociologists

Davis & Moore (1945) (Functionalist)	Sylvia Walby (1953-) (Feminist)	Fiona Devine (1992)	Charles Murray (1996) (New right)	Peter Townsend (1979)
Social stratification was a 'universal necessity' for every society. The system must match the most able people with the functionally most important positions in society. These high rewards would encourage ambitious people to compete for them, with the most talented achieving success.	Walby argued that there are 6 patriarchal structures which allow men to dominate society and oppress women. These are the household, paid work, the state, male violence, sexuality and cultural institutions (e.g. the media and education system). Walby suggested that women experience both private patriarchy in the home, with men controlling their wives and daughters, and public patriarchy in society with bosses controlling female workers etc.	Devine tested Lockwood's idea that 'privatized instrumentalism' would become typical amongst the working class. This term refers to social relationships centred on the home with work only to an end, when affluent workers joined with their workmates. Paid work is a means to a comfortable lifestyle rather than having job satisfaction.	Society had a growing underclass. Government policies have encouraged the members of this underclass to become dependent on benefits. Traditional values such as honesty, family life and hard work were being undermined by the members of the underclass, to be replaced by an alternative value system that tolerated crime and various forms of anti-social behaviour.	Identified three ways of defining poverty: The state's standard of poverty on which official statistics are based, The relative income standard of poverty based on identifying those households whose income falls below the average for similar households. Relative deprivation, when families are unable to participate in activities and have the living conditions that are widely available in society

Sociology

Social Stratification knowledge Organiser

Sex & Gender
Sex: Male or female (biology)
Gender: Masculine or feminine.

Gender & power:
Feminists see gender inequality as the most important source of division in society. Society is mainly controlled by men who have considerable power within politics and the workplace.

The crisis of masculinity:
Men are currently experiencing this because of the underachievement of boys in school, the decline of paid work in manufacturing, women's increased participation in paid employment.

Inequalities:
- Gender dominated occupations e.g. fire-fighting, nursery worker.
- Glass ceiling for women- invisible barriers for promotion.
- Gender pay gap.
- Women's triple shift.
- Childcare provision- barrier preventing women from returning to work.

Ethnicity
A social group that share an identity based on their cultural traditions, religion or language

Ethnicity & Power:
Under-represented in political power/decision makers. Also under-represented in teaching, armed forces, police officers, particularly at high levels of the organisation. Although 40% of highest positions in the NHS are from ethnic minority groups

Inequalities:
- Unemployment
- Discrimination in the labour market
- Minority groups have become an underclass (see Charles Murray)
- Racism is built into the workings of capitalism.

Age
Chronological, biological or a social category. When does 'youth' begin and end?
Childhood & Power
Families are agency of social control so they are expected to authorise discipline of their children. Parents exercise power when they try to influence their child's behaviour against their will.
Young People & Power
Authority from teachers over students based on their status in the school setting. Some students do not conform to this authority however. See Paul Willis.
Inequalities:
- Ageism- age discrimination. Younger or older people tend to be victim of this.
- Negative stereotyping
- Older people living in poverty.

Poverty

Absolute Poverty: Income is insufficient to have the minimum to survive. No access to the basic necessities in life e.g. shelter, food, clean water, heating & clothes.

Relative Poverty: Cannot afford the general standard of living of most people in their society. Income is much less than the average for that society.

The welfare state: (a system in which the state takes responsibility for protecting the health and welfare of it's citizens and for meeting their social needs.)

- **The National Health Service (NHS):** Funded by central government from national taxation. Provided GPs, hospitals, opticians and dentists.

Welfare Benefits:
National Insurance Benefits: If you have paid into the system (National Insurance Contributions) you are entitled to Jobseekers Allowance and the state retirement pension.
- **Income Support and Child Tax Credit**
- **Local Benefits** could include free school meals, educational subsidies, housing benefits.

Gender & Poverty:
- Women have longer life expectancy so more female pensioners living alone.
- Women more likely to head lone-parent families. Usually have a low income.
- Gender pay gap
- Women are more likely to be in part-time income than men.

Ethnicity & Poverty:
- Lower income families
- Generally disadvantaged in employment, pay and quality of job.

Child Poverty: More likely to live in poverty if:
- Household has four or more children.
- Where the head of the house is a lone parent or from an ethnic minority
- With no paid workers.

	Poverty	Power
Functionalists	Focus on the positive functions of poverty for some groups e.g. knowing you could live in poverty means people will undertake undesirable jobs, creates jobs for groups who deal with the poor. The poor also reinforce mainstream norms and provide examples of deviance such as lazy and dishonest.	Government and politics serves a purpose to regulate main stream norms and values.
Marxists	Poverty is the result from class-based inequalities. It is inevitable that some people will be poor in a capitalist society. Poverty serves the interests of the bourgeoise who can hire and fire people e.g. if they demanded higher wages, the bourgeoise could threaten to higher from the unemployed.	**Weber-** power is based on coercion or authority. The main sources of authority are traditional, rational legal and charismatic authority. Marxists argue the bourgeoise use their power to exploit the proletariat. They have economic and political power.
Feminists	Women face the greatest risk of poverty than men, lone-mothers and the older women living alone in particular. The gender pay gap and the inequality of the division of caring responsibilities contribute to this.	**Patriarchy-** the system of our social structures and practices are male dominated and they use this power to oppress and exploit women.
New Right	Focus on individuals behaviour rather than structural causes of poverty. Stress the importance of traditional values and self-reliance. Welfare dependency and the underclass are key ideas in this approach.	The government does not meet it's peoples needs, and they believe their should be minimal government intervention from the welfare state.

SPANISH Module 6

Las comidas	*Meals*
el desayuno	*breakfast*
la comida / el almuerzo	*lunch*
la merienda	*tea (meal)*
la cena	*dinner / evening meal*
desayunar	*to have breakfast / to have for breakfast*
comer / almorzar	*to have lunch / to have … for lunch*
merendar	*to have tea / to have … for tea*
cenar	*to have dinner / to have … for dinner*
tomar	*to have (food / drink)*
beber	*to drink*
entre semana…	*during the week…*
los fines de semana…	*at weekends…*
Desayuno a las ocho.	*I have breakfast at eight o'clock.*
Desayuno / Como / Meriendo / Ceno…	*For breakfast / lunch / tea / dinner*

Las expresiones de cantidad	*Expressions of quantity*
cien / quinientos gramos de…	*100 / 500 grammes of…*
un bote de…	*a jar of…*
un kilo de…	*a kilo of…*
un litro de…	*a litre of…*
un paquete de…	*a packet of…*
una barra de…	*a loaf of…*
una botella de…	*a bottle of…*
una caja de…	*a box of…*
una docena de…	*a dozen…*
una lata de…	*a tin / can of…*

I have…	
un huevo	*an egg*
un yogur	*a yogurt*
un pastel	*a cake*
un bocadillo	*a sandwich*
una hamburguesa	*a hamburger*
(el) café / (el) té	*coffee / tea*
(el) Cola Cao	*Cola Cao (Spanish chocolate drink)*
(el) marisco	*seafood*
(el) pescado	*fish*
(el) pollo	*chicken*
(el) zumo de naranja	*orange juice*
(la) carne	*meat*
(la) ensalada	*salad*
(la) fruta	*fruit*
(la) leche	*milk*
(la) sopa	*soup*
(la) tortilla	*omelette*
(los) cereales	*cereals*
(los) churros	*fried doughnut sticks*
(las) galletas	*biscuits*
(las) patatas fritas	*chips*
(las) tostadas	*toast*
(las) verduras	*vegetables*
algo dulce / ligero / rápido	*something sweet / light / quick*
ser goloso/a	*to have a sweet tooth*
tener hambre	*to be hungry*
tener prisa	*to be in a hurry*
tomar un desayuno fuerte	*to have a big (lit. strong) breakfast*

Mi rutina diaria	*My daily routine*
me despierto	*I wake up*
me levanto	*I get up*
me ducho	*I have a shower*
me peino	*I brush my hair*
me afeito	*I have a shave*
me visto	*I get dressed*
me lavo los dientes	*I clean my teeth*
me acuesto	*I go to bed*
salgo de casa	*I leave home*
vuelvo a casa	*I return home*
temprano / tarde	*early / late*
enseguida	*straight away*
odio levantarme	*I hate getting up*

The **passive** is used to say what is / was / will be done to something or someone. To form it, use the correct person and tense of ***ser*** followed by the **past participle**, which must agree.

Fue inventado *hace mil años.* — **It was invented** a thousand years ago.
Es conocida *en todo el mundo.* — **It's known** throughout the world.

Can you spot the other examples of the passive used in exercise 5?

¿Has probado…?	*Have you tried…?*
el gazpacho	*gazpacho (chilled soup)*
la ensaladilla rusa	*Russian salad*
la fabada	*stew of beans and pork*
Es un tipo de bebida / postre.	*It's a type of drink / dessert.*
Es un plato caliente / frío.	*It's a hot / cold dish.*
Contiene(n)…	*It contains / They contain…*
Fue inventado/a / introducido/a…	*It was invented / introduced…*

Los alimentos	Food products
el aceite de oliva	*olive oil*
el agua	*Water*
el ajo	*Garlic*
el arroz	*Rice*
el atún	*Tuna*
el azúcar	*Sugar*
el chorizo	*spicy sausage*
el maíz	*Corn*
el pan	*Bread*
el queso	*Cheese*
la cerveza	*Beer*
la carne de cerdo / cordero / ternera	*pork / lamb / beef*
la coliflor	*Cauliflower*
la harina	*Flour*
la mantequilla	*Butter*
la mermelada	*Jam*
los albaricoques	*Apricots*
los guisantes	*Peas*
los lácteos	*dairy products*
los melocotones	*peaches*
los melones	*melons*
los pepinos	*cucumbers*
los pimientos	*peppers*
los plátanos	*bananas*
los pomelos	*grapefruits*
los refrescos	*fizzy drinks*
las cebollas	*onions*
las fresas	*strawberries*
las judías (verdes)	*(green) beans*
las legumbres	*pulses*
las lentejas	*lentils*
las manzanas	*apples*
las naranjas	*oranges*
las peras	*pears*
las piñas	*pineapples*
las uvas	*grapes*
las zanahorias	*carrots*

Un festival de música	*A music festival*
Me fascina(n)…	*…fascinate(s) me.*
Admiro…	*I admire…*
No aguanto / soporto…	*I can't stand…*
su actitud / talento	*his/her attitude / talent*
su comportamiento	*his/her behaviour*
su determinación / estilo	*his/her determination / style*
su forma de vestir	*his/her way of dressing*
su música / voz	*his/her music / voice*
sus canciones / coreografías	*his/her songs / choreography*
sus ideas / letras	*his/her ideas / lyrics*
atrevido/a(s)	*daring*
imaginativo/a(s)	*imaginative*
precioso/a(s)	*beautiful*
repetitivo/a(s)	*repetitive*
original(es)	*original*
triste(s)	*sad*
Me/Te hace(n) falta…	*I/You need…*
crema solar	*sun cream*
el pasaporte / DNI	*your passport / national ID card*
un sombrero / una gorra	*a hat / cap*

To enhance your writing, use a range of expressions which are followed by the infinitive:

para + infinitive	in order to (do)
al + infinitive	on (doing)
sin + infinitive	without (doing)
antes de + infinitive	before (doing)
después de + infinitive	after (doing)
Al llegar *al festival…*	**On arriving** at the festival…
Pasé cuatro noches ***sin dormir.***	I spent four nights **without sleeping**.

Take care with stem-changing verbs e.g. **almorzar** (almuerzo) and **merendar** (meriendo)

Remember, many daily routine verbs are reflexive in Spanish.

me *levanto*	I get up
te *levantas*	you get up
se *levanta*	he/she gets up
nos *levantamos*	we get up
os *levantáis*	you (plural) get up
se *levantan*	they get up

When the verb is used in the infinitive, the correct reflexive pronoun is added to the end.

*No me gusta levantar****me*** *temprano.* — I don't like getting up early.

Remember that lots of daily routine verbs are also stem-changing.

Me *ac****ue****sto a las once.* — I go to bed at 11.00.
*Prefiero ac****o****star****me*** *temprano.* — I prefer going to bed early.

Add variety to your language

- Use soler + infinitive.

Suelo almorzar a la una. ***I tend to*** *have lunch at 1.00.*

- Use verbs in the 'we' form.

En mi casa **cenamos** a las diez. *In my house* ***we have dinner*** *at 10.*

SPANISH Module 6

¿Qué le pasa?	*What's the matter?*
No me encuentro bien.	*I don't feel well.*
Me siento fatal.	*I feel awful.*
Estoy enfermo/a / cansado/a.	*I am ill / tired.*
Tengo calor / frío.	*I am hot / cold.*
Tengo catarro.	*I have a cold.*
Tengo diarrea.	*I have diarrhoea.*
Tengo dolor de cabeza.	*I have a headache.*
Tengo fiebre.	*I have a fever / temperature.*
Tengo gripe.	*I have flu.*
Tengo mucho sueño.	*I am very sleepy.*
Tengo náuseas.	*I feel sick.*
Tengo quemaduras de sol.	*I have sunburn.*
Tengo tos.	*I have a cough.*
Tengo una insolación.	*I have sunstroke.*
Tengo una picadura.	*I've been stung.*
Me duele(n)…	*My … hurt(s)*
Me he cortado el/la…	*I've cut my…*
Me he hecho daño en…	*I've hurt my…*
Me he quemado…	*I've burnt my…*
Me he roto…	*I've broken my…*
Me he torcido…	*I've twisted my…*
el brazo / el estómago	*arm / stomach*
el pie / el tobillo	*foot / ankle*
la boca / la cabeza	*mouth / head*
la espalda / la garganta	*back / throat*
la mano / la nariz	*hand / nose*
la pierna / la rodilla	*leg / knee*
los dientes / las muelas	*teeth*
los oídos / las orejas	*ears*
los ojos	*eyes*

Tiene(s) que / Hay que…	*You have to…*
beber mucha agua	*drink lots of water*
descansar	*rest*
ir al hospital / médico / dentista	*go to the hospital / doctor / dentist*
tomar aspirinas	*take aspirins*
tomar este jarabe / estas pastillas	*take this syrup / these tablets*
usar esta crema	*use this cream*

In Spanish the passive is often avoided by using the reflexive pronoun ***se***.

*La fiesta **se celebra** en marzo.* — The festival **is celebrated** (literally 'celebrates itself') in March.

Sometimes the subject of the verb comes after the verb.

***Se lanzan** huevos.* — Eggs **are thrown** (literally 'throw themselves').

Uses of Estar – Tener – Doler

- Remember to use **estar** for temporary states and feelings.
  Estoy enfermo. ***I am** ill*
- Usar **tener** to say that you have something but also for certain expressions where English use the verb 'to be'.
  Tengo gripe. ***I have** flu*
  Mi madre **tiene** sueño. *My mum **is** sleep.*
- **Doler** (to hurt) is a stem-changing verb. It works like gustar.
  Me duele la espalda. *My back hurts.*
  A mi abuela le duelen los oídos. *My gran has earache.*
  To say you have hurt/broken/twisted/cut/burned something, use the perfect tense. Put the correct reflexive pronoun before the verb, and use the definite article.
  Me he roto **la** pierna. *I have broken my leg.*

In the **preterite tense**, reflexive verbs behave in the same way as other verbs but need a reflexive pronoun in front of the verb.

***me** acosté*	***nos** acostamos*
***te** acostaste*	***os** acostasteis*
***se** acostó*	***se** acostaron*

Stem-changing verbs only have a stem change in the present tense, not in the preterite.

infinitive	present	preterite
acostarse	me ac**ue**sto	me ac**o**sté
despertarse	me desp**ie**rto	me desp**e**rté

Las fiestas	*Festivals*
la fiesta de…	*the festival of…*
esta tradición antigua…	*this old tradition…*
se caracteriza por…	*is characterised by…*
se celebra en…	*is celebrated in…*
se repite…	*is repeated…*
se queman figuras de madera	*wooden figures are burnt*
se construyen hogueras	*bonfires are built*
se disparan fuegos artificiales	*fireworks are set off*
se lanzan huevos	*eggs are thrown*
las calles se llenan de…	*the streets are filled with…*
los niños / los jóvenes…	*children / young people…*
los familiares / las familias…	*relations / families…*
comen manzanas de caramelo	*eat toffee apples*
decoran las casas / las tumbas	*decorate houses / graves*
con flores / velas	*with flowers / candles*
preparan linternas / altares	*prepare lanterns / altars*
se disfrazan de brujas / fantasmas	*dress up as witches / ghosts*
ven desfiles	*(they) watch processions*

Un día especial	*A special day*
Abrimos los regalos.	*We open presents.*
Buscamos huevos de chocolate.	*We look for chocolate eggs.*
Cantamos villancicos.	*We sing Christmas carols.*
Cenamos bacalao.	*We have cod for dinner.*
Comemos dulces navideños / doce uvas / pavo.	*We eat Christmas sweets / twelve grapes / turkey.*
Nos acostamos muy tarde.	*We go to bed very late.*
Nos levantamos muy temprano.	*We get up very early.*
Rezamos.	*We pray.*
Vamos a la mezquita / iglesia.	*We go to the mosque / church.*
Ayer fue…	*Yesterday was…*
el baile de fin de curso	*the school prom*
el Día de Navidad	*Christmas Day*
(el) Domingo de Pascua	*Easter Sunday*
(la) Nochebuena	*Christmas Eve*
(la) Nochevieja	*New Year's Eve*
Me bañé y luego me maquillé.	*I had a bath and then did my make up.*

¿Desde hace cuánto tiempo?	*How long for?*
desde hace…	*for…*
un día / un mes	*a day / a month*
una hora / una semana	*an hour / a week*
¿Desde cuándo?	*Since when?*
desde ayer	*since yesterday*
desde anteayer	*since the day before yesterday*
no se preocupe	*don't worry*
¡Qué mala suerte!	*What bad luck!*

¿Qué va a tomar?	*What are you going to have?*
de primer / segundo plato…	*for starter / main course…*
de postre…	*for dessert…*
Voy a tomar…	*I'm going to have…*
(el) bistec	*steak*
(el) filete de cerdo	*pork fillet*
(el) flan crème	*caramel*
(el) jamón serrano	*Serrano ham*
(la) merluza en salsa verde	*hake in parsley and wine sauce*
(la) sopa de fideos	*noodle soup*
(la) tortilla de espinacas	*spinach omelette*
(la) trucha a la plancha	*grilled trout*
(los) calamares	*squid*
(las) albóndigas	*meatballs*
(las) chuletas de cordero asadas	*roast lamb chops*
(las) croquetas caseras	*homemade croquettes*
(las) gambas	*prawns*
(las) natillas	*custard*

¿Qué me recomienda?	*What do you recommend?*
el menú del día	*the set menu*
la especialidad de la casa	*the house speciality*
está buenísimo/a / riquísimo/a	*it's extremely good / tasty*
¡Que aproveche!	*Enjoy your meal!*
¿Algo más?	*Anything else?*
Nada más, gracias.	*Nothing else, thank you.*
¿Me trae la cuenta, por favor?	*Can you bring me the bill, please?*

No tengo cuchillo / tenedor / cuchara.	*I haven't got a knife / fork / spoon.*
No hay aceite / sal / vinagre.	*There's no oil / salt / vinegar.*
El plato / vaso / mantel está sucio.	*The plate / glass / table cloth is dirty.*
El vino está malo.	*The wine is bad / off.*
La carne está fría.	*The meat is cold.*
dejar una propina	*to leave a tip*
equivocarse	*to make a mistake*
pedir	*to order / ask for*
ser alérgico/a…	*to be allergic to…*
ser vegetariano/a	*to be a vegetarian*

Irregular verbs in the preterite tense Page 2

If you know the 'I' form of the preterite you can usually work out the other forms.

E.g. ***tener*** (to have):

tuve	I had
tuviste	you had
tuvo	he/she had
tuvimos	we had
tuvisteis	you (plural) had
tuvieron	they had

Now work out the other forms of these verbs.

- *poner* (to put) → *puse* (I put)
- *poder* (to be able to) → *pude* (I was able to)
- *venir* (to come) → *vine* (I came)
- *traer* (to bring) → *traje* (I brought)*
- *decir* (to say) → *dije* (I said)*

* 'they' form ends in *–jeron*

To say **really** (nice), **extremely** (expensive), etc. use the absolute superlative.

Add ***–ísimo*** to the end of the adjective, and make it agree.

*Este ejercicio es facil**ísimo**.* This exercise is **really** easy.

If the adjective ends in a vowel, remove it before adding the ending.

*Estas gambas están buen**ísimas**.* These prawns are **extremely** good.

Highly frequent verbs

Preterite		Imperfect		Present		Immediate future		Future		Conditional	
fui **fue** **fuimos** **fueron**	*I was* *S/he/it was* *We were* *They were*	**era** **era** **éramos** **eran**	*I used to be* *s/he/it used to be* *We used to be* *They used to be*	**soy** **es** **somos** **son**	*I am* *S/he/it is* *We are* *They are*	**voy a ser** **va a ser** **Vamos a ser** **van a ser**	*I am going to be* *You are going to be* *We are going to be* *They are going to be*	**seré** **será** **seremos** **serán**	*I will be* *S/he will be* *We will be* *They will be*	**sería** **sería** **seríamos** **serían**	*I would be* *S/he would be* *We would be* *They would be*
compré **compró** **compramos** **compraron**	*I bought* *S/he bought* *We bought* *They bought*	**compraba** **compraba** **comprábamos** **compraban**	*I used to buy* *S/he used to buy* *We used to buy* *They used to buy*	**compro** **compra** **compramos** **compran**	*I buy* *S/he buys* *We buy* *They buy*	**voy a comprar** **va a comprar** **vamos a comprar** **van a comprar**	*I'm going to buy* *S/he is going to buy* *We are going to buy* *They are going to buy*	**compraré** **comprará** **compraremos** **comprarán**	*I will buy* *S/he will buy* *We will buy* *They will buy*	**compraría** **compraría** **compraríamos** **comprarían**	*I would buy* *S/he would buy* *We would buy* *They would buy*
trabajé **trabajó** **trabajamos** **trabajaron**	*I worked* *S/he worked* *We worked* *They worked*	**trabajaba** **trabajaba** **trabajábamos** **trabajaban**	*I used to work* *S/he used to work* *We used to work* *They used to work*	**trabajo** **trabaja** **trabajamos** **trabajan**	*I work* *S/he works* *We work* *They work*	**voy a trabajar** **va a trabajar** **vamos a trabajar** **van a trabajar**	*I'm going to work* *S/he is going to work* *We are going to work* *They are going to work*	**trabajaré** **trabajará** **trabajaremos** **trabjarán**	*I will work* *S/he will work* *We will work* *They will work*	**me gustaría trabajar** **le gustaría trabajar**	*I would like to work* *S/he would like to work*
gané **ganó** **ganamos** **ganaron**	*I earned (won)* *S/he earned (won)* *We earned (won)* *They earned (won)*	**ganaba** **ganaba** **ganábamos** **ganaban**	*I used to earn (win)* *S/he used to earn (win)* *We used to earn (win)* *They used to earn (win)*	**gano** **gana** **ganamos** **ganan**	*I earn (win)* *S/he earns (wins)* *We earn (win)* *They earn (win)earn*	**voy a ganar** **va a ganar** **vamos a ganar** **van a ganar**	*I'm going to earn* *S/he is going to earn* *We are going to earn* *They are going to earn*	**ganaré** **ganarás** **ganaremos** **ganaran**	*I will earn* *S/he will earn* *We will earn* *They will earn*	**ganaría** **ganarías** **ganaríamos** **ganarían**	*I would earn* *S/he would earn* *We would earn* *They would earn*
hice **hizo** **hicimos** **hicieron**	*I did* *S/he did* *We did* *They did*	**hacía** **hacía** **hacíamos** **hacían**	*I used to do* *S/he used to do* *We used to do* *They used to do*	**hago** **hace** **hacemos** **hacen**	*I do* *S/he does* *We do* *They do*	**voy a hacer** **va a hacer** **vamos a hacer** **van a hacer**	*I'm going to do* *S/he is going to do* *We are going to do* *They are going to do*	**haré** **harás** **haremos** **harán**	*I will do* *S/he will do* *We will do* *They will do*	**haría** **haría** **haríamos** **harían**	*I would do* *S/he would do* *We would do* *They would do*

he trabajado *I have worked*
he estado *I have been*

Si + presente + futuro — ***If + present + future***

(1st Type)	**Si tengo dinero, lo gastaré en ropa.**	*If I have money, I will spend it on clothes.*
	Si hace buen tiempo, iremos a la playa.	*If the weather is nice, we will go to the beach.*
	Si no llueve, iré al trabajo a pie.	*If it doesn't rain, I will go to work on foot.*

Si + Imperf subj + condicional — ***If + imperfect subjunctive + conditional **Hypothetical situation*****

(2nd Type)	**Si pudiera, trabajaría en España.**	*If I could, I would work in Spain.*
	Si tuviera dinero, compraría una casa enorme y moderno.	*If I had the money, I would buy an enormous modern house.*
	Si fuera rico/a, viviría en una mansión.	*If I were rich, I would live in a mansion.*

Si + pluperfe subj + condicional pasado — ***If + pluperfect subjunctive + past conditional **Hypothetical situation in the past *****

(3rd Type)	**Si hubiera podido ir, habría trabajado de azafata.**	*If I had been able to, I would have worked as an air steward.*
	Si hubiera tenido dinero, me habría comprado un coche.	*If I had had the money, I would have bought a car.*
	Si hubiera sido rico/a, habría vivido en una mansión con vistas al mar.	*If I had been rich, I would have lived in a mansion with sea views.*