



# Knowledge Organiser

## Year 10

### Term 1

Name

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Tutor Group

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

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# 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



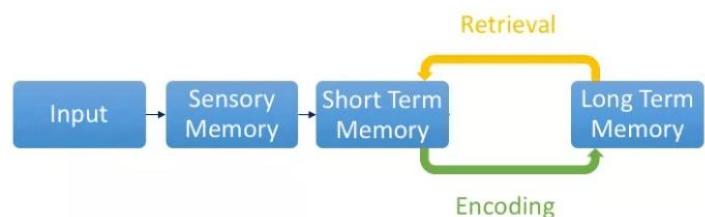
## How can you use your Knowledge Organiser most effectively?



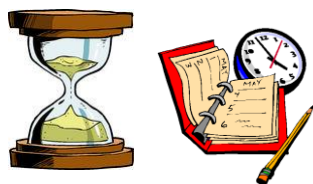
1. Use it as a **checklist** to make sure you have notes and resources in your books or folders on each area. If you have a gap, talk to your teacher.



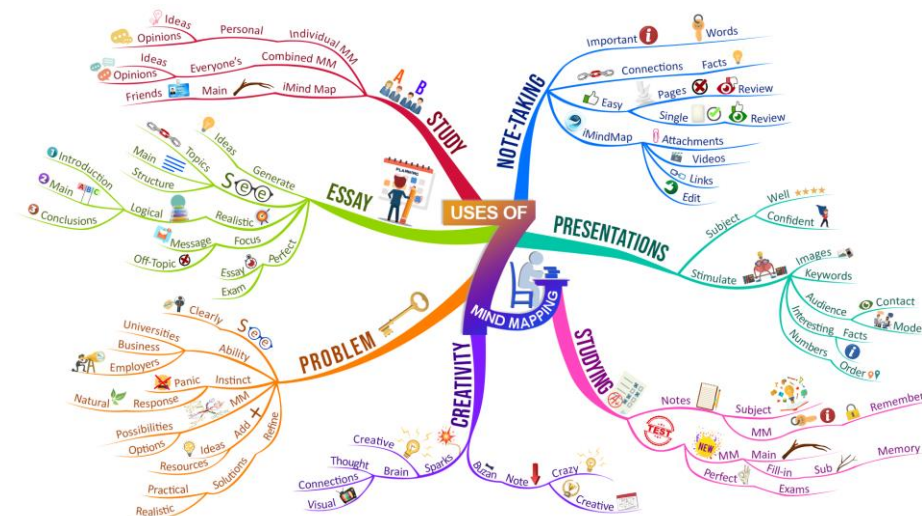
4. Use your knowledge organiser **to get ahead on a topic**. Reading about what you are going to study and looking up any new or difficult words means that you are better prepared for your learning in the next lesson.



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.



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.



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**.

# 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 ink 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.

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

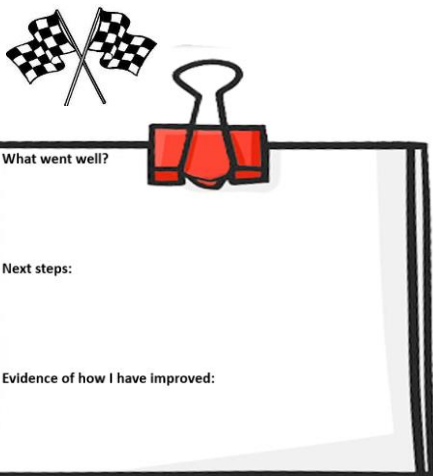
*Completed by your teacher or by you after receiving some guidance from your teacher.*

### 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.

# AUTUMN 1

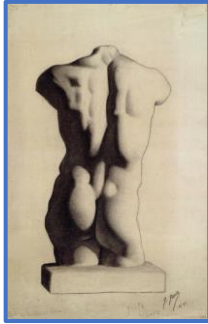


Van Gogh



## 1. Viewpoints

Three-Quarter view of a shoe.



Picasso



## 2. White Object

Use of dark tones to show a light source



Leonardo



## 3. Dark Object

Use of light tones to show a light source.



English



## 4. Reflection (1)

Looking at reflective surfaces.

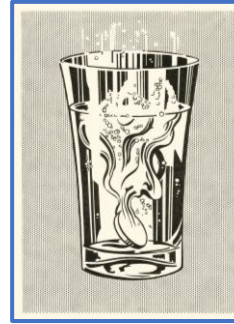


Escher



## 5. Reflection (2)

Looking at reflection capturing surrounding environment.



Lichtenstein



## 6. Reflection (3)

Looking through translucent surfaces.



Dan Mask



## 7. Cultural Diversity

Ethnic Objects from challenging angles.



Van Gogh



## 8. Cuboids

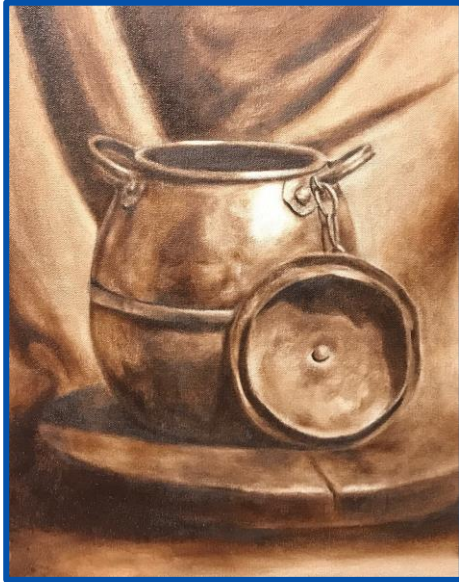
Cuboid shapes seen from different angles.

- Rapid development of technical drawing skills, looking closely at a three-dimensional experience of an object.
- Use of a range of different media and resources including, pencil, ink, charcoal, pastel, coloured pencils and simple printmaking techniques.
  - Key links to relevant artists with extended written study.
  - Identification of selected objects with their symbolic meanings.

### Key Words

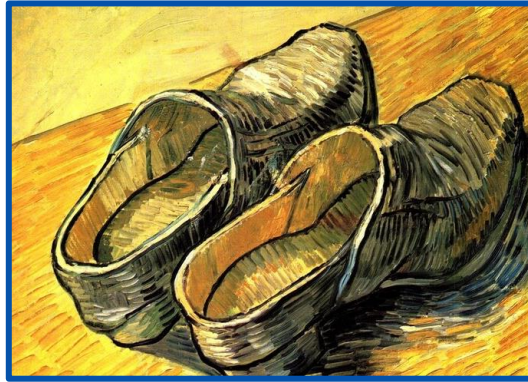
Technical Terms: Line, Shape, Form, Tone, Gradation, Contrast.

Viewpoints, Inverted, Illuminated, Reflection, Translucent, Cuboid, Spherical, Orientation. Arial Viewpoint, Overlapping, Composition, Juxtaposition, Symbolism.

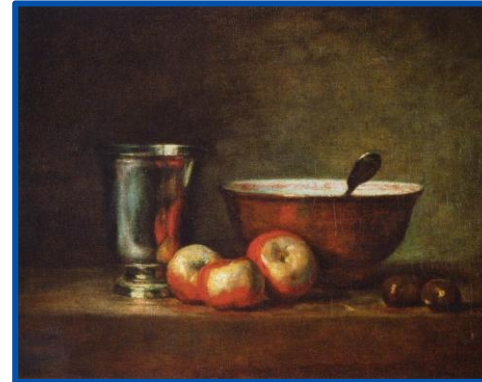


### Introduction to Oil Paint Underpainting Technique

- Dark, Mid and Light Tones established with different shades of Raw Umber Oil Paint.
- Clarification of a light source.



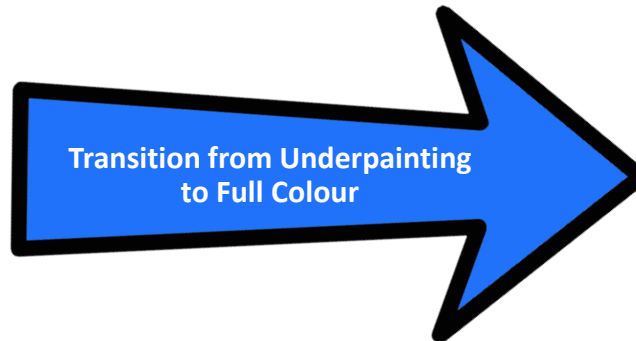
Van Gogh



Chardin

### First Oil Paintings of Still Life objects

Understanding the idea of technical process in different stages influenced by the chiaroscuro technique of the Old Masters.



### Introduction to Oil Paint Full Colour Application

- Focus on heightening colour experience.
- Experimenting and testing out shades of local colour.
- How the environment effects colour on the surface of the object.

### Key Words

Underpainting, Chiaroscuro, Raw Umber, White Spirit, Colour Modulation, Brush marks, Illumination, Brilliance, Opacity, Transient, Shadow, Reflective Colour.








# Design & Technology - 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

## Types of Hardwoods

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

### 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.









### 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.

## Types of Softwoods

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

	Example	Properties	Uses
<b>Medium Density Fibreboard (MDF)</b>		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
<b>Plywood</b>		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
<b>Chipboard</b>		This compressed board not as strong as MDF or plywood is prone to chipping	Flooring, low end furniture kitchen units & cupboards

## Finishing Manufactured Boards

### 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.

### 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.

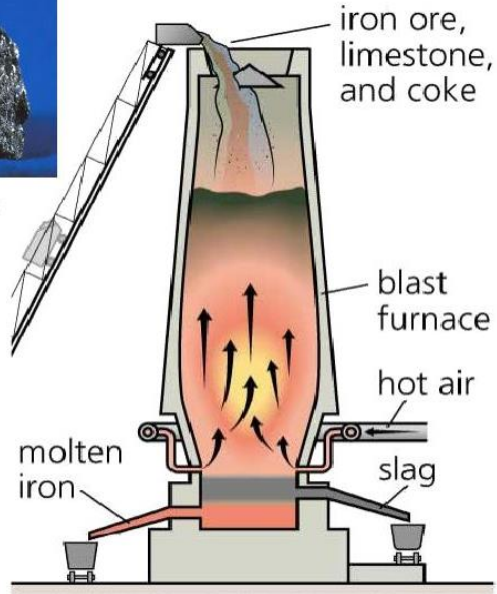
# Design & Technology - Metals and Alloys

## 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



Iron Ore



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.

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

## 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.



**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



**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

## 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 & Technology - 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 1<sup>st</sup> 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.

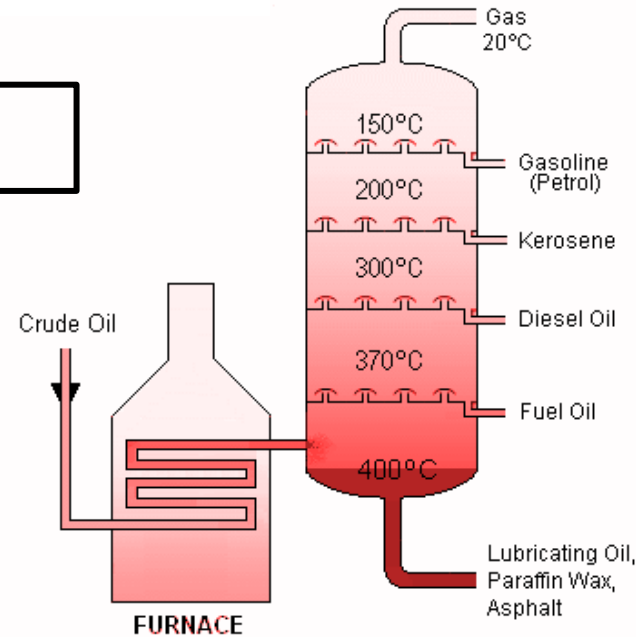


**Antistatics** are used to reduce static charge

### 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 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.



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



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



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.



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



# Design & 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:

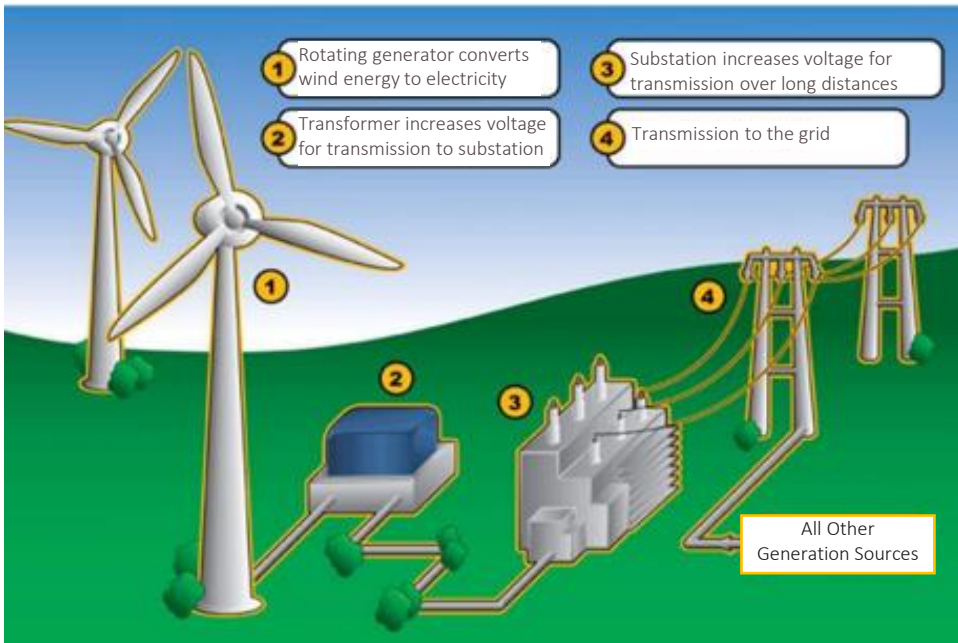
- Fossil fuels (finite)
- Renewables (non-finite)

## 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.

### Emission

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.



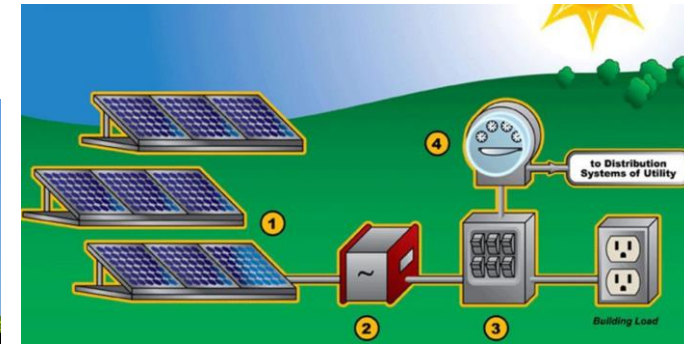
### Renewable Resources

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.



## 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.



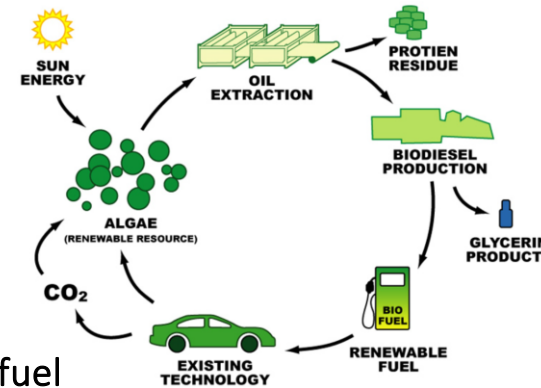
## Nuclear Power

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



## Fossil Fuels

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



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

**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*

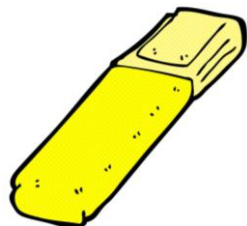
- Evidence from Source 1
- Inference linked to evidence and question
- Comparison connective*
- Evidence from Source 2
- Inference linked to evidence and question
- REPEAT TWICE (3 PARAGRAPHS IN TOTAL)

**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 ! ? - : ;

<u>Text type</u>	<u>To include</u>
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!	



**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.

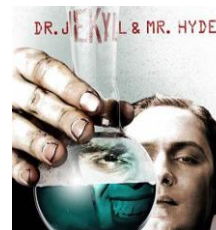
Stevenson exposes the hypocrisy of Victorian society, in which appearances mean everything. Stevenson communicates the horrific consequences of strongly repressing all physical desires; the novel proposes that society needs to allow individuals greater freedom.

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

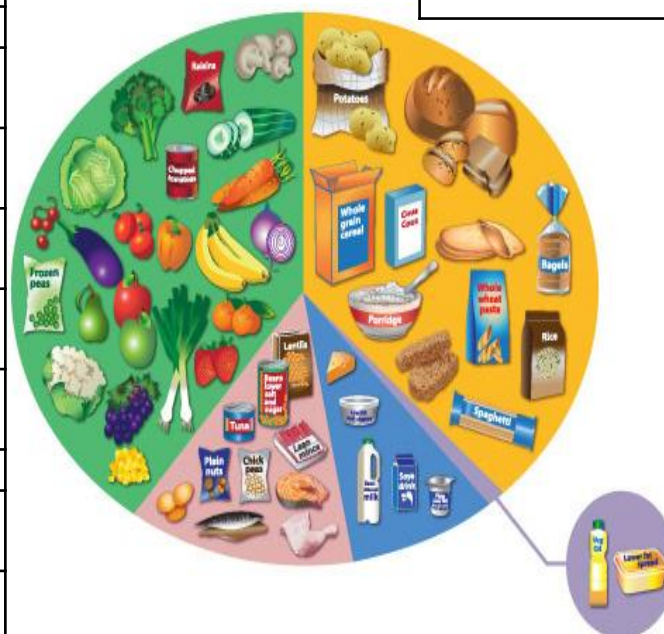
# Food Preparation & Nutrition: Macronutrients & Micronutrients

## Functions of macronutrients

Fat required to insulate the body	Carbohydrates are a primary energy source
Fat required to protect vital organs	Carbohydrates divided into simple & complex
Fat required as an energy source	Simple are monosaccharides. Glucose, fructose
Fat required to insulation	Simple are disaccharides. Sucrose, lactose
Fat allows the body to feel fuller (satiety)	Complex are polysaccharides- Starch and fibre NSP
<b>Proteins required to provide amino acids</b>	Starch comes from plants and is used for energy
<b>Proteins required for growth</b>	Starch as bulk to the diet
<b>Proteins required for repair</b>	Starch keeps you fuller for longer
<b>Proteins are a secondary energy source</b>	Excess starch is turned to fat and stored
<b>Proteins are made up of amino acids</b>	Fibre aids digestion, prevents constipation

## Functions of Micronutrients

<b>Water soluble Vitamin B</b>	Releases energy from food
<b>Water soluble Vitamin C</b>	Builds connective tissue, assists immunity
<b>Fat soluble Vitamin A- Retinol- Oily fish, red and orange veg</b>	Eyesight and antioxidant, production of white blood cells
<b>Fat soluble Vitamin D- Sunshine and dairy</b>	Controls calcium uptake, strong bones
<b>Fat soluble Vitamin E- Veg oils, peanuts, avocado</b>	Antioxidant, destroys dangerous microbes
<b>Fat soluble Vitamin K-Green leafy veg</b>	Helps blood to clot
<b>Iron- Spinach , red meat</b>	Production of red blood cells
<b>Calcium- Dairy products</b>	Works with Vit D for strong bones and teeth
<b>Sodium- Cheese, bacon</b>	Maintains water balance in the body
<b>Potassium- All red meats</b>	Helps build proteins



## TECHNICAL VOCABULARY

<b>High biological value</b>	Proteins that contain all the essential amino acids. Red meats
<b>Low biological value</b>	Proteins that contain some amino acids - pulses, lentils, nuts
<b>Protein complementation</b>	Combining two incomplete proteins to get a complete one
<b>Invisible fat</b>	Fat that cannot be seen, impossible to separate from food- biscuits, cakes
<b>Trans fats</b>	Unsaturated fats that have been hydrogenated
<b>Fat soluble vitamins</b>	Carried round body by proteins, these are <b>ADEK</b>
<b>Cholesterol</b>	A fatty substance made in the liver, carried by the blood
<b>Hydrogenation</b>	A process of turning oils into solid fats
<b>Saturated fat</b>	Derived from animals, single bonded. Butter, lard. Solid at room temperature
<b>Unsaturated fats</b>	Derived from plants, contain single and double bonds. Liquid at room temperature. Olive oil, veg oil

## Importance of Water and hydration

<b>Regulates body temperature- sweating</b>	Overheating of the body
<b>Gets rid of waste products</b>	Constipation, bowel cancer
<b>Keeps internal organs moist</b>	So they don't rub together create friction/pain
<b>Helps absorb nutrients</b>	Weakness and nausea
<b>Transports nutrients, CO2 and O2 around the body via the blood</b>	Changes in blood pressure/ headaches



## Keywords and definitions:

**Anorexia:** an emotional and mental health disorder characterized by an obsessive desire to lose weight by refusing to eat.

**Basal Metabolic Rate (BMR):** energy needed by the body to power internal organs when at rest

**Body Mass Index (BMI):** a measure that adults can use to see if they are healthy weight. The ideal BMI is between 18.5 and 25

**Bulimia:** an emotional and mental health disorder characterized by a distorted body image and an obsessive desire to lose weight, in which bouts of extreme overeating are followed by fasting or self-induced vomiting or purging.

**Energy Density:** amount of energy, calories (Kcal) or kilojoules (KJ) a food contains per gram. Fat = 9 Kcal/g, Protein = 4 Kcal/g, Carbohydrate = 4 Kcal/g.

**Estimated Average Requirements (EARs):** tables used by nutritionists that provide guidelines to the energy needs of individuals at various stages of life.

**Ethical:** decisions or actions taken on the basis of strongly held moral beliefs or intellectual principles

**Halal:** meat that can be eaten by Muslims because it has been killed in accordance with Islamic law

**Haram:** forbidden or proscribed by Islamic law

**Kosher:** food that conforms to Jewish dietary law

**Lethargy:** a lack of energy and enthusiasm

**Malnutrition:** a result of under-consumption of nutrients. Anorexia and bulimia can lead to malnutrition symptoms.

**Menstruation:** the monthly process the female body goes through to discharge the lining of the uterus; takes place from puberty to menopause.

**Osteoporosis:** a disease common in old age. Bones become weak and brittle. A calcium and vitamin rich diet is needed for bone strength.

**Physical Activity Level (PAL):** the energy needed by the body for movement of all types

**Puberty:** the stage of life when adolescents become mature and become capable of sexual reproduction.

**Reference Intake (RI):** the approximate amount of a nutrient provided by a portion of food.

**Weaning:** to introduce a baby to solid food.

# Food Preparation & Nutrition - Diet and Good Health

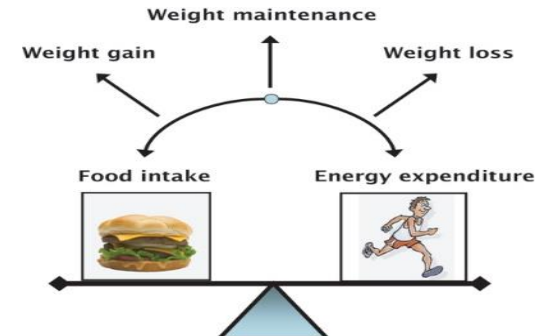
## Eat Well Guide and Government Guidelines:



The Eatwell Guide shows the proportions of food groups that should be eaten daily in a well-balanced diet. There are 8 main government guidelines for a healthy diet

- Base your meals on starchy carbohydrates
- Eat lots of fruit and veg (5-7 portion a day)
- Eat plenty of fish, including oily fish
- Cut down on saturated fat and sugars
- Eat less salt – no more than 6g a day
- Get active and maintain a healthy weight
- Drink 6-8 glasses of water a day
- Always eat a healthy breakfast

## Energy Balance:



- Energy balance is when you use the same amount of energy that you take in through food. This results in weight maintenance.
- Too much energy intake can result in weight gain.
- Too little energy intake can result in weight loss
- You can work out how much you should be eating:  $BMR \times PAL = EAR$
- Guidelines suggest 60 minutes of activity a day.

## Life Choice Nutritional Needs:

- **Pregnancy:** A healthy diet to ensure baby receives the essential nutrients required for development. Folate (folic acid) is needed to prevent neural tube defects. The baby's bones need a good supply of calcium. An iron rich diet is needed to supply of iron for the baby. Constipation is common so a high fibre diet is needed.
- **Vegetarian:** Do not eat meat, fish, poultry or gelatin.
- **Ovo-Lacto Vegetarians:** eat eggs and dairy (but only cheese made with vegetable rennet)
- **Lacto Vegetarian:** eat dairy and honey but do not eat eggs
- **Vegan:** Do not eat any food with an animal origin, this includes things like honey and avocado.

People are often Vegetarian / Vegan due to ethical reasons. To prevent malnutrition, they must get their iron, Vitamins D and B12 from other sources.

## Nutritional Age Needs:

- **Babies:** Newborn babies only drink milk for the first 4-6 months before being weaned. First milk is called colostrum. Human milk provides all nutrients except iron, babies are born with an iron store in their liver.
- **Children:** 1-3 yrs grow quickly so needs a well balanced diet for development. Toddlers are very active and need a good supply of fat for energy, this also helps with brain and nervous system development. New foods should be introduced in an attractive and appealing way. Avoid sweets, fizzy drinks, sugary foods.
- **Teenagers:** Rapid growth and puberty occurs. They need a higher amount of nutrients & energy. Boys need protein for muscle growth. Girls need more iron to replace blood loss during menstruation, (prone to iron-deficiency anaemia).
- **Adults and Older People:** Adults need to maintain a healthy balanced diet to keep the body working properly and prevent diet-related problems. In older people, energy requirements decrease so they need smaller portions and less calories. They must keep hydrated and drink plenty of fluids. Osteoporosis may occur and so a diet high in calcium and vitamin D is needed to strengthen bones.

## Religious Needs:

Judaism	<ul style="list-style-type: none"> <li>• Shellfish or pork</li> <li>• No dairy food eaten in the same meal as meat</li> <li>• Only Kosher meat can be eaten</li> </ul>
Hinduism	<ul style="list-style-type: none"> <li>• No beef or beef products &amp; will avoid pork – many are vegetarian</li> <li>• Some Hindus Practice Fasting</li> <li>• Foods such as onion, garlic &amp; alcohol are forbidden</li> </ul>
Islam	<ul style="list-style-type: none"> <li>• No pork</li> <li>• Only Halal meat can be eaten</li> <li>• Haram foods cannot be eaten</li> </ul>
Sikhism	<ul style="list-style-type: none"> <li>• No beef</li> <li>• Many Sikhs are vegetarian or Ovo-lacto vegetarian</li> </ul>
Christianity	<ul style="list-style-type: none"> <li>• No particular dietary requirements, though some foods are associated with celebrations e.g. pancakes on shrove Tuesday and hot cross buns at Easter</li> </ul>
Buddhism	<ul style="list-style-type: none"> <li>• Vegetarian</li> </ul>
Rastafarianism	<ul style="list-style-type: none"> <li>• Vegetarian or Vegan</li> <li>• White fish are sometimes eaten (but no shellfish)</li> </ul>

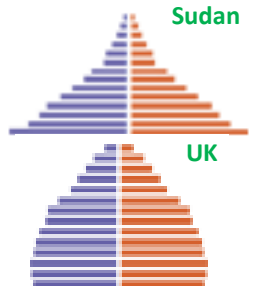
# Geography Paper 1 : Topic 2 – Development Dynamics

Key Term	Definition
<b>Aid</b>	Assistance in the form of grants or loans at below market rates.
<b>Birth rate</b>	The number of live births per 1000 population per year.
<b>Bottom-up development</b>	Experts work with communities to identify their needs, offer assistance and let people have more control over their lives, often run by NGOs.
<b>Colonialism</b>	Acquiring control over another country, occupying it with settlers and exploiting it economically.
<b>Colony</b>	A country or region under the political control of another country and occupied by settlers from that country.
<b>Consumerism</b>	An economy or society based on people consuming large amounts of goods and services.
<b>Death rate</b>	The number of deaths per 1000 population per year.
<b>Debt</b>	Money owed by a country to another country, to private creditors (e.g. commercial banks) or to international agencies such as the World Bank or IMF.
<b>Dependency theory</b>	A theory which blames the relative underdevelopment of the developing world on exploitation by the developed world, first through colonialism and then by neo-colonialism.
<b>Developed country</b>	A country with very high human development.
<b>Developing country</b>	A country with low human development.
<b>Development</b>	The economic or social progress a country or people makes.
<b>Development gap</b>	The difference in income and the quality of life in general between the richest and poorest countries in the world.
<b>Economic liberalisation</b>	When a country's economy is given the freedom of a 'market economy', consumers and companies decide what people buy based on demand.
<b>Emerging economies</b>	Countries that have recently industrialised and are progressing towards an increased role in the world economy.
<b>Fair trade</b>	Farmers and producers in developing countries are given a fair deal by buyers in developed countries; prices paid are always higher than their costs of production.
<b>Foreign direct investment (FDI)</b>	Overseas investment in physical capital by transnational corporations.
<b>Formal economy</b>	Means one which is official, meets legal standards for accounts, taxes and workers' pay and conditions.
<b>Free trade</b>	The free flow of goods and services, without the restriction of tariffs.
<b>Geopolitical influence</b>	The way in which a country's geography and economy affects its relations with other countries.
<b>Globalisation</b>	Increased connections between countries.

<p><b>Developed countries:</b> A country with a very high human development </p> <p><b>Emerging countries:</b> A country with a medium/high human development </p> <p><b>Developing countries:</b> A country with a low human development </p>
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As a country develops the population structure changes. This is shown by a population pyramid:

- A wide base shows a very high birth rate and therefore a high fertility rate
- A narrow base shows a low birth rate
- Steep sides show a high death rate
- Shallow sides show a low death rate
- A thin top shows a low life expectancy – fewer old people
- A wide top shows a high life expectancy – lots of people living to old age



**Inequality** means the differences in wealth. There are 4 key causes of global differences in wealth:

- **Environmental factors e.g. climate and relief**
- **Political factors e.g. corruption**
- **Historical factors e.g. colonialism**
- **Social factors e.g. healthcare**

Economic Measures	Social Measures	Political Measures
<ul style="list-style-type: none"> <li>• Gross Domestic Product (GDP)</li> <li>• Gross Domestic Product (GDP) <i>per capita</i></li> <li>• Gross National Income (GNI) <i>per capita</i></li> <li>• Value of imports and exports</li> </ul> 	<ul style="list-style-type: none"> <li>• Gender Inequality Index</li> <li>• Birth rate</li> <li>• Death rate</li> <li>• Infant mortality</li> <li>• Literacy rate</li> <li>• Life expectancy</li> </ul> 	<ul style="list-style-type: none"> <li>• Political Freedom</li> <li>• Corruption Perception Index</li> </ul> 
<ul style="list-style-type: none"> <li>• Human Development Index (HDI) – this considers economic <b>and</b> social development. It gives each country a score based on the average life expectancy, education and income of the people in that country.</li> </ul>		




Rostow says there is a path to development that countries have to follow. He said that countries further behind on the path would move through the stages more quickly than those before them.

Some countries are poor because of their past relationships with other countries e.g. colonialism. Rich countries sell their manufactured goods and services at a high price to developing countries, in turn they buy raw materials from developing countries at much lower prices. So the poor (periphery) will always rely on the rich (core).

# Geography Paper 1 : Topic 2 – Development Dynamics – India


Key Term	Definition
<b>Gross domestic product (GDP)</b>	The total value of goods and services produced by a country in one year.
<b>HDI</b>	Human development Index - A standard means of measuring human development.
<b>IGO</b>	Inter-governmental organisation e.g. The UN.
<b>Industrialisation</b>	Where a mainly agricultural society changes and begins to depend on manufacturing industries instead.
<b>Infant mortality rate</b>	The number of deaths of infants under one year of age per 1000 live births per year.
<b>Informal economy</b>	Means an unofficial economy, where no records are kept. People in the informal economy have no contracts or employment rights.
<b>Intermediate technology</b>	Uses low-tech solutions using local materials, labour and expertise to solve problems.
<b>International aid</b>	The giving of resources (money, food, goods, technology) by one country or organisation to another poorer country.
<b>Life expectancy</b>	Average number of years that a newborn child can expect to live.
<b>Maternal mortality rate</b>	The annual number of deaths of women from pregnancy-related causes per 100,000 live births.
<b>Neo-colonialism</b>	The dominance of poor countries by rich countries, not by direct political control (as in colonialism) but by economic power and cultural influence.
<b>Non-governmental organisation (NGO)</b>	NGOs work to make life better, especially for the poor. Oxfam, the Red Cross and Greenpeace are all NGOs.
<b>Outsourcing</b>	Using people in other countries to provide services if they can do so more cheaply e.g. call centres.
<b>Population structure</b>	The number of each sex in each age group (e.g. 10-14), usually displayed in a population pyramid diagram.
<b>Poverty line</b>	The minimum level of income required to meet a person's basic needs (US\$1.25).
<b>Terms of trade</b>	Means the value of a country's exports relative to that of its imports.
<b>Top-down development</b>	When decision making about the development of a place is done by the governments or large companies.
<b>Total fertility rate</b>	The average number of children born per woman in a country.
<b>TNC's</b>	Transnational corporations which operate across more than one country.

**Where is India located?**



**Continent:** Asia  
**Nearby countries:** Pakistan, Sri Lanka, Bangladesh, Nepal  
**Nearby oceans:** Indian Ocean, Arabian Sea, Bay of Bengal

**India is the 7<sup>th</sup> largest country in the world by land mass.**



**How does India's location promote economic development?**

- **What other major economies are nearby?** China! Now a major economy and superpower. India and China have existing political tensions. India is a former British colony.
- India is not landlocked, meaning it can easily transport goods internationally by boat. India aims to become a major transport hub within south east Asia.
- India is a large country, with good access to resources such as coal. India's population is rapidly growing, totals 1.324 billion (2016). This makes India the second most populous country in the world.

Development Indicator	Social, Economic or Environmental	Value
<b>HDI (Human Development Index)</b>	Social, Economic and Environmental	0.621 (131 <sup>st</sup> in the world)
<b>Life Expectancy</b>	Social	68 years
<b>Adult Literacy</b>	Social	74%
<b>Infant Mortality</b>	Social	34 per 1000 birth
<b>GDP (Gross domestic Product per capita)</b>	Economic	\$1,709

## Impact of Development

**Economic Development on Different Age and Gender Groups**

**The Elderly (50+):** Access to better healthcare, which may prolong their life. Do not possess necessary skills so may lag behind. Socially, changes to the Indian society may be difficult to adapt to.

India is ranked as the 155<sup>th</sup> country out of 177 in a global ranking on environmental quality. This costs India around \$80 billion per year (5.7% of its total economy)

### The effects

**Females: The BIGGEST winners:** Emancipation of women = equal access to a high quality education and healthcare system, which enables them access to highly skilled jobs that are well paid.

**Pollution:**

Indian cities generate 100 million tonnes of waste each year.

40% of urban waste in India is not collected

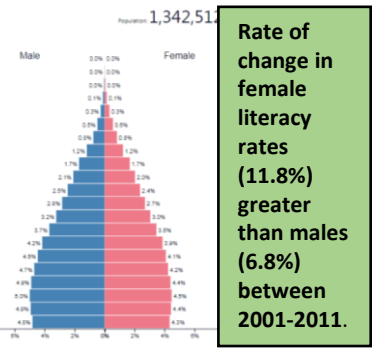
India has the capacity to deal with just 1/6 of its sanitation produced.

Over 100 Indian cities directly dump untreated sewage into the Ganges.

Major issue in India, with wood burning and vehicle emissions behind the primary cause.

**Young adults:**

Access to top universities, receiving a world class education = compete for the highest skilled and paid jobs = more equal society.



## Geopolitics



**Definition:** How are a country's world politics influenced by geographical factors.

What controls India's geopolitics?: It's history, geography, international context and domestic policies

**In Asia:** The partitioning of India and Pakistan in 1947 was accompanied with riots and mass casualties. The effects of this are still felt today: The relationship between India and Pakistan is still far from healthy. Both countries are nuclear armed.

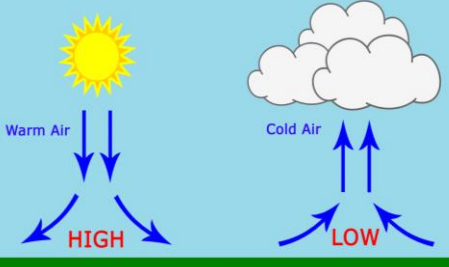
**Globally:** India is a member of the G20. The G20 are the twenty most developed economies in the world. These countries meet every year, and discuss world trade issues.



# Geography Paper 1 : Topic 1 – Hazardous Earth – Climate

Key Term	Definition
Atmosphere	The layer of gases above the Earth's surface
Evaporation	The changing of a liquid into vapour or gas.
Glacial	A cold period of time during which the Earth's glaciers expanded widely.
Global circulation model	A theory that explains how the atmosphere operates in a series of three cells each side of the equator.
Greenhouse effect	The way that gases in the atmosphere trap heat from the sun. Like the glass in a greenhouse – they let heat in, but prevent most of it from escaping.
Greenhouse gases	Gases like carbon dioxide and methane that trap heat around the Earth, leading to global warming.
Interglacial	A long period of warmer conditions between glacials.
Inter-Tropical Convergence Zone (ITCZ)	A narrow zone of low pressure near the Equator where northern and southern air masses converge.
Latitude	How far north or south a location is from the Equator, measured in degrees.
Milankovitch cycles (orbital change)	The three long-term cycles in the Earth's orbit around the sun.
Ocean currents	Permanent or semi-permanent large-scale horizontal movements of the ocean waters.
Quaternary	The last 2.6 million years, during which there have been many glacials.
Thermal expansion	As a result of heating, expansion occurs. When sea water warms up, it expands.
Tree rings	Marks on the inside of trees trunks that show individual growing seasons. The thickness of the rings varies depending on climatic conditions during the seasons.

**Low pressure system:**  
The warmth of the earth's surface heats the air above  
Air begins to rise – so there is less pressure on the ground below  
As air rises it cools in the upper atmosphere and condenses forming clouds  
Regular areas with low pressure usually receive lots of annual rainfall – rainforest ecosystems are found in these areas



**High Pressure system:**  
This is when cool air sinks back down to the earth. The weight of the sinking air causes more pressure on the earth – so high pressure is formed  
Regular areas with high pressure are **arid areas (deserts)**. They usually receive low average rainfall (usually 250mm in a year)

## Evidence of climate change



### Warmer Global temperatures:

Measurements of average global atmospheric temperatures show a steep rise from around the 1950s to the present.

**Melting Ice Caps:**

- Sea level change is caused by **thermal expansion** – when water warms up it expands
- The Arctic Ice Caps have decreased. Warmer temperatures meant that sea ice has declined

**Increased carbon Dioxide**

- The increase in carbon dioxide since 1950 has been much higher and much more rapid than anything recorded for the last 400,000 years.

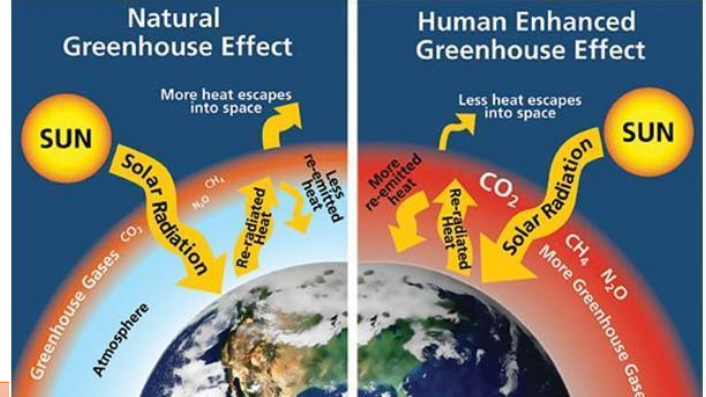
**Sea Level Change:**

- Long-term measurement of sea levels shows there has been 20cm increase since 1900
- Rises have increased recently to 3.2mm per year and are more in some areas.

Natural climate change	Effect
<b>Milankovitch Cycles</b> 	These are natural changes to the earth's orbit and position that affect how much solar radiation we receive from the sun <ul style="list-style-type: none"> <li>Eccentricity – The orbit becomes elliptical so at times the earth is further from the sun causing it to be much cooler</li> <li>Axial tilt – The angle of the earth's tilt changes so summers and winters are more extreme when this happens</li> <li>Precession – The earth sometimes wobbles on it's axis and it changes seasons slightly.</li> </ul>
<b>Solar output theory</b>	The amount of radiation the sun produces varies over time due to the presence of sunspots. The more sunspots, the more solar radiation is released.
<b>Volcanism</b>	Large-scale eruptions can lead to lots of ash in the atmosphere, sometimes it's so great it can block out the sunlight reducing global temperatures
<b>Asteroid collisions</b>	Asteroids and comets can impact the earth's surface and cause lots of ash blocking out sunlight and reducing global temperatures

## Human causes of Climate change and the effects

Human activity such as use of transport systems, creating energy from fossil fuels, increased industrial activity and farming all produce greenhouse gases that enhance the natural greenhouse effect and make the Earth a little warmer.



## Evidence of past climate change:

**Tree rings** – each ring represents a year, the wider the ring the longer the growing season.

**Ice cores** – drilling ice cores in Antarctica, layers form showing a year of snow fall and trapped co<sub>2</sub> bubbles – tells us what climate was like.

**Historical sources** – books, news articles, diary entries all tell us what climate was like.

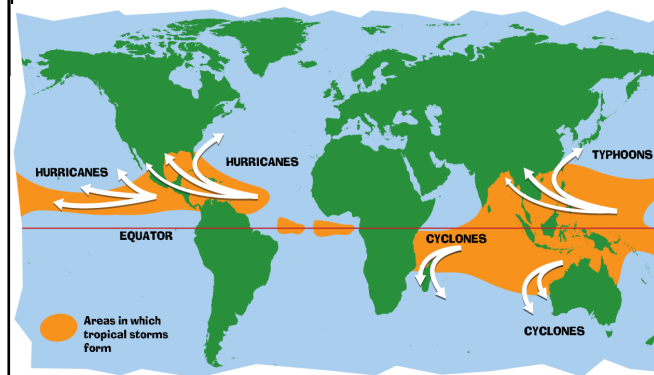
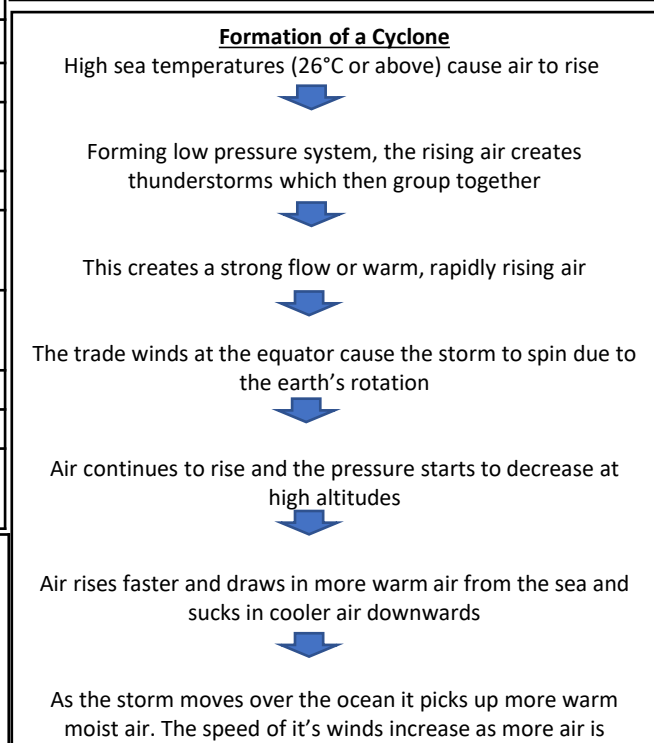




# Geography Paper 1 : Topic 1 – Hazardous Earth – Tropical cyclones

Key Term	Definition
<b>Coriolis force</b>	A strong force created by the Earth's rotation. It can cause storms, including hurricanes.
<b>Dissipate</b>	Means to reduce energy.
<b>Distribution</b>	The way something is spread out or arranged over a geographic area.
<b>Evaporation</b>	The changing of a liquid into vapour or gas.
<b>Eye</b>	The centre of a tropical cyclone; an area of clear conditions created by air converging at the centre of the storm and then sinking.
<b>Latitude</b>	How far north or south a location is from the Equator, measured in degrees.
<b>Saffir-Simpson Hurricane Scale</b>	A scale that classifies hurricanes into five different categories according to their wind strength.
<b>Secondary effects</b>	The indirect impacts of an event, usually occurring in the hours, weeks, months or even years after the event.
<b>Storm surge</b>	A rapid rise in the level of the sea caused by low pressure and strong winds.
<b>Track</b>	The path followed by a tropical cyclone.
<b>Tropical cyclone</b>	A weather system that forms over the ocean in tropical areas and can produce high winds and heavy rain.

**Tropical cyclone ingredients:** warm ocean (26.5°C), strong winds in the troposphere and a strong Coriolis force – they are not found on the equator but at 5° - 30°








**Hurricane** – North Atlantic and the Pacific coast of the USA.  
**Cyclone** – Indian and South Pacific Oceans  
**Typhoon** – western North Pacific

**Measuring cyclones**

The Saffir-Simpson scale is used to classify tropical cyclones. It is based on the wind speed generated by the cyclone and estimates the damage.

Saffir-Simpson Hurricane Scale		
Category	Wind Speed (mph)	Type of Damage
1	74-95	Some Damage
2	96-110	Extensive Damage
3	111-129	Devastating Damage
4	130-156	Catastrophic Damage
5	157 and above	Catastrophic Damage

Tropical cyclone hazards	Impact on people	Impact on the environment
<b>High Winds</b> 	Infrastructure such as power lines damaged Buildings destroyed Loss of life, injury	Trees uprooted
<b>Intense Rainfall</b> 	Damage property Injury Potential loss of life	Flooding Pollution of water systems
<b>Storm surges</b> 	Coastal defences destroyed Flooded inland areas contaminating farmland Damage to properties	Beaches and coastal habitats destroyed
<b>Coastal Flooding</b> 	Peoples lives and properties at risk of destruction Farming, tourism and industry at risk of	Salt water intrusion Habitats destroyed Water contamination
<b>Landslides</b> 	Settlements destroyed/damaged Transport routes cut off Loss of life and injury Displacement	River flooding if a channel is blocked Habitats destroyed Debris contaminated water

**Typhoon Haiyan, Philippines (Emerging country), 2013**

- Category 5
- Storm surge height: 5m
- 7000 deaths
- \$3 billion
- 71,000 hectares of farmland was affected.
- In the city of Tacloban, widespread looting took place
- It was one of the strongest tropical cyclones ever recorded with winds of 313 km/h.
- 1.9 million people were left homeless
- More than 6,000,000 displaced.
- Six million workers lost their sources of income.

**Hurricane Katrina, USA (Developed country), 2005**

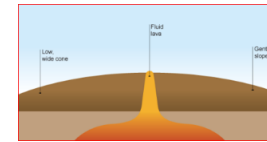
- Category 3
- Storm surge height: 6m
- 1800 deaths
- \$100 billion
- \$50 billion in aid was given by the government.
- People sought refuge in the Superdome stadium. Conditions were unhygienic, and there was a shortage of food and water.
- 1 million people were made homeless and about 1,200 people drowned in the floods.
- Despite an evacuation order, many of the poorest people remained in the city.
- Looting was commonplace throughout the city.
- 80% of the city was flooded to depths of up to six metres.

# Geography Paper 1 : Topic 1 – Hazardous Earth – Tectonics

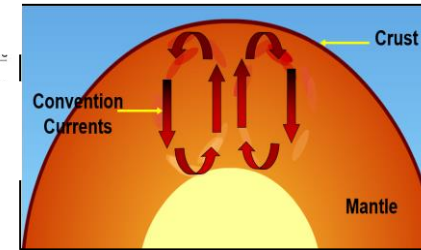
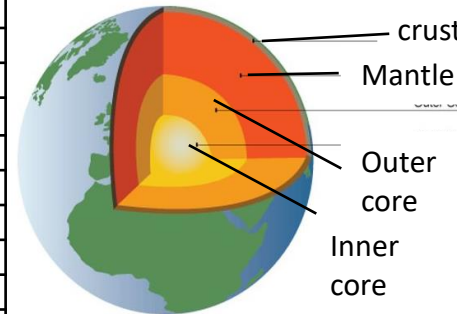
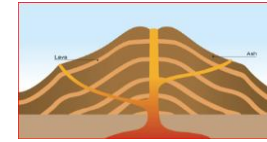
Key Term	Definition
Andesitic lava	A thick and sticky lava erupted from composite volcanoes.
Basalt	A dark-coloured volcanic rock. Molten basalt spreads rapidly and is widespread.
Composite volcano	A steep-sided volcano that is made up of a variety of materials, such as lava and ash.
Conservative boundary	Where two tectonic plates slide past each other.
Continental crust	The part of the Earth's crust that makes up land, on average 30-50km thick.
Convection currents	In the Earth's mantle, the currents which rise from the Earth's core are strong enough to move the tectonic plates on the Earth's surface.
Convergent boundary	Where two tectonic plates come together.
Core	The central part of the Earth's structure, made up of a solid inner and liquid outer core.
Divergent boundary	Where two tectonic plates move away from each other.
Epicentre	The point on the ground directly above the focus (centre) of an earthquake.
Fault	Large cracks caused by past tectonic movement.
Focus	The point of origin of an earthquake.
Friction	The force which resists the movement of one surface over another.
Hot spot	Columns of heat in Earth's mantle found in the middle of a tectonic plate.
Landslide	A rapid mass movement of rock fragments and soil under the influence of gravity.
Lava	Melted rock that erupts from a volcano.
Lithosphere	The uppermost layer of the Earth. It is cool and brittle. It includes the very top of the mantle and, above this, the crust.
Magma	Melted rock below the Earth's surface. When it reaches the surface it is called lava.
Mantle	The middle layer of the Earth. It lies between the crust and the core and is about 2900km thick.
Oceanic crust	The part of the Earth's crust which is under the oceans, usually 6-8km thick.
Plate boundaries	Where tectonic plates meet. There are 3 kinds: divergent, convergent and conservative.
Primary effects	The immediate effects of a natural hazard, caused directly by it.
Pyroclastic flow	A lethal hot mixture of broken rocks and gases that races down the side of a volcano.
Radioactive decay	The process where natural radioactive materials in the Earth's rocks break down, giving out energy and heat as they do.
Richter scale	A scale for measuring the magnitude of earthquakes.
Secondary effects	The indirect impacts of an event, usually occurring in the hours, weeks, months or even years after the event.
Seismometer	A machine for recording and measuring an earthquake using the Richter scale.
Subduction	Describes oceanic crust sinking into the mantle at a convergent plate boundary. As the crust subducts, it melts back into the mantle.
Tectonic hazards	Natural events caused by movement of the Earth's plates that affect people and property.
Tectonic plates	The Earth's surface is broken into large pieces called tectonic plates.
Tsunami	Earthquakes beneath the sea bed generate huge waves that travel up to 900km/h.

## Volcanoes

A **shield volcano** has gently sloping sides and runny lava that covers a wide area. They are more frequent but cause less damage.



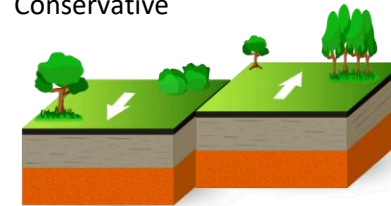
A **composite volcano** is steep sided and cone-shaped, it is made up of layers of ash and lava. The lava is sticky (viscous) so it does not flow far. They are less frequent but cause more damage.



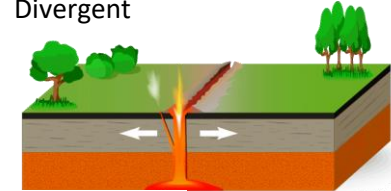
- The **inner core** is extremely hot and is a very dense solid.
- The **outer core** is 2,000 km thick and is a liquid.
- The **mantle** is semi-molten and about 3,000 km thick.
- The **crust** is the rocky outer layer; it is thin compared to the other sections, approximately 5 to 70 km thick.

## PLATE MOVEMENT

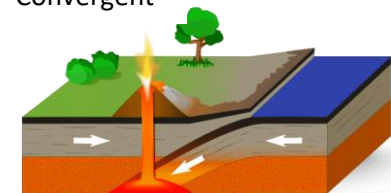
Conservative



Divergent



Convergent



## Japan 2011 – Earthquake and tsunami

Magnitude: 9  
 Focus: 30km deep – convergent boundary  
 Epicentre – 70km from coast in Sendai Bay  
 16,000 deaths  
 \$235 billion in damage  
 2600 missing, 350,000 homeless  
 93% of deaths from drowning  
 Explosion of Fukushima power plant  
 1 oil refinery set on fire  
 1 dam collapsed  
 75% of buildings were earthquake proof  
 Emergency kits and earthquake drills at schools  
 Strong government and economy which helped

## Haiti 2010 – Earthquake

Magnitude: 7  
 Focus: 13km deep – conservative plate boundary  
 Epicentre – 25km from capital Port-au Prince  
 316,000 deaths, 300,000 injured  
 1 million homeless  
 Roads, port and bridges destroyed  
 Cholera outbreak killed 8000 people  
 1 in 5 jobs were lost  
 10 years on – very few people have been re-housed  
 High gov corruption  
 Poorest country in western hemisphere

# History: Paper 1 Crime and Punishment

## THEMATIC STUDY

### Key Topic 1: Medieval England, c1000-c1500

In the year 1000, the people of England and their rulers were **Anglo-Saxon**. Crime and punishment was dealt with by **local communities**, with some involvements of the king and the Church. A dramatic change to everyday life came when the Normans invaded England in 1066. The arrival of a new **Norman** king, William I and his nobles, changed England socially, politically and culturally. As they imposed their authority, they redefined some activities that had previously been legal as crimes and they also introduced new punishments and ways of dealing with crime. The new regime also sparked **challenges** to government authority. As the mediaeval period continued, the **growth of towns** led to a rise in crimes rates in some areas. This stimulated new ideas about law enforcement. Throughout this period, the **Church** also played an important part in defining and enforcing the law.

2: Early Modern England

1: Medieval England

c.1000-c.1500

c.1500-  
c.1700

3: C18<sup>th</sup> and C19<sup>th</sup>  
c.1700-c.1900

4: Recent times  
c.1900-c.Present

Anglo-Saxon; Norman; Late Middle Ages; Tudor; Stuart; Georgian; Victorian; Edwardian; World Wars; Modern Era

**954:** English kingdoms unite under one ruler: Edred

**C1000:** King Ethelred II attacks Viking settlements

**C1000:** English shires divided into Hundreds

**1066:** William I crowned King after Battle of Hastings

**1069-70:** The Harrying of the North subdues the English

**1070:** Murdrum Fine for killing Normans

**1072:** Forest Laws take away common land into the king's hands

**1166:** Henry II reforms crime and punishment

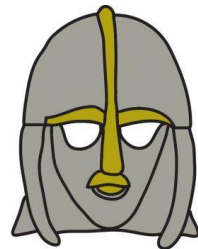
**1194:** Richard I introduces coroners to investigate suspicious deaths

**1215:** Church forbids trial by ordeal

**1327:** Keepers of the 'king's peace' known as JPs

**1351:** The Statute of Labourers introduced a maximum wage

**1382, 1401, 1414:** Heresy Laws including burning at the stake



## Key Terms:

<b>Superstitious</b>	Beliefs based on old ideas about luck or magic rather than science or reason.
<b>Witan</b>	The leading nobles and bishops of the Royal Court in Anglo-Saxon times that advised and chose the king.
<b>Heresy</b>	Going against the teachings of the Catholic Church.
<b>Treason</b>	Crime of betraying one's country, usually by killing or overthrowing the king/ government.
<b>Poaching</b>	Illegal hunting on land that belongs to someone else.
<b>Retribution</b>	Revenge.
<b>Deterrence</b>	Something which warns others not to commit a crime.
<b>Hue and cry</b>	When a person committing a crime in medieval England you had to raise the hue and cry, where you would shout loudly and others would come to help you find the criminal (you could be fined if you did not assist).
<b>Tithings</b>	All the men over the age of 12 were responsible for the behaviour of all the others.
<b>Trial by ordeal</b>	A Medieval judicial practice by which the guilt or innocence of the accused was determined by subjecting them to a painful, or at least an unpleasant, usually dangerous experience (abolished 1215).
<b>Stocks and pillories</b>	Stocks secured the ankles so you could not move. Pillories secured the arms and neck. Both were forms of punishment through public humiliation.
<b>Norman Conquest</b>	After the defeat of Harold Godwinson by William, Duke of Normandy at the Battle of Hastings in 1066, the Normans went on to rule England.
<b>Murdrum fine</b>	William the Conqueror made a law that if a Norman was murdered, all of the people in that region had to join together and pay an expensive Murdrum fine.
<b>Forest laws</b>	William the Conqueror made a law that states trees could no longer be cut down for fuel or building and anyone caught hunting deer was punished by having their first two fingers chopped off. Repeat offenders were blinded.
<b>Trial by combat</b>	A Norman custom whereby the winner of the combat would be deemed not-guilty. An invalid or a woman could be represented by an appointed 'champion'.
<b>Church courts</b>	Introduced by the Normans, which were separate courts used by churchmen and tended to be more lenient.
<b>Constable</b>	He is the man responsible for keeping the peace within the village in the late middle ages.
<b>Sherriff</b>	A Royal Official who was appointed locally to bring criminals to justice in the late middle ages.
<b>Coroner</b>	He is responsible for examining suspicious deaths in the late middle ages.
<b>Common law</b>	Henry II introduced a series of changes and it is argued that he laid the foundations of 'common law', that is, a consistent legal system that is 'common' to all.
<b>Sanctuary</b>	Criminals could find sanctuary in the church. This effectively sheltered them from the king's justice.
<b>Benefit of the clergy</b>	Anyone could claim benefit of the clergy (and thereby avoid death) if they read a verse from the bible.



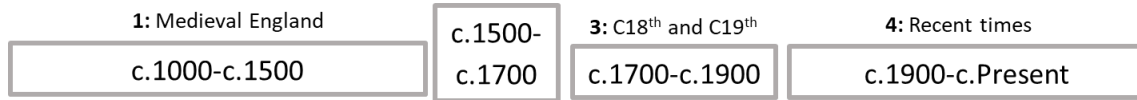
# History: Paper 1 Crime and Punishment

## THEMATIC STUDY


### Key Topic 2: Early Modern England, c1500-c1700

Between c1500 and c17000, there were wide-ranging **social, religious and political changes** in England. Religion became volatile and dangerous after Henry VIII broke from Rome to create his own **Church of England** in the 1530s. The question of how to deal with religious division in England was a constant source of concern and led to many activities being viewed as new religious crimes. The **Gunpowder Plot** – an attempt to destroy Parliament, the king and the heart of the England state in 1605 – increased fears around religious conflict in England. The English Civil Wars in the mid-17th century also led to great changes and instability. The 17<sup>th</sup> century also saw a dramatic increase in **witchcraft** persecution – fuelled by social divisions, hatred towards women and political instability. This was coupled with an unstable economic situation in which the **poor** were increasingly vulnerable to powerful economic changes. In this period, the ruling elite continued to use the law to protect their own position within society. Punishments became harsher and more varied.

2: Early Modern England



Anglo-Saxon; Norman; Late Middle Ages; Tudor; Stuart; Georgian; Victorian; Edwardian; World Wars; Modern Era

<b>1494:</b> Vagabonds and Beggars Act put the 'idle' in stocks	<b>1556:</b> Bridewell Prison set up to punish and house children	<b>1605:</b> Gunpowder Plot: an attempt to kill Catholic James I
<b>1517:</b> Martin Luther protests against Catholic Church	<b>1559:</b> Elizabeth I passes several new laws about religion	<b>1615:</b> Transportation to North America begins
<b>1534:</b> Henry VIII Head of the Church of England	<b>1563:</b> Act against Conjugations, Enchantments and Witchcraft	<b>1645:</b> Mathew Hopkins Witchfinder General
<b>1536:</b> Sanctuary ends	<b>1597:</b> James I publishes Demonologie, a guide to hunting witches	<b>1660:</b> Oliver Cromwell's 'moral laws' lifted
<b>1542:</b> Witchcraft Act declares death penalty	<b>1601:</b> Poor Laws and Houses of Correction	<b>1668:</b> 'Bloody Code': 50 capital crimes including poaching
<b>1547:</b> Vagrancy Act included harsh terms	<b>1604:</b> Witchcraft and Conjugations Act	
<b>1553-58:</b> Mary I burns c300 heretics at the stake		

Key Terms:	
<b>The Reformation</b>	Refers specifically to the Protestant Reformation in Europe, which was a religious change instigated in 1517 by Protestants who wished to reform the Catholic Church.
<b>The English Reformation</b>	When Henry VIII split the Church in England from the Roman Catholic Church and the Pope. The Protestant Church of England was established and the English monarch became its supreme head not the Pope.
<b>Puritan</b>	A member of a group of English Protestants of the late 16th and 17th centuries who regarded the Reformation of the Church under Elizabeth I as incomplete and sought to simplify and regulate forms of worship.
<b>The English Civil War</b>	A war within England from 1642-1651 was between Parliament (which was mostly Protestant) and Charles I.
<b>Commonwealth</b>	England was a republic from 1649 -60 for 11 years ruled by Oliver Cromwell, and the Puritans became powerful.
<b>The Gunpowder Plot</b>	A failed attempt to assassinate King James I of England during the Opening of Parliament in November 1605.
<b>Highway robbery</b>	Robbery committed on a public road through violent and threatening attacks. Increased and decreased in EME.
<b>Vagabondage</b>	A homeless person with no job, often found begging on the streets. Fear of this increased in EME.
<b>Smuggling</b>	The bringing of goods into a country illegally, which rose as a crime in EME due to import duties.
<b>Poaching</b>	When an animal is killed illegally. Made more difficult by enclosure but considered by most a social crime.
<b>Witchcraft</b>	The practice of magic, especially black magic. Between 1645 and 1647 (Civil War!), there were many cases of witchcraft in East Anglia. At the centre of this was Matthew Hopkins, a man known as the Witchfinder General.
<b>Witch's familiar</b>	A small animal or imp kept as a witch's attendant, given to her by the devil or inherited from another witch.
<b>Town Constable</b>	Appointed by local people with good standing in the community. Expected to turn in serious criminals to the courts, stop suspected criminals, break up fights and round up sturdy beggars.
<b>Night Watchmen</b>	Unpaid volunteers who carried a lamp to help patrol when it's dark, rang a bell at night to warn people to go home or risk being viewed as a possible criminal, took turns to patrol the local area between 10pm and dawn.
<b>Professional 'thief takers'</b>	The thief taker was paid a reward for catching a criminal and delivering them to the law.
<b>Bloody Code</b>	The rise in the number of crimes that held a capital punishment from 1688 to c1810.
<b>Transportation</b>	The transporting of convicts by ship to new English colonies, first to North America around 1610, and then to Australia after 1783.
<b>Burning at the stake</b>	An execution method involving exposure to extreme heat (often the victim is tied to the stake and a fire built around them). In EME, a form of punishment especially for heresy.

# History: Paper 1 Crime and Punishment

## THEMATIC STUDY

### Key Topic 3: Industrial Britain (18<sup>th</sup> and 19<sup>th</sup> centuries), c1700-c1900

From 1700 to 1900, there were many changes in society that had a significant impact on crime and punishment. Rapid **population growth** and **urbanisation** meant more opportunities for crime, as rich and poor now lived more closely together. Mass **migration** from countryside to town made enforcing the law more difficult, as it was harder to keep track of people, and extreme poverty in some areas of big cities, like London, saw the growth of a **criminal underclass**. There were also important developments in ideas and **attitudes** that led to new ways of catching and dealing with criminals. For example, in the 19<sup>th</sup> century prisons were intended to **reform** criminals and not just lock the away. A number of individuals had a significant impact on changes in law enforcement and punishment at this time, including: the prison reformer, **John Howard**; and the founder of the **Metropolitan Police, Robert Peel**.

2: Early Modern England

1: Medieval England

c.1500-

3: C18<sup>th</sup> and C19<sup>th</sup>

4: Recent times

c.1000-c.1500

c.1700

c.1700-c.1900

c.1900-c.Present

Anglo-Saxon; Norman; Late Middle Ages; Tudor; Stuart; Georgian; Victorian; Edwardian; World Wars; Modern Era

<b>1723:</b> Black Acts makes poaching punishable by death	<b>1788:</b> Transportation to Australia begins	<b>1842:</b> Pentonville Prison and the 'separate system'
<b>1735:</b> Witchcraft Act states witches are confidence tricksters	<b>1810:</b> 'Bloody Code': 222 capital crimes	<b>1857:</b> Transportation abolished
<b>1736:</b> Witchcraft decriminalised	<b>1813:</b> Elizabeth Fry visits Newgate Prison and is shocked by conditions	1868: Public Executions ended
<b>1748:</b> Bow Street Runners established by Henry Fielding	<b>1823:</b> Black Act repealed as part of Robert Peel's reforms	<b>1877:</b> All prisons brought under government authority
<b>1765:</b> 'Bloody Code': 160 capital crimes	<b>1829:</b> Robert Peel sets up Metropolitan Police Force	<b>1878:</b> CID set up employing 200 detectives
<b>1772:</b> Death penalty for anyone armed and disguised on high road	<b>1832:</b> Punishment of Death Act: Capital crimes down to 60	<b>1888:</b> Jack the Ripper murders
<b>1777:</b> John Howard publishes 'The State of Prisons'	<b>1833:</b> Tolpuddle Martyrs sent to Australia	



Key Terms:	
<b>Slums</b>	Poor part of city with crammed housing.
<b>Industrial Revolution</b>	A time in history where industry grew rapidly and on a large scale.
<b>Social crime</b>	An act that is illegal by law, but that some people do not view as wrong.
<b>Claude Duval</b>	A dashing highwayman ever in England, known as a "true gentleman of the road".
<b>Trade union</b>	An organized association of workers in a trade or profession formed to protect and further their rights and interests.
<b>Tolpuddle Martyrs</b>	6 agricultural labourers from the village of Tolpuddle in Dorset, England, who, in 1834, were convicted of swearing a secret oath as members of a trade union and sent to Australia.
<b>Fielding brothers</b>	London lawyers who had become tired of protecting criminals, and thought a far better idea would be to attempt to dissuade people from committing crimes in the first place.
<b>Bow Street Runners</b>	Men dedicated to catching thieves and providing evidence in court.
<b>Robert Peel</b>	Home Secretary from 1822-1827 and a conservative politician, he had a huge impact on Crime and Punishment due to his prison reforms as well as his role in creating the Met Police.
<b>Metropolitan Police Force</b>	A new organised police force that replaced the system of watchmen and Parish Constables in 1829. This was originally in London, but in 1835 a new law allowed towns to set up their own police force.
<b>Bobbies</b>	As his name was Robert Peel, the Met officers were called 'Bobbies' and were viewed as approachable. Peel issued his new policemen with a smart blue uniform that looked like a casual suit.
<b>National Crime Records</b>	Set up in 1869 to use new technology in policing e.g. telegraph communications which meant that different police forces could communicate quickly and effectively to share information.
<b>CID</b>	The Criminal Investigations Department set up in 1878 which employed 200 detectives. A further 600 were added in 1883. The CID developed new methods of detection.
<b>Bloody Code</b>	This rise in the number of crimes that held a capital punishment from 1688 to c1810. Phased out in IB.
<b>Public execution</b>	A form of capital punishment which members of the general public may voluntarily attend, and indeed were encouraged in order to deter others from committing crimes. It became ineffective.
<b>Ticket of leave</b>	After being transported to Australia, upon completing their 7 years service, convicts would be given a 'ticket of leave' and their freedom. If convicts didn't behave well, they would not get this and would be killed.
<b>Prison Hulks</b>	Old, rotten prison ships. The conditions were worse than in prisons – many died from disease.
<b>John Howard</b>	A man who campaigned on prison conditions and wrote <i>The State of Prisons in England and Wales</i> .
<b>Elizabeth Fry</b>	A Quaker who believed that prisoners should be reformed. Horrified by the conditions in Newgate women's prison. She set up a school for children living with their mothers at the prison.
<b>Pentonville Prison</b>	Set up in 1842 built on the site of old Millbank Prison. Known for the 'separate system'.



## History: Paper 1 Crime and Punishment

### HISTORIC ENVIRONMENT

#### Key Topic 4: Whitechapel. c1870-c1900: Crime, policing and the inner city

Living in **Whitechapel** – a district in the **East End** of London – in the last quarter of the 19<sup>th</sup> century, you were in a black hole at the heart of British Empire: one that sucked in beggars, prostitutes, criminals and alcoholics. The **Great Depression**, which began in 1873, brought widespread **unemployment** and **poverty** – in an age when being poor implied you were a bad person. Even if you had employment, you were amongst the most vulnerable: seeking labour on a day-to-day basis, hanging around for hours outside of factory gates in the hope of work – just so you might put bread on the table for your family. Shipping owner **Charles Booth** investigated East End squalor between 1889 and 1903, and found that 35.7% of east Londoners were living in utter poverty. This was not the result of idleness or drink – it was caused by low pay and unemployment. Prostitution was often a necessity, not a choice- the workhouse a last resort. Though there was often trouble, the police were rarely ready for it. According to the funder of the Salvation Army, the **slums** were a ‘dark continent full of nameless loathing where lawlessness still reigns supreme’. In 1888, serial killer **Jack the Ripper** focused national attention on Whitechapel. Lurking in dark alleyways, he became a symbol for all the fears and worries of the residents. He seemed to represent what was wrong with the East End as a whole – a **dangerous area** where **policing was ineffective**. This was the context in which **H Division** of the Met Police had to operate.

<b>1885:</b> Keeping a brothel made illegal.
<b>January 1886:</b> Sir Edmund Henderson replaced as Police Commissioner by Sir Charles Warren after a riot in Trafalgar Square got out of hand.
<b>1886:</b> Sir Charles Warren sets about making the Metropolitan Police more regimented.
<b>November 1887:</b> Another riot in Trafalgar Square gets out of hand and is criticised in the press due to what seemed to be “use of excessive force”.
<b>31st August 1888:</b> Mary Nichols is murdered. Her throat was cut, and later examination found that her abdomen had been cut open.
<b>8th September 1888:</b> Annie Chapman murdered. Signs of strangulation before her throat was cut and intestines pulled out and laid over her right shoulder.
<b>27th September 1888:</b> The first supposed Ripper letter, Dear Boss received by the Central News Agency. Passed to police on 1st October 1888.

<b>29th September 1888:</b> Order given for more police officers to work in plain clothes as well as 50 constables transferred temporarily to H Division.
<b>30th September 1888:</b> Elizabeth Stride and Catherine Eddowes are murdered on the same night.
<b>30th September 1888:</b> Anti-Semitic graffiti found written on a wall above where Eddowes’ apron had been found.
<b>1st October 1888:</b> ‘Saucy Jack’ postcard references the ‘double event’ and not having time to ‘get ears off’.
<b>Early October 1888:</b> Met police trial the use of bloodhounds to hunt the killer - press criticised this.
<b>November 1888:</b> Sir Charles Warren resigns as Police Commissioner after writing an article in defence of the police over the 1887 Trafalgar Square riot.
<b>9th November 1888:</b> The ‘final’ Ripper victim, Mary Kelly. Murdered in her room, parts of her body were removed completely and strewn across the room.

Key Terms:	
<b>Immigration</b>	The action of coming to live permanently in a foreign country.
<b>Fenians</b>	Irish people who wanted independence for Ireland
<b>Segregation</b>	The action or state of setting someone or something apart from others.
<b>Anarchists</b>	People who wanted a revolution in which all laws and authority would be swept away.
<b>Socialists</b>	People who wanted to bring down the existing capitalist system and redistribute the property of the rich to create equality.
<b>“Bloody Sunday”</b>	A working-class / Socialist / unemployed demonstration in 1887 in Trafalgar Square.
<b>Rookeries</b>	The densely populated, low-quality housing found within slum areas.
<b>Lodging houses</b>	Where homeless people could sleep in 8-hour shifts.
<b>Peabody Estate</b>	Opened in 1881 and provided 286 flats with the aim to improve living conditions of the poor.
<b>Casual labour</b>	e.g. in the docks – meant that workers were employed a day at a time - no job security.
<b>Sweated labour</b>	Work in cramped, dusty and unhealthy “sweatshops” for low wages in “sweated trades”, e.g. tailoring.
<b>Watch committees</b>	A group of local politicians or law professionals set up to monitor the work of police forces outside of London.
<b>Metropolitan Police</b>	A London based police department established in 1829, which would become a model for future police departments.
<b>H-Division</b>	H-Division oversaw policing in Whitechapel.
<b>The “Beat”</b>	Regular on-foot patrol by each police officer around a set area of Whitechapel.
<b>CID</b>	Criminal Investigations Department.
<b>Old Bailey</b>	The main criminal court of London.
<b>Commissioner</b>	The head of the Metropolitan Police in London.
<b>Edmund Henderson</b>	Appointed as Commissioner in 1870, was forced to resign in 1886 following a string of scandals.
<b>Charles Warren</b>	A former army general, was appointed Commissioner of the Metropolitan Police in 1886.
<b>Frederick Abberline</b>	The CID Inspector on the Ripper case.
<b>Vigilance Committee</b>	Set up by George Lusk, a local builder, who believed that the police were not doing enough.
<b>Leather Apron</b>	The press identified the Ripper as “Leather Apron”, a local Jewish man called John Pizer.



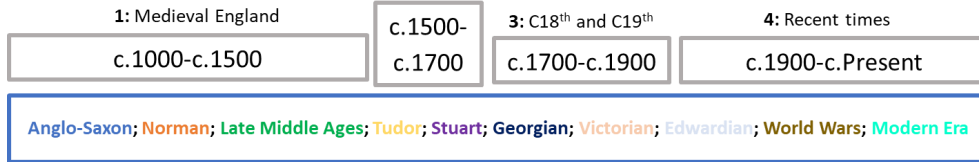
# History: Paper 1 Crime and Punishment

## THEMATIC STUDY

### Key Topic 5: Modern day, c1900-present

In the 20<sup>th</sup> century, **society changed** in many ways that affected crime, punishment and law enforcement. The role of the **government** in people's lives grew, largely as a result of the **First and Second World Wars**, and the role of **state** in enforcing the law also grew. Social **attitudes changed** dramatically during the 20<sup>th</sup> century, which impacted heavily on how crimes were defined. This led to some activities becoming **decriminalised**, while others were made **illegal** for the first time – so creating new crimes. **Crime detection** and prevention during the period changed significantly as a result of developments in **science and technology**. New **communication** technologies, in particular, have had an important impact on the types of crime carried out on crime detection. Changing attitudes about the **rehabilitation** of offenders, as well as greater concern for the welfare of more vulnerable groups of offenders, in particular young people, has also been an important feature of this period.

2: Early Modern England



<b>1901:</b> Fingerprint Branch set up by Met Police; photography used	<b>1965:</b> Death penalty abolished for most crimes
1902: First borstal introduced in Kent to separate young convicts	<b>1967:</b> Sexual Offences Act decriminalises homosexuality
<b>1909:</b> Police bicycles introduced to pursue criminals faster	<b>1967:</b> Abortion Act legalised abortion with certain conditions
<b>1916:</b> Military Service Act introduces conscription during WW1	<b>1967:</b> Abortion Act legalised abortion with certain conditions
<b>1933:</b> Under-18 execution ends	<b>1976:</b> Domestic Violence Act
<b>1930s:</b> Peace Pledge Union founded; members put on trial during WW2	<b>1988:</b> First murder convictions based on DNA samples
<b>1946:</b> First specialist dog section established within Met Police	<b>1998:</b> Death penalty abolished all crimes
<b>1953:</b> Execution of Derek Bentley	<b>2005:</b> Criminal Justice Act: more severe sentences for hate crime
	<b>2016:</b> Racial and Religious Hatred Act

Key Terms:	
<b>Hate crime</b>	A crime motivated by prejudice against the victim's race, gender, disability or sexual orientation.
<b>Homophobic</b>	Prejudiced against people who are gay.
<b>Domestic violence</b>	Violence and intimidation in a relationship.
<b>Abortion</b>	Terminating a pregnancy.
<b>Terrorism</b>	The use of violence, fear and intimidation to publicise a political cause.
<b>Welfare State</b>	When the government provides help and services to meet the needs of the population.
<b>Sexual Revolution</b>	A significant shift in public attitude in the 1960s which challenged traditional codes of behaviour related to sexuality and relationships.
<b>Fraud</b>	Impersonating other people or businesses to make money illegally.
<b>Copyright</b>	The right of an artist or company to be recognised – and paid – as the creator of their work.
<b>Extortion</b>	Involves making someone pay money by using threats or blackmail.
<b>Conscientious Objector</b>	Men refused to fight in WW1 and WW2 because they said their conscience would not allow it.
<b>Tribunal</b>	A special kind of court in which disputes are settled.
<b>Forensic Science</b>	Highly specialised search teams looking for evidence such as fingerprints, blood samples or DNA.
<b>Alexander Patterson</b>	A prison commissioner influential in changing how young offenders were treated. The Criminal Justice Act included a lot of his ideas. He argued that probation and rehabilitation were essential.
<b>Borstal</b>	A prison for boys only (replaced with youth custody centres in 1982) with the purpose of ensuring that young convicts are kept entirely separate from older criminals.
<b>Youth detention</b>	A prison for people under the age of 21.
<b>Derek Bentley</b>	A British man who was hanged for the murder of a policeman during a burglary attempt. This controversial hanging helped lead to the abolishment of capital punishment.
<b>The Criminal Justice Act</b>	A 1948 reform that reduced the use of prisons for juveniles, and led to improvements in the probation service for young people.
<b>The Children and Young Persons Acts of 1963</b>	Focused on importance of caring for and protecting young offenders and raised the age of criminal responsibility from 8 to 10 years.
<b>The Children and Young Persons Acts of 1969</b>	Brought in during Harold Wilson's Labour government, favoured care orders, and supervision by probation officers and social workers, over prison sentences.
<b>ASBO</b>	Anti-Social behaviour Order (ASBO) - A court order that places restrictions on what a person can do, e.g. where they can go or who they can talk to.
<b>Community service</b>	People convicted of minor offences are ordered to do supervised work to improve their local community.



Topic



Judaism



Comparative faith/society



**Sexuality/family planning**



Judaism allows contraception only under certain circumstances eg If the mother’s life is in danger.  
 Judaism does not allow permanent contraception as this goes against the commandment to **“Be fruitful and Multiply” (Torah)**.  
 Jews are instructed to not **“waste the seed” (Torah)**. Men can therefore not use a condom.  
 “Orthodox Judaism believes that **“man shall not lie with man as with women as it is an abomination” (Leviticus)** and does not accept same sex marriages or civil partnerships.  
 The act of physical homosexual relations is considered wrong as it goes the commandment to be **“fruitful and multiply”**.  
 Reform Judaism has adapted Jewish law to fit in with modern society. It accepts same sex marriages and conducts them in some of their synagogues. It also allows contraception in all forms.

The Christian Church believes that **one of the key purposes of sex is to ‘be fruitful and multiply’**. The Catholic Church does not permit contraception.  
 The Church of England permits contraception giving couples a choice as to the size of their family.  
 All churches see family planning as a natural method of contraception.  
**All forms of contraception are legal in Britain.**  
  
 The Catholic Church believes that **“man shall not lie with man as with women as it is an abomination” (Leviticus)**.  
 The Roman Catholic church teaches that sex between people of the same gender is ‘disordered’ and does not accept same sex marriages or civil partnerships.  
 The Church of England does not accept same sex marriages or civil partnerships.  
 Liberal Christians teach that Jesus wanted people to love each other and show mercy and that we should be accepting of homosexuals.  
**Modern society has accepted and legalised same sex marriages and civil partnerships.**

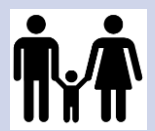
**Marriage**



**Man should not be alone; I will create a partner for him” (Torah)**. Orthodox Judaism teaches that men and women should be together in marriage and to have children once married.  
 Orthodox Jews believe that marriage is essential for a stable society in which children can be brought up in a secure relationship. It sees marriage as the only acceptable relationship within which to have sexual relations. **“A man without a wife is incomplete” (Talmud)**  
 Adultery is never acceptable. The 7<sup>th</sup> of the 10 commandments states **“You shall not commit adultery” (Exodus)**. It is also one of the 36 crimes punishable by death in the Torah.  
 Reform Judaism accepts cohabitation between committed couples.

Christians believe that **marriage is a gift from God, one that should not be taken for granted**. It is the right atmosphere to engage in sexual relations and to build a family life. Getting married in a church, in front of God, is very important. A marriage is a public declaration of love and commitment. The Church of England may accept cohabiting couples if they intend to get married. All Christians say adultery is wrong. **“You shall not commit adultery” (Bible)**. Quakers viewpoint aligns with modern society. They believe that a couple can be faithful to each other in a committed relationship outside marriage.  
**British society accepts all committed relationships where both couple consent to sex.**

**Family and gender equality**





Parents should provide their children with their needs (clothes, food, roof etc). **A father is obligated to teach his son Torah and the commandments.**  
  
 Judaism believes **“we are created in the image of G-d” (Torah)**. Orthodox Jews believe men and women have equal but different roles . Men have a more public role in worship eg being part of a minyan for daily prayers. Women have a more private, spiritual role role, based in the home.  
 Reform Judaism challenges this and strives for compete equality between men and women in all aspects of Jewish life.

Women cannot be priests in the Roman Catholic church. They are scripturally excluded. Timothy states **“They could not teach or have authority over a man”**.  
 The Church of England has male and female clergy, including female bishops.  
 In the UK, there is a demand for equality between the sexes in all aspects of life. IN reality, there are still many areas where women do not see themselves as having equal opportunities/treatment.

What do you think?  
 How would you define a family?



Topic	Judaism	Comparative Faith/society
Divorce 	Judaism does allow divorce, however it should be a last resort after counselling or attempts to save the marriage. <b>“G-d hates divorce” (Torah)</b> <b>“anyone who divorces his wife, even the altar weeps” (Talmud)</b> A Beit Din must grant the divorce by giving a ‘get’. The man must give this and the woman keeps the actual ‘get’ document. Reform Judaism has adapted this and a man or woman can give the get.	Roman Catholics are against divorce and state it is always wrong.  <b>“Whoever divorces ... then remarries another; it is as if he committed adultery”</b> Other Christians consider it the lesser of two evils or even a necessary evil, but a divorced couple are not usually able to remarry in a church.  <b>Divorce is legal in the UK.</b>
Remarriage 	Judaism allows remarriage once a woman has received a ‘Get’. A person should be given every opportunity to find a partner and be happy. A couple should wait for 90 days before remarrying to ensure the woman is not pregnant.	<b>Catholics do not allow remarriage</b> because a person has broken promises they have made in front of God once they should not be given the opportunity to do this again. An annulment (as if the marriage never took place). may take place after a few months if the relationship was not consummated (sex).  <b>Church of England</b> does allow couples to remarry so they can be happy but does not allow for a religious ceremony due to the holiness of the vows they originally made.

Key word	Definition
<b>Adultery</b>	Having sex with someone who is not your husband or wife, outside of marriage
<b>Artificial contraception</b>	Methods of preventing pregnancy e.g., condoms, the pill, the coil
<b>Cohabitation</b>	Living and starting a family with someone who you are not married to
<b>Divorce</b>	The legal ending of a marriage
<b>Family planning</b>	Using a woman’s natural cycle of fertility to try and avoid pregnancy
<b>Gender discrimination</b>	Acting against people based on their gender
<b>Gender prejudice</b>	Holding biased opinions about people based on their gender
<b>Heterosexual</b>	Sexual attraction to the opposite gender
<b>Homosexual</b>	Sexual attraction to the same gender
<b>Marriage</b>	A legal and religious ceremony joining two people together in love
<b>Procreation</b>	Bringing babies into the world
<b>Remarriage</b>	Marrying someone else after divorce

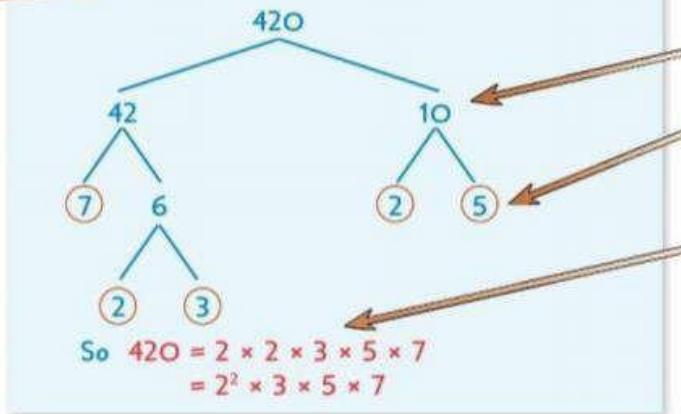
Key word	Definition
Beit Din	Jewish Court of Law
Get	Jewish document of divorce
Torah	Jewish holy book
Talmud	Jewish oral law
annulment	Legal process making a marriage no longer valid
minyan	10 men over 13 needed for a full service in synagogue
Nuclear family	Family made up of 2 parents and children

# MATHS Foundation Unit 1 - Number

Any number can be written as a **product of prime factors**. It is also called **Prime Factorisation** or **Prime Factor Decomposition**.

We use a factor tree method to do this:

**EXAMPLE:** Express 420 as a product of prime factors.



- 1) Start with the number at the top and split it into **factors** as shown.
- 2) Then do the same with factors you have written.
- 3) If the number is a **prime number** put a circle around it.
- 4) Keep going until you can't go any further (i.e. you are just left with prime numbers)
- 5) Write these prime numbers out as a **product**.
- 6) If there is more than one of the same factor, you can write them as powers (**index form**).

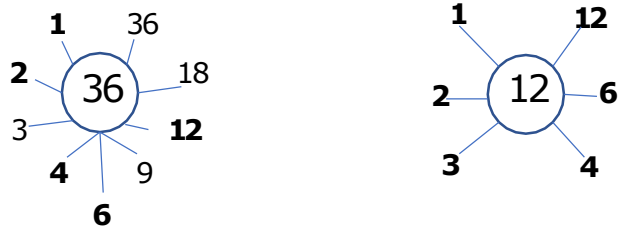
No matter what numbers you choose for each step, you'll find the product of primes is exactly the same!

Keyword/Skill	Definition/Tips
Product	Means multiply
Prime number	A number that has exactly two factors
Factor	An integer that divides the number exactly leaving no remainder
Multiples	Multiples of 4 is anything in the 4 times table E.g. 4, 8, 12, 16, 20, 24, 28, ...
Index Form	Writing numbers in terms of powers E.g. $6 \times 6 \times 6 \times 6 = 6^4$ < This is in index form
Prime Factor	A factor of a number that is also a prime number
Prime Factor Decomposition/ Prime Factorisation	To write a number as a product of prime numbers Every number has a unique prime factorisation
Highest Common Factor (HCF)	The highest number that can be divided exactly into each of two or more numbers.
Lowest Common Multiple (LCM)	The lowest quantity that is a multiple of two or more given quantities.

## Highest Common Factor

To find the highest common factor of two numbers, you need the biggest number that is a factor of the two (or more) numbers stated.

Ex1: Find the HCF of 36 and 12



As you can see: 1, 2, 3, 4, 6 and 12 are all common factors. We want the **highest common factor** which in this case is 12  
Ans: HCF of 12 and 36 = 12

## Lowest Common Multiple

To find the lowest common multiple you need to list the multiples of two (or more) numbers and see which number appears in both first.

Ex1: Find the LCM of 4 and 6  
First list the multiples of 4 and 6

Multiples of 4: 4, 8, **12**, 16, 20, **24**, 28, 32, ...  
Multiples of 6: 6, **12**, 18, **24**, 30, ...

As you can see: 12 and 24 are common multiples  
We want the **lowest common multiple** which in this case is 12  
Ans: LCM of 4 and 6 = 12

## Other Topics/Units this could appear in:

- Factorising
- Use of Calculator
- Algebraic Proof

## Exams!

- In an exam you will get the first mark for correctly listing 5 correct factors or multiples of one of the numbers, then a second mark for listing 5 correct factors or multiples for the second number. So try and do that if you are unsure how to go any further.

# MATHS Foundation Unit 2 - Algebra

## Expanding Single Brackets

When you are expanding brackets you need to multiply all the terms inside the bracket by the term on the outside. The grid method is useful when we are expanding brackets.

Example: Expand  $3(a + 4)$

$$3(a + 4) = 3a + 12$$

x	a	+4
3	3a	12

Example: Expand  $y(3y - 5)$

$$y(3y - 5) = 3y^2 - 5y$$

x	3y	-5
y	3y <sup>2</sup>	-5y

Substitution - Expressions

Substitution: This is where we replace the letter we see for the number that it is worth.

For example: If  $w = 6$  and  $y = 7$

a)  $w + 5 = 6 + 5 = 11$

b)  $3y - 2 = 3 \times 7 - 2 = 21 - 2 = 19$

c)  $8w + 2y = 8 \times 6 + 2 \times 7 = 48 + 14 = 62$

Remember: 3y means 3 multiplied by the value of y

## Factorising Expressions

Factorising is the opposite of expanding. You factorise an expression by first finding the highest common factor of the terms in the expression. This goes outside of the brackets. Divide each term by the highest common factor to find the new terms inside the brackets.

Example: Factorise  $10x - 15$

$$\begin{aligned} \text{HCF of } 10x \text{ and } 15 \text{ is } 5. \quad & 10x \div 5 = 2x \\ & 15 \div 5 = 3 \\ & = 5(2x - 3) \end{aligned}$$

The highest common factor is not always a number. Sometimes it is a letter!

Example: Factorise  $x^2 + 5x$

$$\begin{aligned} \text{The HCF of } x^2 + 5x \text{ is } x. \quad & x^2 \div x = x \\ & 5x \div x = 5 \\ & = x(x + 5) \end{aligned}$$

Exams!

- Check your answer by expanding it, you should get the expression from the question.

Keyword/Skill	Definition/Tips
Expression	One or a group of symbols representing a number or a value. Can contain numbers, variables & operations
Variable	A symbol for a number we do not know yet
Simplify	To reduce an expression to the smallest number of terms.
Expand	To multiply out terms to remove the brackets () (Opposite of factorise)
Coefficient	A number used to multiply a variable. Eg) $4x$ 4 is the coefficient, x is the variable
Factor	An integer that divides the number exactly leaving no remainder
Factorise	Write an expression as a product of its factors. (Opposite of expanding)
Power/Index	The number of times a number is multiplied by itself. E.g. $10^3$ - This means multiply 10 by itself 3 times $\rightarrow 10 \times 10 \times 10$
Quadratic	An expression where the highest power is 2 Eg) $x^2$
Term	A single number or a variable
Highest Common Factor (HCF)	The highest number or variable that divides exactly into two or more numbers or variables

Other Topics/Units this could appear in:

- Forming and Solving Equations
- Quadratics
- Expanding & Factorising (Working Above)
- Algebraic Fractions
- Algebraic Proof
- Simultaneous Equations

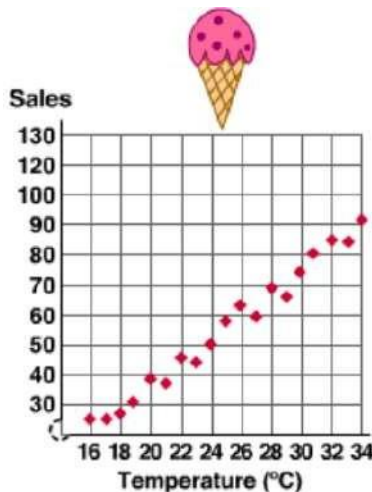
# MATHS Foundation Unit 3 – Graphs, tables and charts

## Scatter Graph

A scatter graph is a diagram where points are plotted to show the relationship (correlation) between two variables.

The value of one variable is shown along the x-axis and the values of the second variable is shown on the y-axis.

The scatter graph to the right shows the temperature compared with the number of ice-creams sold.



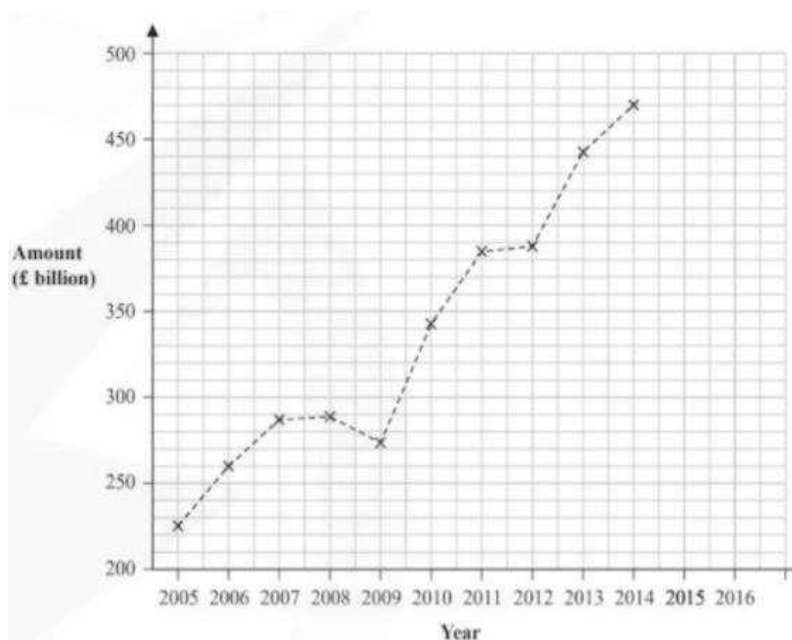
## Time-series graph

Time series graphs show data fluctuations over time and are used to predict trends, cycles and seasonality.

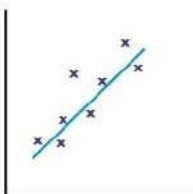
### Example

The time series graph below shows the amount of money invested by a company between 2005 and 2014.

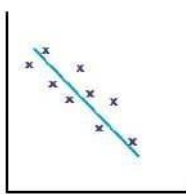
The general trend of the graph is an increase in the amount of money invested over time.



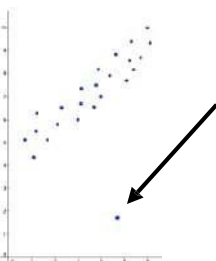
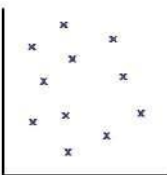
Positive Correlation



Negative Correlation



No Correlation



Outlier

### Exams!

- When interpreting scatter graphs always refer to what the graph is showing. For example "it has positive correlation so the hotter it is the more ice creams that are sold"

### Exams!

- Once all points have been plotted, ALWAYS draw a line of best fit. (Scatter graph)
- Use line of best fit to estimate answers.

### Keyword/Skill

### Definition/tip

Scattergraph

A diagram with points plotted to show a relationship between two variables.

Variable

A quantity that can change or vary, taking on different values.

Line of best fit

A straight line that best represents the data on a scatter graph.

Correlation

A relationship between two or more things.

Positive correlation

Both variables increase or both variables decrease.

Negative correlation

One variable increases and the other decreases or vice versa.

No correlation

There is no relationship between the two variables.

Outlier

A value that lies outside most other values.

Time-Series

A line graph of repeated measurements taken over regular time intervals.

Trend

A direction in which something is changing.

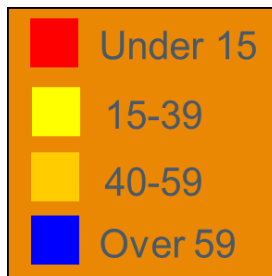
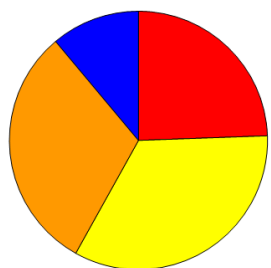
### Other topics/Units this could appear in:

- Coordinate Geometry
- A-Level Statistics - Correlation

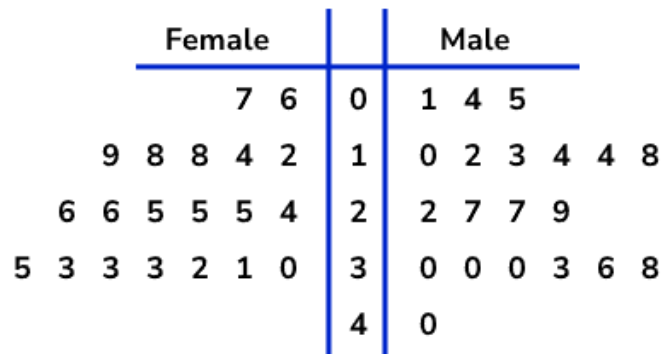


## Pie Charts

- Pie charts use different sized sectors of a circle to represent data.
- The angle of each sector represents the fraction, out of 360, assigned to that data value.
- Pie charts should always be labelled, either on the pie chart or by using a colour coded key.



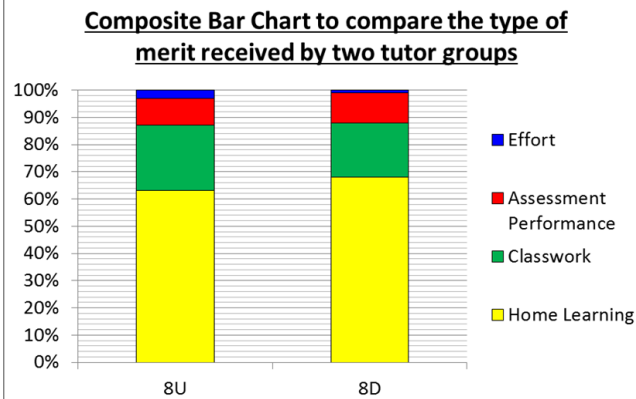
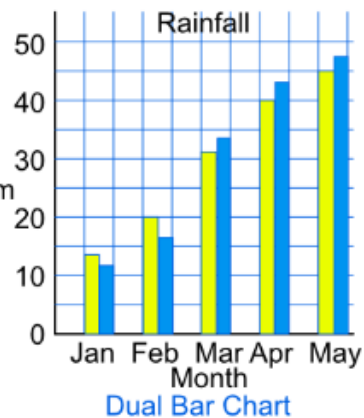
## Back-to-back stem and leaf diagram



Key : 3 | 1 | 4 represents  
13 Female  
14 Male

Keyword/Skill	Definition/Tips
Sample	A selection taken from a larger group 'the population' that will let you find out things about a larger group.
Population	The whole group being studied
Stem and Leaf	A plot where each data value is split into a 'leaf' and a 'stem'. 'Stem' values are listed down and 'leaf' values are listed next to them.
Pie Chart	Graph using a divided circle where each section represents part of the total.
Estimate	To make an approximate or rough calculation often based on rounding.
Primary	Primary data is data that is collected by a data researchers from first hand sources.
Secondary	Secondary data is data gathered from studies, surveys or experiments run by other people or for other research.
Interval	An interval is between two points of values. An interval may or may not include start and end points.
Survey	To gather information by individual samples so we can learn about the whole thing.
Sort	To arrange or group in a special way (such as by size, type or alphabetically).

## Dual and compound bar charts to compare data



## Two way tables

These are used to display data for two categories.

	Male	Female	TOTAL
Constable	56	23	79
Sergeant	8	5	13
Inspector	2	6	8
TOTAL	66	34	100

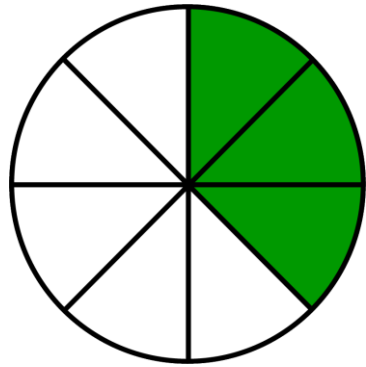
There are 6 female inspectors  
There are 13 sergeants in total

### Other Topics/Units this could come up in:

- Averages
- Mode, median, range and mean
- Cumulative frequency

# MATHS Foundation Unit 4 – Fractions and percentages

## Recognising Fractions



**Numerator**  
How many equal parts of a number are needed

$\frac{3}{8}$

**Denominator**  
How many equal parts are there altogether

## Simplifying Fractions

You will need to simplify your answers after you have added, subtracted, multiplied or divided your fraction. Here's a reminder how:

- To simplify a fraction, you need to find a common factor of the **numerator** and the **denominator**.
- Ex: Simplify:  $\frac{18}{30}$  A common factor of 18 and 30 would be 6. So, I need to divide 18 and 30 by 6
- $18 \div 6 = 3$  and  $30 \div 6 = 5$ , therefore my simplified fraction is  $\frac{3}{5}$

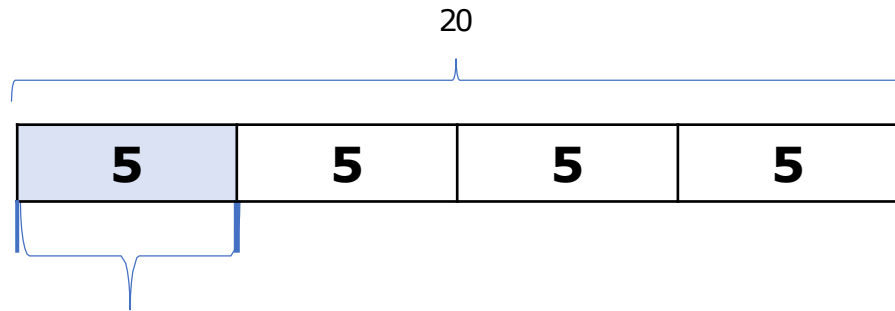
Keyword/Skill	Definition/Tips
Numerator	How many parts of a whole. The top number in a fraction.
Denominator	How many parts the whole is split into. The bottom number in a fraction.
Improper Fraction	A fraction where the numerator is bigger than the denominator
Mixed Number	A number made from an integer and a fraction
Multiplicative Inverse	Another way of describing reciprocal
Conversion	To change our fraction into something else (decimal or percentage)
Equivalent Fractions	Two or more fractions that are equal in value
Common Denominator	When two or more fractions have the same denominator

## Fractions of Amounts

Zaki's mum buys 20 sweets and gives Zaki  $\frac{1}{4}$  of them. How many sweets does Zaki get?

I am splitting 20 into four parts as it is  $\frac{1}{4}$  of the sweets.

$20 \div 4 = 5$   
That means each part is worth 5

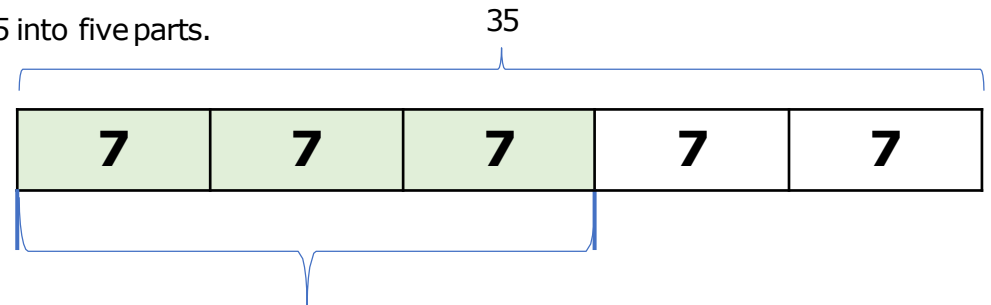


Gurpreet & Mitch share 35 sweets.

Gurpreet gets  $\frac{3}{5}$  of them.

I am splitting 35 into five parts.

$35 \div 5 = 7$   
That means each part is worth 7

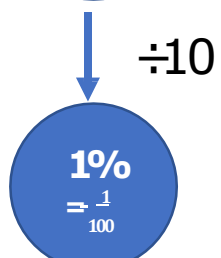
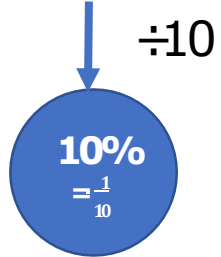


As it is  $\frac{3}{5}$  I need three parts so this is  $7 \times 3 = 21$

So Gurpreet gets 21 sweets.



# MATHS Foundation Unit 4 – Fractions and percentages



We can use combinations of these key percentages to find any percentage.  
For example:  
 $30\% = 10\% \times 3$   
 $75\% = 25\% + 50\%$   
 $16\% = 10\% + (10\% \div 2) + 1\%$

### Example 1:

Find 25% of £120  
To find 25% you divide by 2 then divide by 2 again (or  $\div 4$ )  
 $\pounds 120 \div 4 = \pounds 30$   
So, 25% of £120 is £30

### Example 2:

Find 60% of 300kg  
To get 60% we can use 50% + 10%  
To find 50% you divide by 2  
So 50% = 150kg  
To find 10% you divide by 10  
So 10% = 30kg  
Therefore 60% of 300kg = 180kg

### Percentage increase/decrease (without a calculator)

Firstly, find the percentage of the given amount.  
Then you add or subtract this amount depending on whether you are increasing or decreasing.

#### Example 1

**Increase** \$80 by 50%

50% of \$80 = \$40  
Then **add** this onto the starting amount  
 $\$80 + \$40 = \$120$

#### Example 2

**Decrease** 500g by 3%

1% of 500g = 5g  
3% of 500g = 5g  $\times 3 = 15$ g  
Then **subtract** this from the starting amount  
 $500\text{g} - 15\text{g} = 485\text{g}$

### Percentage of an Amount (with a calculator)

Here we can use **percentage multipliers**.  
First of all you need to find the decimal equivalent of the percentage you need.

50%	=	0.5
75%	=	0.75
30%	=	0.3
2%	=	0.02

You need to use these decimals as percentage multipliers.

#### Example

Find 48% of £250  
 $48\% = 0.48$  (this is the percentage multiplier)  
 $250 \times 0.48 = 120$   
So, 48% of £250 is £120

### Percentage Increase/Decrease (with a calculator)



Here we can also use **percentage multipliers**.

#### Increasing Example

**Increase** 480 by 16%.  
Every amount starts at 100%. If I want to **increase** by 16%, this would go up to 116%.  
So I need my multiplier to be the decimal equivalent of 116%  
 $116\% = 1.16$   
So to increase 480 by 16%  
 $480 \times 1.16 = 556.8$

#### Decreasing Example

**Decrease** 725 by 26%.  
Every amount starts at 100%. If I want to **decrease** by 26% this would go down to 74%. ( $100 - 26 = 74$ )  
So I need my multiplier to be the decimal equivalent of 74%.  
 $74\% = 0.74$   
So to **decrease** 725 by 26%  
 $725 \times 0.74 = 536.5$

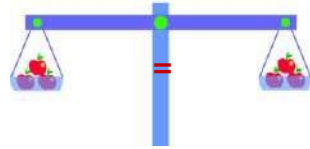
Keyword/Skill	Definition/Tips
Percentage	A number out of 100. <span style="border: 1px solid green; padding: 2px;">Symbol %</span>
Fraction	Any part of a group, number or whole. They are written as one number over another. <span style="border: 1px solid gray; padding: 2px;">fraction <math>\frac{\quad}{\quad}</math></span>
Decimal	A number with a decimal point in it. It can be positive or negative. <span style="color: blue; font-weight: bold;">3746.374</span>
Equivalent	Having the same value or amount.
Increase	To get larger in size or number.
Decrease	To get smaller in size or number.
Profit	This occurs when an item is sold for more than it cost to buy. It is the difference between the amount earned and the amount spent.
Loss	This occurs when an item is sold for less than it cost to buy.
Interest	Money paid regularly at a particular rate. Usually on bank accounts or loans.
Percentage multiplier	The number you multiply a quantity by to find a percentage or increase/decrease it by a percentage.
Simple Interest	Interest calculated as a percentage of the original amount.
Compound Interest	Interest paid on the original amount and the accumulated interest.
Decay/Depreciation	The decrease in the value or amount of something overtime. (Car prices are a common example) 
Growth/Appreciation	The increase in the value or amount of something overtime. (House prices are a common example) 

# MATHS Foundation Unit 5 – Equations, inequalities and sequences

When we are solving equations, you need to figure out the value of the variable in the equation

You need to carry out the inverse operations to find the value of the variable.

Remember whatever operation you do to one side of the equals sign, you must do the same to the other to keep it balanced. Think of it like a set of scales:



If I remove one apple from the left side, to keep it balanced I must do the same to the right side! We need to think like this when we solve equations.

$$4x - 7 = 5$$

Variable  
↓

## One – Step Equations

These are equations where you only need to do one inverse operation to solve the equations:

Ex1

$$\begin{aligned} y + 14 &= 20 \\ -14 \quad -14 \\ \hline y &= 6 \end{aligned}$$

Ex2

$$\begin{aligned} x - 120 &= 80 \\ +120 \quad +120 \\ \hline x &= 200 \end{aligned}$$

Ex3

$$\begin{aligned} 3n &= 12 \\ \div 3 \quad \div 3 \\ \hline n &= 4 \end{aligned}$$

Ex4

$$\begin{aligned} \frac{k}{2} &= 16 \\ \times 2 \quad \times 2 \\ \hline k &= 32 \end{aligned}$$



## Two – Step Equations

These are equations where you need to do two inverse operations to solve the equations:

Ex1

$$\begin{aligned} 4x - 3 &= 25 \\ +3 \quad +3 \\ \hline 4x &= 28 \\ \div 4 \quad \div 4 \\ \hline x &= 7 \end{aligned}$$

Ex2

$$\begin{aligned} \frac{y}{6} + 6 &= 14 \\ -6 \quad -6 \\ \hline \frac{y}{6} &= 8 \\ \times 6 \quad \times 6 \\ \hline y &= 48 \end{aligned}$$



## Expanding and Solving Equations

You will also need to use skills you have already learnt to solve some equations.

Ex1  $3(x + 4) = 27$

**Expand the brackets first**

$$\begin{aligned} 3x + 12 &= 27 \\ -12 \quad -12 \\ \hline 3x &= 15 \\ \div 3 \quad \div 3 \\ \hline x &= 5 \end{aligned}$$

Keyword/Skill	Definition/Tips
<b>Expression</b>	One or a group of symbols representing a number or a value. Can contain numbers, variables & operations
<b>Equation</b>	Statement using an equal sign, to show two expressions are equal.
<b>Variable</b>	A symbol for a number we do not know yet
<b>Operations</b>	The four basic operations in maths: addition, subtraction, multiplication & division
<b>Inverse Operations</b>	The operation that reverses the effect of another operation. Addition & subtraction are inverse operations. Multiplication & division are inverse operations.
<b>Simplify</b>	To remove unnecessary terms and numbers
<b>Formula</b>	A rule or fact written using mathematical symbols
<b>Solve</b>	To find the answer/value of something
<b>Rearranging Formulae</b>	Use inverse operations on both sides of the formula until you find the expression /equation for the letter you need.
<b>'Subject of'</b>	A certain variable needs to be by itself on one side of the equal sign Example: $x = 4y + 10$ $x$ is the subject of this formula



### Other Topics/Units this could appear in:

- Forming and Solving Equations
- Expanding and Factorising
- Simultaneous Equations
- Algebraic Fractions
- Algebraic Proof
- Rearranging Equations

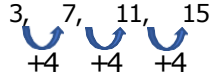
# MATHS Foundation Unit 5 – Equations, inequalities and sequences

## Term to Term Rule

2, 6, 10, 14... This sequence follows the rule "add 4"  
 81, 27, 9, 3... This sequence follows the rule "divide by 3"  
 5, 8, 14, 23... This sequence follows the rule "add 3, add 6, add 9..."

You may be given the starting number then the rule.

Example Start at 3 add 4 each time



## Position to Term Rule (Using the nth Term)

The nth term can be used to find any term in a sequence. To use the nth term you substitute in the value of the position you need.

### Example

If the nth term is  $3n - 5$  and you need to find the 10<sup>th</sup> term:

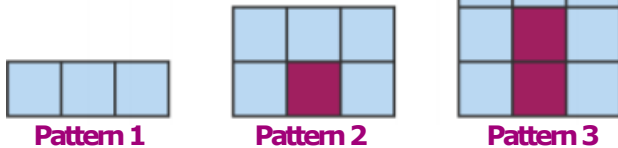
Substitute  $n = 10$  into the nth term

$$(3 \times 10) - 5 = 25$$

$$10^{\text{th}} \text{ Term} = 25$$

## Recognising Patterns from Diagrams

A number pattern in a diagram often requires counting shapes to find the rule. Look at how the pattern grows from one term to the next.



Pattern 1  
 0 purple  
 3 blue  
 3 in total

Pattern 2  
 1 purple  
 5 blue  
 6 in total

Pattern 3  
 2 purple  
 7 blue  
 9 in total

You can now predict that in pattern 4 there will be:  
 3 purple, 9 blue and 12 in total

## Finding the nth term

To find the nth term of a sequence, you first start by finding the difference of each term.

$$7, 12, 17, 22, 27, 32, 37, \dots$$

$$+5 \ +5 \ +5 \ +5 \ +5 \ +5$$

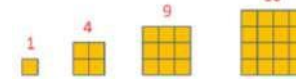
The difference between each term is 5. That means the sequence has something to do with the 5 times table, we can call this  $5n$   
 Then see what you need to do from the 5 times table to get to the number in the sequence

n(position)	1	2	3	4	5
	x5	x5	x5	x5	x5
5n	5	10	15	20	25
	+2	+2	+2	+2	+2
5n + 2	7	12	17	22	27

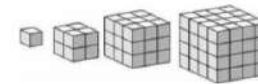
Therefore, the nth term of the sequence =  $5n + 2$

## Special Sequences

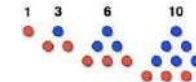
Square numbers – 1, 4, 9, 16, 25, 36, ...




Cube Numbers – 1, 8, 27, 64, 125, 216, ...



Triangle Numbers – 1, 3, 6, 10, 15, 21, 28, ...



A Fibonacci Sequence – 1, 1, 2, 3, 5, 8, 13, 21, ...

Keyword/Skill	Definition/Tips
Sequence	An ordered list of numbers or objects arranged according to a rule
Term	One of the numbers/objects in a sequence
Arithmetic/Linear Sequence	A sequence made by adding or subtracting the same value
Geometric Sequence	A sequence made by multiplying by the same value each time.
Term to term rule	A rule that allows you to find the next term in a sequence if you know the previous term
nth term	The rule for finding any value in the sequence. Also called the Position to Term rule
Triangular Number	A number that can make a triangle pattern. E.g. 1, 3, 6
Fibonacci Sequences	A sequence where the next number is found by adding up the previous two terms
Function	A special relationship where each input has a single output
Coefficient	A number used to multiply a variable 

## Other topics/units this could appear in:

- Rearranging Equations
- Quadratic Sequences
- A Level Topics

## Exam!

All sequences are not linear. If a sequence is going up by a different number each time, it can still be a sequence, it means it's just not linear.

# MATHS Foundation Unit 5 – Equations, inequalities and sequences

## Solving Inequalities

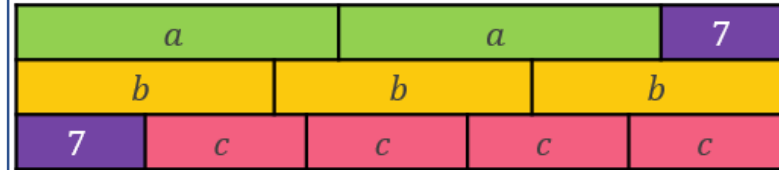
Solving an inequality means finding the range of values that **satisfy** the inequality.

$3x + 7 < 22$

$22 - 7 = 15$

$3x < 15$

$x < 5$



$2x + 3 < 17$

$17 - 3 = 14$

$2x < 14$

$x < 7$

$2x + 3 < x + 17$

$17 - 3 = 14$

$2x < x + 14$

$x < 14$

Keyword / Skill	Definition/Tips
Product	Means multiply
Prime number	A number that has exactly two factors
Integer	Whole number including 0 and negative numbers. No fractions or decimals.
Inequality	Compares two values showing if one is less than, greater than or not equal to each other.
Greater than	One number is BIGGER than another number.
Less than	One number is SMALLER than another number.
Equal to	Two things have the SAME value.
Equation	Says that two things are equal. ( $1 + 1 = 2$ ).
Satisfy	A value that solves an equation. E.g. $2x + 1 = 9$ $x = 4$ so $x = 4$ satisfies the equation.
Variable	A symbol for a number we don't know yet, usually a letter.
Coefficient	A number used to multiply a variable. E.g. $6y = 6xy$ . $y$ is the variable and $6$ is the coefficient.
Inverse	Opposite of (i.e. $x$ and $\div$ , $+$ and $-$ )
Solve	Find all of the values that satisfy the inequality.



# MATHS Higher Unit 1 - Number

## Multiplying and Dividing in Standard Form

- To multiply powers – you add:  $10^5 \times 10^3 = 10^8$

$$(2 \times 10^3) \times (3 \times 10^6) = 2 \times 3 \times 10^3 \times 10^6 \\ = 6 \times 10^9$$

- To divide powers – you subtract:  $10^5 \div 10^3 = 10^2$

$$(6 \times 10^6) \div (2 \times 10^2) = \frac{6 \times 10^6}{2 \times 10^2} \\ = \frac{6}{2} \times \frac{10^5}{10^3} = 3 \times 10^2$$

## Converting Large Numbers into Standard Form

Write  $15,000,000$  in standard index form. can

$15,000,000$  be written as:

$$15,000,000 = 1.5 \times 10,000,000 \\ = 1.5 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \\ = 1.5 \times 10^7$$

Keyword/Skill	Definition/Tips
Decimal Numbers	The numbers we use in everyday life are decimal numbers, because they are based on 10 digits (0,1,2,3,4,5,6,7,8 and 9)
Standard Form	A way of writing very large numbers or very small numbers using a number between 1 and 10, multiplied by a power of 10.
Power	The number of times a base number is multiplied by itself.
Index	A small number placed on the upper-right of a base number to inform how many times to multiply by itself.

## Standard Index Form

$$10^3 = 1,000$$

$$10^2 = 100$$

$$10^1 = 10$$

$$10^0 = 1$$

$$10^{-1} = 0.1$$

$$10^{-2} = 0.01$$

$$10^{-3} = 0.001$$

## Negative Indices

The rule for negative indices is  $a^{-m} = \frac{1}{a^m}$ .

A negative power is often referred to as a **reciprocal** (

$a^{-m} = \frac{1}{a^m}$  is the reciprocal of  $a^m$ ).

Examples

$$p^{-2} = \frac{1}{p^2}$$

## Fractional Indices

Numerator – Power

$$a^{\frac{m}{n}} = \left( \sqrt[n]{a} \right)^m$$

Denominator – Root

Examples:

$$8^{\frac{1}{3}} = \sqrt[3]{8} = 2$$

$$25^{\frac{3}{2}} = \left( \sqrt{25} \right)^3 = 5^3 = 125$$

## Rationalise the denominator

Rationalise the denominator is to remove the surd element from the denominator, it is done by multiplying by the surd.

$$\text{e.g. (i) } \frac{4}{\sqrt{2}} = \frac{4}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} \\ = \frac{4\sqrt{2}}{2} \\ = 2\sqrt{2}$$

## Simplifying expressions involving surds

Here are some general rules with surds

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

Examples

$$1) \sqrt{32} = \sqrt{16} \times \sqrt{2} = 4\sqrt{2}$$

$$2) \sqrt{2}(\sqrt{3} + 5) = \sqrt{6} + 5\sqrt{2}$$

## Other Topics/Units this could appear in:

- Negative & Fractional Index Laws
- Surds including rationalising
- Algebraic Fractions
- Algebraic Proof
- Standard Form
- Expanding & Simplifying
- A-Level – Core – Algebra & Functions

# MATHS Higher Unit 2 - Algebra

Before progressing through this section of work, you may find it useful to look back at **Crossover Unit 19- Expand and Simplify, Unit 20 – Factorising, Unit 21-Solving Equations** knowledge organisers.

## Solving Quadratic Equations by Factorisation

You must be able to factorise quadratics in order to solve quadratic equations using this method.

### Example 1

Solve  $x^2 + 6x + 5 = 0$

This factorises into  $(x + 5)(x + 1) = 0$

Each bracket needs to equal 0

$$\begin{array}{l} x + 5 = 0 \quad \text{or} \quad x + 1 = 0 \\ \mathbf{x = -5} \quad \text{or} \quad \mathbf{x = -1} \end{array}$$

### Example 2

Solve  $x^2 + 3x - 10 = 0$

This factorises into  $(x + 5)(x - 2) = 0$

$$\begin{array}{l} x + 5 = 0 \quad \text{or} \quad x - 2 = 0 \\ \mathbf{x = -5} \quad \text{or} \quad \mathbf{x = 2} \end{array}$$

### Example 3

Solve  $x^2 - 6x + 9 = 0$

This factorises into  $(x - 3)(x - 3) = 0$

This equation has repeated roots

$$(x - 3)^2 = 0$$

This means there is only one solution,  $\mathbf{x = 3}$

In order to solve quadratic equations, you need to be able to recognise when you can solve by factorising or when you need to use the quadratic formula or complete the square. Sometimes it will tell you which method to use in the question.

**Solving quadratic equations by Completing the Square** This method can be used to give answers to a specified number of decimal places or to leave answers in surd form.

From previous learning, you may remember that;

$$(x + a)^2 = x^2 + 2ax + a^2$$

which can be rearranged to give:

$$x^2 + 2ax = (x + a)^2 - a^2$$

This is the basic principal behind completing the square.

### Example 1

Rewrite the following in the form  $(x \pm a) \pm b$

$$\begin{array}{l} x^2 + 6x - 7 \\ \text{Rewrite } x^2 + 6x \text{ as } (x + 3)^2 - 9 \end{array}$$

Ignore the -7 to begin with

Divide the coefficient by 2

Bring back the -7 so

$$(x + 3)^2 - 9 - 7$$

Put it into your bracket and square it.

$$\mathbf{(x + 3)^2 - 16}$$

Combine the constant terms to get the final answer.  $(-9 - 7 = -16)$

Keyword / Skill	Definition / tip
Quadratic (expression/ equation)	An expression/equation involving $x^2$
Factorise	An expression written as a product of it's factors.
Completing the square	A method of solving quadratic equations which involves rewriting the equation $x^2 + px + q$ in the form $(x + a)^2 + b$
Solution	A value or values that we can put in place of a variable (such as x) that makes the equation true.
Coefficient	A number used to multiply a variable. Eg, $3x$ (3 is the coefficient)

## Other topics/Units this could appear in:

- A-level Pure 1
- Quadratics
- Equations and Inequalities

## MATHS Higher Unit 2 - Algebra

### Generate and use the nth term of a quadratic sequence

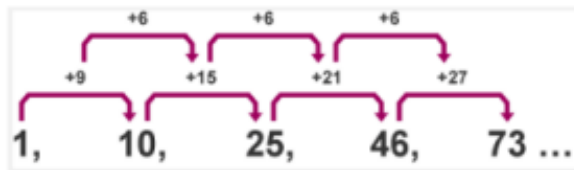
**Example:** Generate the first 4 terms of the sequence  $2n^2 - 5$

$$2 \times 1^2 - 5 = -3, 2 \times 2^2 - 5 = 3, 2 \times 3^2 - 5 = 13, 2 \times 4^2 - 5 = 27 \text{ so the answer is } -3, 3, 13, 27$$

In a quadratic sequence, the difference between each term is different, however the difference between the differences is the same. We use this to find the nth term

**Example:** Find the  $n^{\text{th}}$  term of the sequence 1, 10, 25, 46, 73, ...

First step is to find the difference of the differences



The differences of the differences is 6, therefore the coefficient of  $n^2$  will be  $6/2 = 3$

We generate the sequence  $3n^2$  which is 3, 12, 27, 48, 75.

Comparing this to our current sequence it is 2 more for each term, therefore the final  $n^{\text{th}}$  term is  $3n^2 - 2$

### Continue and find the term to term rule for a geometric sequence

A geometric sequence is not generated by adding an amount but by multiplying by the same value each time. The number which you multiply by each time is known as the **common ratio**.

To find the common ratio you divide two subsequent terms in a geometric sequence

**Example**

1) 8, 24, 72, 216 in this geometric sequence the **common ratio**  $= \frac{24}{8} = 3$

2) 3.6.12.24 in this geometric sequence the **common ratio** is  $\frac{6}{3} = \frac{12}{6} = 2$

Keyword/Skill	Definition/Tips
Sequence	An ordered list of numbers or objects arranged according to a rule
Term	One of the numbers/objects in a sequence
Arithmetic/Linear Sequence	A sequence made by adding or subtracting the same value
Geometric Sequence	A sequence made by multiplying by the same value each time.
Term to term rule	A rule that allows you to find the next term in a sequence if you know the previous term
nth term	The rule for finding any value in the sequence. Also called the Position to Term rule
Fibonacci Sequences	A sequence where the next number is found by adding up the previous two terms
Function	A special relationship where each input has a single output

Finding the mode from a table

- The mode is the value that occurs most often.
- The mode is the only average that can have no value, one value or more than one value.
- When finding the mode, it helps to order the numbers first.

In this frequency table, the mode is the value with the highest frequency:

Shoe size	5	6	7	8	9
Frequency	2	5	11	4	1

The modal size is 7 because more people wear size 7 than any other size.

Finding the modal class from a grouped frequency table

The following table shows the weights of children in a class.

Mass ( <i>m</i> ) kg	Frequency
$30 \leq m < 40$	7
$40 \leq m < 50$	6
$50 \leq m < 60$	8
$60 \leq m < 70$	4

The modal class is the class that has the highest frequency. In this case the modal class is:

$$50 \leq m < 60$$

Total Frequency

score	frequency
1	19
2	18
3	12
4	19
5	9
6	23

Andy throws a dice in an investigation. How would you work out the total number of times he has thrown the dice?

You can work out the **total frequency** by adding up each frequency.

100

Finding the median from a Table

The table below shows the average number of hours a group of 200 students spend watching TV per week to the nearest hour.

hours	frequency	cumulative frequency
0	8	8
1	16	24
2	33	57
3	75	132
4	44	176
5	8	184
6	16	200

The 105.5<sup>th</sup> value which is the **median** would be in this category.

- There are 200 data items, so **the median** must lie between items 100 and 101

$$\text{Median} = \frac{n+1}{2} \quad \text{Median} = \frac{200+1}{2} = \frac{201}{2} = 105.5$$

The median value would be the **105.5<sup>th</sup> value** in the table. Then use this to help you to work out where this data would lie using the **cumulative frequency column**

Keyword/Skill	Definition/Tips
Discrete	Discrete data can only have a finite or limited number of possible values
Continuous	Continuous data can have an infinite number of possible values within a selected range
Quantitative	Quantitative data that can be counted (discrete), quantitative data that can be measured (continuous)
Qualitative	Information that describes something
Average	A calculated 'central value' of a set of numbers
Mean	To calculate the mean, add up all of the numbers and then divide by how many numbers there are
Median	Place the numbers in value order and then find the middle number. When there are two numbers in the middle we average them.
Mode	The number which appears most often in a set of numbers
Range	The difference between the highest and lowest values
Frequency	How often something happens.
Table	Information (such as numbers and descriptions) arranged in rows and columns.
Midpoint	The middle point. The point halfway between.



# MATHS Higher Unit 3 – Interpreting and representing data

## Calculating the Mean from a Table

- The **mean** is found by adding up all the numbers and dividing by how many numbers there are.

To find the mean in this example, the total number of goals must be found and then divided by the number of games.

	Number of Goals ( $x$ )	Frequency ( $f$ )	$fx$
	0	2	$0 \times 2 = 0$
	1	2	$1 \times 2 = 2$
	2	5	$2 \times 5 = 10$
	3	1	$3 \times 1 = 3$
<b>Total</b>		10	15

Total number of football games

Total number of goals.

- From the table, we can see that for 2 games, no goals were scored. This makes a grand total of zero goals so far.
- The rest of the total amount of goals can be worked out in this way, by multiplying goals ( $x$ ) by the frequency ( $f$ ). Call this column  $fx$  ( $f$  multiplied by  $x$ )

The total number of goals is 15. There were 10 football games so  **$15 \div 10 = 1.5$**   
The mean number of goals is 1.5 goals per game.

Remember to divide  $fx$  by the total of the frequencies, not by the amount of different items of data. So 15 divided by 10

$x$	$f$	$fx$
1	15	15
2	27	54
3	8	24
4	5	20
<b>TOTALS:</b>	<b>55</b>	<b>113</b>

### Further Example

The table shows the number of parking spaces per house in a street. Work out the **mean number of spaces**

Mean =  $\frac{113}{55} = 2.05...$

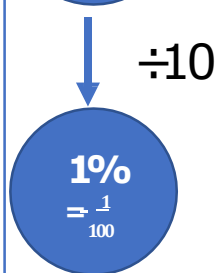
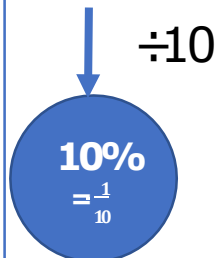
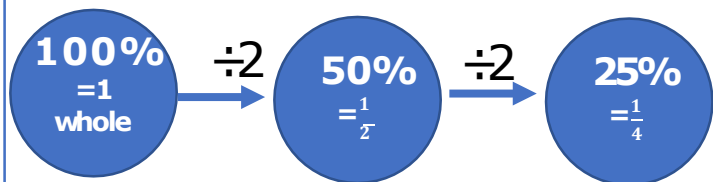
**Finding the Range**  
The **range** is the **difference between the highest and lowest values** in a set of numbers.  
<-Using this table as an example:  
The highest value is 4 and the lowest value is 1. Range =  $4 - 1 = 3$

Keyword/Skill	Definition/Tips
Sample	A selection taken from a larger group 'the population' that will let you find out things about a larger group.
Population	The whole group being studied
Stem and Leaf	A plot where each data value is split into a 'leaf' and a 'stem'. 'Stem' values are listed down and 'leaf' values are listed next to them.
Pie Chart	Graph using a divided circle where each section represents part of the total.
Estimate	To make an approximate or rough calculation often based on rounding.
Primary	Primary data is data that is collected by a data researcher from first hand sources.
Secondary	Secondary data is data gathered from studies, surveys or experiments run by other people or for other research.
Interval	An interval is between two points of values. An interval may or may not include start and end points.
Survey	To gather information by individual samples so we can learn about the whole thing.
Sort	To arrange or group in a special way (such as by size, type or alphabetically).

**Other Topics/Units this could come up in:**

- Averages
- Mode, median, range and mean
- Cumulative frequency

# MATHS Higher Unit 4 – Fractions, ratios and percentages



We can use combinations of these key percentages to find any percentage.  
For example:  
30% = 10% x 3  
75% = 25% + 50%  
16% = 10% + (10% ÷ 2) + 1%

**Example 1:**  
Find 25% of £120  
To find 25% you divide by 2 then divide by 2 again (or ÷4)  
£120 ÷ 4 = £30  
So, 25% of £120 is £30

**Example 2:**  
Find 60% of 300kg  
To get 60% we can use 50% + 10%  
To find 50% you divide by 2  
So 50% = 150kg  
To find 10% you divide by 10  
So 10% = 30kg  
Therefore 60% of 300kg = 180kg

## Percentage increase/decrease (without a calculator)

Firstly, find the percentage of the given amount.  
Then you add or subtract this amount depending on whether you are increasing or decreasing.

**Example 1**  
**Increase** \$80 by 50%

50% of \$80 = \$40  
Then **add** this onto the starting amount  
\$80 + \$40 = \$120

**Example 2**  
**Decrease** 500g by 3%

1% of 500g = 5g  
3% of 500g = 5g x 3 = 15g  
Then **subtract** this from the starting amount  
500g - 15g = 485g

## Percentage of an Amount (with a calculator)

Here we can use **percentage multipliers**.  
First of all you need to find the decimal equivalent of the percentage you need.

50%	=	0.5
75%	=	0.75
30%	=	0.3
2%	=	0.02

You need to use these decimals as percentage multipliers.

**Example**  
Find 48% of £250  
48% = 0.48 (this is the percentage multiplier)  
250 x 0.48 = 120  
So, 48% of £250 is £120

## Percentage Increase/Decrease (with a calculator)


Here we can also use **percentage multipliers**.

### Increasing Example

**Increase** 480 by 16%.  
Every amount starts at 100%. If I want to **increase** by 16%, this would go up to 116%.  
So I need my multiplier to be the decimal equivalent of 116%  
116% = 1.16  
So to increase 480 by 16%  
480 x 1.16 = 556.8

### Decreasing Example


**Decrease** 725 by 26%.  
Every amount starts at 100%. If I want to **decrease** by 26% this would go down to 74%. (100 - 26 = 74)  
So I need my multiplier to be the decimal equivalent of 74%.  
74% = 0.74  
So to **decrease** 725 by 26%  
725 x 0.74 = 536.5

Keyword/Skill	Definition/Tips
Percentage	A number out of 100. <span style="border: 1px solid green; padding: 2px;">Symbol %</span>
Fraction	Any part of a group, number or whole. They are written as one number over another. <span style="border: 1px solid black; padding: 2px;">fraction</span> <input type="text"/> <input type="text"/>
Decimal	A number with a decimal point in it. It can be positive or negative. <b>3746.374</b>
Equivalent	Having the same value or amount.
Increase	To get larger in size or number.
Decrease	To get smaller in size or number.
Profit	This occurs when an item is sold for more than it cost to buy. It is the difference between the amount earned and the amount spent.
Loss	This occurs when an item is sold for less than it cost to buy.
Interest	Money paid regularly at a particular rate. Usually on bank accounts or loans.
Percentage multiplier	The number you multiply a quantity by to find a percentage or increase/decrease it by a percentage.
Simple Interest	Interest calculated as a percentage of the original amount.
Compound Interest	Interest paid on the original amount and the accumulated interest.
Decay/Depreciation	The decrease in the value or amount of something over time. (Car prices are a common example) 



# MATHS Higher Unit 4 – Fractions, ratio and percentages

<p style="text-align: center;"><b>Simplifying Ratios</b></p> <p>Example</p> <p>Simplify</p> $\div 5 \quad \left( \begin{array}{c} 15 : 20 \\ 3 : 4 \end{array} \right) \div 5$ <p><i>To simplify a ratio, you need to divide by a common factor.</i></p>	<p style="text-align: center;"><b>Giving Ratios as Fractions</b></p> <p>Example</p> <p>Aaron and Billy share some money in the ratio 5:4. What fraction do they each receive?</p> <p>5 + 4 = 9 shares in total</p> <p>Aaron = <math>\frac{5}{9}</math> and Billy = <math>\frac{4}{9}</math></p> <p><i>Add the shares to find the denominator of the fraction.</i></p>	<p style="text-align: center;"><b>Ratios in the form n:1</b></p> <p>Example</p> $\div 8 \quad \left( \begin{array}{c} 14 : 8 \\ 1.75 : 1 \end{array} \right) \div 8$ <p>so n = 1.75</p> <p><i>Divide by the part of the ratio that needs to become 1.</i></p>
<p style="text-align: center;"><b>Sharing in a Given Ratio</b></p> <p>Example</p> <p>Share £540 in the ratio 4:5</p> <p>4 + 5 = 9 (total number of shares)  <math>\pounds 540 \div 9 = \pounds 60</math> (amount of one share)  <math>4 \times \pounds 60 = \pounds 240</math>  <math>5 \times \pounds 60 = \pounds 300</math>                      (check that <math>\pounds 240 + \pounds 300</math> adds up to <math>\pounds 540</math>)</p> <p><i>You always need to divide to find one share.</i></p>	<p style="text-align: center;"><b>Ratios Where One Part is Known</b></p> <p>Example</p> <p>John and Sally share some money in the ratio 4:7. If John received £64, how much money is shared in total?</p> <p><math>\pounds 64 \div 4 = \pounds 16</math> (one share)  <math>7 \times \pounds 16 = \pounds 112</math> (Sally's share)  <math>\pounds 64 + \pounds 112 = \pounds 176</math> (total amount of money)</p> <p><i>You always need to divide to find one share.</i></p>	<p style="text-align: center;"><b>Ratios Where the Difference is Known</b></p> <p>Example</p> <p>Barry and Paul share some money in the ratio 3:7. If Barry gets £80 less than Paul, how much do they each receive</p> <p>7 – 3 = 4 shares  <math>\pounds 80 \div 4 = \pounds 20</math> (one share)  <math>3 \times \pounds 20 = \pounds 60</math> (Barry's share)  <math>7 \times \pounds 20 = \pounds 140</math> (Paul's share)</p> <p><i>You always need to divide to find one share.</i></p>

Keyword/Skill	Definition/Tips
Ratio	Ratio compares the size of <b>one part</b> to <b>another part</b> . Written using the ':' symbol.  $3 : 1$ 
Proportion	Proportion compares the size of <b>one part</b> to the size of the <b>whole</b> .
Share	Split or divide.
Parts	One cube in the bar model represents one part
Direct proportion	As one amount increases, another amount increases at the same rate
Inverse proportion	When one value <b>decreases</b> at the same rate that the other increases.
Best Buys	The product which is the best value for money/cheapest

## Reciprocals

The reciprocal of the number  $n$  is  $\frac{1}{n}$

Example) The reciprocal of 7 is  $\frac{1}{7}$

## Currency conversion

It is useful to be able to convert between different currencies. You can use ratio to do this.

Example) The dollar to pounds conversion is £1 = \$1.80  
 Convert \$756 to pounds  
 Answer:  $756 \div 1.80 = 420$   
 So, \$756 = £420

## Percentage change

You can calculate a percentage change using the formula  
 Percentage change =  $\frac{\text{actual change}}{\text{original amount}} \times 100$

This can be used for profit and loss

Example) Inder invests £3200. When her investment matures, she receives £3328. Work out her percentage profit.

Answer: percentage profit =  $\frac{3328 - 3200}{3200} \times 100$   
 = 4%

## Unit ratios

You can compare ratios by writing them as **unit ratios**. In a unit ratio, one of the numbers is 1

Example) 12:4 can be written as 3:1

## Original amount questions

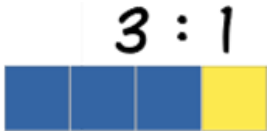
You can use inverse operations to find the original amount after a percentage increase or decrease.  
 Example) In one year, the value of a car dropped by 12% to £9240. How much was the car worth at the start of the year

Answer:  $100\% - 12\% = 88\% = 0.88$   
 Original number  $\times 0.88 = 9240$   
 $9240 \div 0.88 = 10500$

The car was worth £10500 at the start of the year

### Other Topics/Units this could come up in:

- Decimals
- Best buy questions
- Compound measures
- Interest rates
- Proportional reasoning

Keyword/Skill	Definition/Tips
Ratio	Ratio compares the size of <b>one part</b> to <b>another part</b> . Written using the ':' symbol.  
Proportion	Proportion compares the size of <b>one part</b> to the size of the <b>whole</b> .
Share	Split or divide.
Parts	One cube in the bar model represents one part
Direct proportion	As one amount increases, another amount increases at the same rate
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Best Buys	The product which is the best value for money/cheapest



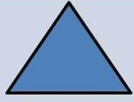
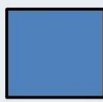


# MATHS Higher Unit 5 – Angles and trigonometry

## Interior Angles

For the **sum** of interior angles in a polygon we can use this formula:

$$\text{sum of interior angles} = 180(n-2) \quad (n = \text{number of side})$$

### Examples

	3	$(3 - 2) \times 180^\circ = 180^\circ$
	4	$(4 - 2) \times 180^\circ = 2 \times 180^\circ = 360^\circ$
	5	$(5 - 2) \times 180^\circ = 3 \times 180^\circ = 540^\circ$
	6	$(6 - 2) \times 180^\circ = 4 \times 180^\circ = 720^\circ$

For **one** interior angle in a **regular** polygon

$$\text{angle} = \frac{180(n-2)}{n}$$

### Example

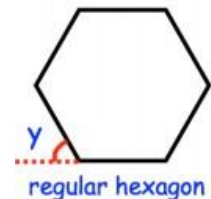
Calculate the size of an interior angle of a regular pentagon:

$$\text{Pentagon} = 5 \text{ sides} = \frac{180(5-2)}{5} = 108^\circ$$

## Exterior Angles

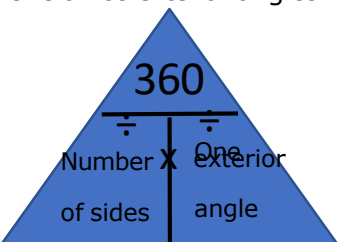
To find an exterior angle =  $\frac{360}{n}$   $n$ = number of sides

### Example



The exterior angle  $y$  would be  $\frac{360}{6} = 60^\circ$

You may be asked to work out how many sides a shape has given the size of its exterior angles. This formula triangle is really useful!

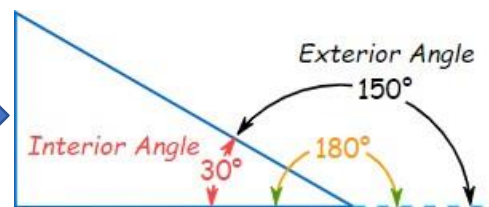


### Example

A regular polygon has exterior angles of  $24^\circ$ . Work out how many sides the shape has.

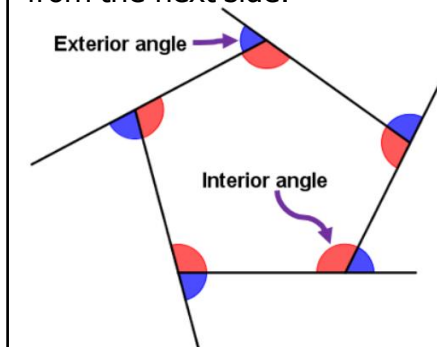
Using formula triangle =  $360 \div 24 = 15$  sides

**Remember**  
Interior angle + exterior angle in Regular polygons =  $180^\circ$   
(They sit on a straight line.)



### Exams!

- You will gain 2 marks for just having to work out an interior or exterior angle of a given polygon.
- A question that requires application of interior/exterior angles knowledge will be worth up to 4/5 marks.

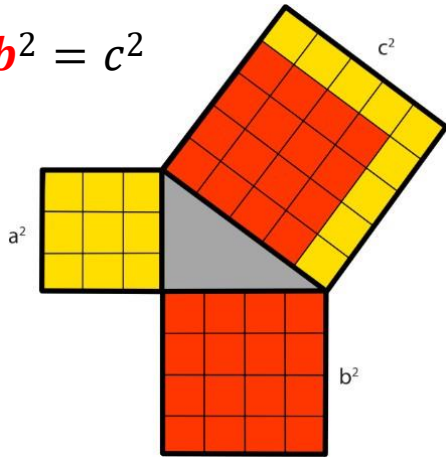
Keyword/Skill	Definition/tip
Angle	The amount of turning between two lines meeting at a point.
Polygon	A 2D shape with straight sides.
Interior angles	An angle inside a shape, between two joined sides.
Exterior angles	The angle between any side of a shape and a line extended from the next side. 
Regular polygon	Has all equal length sides and all equal sized angles.
Irregular polygon	Has differing sized lengths and angles.

Other topics/Units this could appear in:  
Circle theorems  
Congruence and geometric proof

# MATHS Higher Unit 5 – Angles and trigonometry

Pythagoras' Theorem:  $a^2 + b^2 = c^2$  Where  $c$  is the hypotenuse.  
 $a$  and  $b$  can be either of the two shorter sides.

$$a^2 + b^2 = c^2$$



$$3^2 + 4^2 = 5^2$$



$$9 + 16 = 25$$

You can use the theorem to calculate the length of the hypotenuse (the longest side)

$$a^2 + b^2 = c^2$$

You can rearrange the theorem to calculate the length of the shorter sides

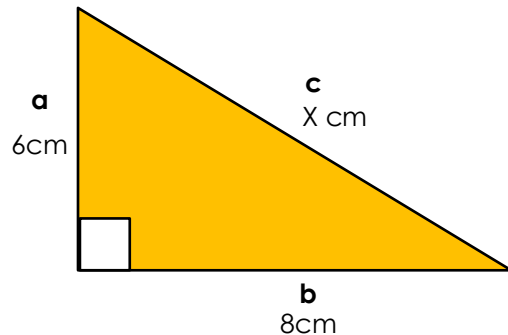
$$a^2 = c^2 - b^2$$

OR

$$b^2 = c^2 - a^2$$

Example of calculating the hypotenuse:

Calculate the value of  $x$ :



Label the sides of your triangle with  $a$ ,  $b$  and  $c$ .  
 The hypotenuse must be labelled  $c$ .  
 The other sides can be labelled  $a$  and  $b$  (it doesn't matter which way round these are).

Substitute the lengths you have into this formula:

$$6^2 + 8^2 = c^2 \quad \leftarrow a^2 + b^2 = c^2$$

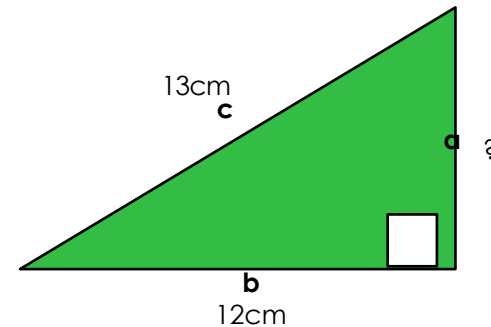
$$36 + 64 = 100$$

$$100 = c^2 \quad \sqrt{100} = c \quad 10cm = c$$

Don't forget, this is  $c^2$ . We want to calculate  $c$  so we need to square root!

Example of calculating the shorter sides:

Calculate the value of the missing side:

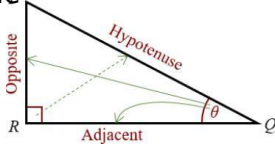


Substitute the lengths you have into this formula:

$$a^2 = 13^2 - 12^2 \quad a^2 = c^2 - b^2$$

$$a^2 = 25 \quad a^2 = 169 - 144 \quad a = \sqrt{25} \quad a = 5cm$$

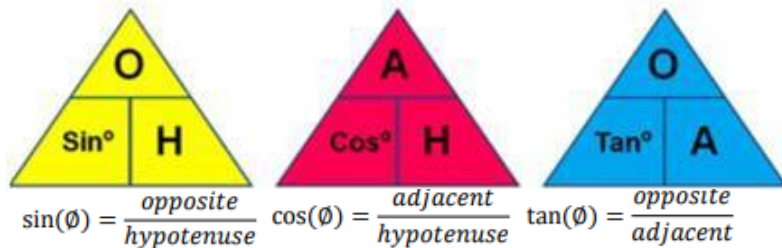
Don't forget, this is  $a^2$ . We want to calculate  $a$  so we need to square root!

Keyword/Skill	Definition/Tips
Pythagoras	A Greek mathematician. He is famous for proving a theorem about the right-angle triangle.
Pythagoras' Theorem	In a right-angled triangle the square of the long side ( <b>hypotenuse</b> ) is equal to the sum of the squares of the other two sides.
Hypotenuse	The longest side of a right-angled triangle. It is always opposite the right angle.
Adjacent & Opposite	Adjacent side - Next to the marked angle Opposite side - Opposite the marked angle 
Trigonometric Ratios/Functions	The special measurements of a right-angled triangle: <b>Sin/Sine Cos/Cosine Tan/Tangent</b>
Inverse Trig Functions	You use these when calculating angles: $\text{Sin}^{-1} x$ $\text{Cos}^{-1} x$ $\text{Tan}^{-1}(x)$
Sin/Sine	The ratio of the length of the <b>opposite</b> side to the length of the <b>hypotenuse</b>
Cos/Cosine	The ratio of the length of the <b>adjacent</b> side to the length of the <b>hypotenuse</b>
Tan/Tangent	The ratio of the length of the <b>opposite</b> side to the length of the <b>adjacent</b> side

# MATHS Higher Unit 5 – Angles and trigonometry

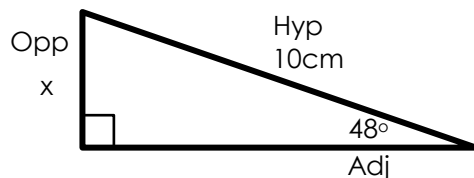
Trig Ratios **Sin** **Cos** **Tan**

**SOH** **CAH** **TOA**



When you are calculating angles it will involve the inverse trig functions:  
 $\sin^{-1}(x)$   $\cos^{-1}(x)$   $\tan^{-1}(x)$

Ex1: Calculate the value of x:



Remember your first step is label the sides!

I am given an angle and a length. I have the hypotenuse and am looking for the opposite. This means it involves **SOH**



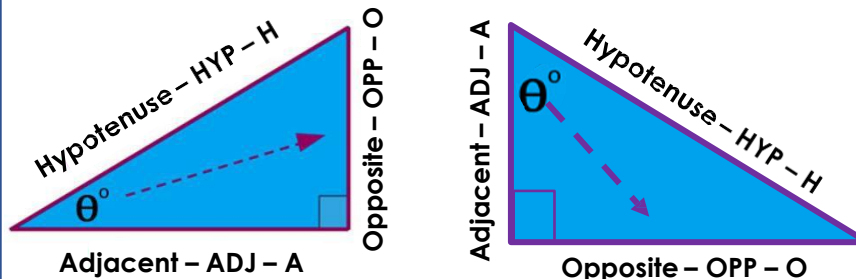
I then cover the O as I am looking for the opposite side.

This means I need to do:

$$\text{opposite} = \sin(x) \times \text{hypotenuse}$$

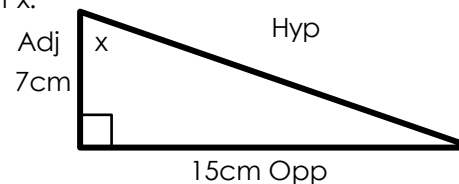
$$\text{opposite} = \sin(48^\circ) \times 10 = 7.43\text{cm (rounded to 2 d.p.)}$$

Your first step in a trigonometry question is to label the triangle's sides. The three sides are the **hypotenuse, opposite & adjacent** sides. The **hypotenuse** side is always the longest side. The **opposite** and the **adjacent** depend on the given angle:



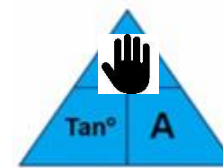
Ex2: Calculate the value of x:

Remember your first step is label the sides!



I am given two lengths, the opposite and adjacent sides, and need to find an angle. This means it involves **TOA**

I then cover **Tan** as I am looking for the angle. This means I need to do:



$$\tan(x^\circ) = \frac{\text{opposite}}{\text{adjacent}}$$

$$\tan(x^\circ) = \frac{15}{7} \quad \text{This is what } \tan(x^\circ) \text{ is equal to. We want just the angle. I need to use } \tan^{-1}$$

$$\tan^{-1}\left(\frac{15}{7}\right) = 64.98^\circ \text{ (rounded to 2 d.p.)}$$

Keyword/Skill	Definition/Tips
Hypotenuse	The longest side of a right-angled triangle. It is always opposite the right angle.
Adjacent & Opposite	Adjacent side – Next to the marked angle Opposite side – Opposite the marked angle
Trigonometric Ratios/Functions	The special measurements of a right-angled triangle: Sin/Sine Cos/Cosine Tan/Tangent
Inverse Trig Functions	You use these when calculating angles: $\sin^{-1}x$ $\cos^{-1}x$ $\tan^{-1}(x)$
Sin/Sine	The ratio of the length of the opposite side to the length of the hypotenuse
Cos/Cosine	The ratio of the length of the adjacent side to the length of the hypotenuse
Tan/Tangent	The ratio of the length of the opposite side to the length of the adjacent side

Other Topics/Units this could appear in:

- Graphs of trigonometric functions.
- Further trigonometry.
- Appears throughout A-Level in the Core and Mechanics Units





# MEDIA

# FINAL DESTINATION

(2000)

Directed by James Wong | Distributed by New Line Cinema



IMDb RATING  
★ 6.7/10  
249K



FACEBOOK  
@finaldestinationmovie



INSTAGRAM  
@deathiscoming180



IMDb  
imdb.com/title/tt0195714



TWITTER  
#FinalDestination



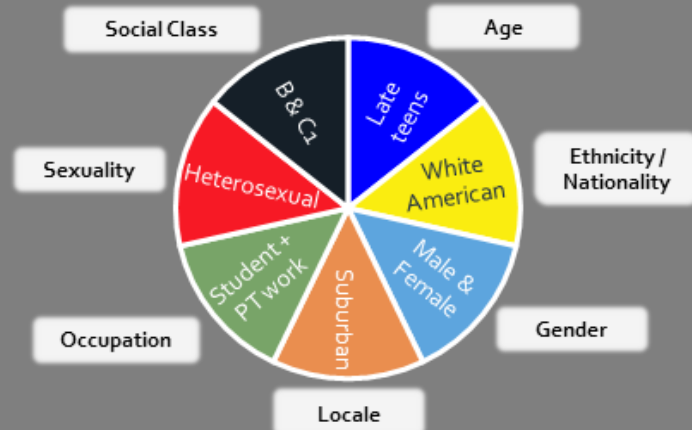
YOUTUBE  
@WBPictures



WIKIPEDIA  
wikipedia.org/wiki/Final\_Destination\_(film)

## DEMOGRAPHICS

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



## PSYCHOGRAPHICS

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



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...



## 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.



## REVIEWS

1. [Empire](#)
2. [Rotten Tomatoes](#)
3. [The Guardian](#)
4. [Roger Ebert](#)

Again, red walls are also seen in the cut scene with Alex and the police officers, even though they are two different locations, it shows Alex knows about the danger and the death is happening in real time, the same time as Alex is sitting there in the room.



Lighting is crucial to the scene; it informs the audience on what type of mood is happening. In the establishing shot (of Ms Lewton's house) it is low key but is juxtaposed with the spotlights and flowers on her front porch. This is symbolic to show even though death will occur, there is life there, and loads of happy memories were created there, that is evident due to Ms Lewton say this on the phone to her friend.



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 connote 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



**FACEBOOK**  
@BritishVogue



**INSTAGRAM**  
@britishvogue



**TWITTER**  
@BritishVogue



**YOUTUBE**  
@BritishVogue



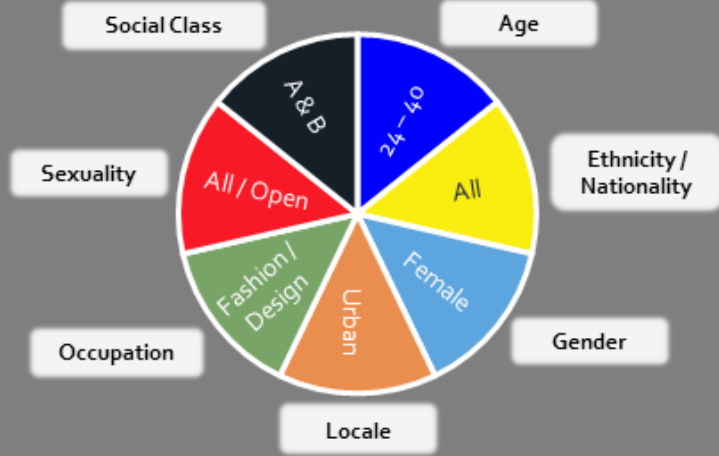
**APP STORE**  
British Vogue



**WIKIPEDIA**  
wikipedia.org/wiki/Vogue\_(magazine)

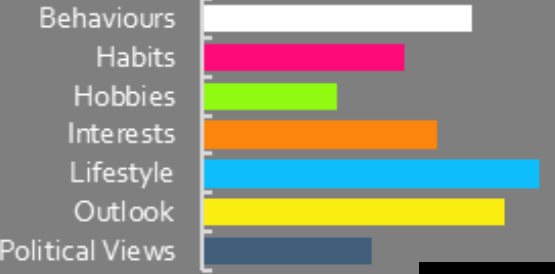
## DEMOGRAPHICS

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## PSYCHOGRAPHICS

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



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".



## REVIEWS

- [The BBC](#)
- [The NYT](#)
- [The Guardian](#)
- [The Telegraph](#)

## 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.



Annotations for the cover diagram:

- Cover lines are used to give an insight into articles within the magazine which may interest the reader. They are also used to tell the audience if any celebrities feature within the magazine.
- The main image of Lana is photographed in the conventional way of making eye contact with the reader, which will therefore boost engagement.
- This specific use of media language would entice an individual to read on as they would like to know more about it.
- Maths-head in large font and capitals. The G is being covered by Lana Del Rey's head, however! due to the very famous and popular nature of Vogue we are able to identify it straight away.
- This specific use of media language would entice a reader in and would encourage the reader to buy the products being advertised inside.
- This issue of the magazine uses the traditional and conventional colour palette of pink and white. This would appeal to the magazines target audience of young females.

Annotations for the contents page diagram:

- The main image of this contents page is very central so the reader's eye is drawn to it immediately. It shows a long shot of a model wearing a red dress. The body position of the model is quite sexual and very confident, showing off the clothing worn which is what this image is designed to do, as this is the main selling point of the magazine. "Vogue" is a women's fashion magazine, therefore it will want to make the clothes featured look attractive to the target audience.
- The main headline covers almost half of the model's face, again making the dress the main focus point of the image.
- The "Cover Stories" section of the contents page is featured over the main image as these are the main articles in the magazine and pairing these here makes them more eye-catching. It says a bit about each article, and the page number so the audience can find it quickly and easily. The text used is made so that some article names are in bold, and some are in italics. This requires the headlines more, and the use of italics makes it look classier, which fits in with the target audience of 18-25 year old females. The language used here strongly appeals to females as words like "Full safe accessories" and "Why we all love make up" are more related to females.
- The date of the magazine issue is featured at the top right hand side of the contents page. The date, "February 2022" is reasonably small as it is not the main priority of the page. It is in a bold font though so you can easily spot it, and it is in red and black, which fits with the colour scheme of the page.
- Around the main image there is different sections of things included in the magazine, divided in to categories which is typical of a contents page. Like with the "Cover stories" section, a small amount of information about articles featured in the magazine, and the page number are shown here. Gutters are used to separate the text, making it easier to read, and separate the different sections.
- The titles of the columns used are in the same red colour as the dress in the main image which makes each section stand out.
- As the contents page shows a lot of information about what is featured within the Vogue magazine, the subscription information is included as many articles listed could be generally attractive to individuals and with this information in the contents page it is easy to see what to do. The title "Subscribe to Vogue" is in a different font to other headers on the page, again making it more eye-catching, and clear to see. There is also an image of some anti-aging cream, which is given as a free gift for subscribing to the magazine. This would appeal to women who are maybe a bit older.



IMDb RATING  
 ★ 9.7/10  
 66K

# MEDIA



FACEBOOK  
 @naughtydog



INSTAGRAM  
 @naughty\_dog\_inc



TWITCH  
 @naughtydog



TWITTER  
 @Naughty\_Dog



YOUTUBE  
 @naughtydog



WIKIPEDIA  
 wikipedia.org/wiki/The\_Last\_of\_Us



More than  
**60!**  
 Awards

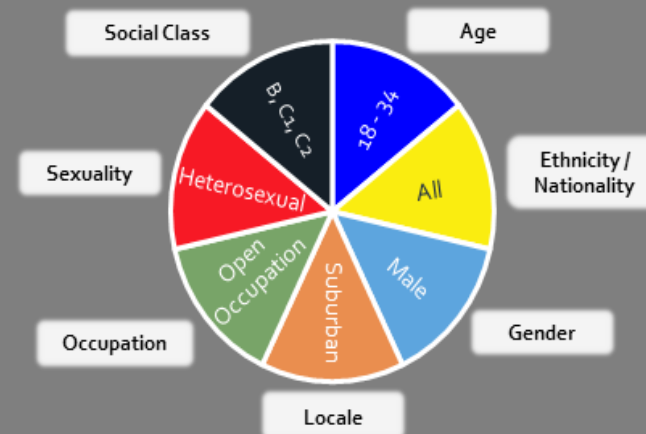
# THE LAST OF US (2013)

Developed by Naughty Dog | Published by Sony Computer Entertainment



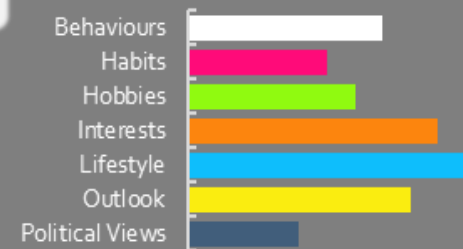
## DEMOGRAPHICS

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



## PSYCHOGRAPHICS

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



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.



## REVIEWS

- [Eurogamer](#)
- [Forbes](#)
- [The Guardian](#)
- [The NYT](#)

## 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.



**THE GAME STRUCTURE NAUGHTY DOG MADE FOR THE LAST OF US CAN BE SUMMED UP AS: WORLD <-> OBJECTIVE <-> CHARACTER**

**1. WORLD**  
 The world of The Last of Us is quite linear but offer multiple paths to the player.  
 Although you need to complete a level to unlock the next one, the game drives you nicely through them.  
 As in any book or movie your journey is already settled however you feel like your the one writing the story.

**2. OBJECTIVE**  
 The player's main objective is to bring Ellie, who is immune to a devastating virus, to the Fireflies. In hope to find a cure. This objective is set at the very beginning of the game and will be the only one through the game. To succeed, the player must travel town to town and get through cities and countryside dangers.

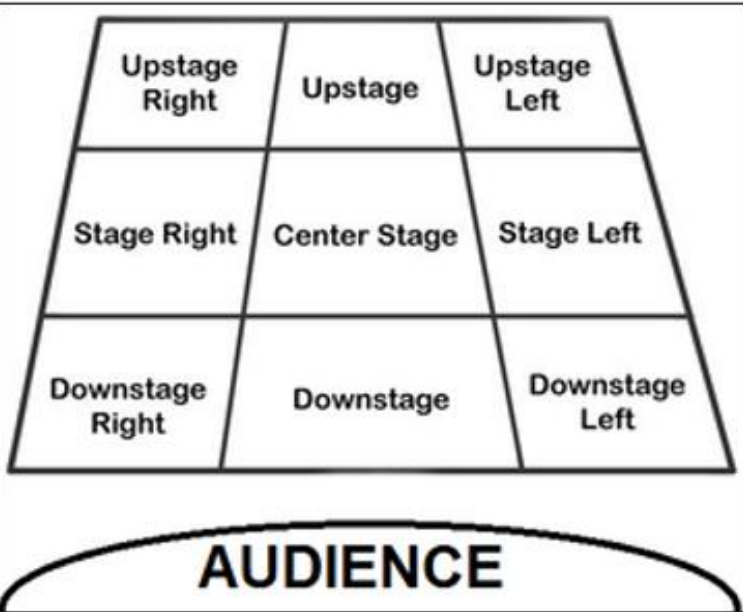
**3. CHARACTER**  
 Playing as Joel, you are depending on the world around you. Finding a clever way to escape when you got no ammo left, exploring to find one expensive shotgun shell are your main concerns to get Ellie to safety.



Interpreting Theatre (The basics)

Creating a performance is not a job for just one person. It requires an array of people who work in the front of house, on the stage and behind the stage. The stage itself can take many forms and be both stationary and moving.

STAGE POSITIONS



REMEMBER

The stage is always from the actor's point of view.



Dramatic elements!

- Role
- Character
- Relationship
- Tension
- Focus
- Situation
- Time
- Place
- Language
- Movement
- Mood
- Atmosphere
- Symbols

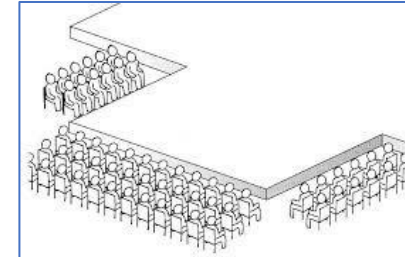
Key Command Words:

**Describe:** Tell me what you see or do.

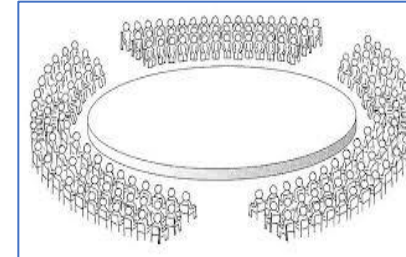
**Explain:** Tell me why you did it or why they did it.

**Evaluate:** Tell me how it could be improved or what was good about it.

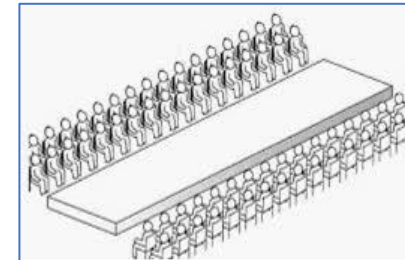
STAGE TYPES  
There are 6 main stage types!



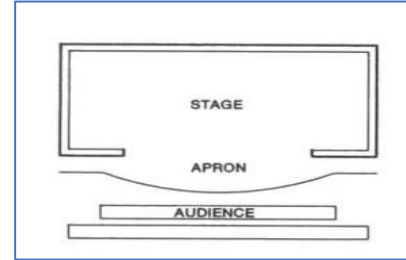
THRUST STAGE



THEATRE IN THE ROUND



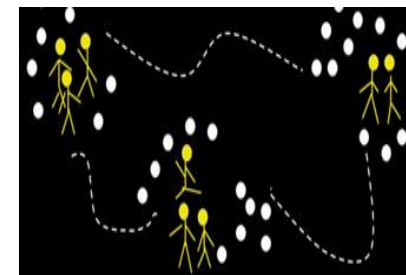
TRAVERSE STAGE



PROSCENIUM ARCH STAGE



END ON STAGE



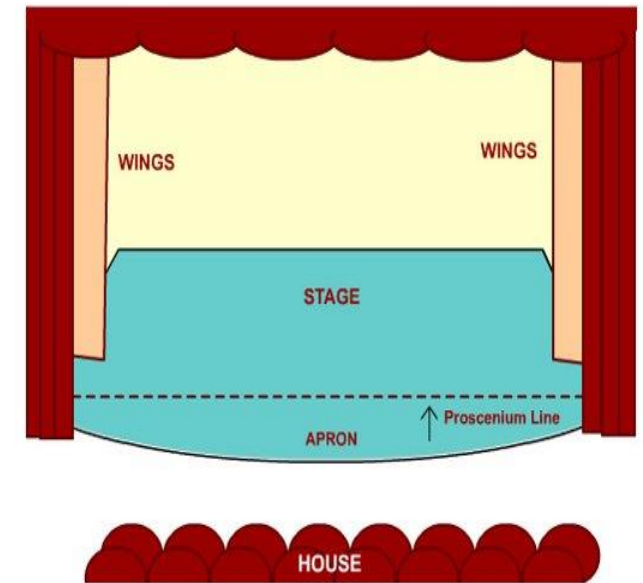
PROMENADE



### Theatre Roles and Responsibilities

Sound Designer	Designing the sound required for the performance, which may include music and sound effects. Considering if amplification such as the use of a microphone is needed and creating a sound plot.
Lighting Designer	Designing the lighting states and effects that will be used in a performance. Understanding the technical capabilities of the theatre and creating a lighting plot.
Performer (Actor/Actress)	Appearing in a production, for example by acting, dancing or singing. Creating a performance or assuming a role on stage in front of an audience.
Understudy	Learning a part, including lines and movements, so they are able to take over a role for someone if needed when there is a planned or unexpected absence.
Puppet Designer	Designing the puppets for a production, taking into account the style of puppets and how they will be operated.
Technician	Operating the technical equipment such as the lighting and sound boards, during the performance.
Set Designer	Designing the set of the play and the set dressing (objects placed on the stage). Providing sketches and other design materials before overseeing the creation of the set.
Stage Manager	Running the backstage elements of the play and supervising the backstage crew. Organising the rehearsal schedule and keeping lists of props and other technical needs. Creating a prompt book and calling the cues for the performance.
Theatre Manager	Running the theatre building, including overseeing the Front of House staff (ushers) and the box office staff who sell tickets.
Director	Overseeing the creative aspects of the production. Developing a 'concept' or a central unifying idea for the production. Liaising with designers, rehearsing the actors and ensuring that all technical elements of the play are ready. Giving 'notes' to the actors to help improve their performances and agreeing the blocking (or movements) of the actors.
Costume Designer	Designing what the actors wear on stage. Making sure that costumes are appropriate for the style and period of the piece. Ensuring the costumes fit the actors.
Playwright	Writing the script of the play including the dialogue and stage directions.

### PARTS OF A STAGE



### Useful Revision

Elements of Drama: [tinyurl.com/2p8nvjp8](https://tinyurl.com/2p8nvjp8)

Stage Directions: [tinyurl.com/4vxk686f](https://tinyurl.com/4vxk686f)

Stage Types: [tinyurl.com/5n8x4ksf](https://tinyurl.com/5n8x4ksf)

Roles & Responsibilities: [tinyurl.com/2ruz5unx](https://tinyurl.com/2ruz5unx)

### GCSE NOTE:

Make sure you know what the person completing the job role does and what they have to take into consideration when working. Also, make sure you know your stage types and your section of the stage.







# 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.



## Colour

The use of colour to convey a particular mood or atmosphere

## Movement

A transition from one lighting state to another.

## Quality

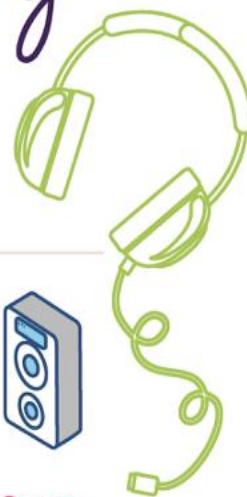
Whether the beam of a lantern is hard or soft.



# 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?



## Types of sound

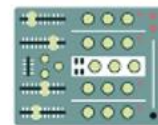
Are the sounds recorded or live (Foley)? Diegetic or non-diegetic?

## Cues

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

## 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.

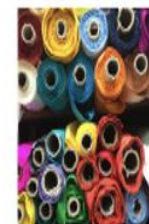


## Shape & Silhouette

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?



## Practitioners

A theatre Practitioner is a person or a theatre company (group of people) that creates practical work and/or specific styles of performing. Each practitioner will have specific techniques they use to ensure their audiences understand their overall intent.

**Intent:** What they want the audience to think, feel, do.

## Key Command Words:

**Describe:** Tell me what you see or do.

**Explain:** Tell me why you did it or why they did it.

**Evaluate:** Tell me how it could be improved or what was good about it.

How to Evaluate

**P -> Point:** Tell me which practitioner style you have used.

**E -> Evidence:** Tell me how you have used the practitioner skill.

**E -> Explain:** Tell me why you used the practitioner skill.

**L -> Link:** Link back to your point reinforcing what practitioner you have used.

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

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

## Antonin Artaud



1896 – 1948

French playwright, poet, actor & theatre director.

**Style:** Theatre of Cruelty

**Aims** for the audience to be “affected”, shocked, and involved; wanted to cleanse the audience of their secret fears and desires.

**Some of their techniques:**

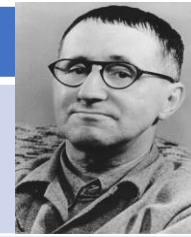
**Visual Poetry** - movement, gesture and dance instead of words to communicate.

**Creating a dream world** - use of ritual, masks, etc; to affect subconscious - like a dream.

**Assaulting the audience** - with lights, music, sound, images .

**Involving the audience** -action would take place all around the audience (to feel a part of it).

## Bertolt Brecht



1898 – 1956

German poet, playwright & director (Marxist, political activist).

**Style:** Epic Theatre

**Aims** to present a “political message”; educating the audience about an issue.

**Some of their techniques:**

**Placards** – signs to get audience to react (‘Applause’) 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.

**Multi-roling** – Each actor takes on more than one part.

## 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.

**Some of their techniques:**

**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.

**Building Blocks** – Small steps to create an overall piece of theatre.

**Happy Accidents** – When you find a special moment through rehearsal.

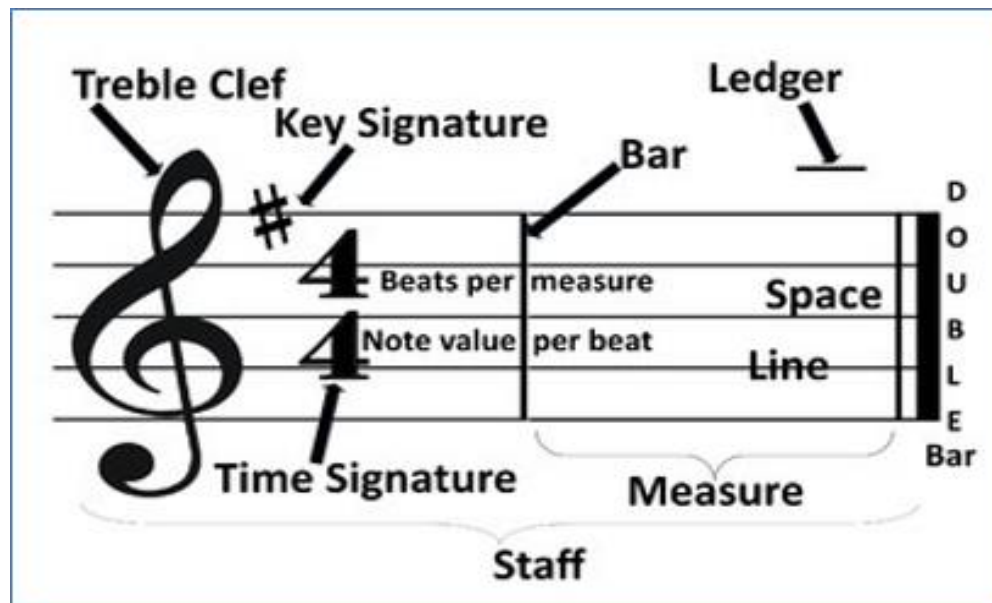
**REMEMBER: When you are working with a specific style don't lose the overall intent of the style!**



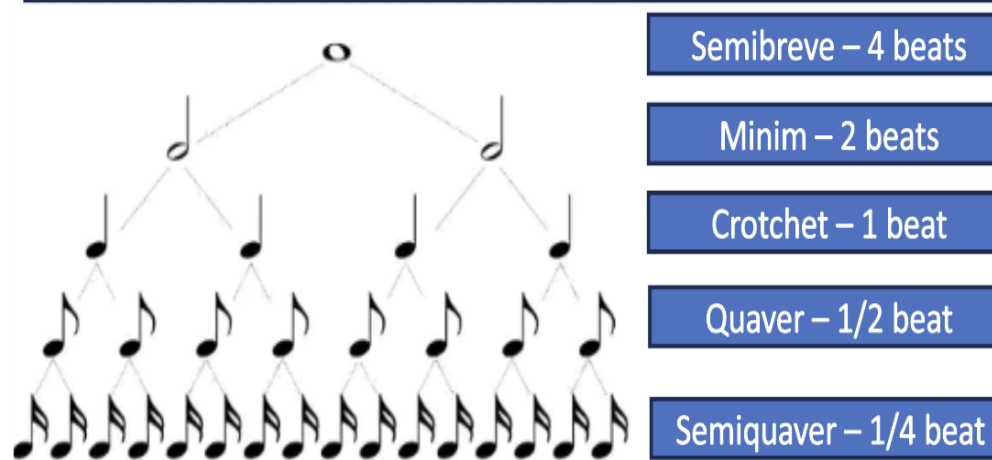
REMEMBER:

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

D Dynamics	R Rhythm	C Context	A Articulation	T Texture	S Structure	M Melody	I Instrument	T Tempo	H Harmony
Crescendo Diminuendo Loud/forte ff f mf mp p pp Quiet/piano	Semi-breve <b>0</b> Minim Crotchet Quaver Semi-quaver Triplet Syncopation Dotted Time signature /Metre 3/4 4/4 6/8	<i>Baroque</i> CLASSICAL <i>Romantic</i> 20 <sup>th</sup> Century Pop ROCK HIP HOP Jazz Blues Soul Folk Reggae R&B Fusion Musical Film Minimalism BAND ORCHESTRA <i>String Quartet</i> Choir Ensemble	Mel - is - ma - tic... Syl - lab - ic Staccato (short) Legato (smooth) Pizzicato/Picking Arco/Bowed Strummed Tremolo Glissando/Slide	Monophonic Homophonic Polyphonic Call and Response Canon Drone	Binary Ternary Rondo Theme and Variation Minuet and Trio 12 Bar Blues Verse Chorus Bridge	High pitch Ascending Descending Low pitch Conjunct Disjunct Sequence Repetition Arpeggio Semitone Tone	Strings Woodwind Brass Percussion Voice	Vivace Allegro Allegretto Moderato Andante Adagio Lento	Major Minor Chords I ii iii IV V vi vii° i i° II iii iv v VI VII Key Signature Cadence Circle of 5ths



Musical Note Tree



**Identifying The Tonality...**

**Tonal**- In a major or Minor key.

**Atonal**- There is no sense of the key.

**Modal**- Uses 'old-fashioned' scales called Modes.

**Pentatonic**- The music only uses 5 notes.

**Chords**

**Triad** - A chord with three notes (See below)

**Power Chord** – Only playing the Root and Fifth of a triad (used in Rock music)

**Dissonance** - Clashing notes played together

**Consonance** - Notes that fit / sound nice together

**Primary Chords** - The three most commonly used chords used in music: I, IV, V

**Secondary Chords** - The other chords: II, III, VI, VII

**Chord Sequence** - The order the chords in a piece of music follow (containing cadences at the ends of phrases)

**Sounds Complete**

<b>Perfect Cadence</b>	V Dominant	I Tonic
<b>Plagal Cadence</b>	IV Subdominant	I Tonic

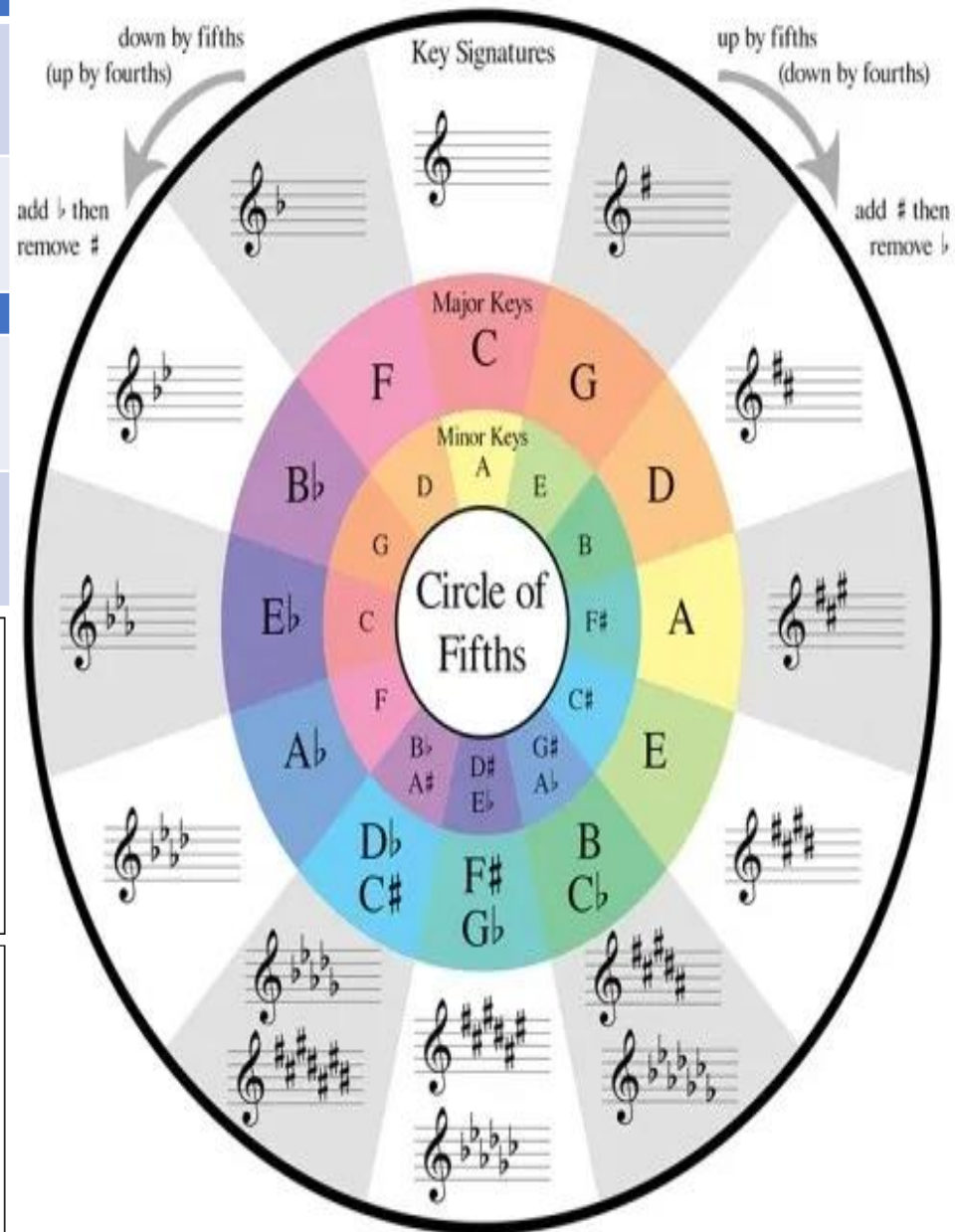
**Sounds Incomplete**

<b>Imperfect Cadence</b>	I Tonic	V Dominant
<b>Interrupted Cadence</b>	V Dominant	Minor Chord

**Inversions** Changing which note of a chord is the lowest sounding:

Root Position      1<sup>st</sup> Inversion      2<sup>nd</sup> Inversion

**Triad** A Chord with three notes:

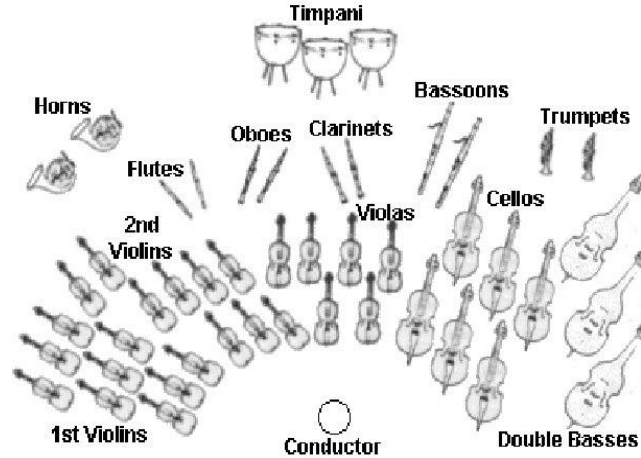






## The Classical Period (1750-1830)

- 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 falls 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.



## The Romantic Period (1600-1750)

- Emphasis on lyrical melodies
- Started 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 and 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

**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 Beethoven**  
(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. He wrote 772 works including symphonies, sonatas and concertos.

## EXPANSION OF THE ORCHESTRA

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**.

D	R	C	A	T	S	M	I	T	H
Dynamics	Rhythm	Context	Articulation	Texture	Structure	Melody	Instrument	Tempo	Harmony
	Semi-breve	Baroque		Monophonic	Binary	High pitch	Strings		Major Minor
	Minim	CLASSICAL		Homophonic	Ternary	Ascending	Woodwind	Vivace	Chords
	Crotchet	Romantic		Polyphonic	Rondo	Descending	Brass	Allegro	
	Quaver	20th Century		Call and Response	Theme and Variation	Low pitch	Percussion	Allegretto	$I\ ii\ iii\ IV\ V\ vi\ vii^{\circ}$
	Semi-quaver	Pop		Canon	Minuet and Trio	Conjunct	Voice	Moderato	Key Signature
	Triplet	ROCK		Drone	12 Bar Blues	Disjunct		Andante	Cadenza
	Syncopation	HIP HOP		Glissando/Slide	Sequence	Repetition		Adagio	Circle of 5ths
	Dotted	Jazz			12 Bar Blues	Arpeggio		Lento	
	Time signature	Blues			Verse Chorus	Semitone			
	/Metre	Fusion			Bridge	Tone			
		Musical Film							
		Minimalism							
		BAND							
		ORCHESTRA							
		String Quartet							
		Choir							
		Ensemble							
				</					



## 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.

## Typical Instruments used throughout classical music include...

**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**



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



**Structure: Binary Form (A,B)**

Section A (repeated)	Section B (repeated)
Bars 0 <sup>1</sup> – 16 <sup>1</sup> (16 bars)	Bars 16 <sup>2</sup> – 40 <sup>1</sup> (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)**

# GCSE PE UNIT 1: SKELETAL SYSTEM

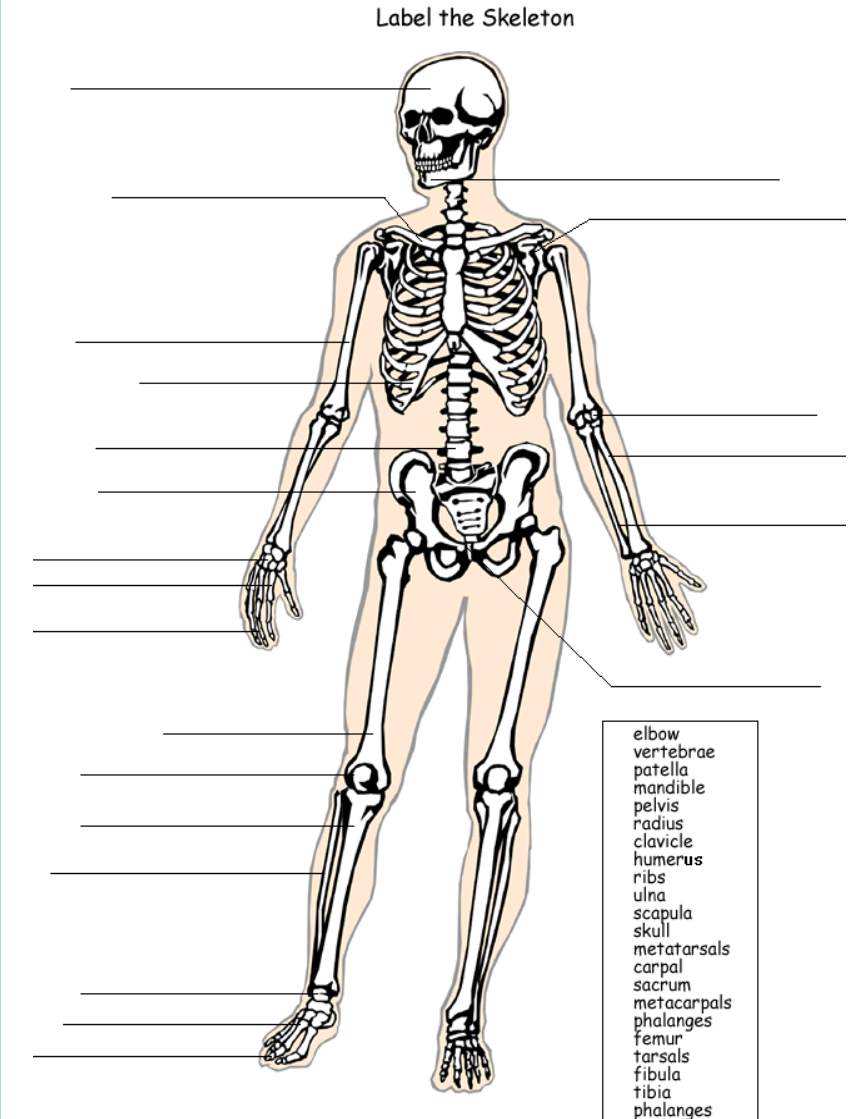
## ONE: Key Vocabulary

Word	Definition
Abduction	Movement away from the midline of the body.
Adduction	Movement towards the midline of the body.
Extension	A straightening movement around a joint.
Flexion	A bending movement around a joint in a limb.
Rotation	The turning of a body part about its long axis as if on a pivot.
Circumduction	The circular movement of a joint. It is a movement pattern that combines flexion, extension, adduction, and abduction.
Synovial joint	An area where two or more bones meet within a joint capsule and allows a wide range of movement to occur.
Articulating bones	Bones that move relative to each other at a joint.
Cartilage	A tough, elastic, fibrous connective tissue.
Ligament	A short band of tough and flexible tissue connects bone to bone and stabilise the joint.
Tendon	A tendon is a tough yet flexible band of fibrous tissue which joins muscle to bone.

## TWO: Core Questions

Question	Answer
Identify four functions of the skeletal system	Blood production, movement, protection, shape, support, mineral storage
Give the function of cartilage	Covers the ends of bones providing smooth, friction free surface
Describe how the skeleton 'protects'	Bones help to protect vital organs
Describe how the skeleton allows 'movement'	Bones provide a surface for muscles / tendons to attach to OR provide lever systems OR muscles pull bones when they contract OR has joints that allow the body to move
Movement at a hinge joint	Flexion & extension
Movement at a ball and socket joint	Flexion, extension, rotation, abduction, adduction and circumduction
Name the long and short term effects of exercise on the skeletal system	There are no short term effects. Long term – increased bone density

## THREE: ...



# GCSE PE UNIT 1: MUSCULAR SYSTEM

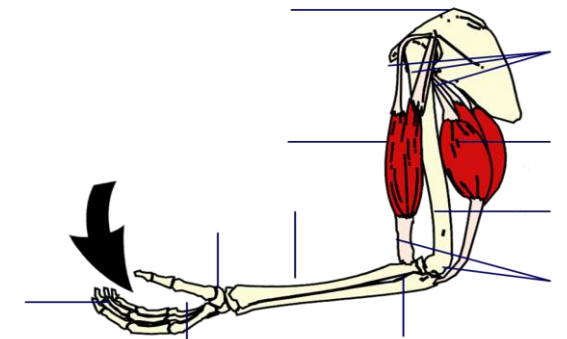
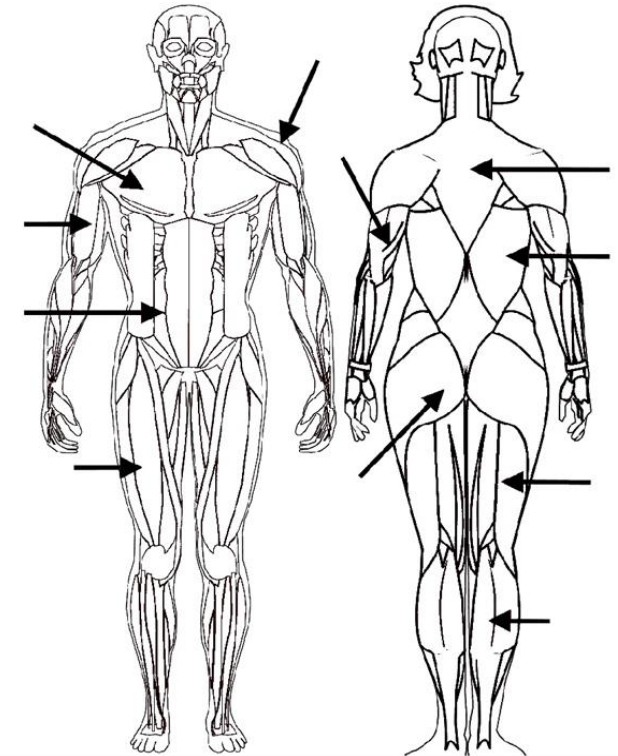
## ONE: Key Vocabulary

Word	Definition
Antagonistic muscle action	A pair of muscles that work together to produce movement with one muscle contracting whilst the other muscle relaxes. E.g. the upper arm, as the arm flexes the bicep contracts and the triceps relaxes.
Agonist	The muscle that works to create the movement.
Antagonist	The muscle that works in the opposite way of the agonist.
Fixator	A muscle which acts as the stabilizer and helps the agonist work effectively of one part of the body during movement of another part.
Fatigue	Muscle tiredness when the body has a lack of energy.
Muscle fibre types	There are three types of muscle fibre that make up the skeletal muscles:
Type I	Slow twitch fibres suited to low intensity aerobic work. They can be used continuously for long periods without fatigue.
Type IIa	Fast twitch fibres suited to high intensity anaerobic work.
Type IIx	Fast twitch fibres that generate a much greater force than other fibre types. They fatigue very quickly.

## TWO: Core Questions

Question	Answer
Explain how a pair of muscles work together during exercise to allow movement	Muscles work together as an antagonistic pair Prime mover / agonist Relax / antagonist Fixator
Name all 11 muscles in the body	Deltoid, pectorals, biceps, abdominals, quadriceps, trapezius, triceps, latissimus dorsi, gluteals, hamstring, gastrocnemius
What movement is a combination of abduction, adduction, extension or flexion and rotation	Circumduction
What is the difference between origin and insertion?	Origin – this is the end of the muscle attached to a bone that is stable, e.g. scapula. The point of origin remains still when contraction occurs. Insertion – this is the end of the muscle attached to the bone that actively moves (e.g. the biceps insertion is on the radius).

## THREE: ...



# GCSE PE UNIT 2: ENGAGEMENT PATTERNS

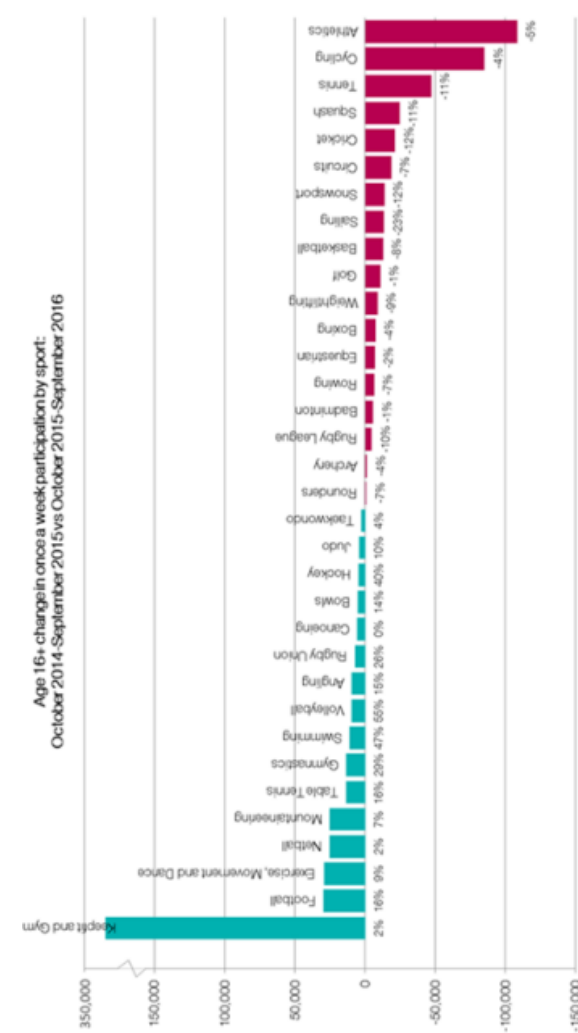
## ONE: Key Vocabulary

Word	Definition
<b>Ethnicity</b>	A state of belonging to a specific social group with common cultural or national traditions or beliefs.
<b>Gender</b>	The state of being male or female.
<b>Role models</b>	Someone to be looked up to, (good role model) an example to follow.
<b>School</b>	Due to bad PE experience at school/ unpleasant showers/ kit/ changing facilities
<b>Low esteem</b>	Low esteem/ lack of confidence/ they don't think they are good enough/ fear of failure/embarrassment/ body consciousness
<b>Religion</b>	Some ethnic groups don't encourage sport for women
<b>Attitudes</b>	Fear among that they may be perceived as homosexual, attitude that sport is for males/ stereotyping
<b>Peers</b>	Peer pressure/friends don't participate
<b>Community</b>	Inadequate choice or provision or opportunity / e.g. lack of clubs/ lack of female sports leaders
<b>Discrimination</b>	The unfair treatment of individuals whereby opportunities are not available to all of the different social groups.

## TWO: Core Questions

Question	Answer
<b>Describe the engagement patterns of the social group: Gender</b>	Women have more body fat up to 30% more, women have 2/3 of the strength of men, flexibility tends to be greater in women, boys overtake women in height, weight and strength
<b>Describe the engagement patterns of the social group: Age</b>	Reaction time decreases as you get older, strength increases with age until 30s, young children cannot cope with difficult tasks, injury and disease are more common as you get older
<b>Describe the engagement patterns of the social group: Disability</b>	Adapted activities, adapted equipment, disability classifications, provision
<b>Identify a range of factors that can affect engagement</b>	Attitudes, role models, education, media coverage, familiarity, income, inclusiveness, religion, sexism, family commitments
<b>Describe the engagement patterns of the social group: Family/friends</b>	Peers may encourage you or discourage you from participation, parents often pay for travel, memberships, costs, peer pressure
<b>Describe the engagement patterns of the social group: Race/religion/culture</b>	Women's boxing, single sex rules in sport, dress codes, head and hair codes e.g. Sikh faith, religious dietary guidelines

## THREE: ...



Note: % figures represent the relative change in the sport's participation numbers compared with 12 months ago  
Source: Sport England's Active People Survey

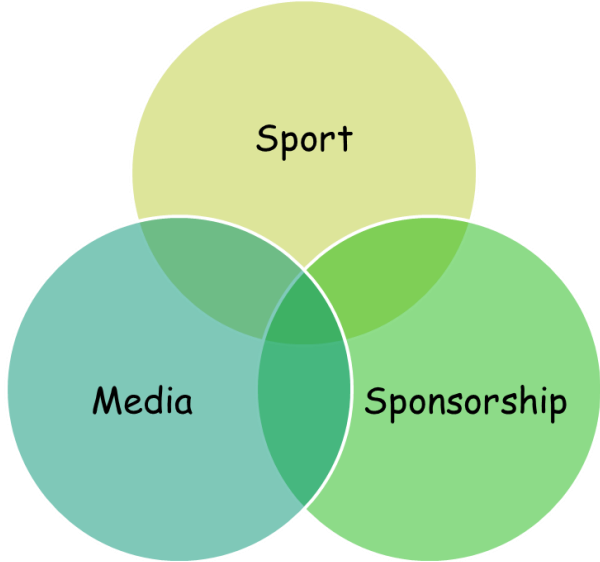



# GCSE PE UNIT 2: COMMERCIALISATION

ONE: Key Vocabulary	
Word	Definition
<b>Commercialisation</b>	Links business and commerce into sport with a primary focus of profit which can lead to exploitation. Using sport with the sole intent to make money from doing so.
<b>Golden triangle</b>	The links and relationship between sponsorship, sporting events and the media.
<b>Media</b>	Different forms of communication that can inform, educate and entertain people including social, internet, TV and newspapers.
<b>Sponsorship</b>	The giving of money or goods to performers in order to get good publicity and/or increase profit.
<b>Unacceptable sponsorship</b>	Sponsorship of sport when a sponsor's image or product appears to undermine the sporting message (e.g. tobacco, alcohol & fast food)
<b>Media pressure</b>	The way the media may hound or intrude upon individuals.
<b>Minority Sports</b>	Lesser known sports with lower participation levels.
<b>Sport</b>	Players, teams, competitions, tournaments, events, coaches, transport
<b>Role models</b>	Someone to be looked up to, (good role model) an example to follow.

TWO: Core Questions	
Question	Answer
<b>What are the positive effects of sponsorship on the performer/sport?</b>	Sponsorship deals, promotion, more prize money, improves profile and image of the sport
<b>What are the negative effects of sponsorship on the performer/sport?</b>	Withdrawal of sponsorship, change of dates of events, clothing and equipment restrictions, inequality
<b>What are the positive effects of sponsorship for the sponsor?</b>	Advertising, image, tax relief, research and development
<b>What are the positive effects of the media on sport?</b>	Promotes sport, raises popularity, increases participation, increased revenue, sponsorship, education
<b>What are the negative affects of the media on sport?</b>	Media pressure, TV directors influence, popularity, undermines officials, intrusion
<b>How can the media impact sport?</b>	Demonstrating performance and participation, Undermining officials, Encouraging variety Biased popularity, Edited coverage, Altered event timings, Limited attendance

THREE: ...

# CNAT SPORT STUDIES

## - UNIT R184: CONTEMPORARY ISSUES IN SPORT

Topic Area 1: Issues which affect participation in sport	Topic Area 3: The implications of hosting a major sporting event for a city or country
Teaching content	Teaching content
<p>1.1.1 Different user groups who participate in sport:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Gender</li> <li><input type="checkbox"/> People from different ethnic groups</li> <li><input type="checkbox"/> Retired people/people over 60</li> <li><input type="checkbox"/> Families with children</li> <li><input type="checkbox"/> Carers</li> <li><input type="checkbox"/> People with family commitments</li> <li><input type="checkbox"/> Young children</li> <li><input type="checkbox"/> Teenagers</li> <li><input type="checkbox"/> People with disabilities</li> <li><input type="checkbox"/> Parents (singles or couples)</li> <li><input type="checkbox"/> People who work</li> <li><input type="checkbox"/> Unemployed/economically disadvantaged people</li> </ul>	<p>3.1.1 The types and scheduling of major sporting events:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Regular</li> <li><input type="checkbox"/> 'One-Off'</li> <li><input type="checkbox"/> Regular and recurring</li> </ul> <p>3.1.2 The nature of the participants and spectators</p>
<p>1.2.1 Possible barriers which affect participation in sport:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Employment and unemployment</li> <li><input type="checkbox"/> Family commitments</li> <li><input type="checkbox"/> Lack of disposable income</li> <li><input type="checkbox"/> Lack of transport</li> <li><input type="checkbox"/> Lack of positive sporting role models</li> <li><input type="checkbox"/> Lack of positive family role models or family support</li> <li><input type="checkbox"/> Lack of appropriate activity provision</li> <li><input type="checkbox"/> Lack of awareness of appropriate activity provision</li> <li><input type="checkbox"/> The lack of equal coverage in media in terms of gender and ethnicity by the media</li> </ul>	<p>3.2.1 Positive and negative pre-event aspects of hosting a major sporting event:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Bidding for the event</li> <li><input type="checkbox"/> Infrastructure and transport systems development</li> <li><input type="checkbox"/> Financial/commercial investment/support</li> <li><input type="checkbox"/> The potential for increased employment</li> <li><input type="checkbox"/> Local/national objections to the bidding process</li> </ul>
<p>1.3.1 Possible solutions to the barriers which affect participation in sport:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Provision of: - Appropriate programmes - Sessions - Activities - Times for the different user groups</li> <li><input type="checkbox"/> Promotion strategies: - The use of targeted promotion - Role models - Initiatives</li> <li><input type="checkbox"/> Increased and appropriate transport availability</li> <li><input type="checkbox"/> Availability of appropriate user group facilities and equipment</li> <li><input type="checkbox"/> Improved access to facilities for all user groups</li> <li><input type="checkbox"/> Appropriate pricing for all user groups</li> </ul>	<p>3.3.1 During the event:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Positive aspects/benefits include: - Improved social infrastructure - Improved national morale/social cohesion - Increase in national status - Greater national interest in sport - Increased media coverage of the sport(s) - A potential increase in direct and indirect tourism - An increase in short-term employment during the event</li> <li><input type="checkbox"/> Negative aspects/drawbacks include: - An increase in transport, litter and noise - The potential for an increase in terrorism and crime - Poor performance by home nation/team and the impact on national pride/morale - Perceived relegation/lack of investment in regional areas not involved in the national event - Negative media coverage of perceived deficiencies in the organisation or infrastructure/facilities</li> </ul>
<p>1.4.1 Positive and negative impacts on the popularity of sport in the UK includes:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> The number of people participating</li> <li><input type="checkbox"/> The provision of facilities</li> <li><input type="checkbox"/> Environment/climate activity influences</li> <li><input type="checkbox"/> Live spectator opportunities</li> <li><input type="checkbox"/> The amount and range of media coverage</li> <li><input type="checkbox"/> The high-level success of both individuals and teams</li> <li><input type="checkbox"/> The number and range of positive role models available in a sport</li> <li><input type="checkbox"/> Social acceptability</li> </ul>	<p>3.3.2 Immediate and longer term post-event:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Positive aspects/benefits include: - A legacy of improved/new sporting facilities - An increase in the sports' participation - An increase in the profile of sports involved - A legacy of improved transport and social infrastructure - Raising of the city/nation's international profile/status - An increase in future financial investment</li> <li><input type="checkbox"/> Negative aspects/drawbacks include: - The event might have costed more to host than the revenue generated - Sports facilities unused after the event - A loss in national reputation/status if the event was badly organised, the host nation's participants performed badly, or scandals emerged</li> </ul>
<p>1.5.1 The growth of emerging/new sports in the UK:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Examples of current emerging sports</li> <li><input type="checkbox"/> The development and opportunities to participate in emerging sports</li> </ul>	

# R185 ASSESSMENT GUIDE

UNIT R185: Performance and leadership in sports activities

Topic Area 2: Applying practice methods to support improvement in a sporting activity



Mark scheme and Teacher Feedback

TA2: Applying practice methods to support improvement in a sporting activity

Mark Band 1 - [1-4 marks]	Mark Band 2 - [5-10 marks]	Mark Band 3 - [11-14 marks]
The review of their performance is <b>basic</b> . Outlines strengths and weaknesses, with <b>limited</b> explanation. The application of practice methods is <b>basic</b> and addresses in a <b>limited</b> way the weaknesses where improvement is needed.	The review of their performance is <b>sound</b> in some aspects. Describes strengths and weaknesses with <b>some</b> explanation and justification. The application of practice methods is <b>sound</b> and <b>adequately</b> addresses the weaknesses where improvement is needed.	The review of their performance is <b>detailed</b> in most aspects. <b>Comprehensively</b> describes the strengths and weaknesses with in-depth analysis and justification. The application of practice methods is <b>considered</b> and <b>comprehensively</b> addresses the weaknesses where improvement is needed.

# CNAT SPORT STUDIES

## - UNIT R185: PERFORMANCE AND LEADERSHIP IN SPORTS ACTIVITIES



# Combined and Separate Biology B2: Cells + control

## Combined and Separate lessons

1. Mitosis
2. Animal growth
3. Plant growth
4. Stem cells
5. Nervous system
6. Neurotransmission

## Separate only lessons

- 8. The Brain
- 9. Brain and Spinal cord problems
- 10. The Eye

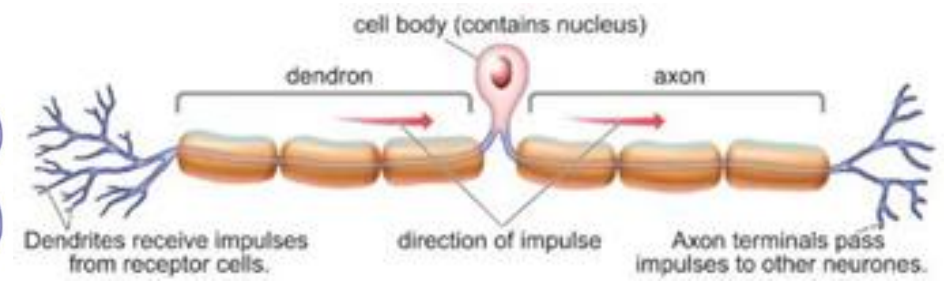
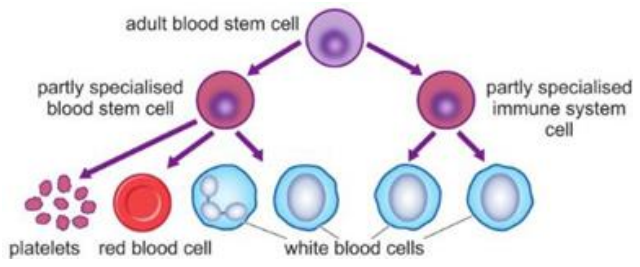
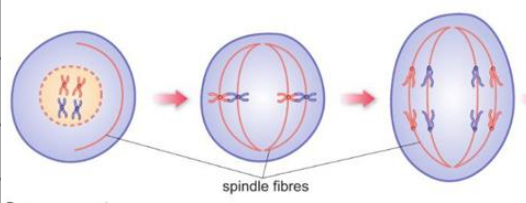
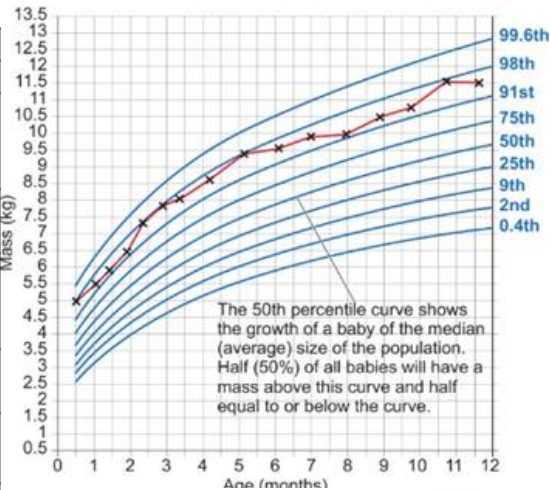
2. Animal growth	
<b>Growth</b>	Increase in size due to increased numbers of cells.
<b>Percentile</b>	A measure of the growth of a child that compares them to other children of the same age.
<b>50<sup>th</sup> percentile</b>	Average for height/mass for age.
<b>Cell differentiation</b>	When a cell divides by mitosis to produce two different types of cell (not two identical ones).
<b>Specialised cell</b>	A cell special features designed for a specific job.

3. Plant growth	
<b>Plant growth</b>	Cell division creates more cells, elongation makes these cells get bigger.
<b>Meristems</b>	Areas just behind the tips of roots and shoots where cell division and differentiation happens.
<b>Importance of differentiation in plants</b>	To produce all the different types of cell a plant needs such as root hair cells and xylem cells.
<b>Calculating percentage changes</b>	$\% \text{ change} = (\text{final value} - \text{starting value}) / \text{starting value} \times 100$

4. Stem cells	
<b>Stem cell</b>	A cell that can differentiate when it divides, to produce two different cells.
<b>Embryonic stem cell</b>	A stem cell that can become any kind of cell. Found in developing embryos.
<b>Adult stem cell</b>	A stem cell that can only become a few types of cell. Found in animals after birth.
<b>Stem cells in medicine</b>	It is hoped they can be used to replace damaged cells in diseases like type 1 diabetes or leukaemia, or to grow new organs for transplant.
<b>Problems with stem cells</b>	They may potentially cause cancer, stem cells can only be used in the person they have come from.

5. Nervous system	
<b>Nervous system</b>	All the nerves in your body working together to gather information, make decisions and control responses.
<b>Central nervous system</b>	The brain and spinal cord – makes decisions (aka CNS).
<b>Peripheral nervous system</b>	All your other nerves – gathers information from your sense and carries messages from the CNS to your muscles.
<b>Neurone</b>	A nerve cell
<b>Impulse</b>	Electrical message carried by a neuron.
<b>Cell body</b>	The central part of a nerve cell containing its nucleus.
<b>Dendron and axon</b>	The long parts of a nerve cell carrying impulses towards the cell body (dendron) and away from it (axon)
<b>Myelin sheath</b>	A fatty layer around the axon and dendron that insulates it to prevent the impulse from escaping and speeds the impulse up.

1. Mitosis	
<b>Cell cycle</b>	Life of cell comprising interphase and mitosis.
<b>Interphase</b>	Preparation for mitosis in which extra cell parts are made and DNA chromosomes are replicated (copied).
<b>Mitosis</b>	When one cell divides into two genetically identical daughter cells.
<b>(I)PMATC</b>	The stages of mitosis: interphase (not mitosis), prophase, metaphase, anaphase, telophase, cytokinesis.
<b>Prophase</b>	The membrane of the nucleus breaks down and spindle fibres start to form.
<b>Metaphase</b>	Spindle fibres fully form and chromosomes line up across the middle of the cell.
<b>Anaphase</b>	Chromosome copies separate and move to each end of the cell.
<b>Telophase</b>	A new membrane forms around each set of chromosomes to form two nuclei.
<b>Cytokinesis</b>	The two new cells fully separate.
<b>Cancer</b>	When mitosis happens out of control forming large lumps of cells called tumours.



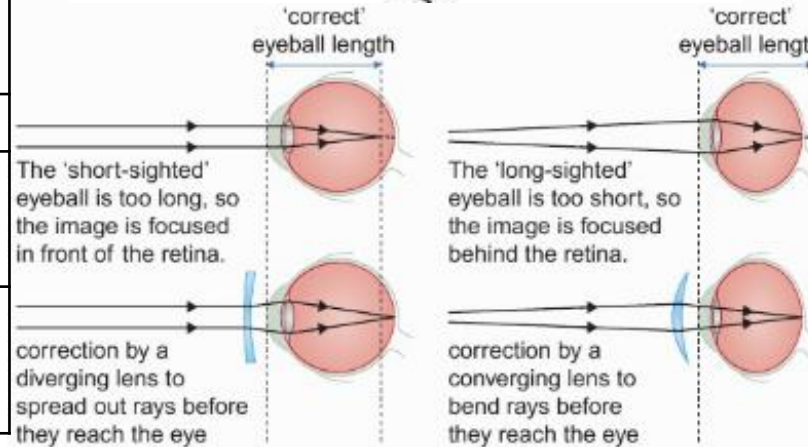
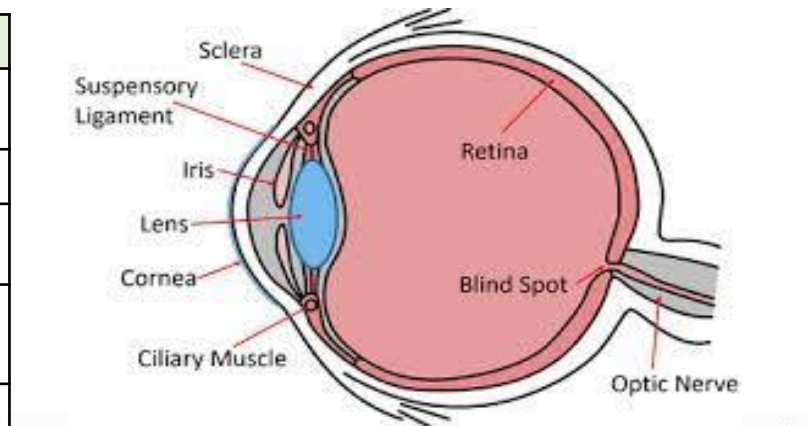


**7 Neurotransmission**

<b>Dendrites</b>	Branches at the beginning of a dendron that connect to receptor cells or another neuron.
<b>Synapse</b>	Small gap between two neurons where the axon terminals of one meet the dendrites of another.
<b>Neurotransmitter</b>	Chemicals released by axon terminals that diffuse across the synapse to trigger a new impulse the dendrite of another neuron.
<b>Sensory neuron</b>	Nerve cell that carries impulses from sense organs to the CNS. Has a long dendron and a long axon.
<b>Relay neuron</b>	Nerve cell in the CNS that makes decisions. Dendrites join onto cell body, short axon.
<b>Motor neuron</b>	Nerve cell that carries impulses from the CNS to muscles. Dendrites join onto cell body, long axon.

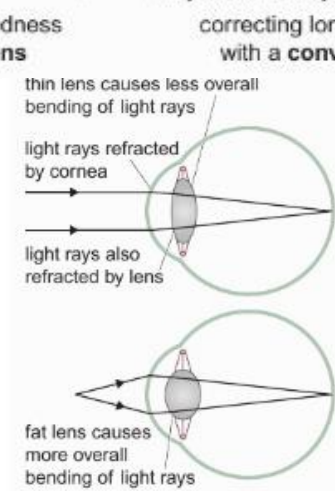
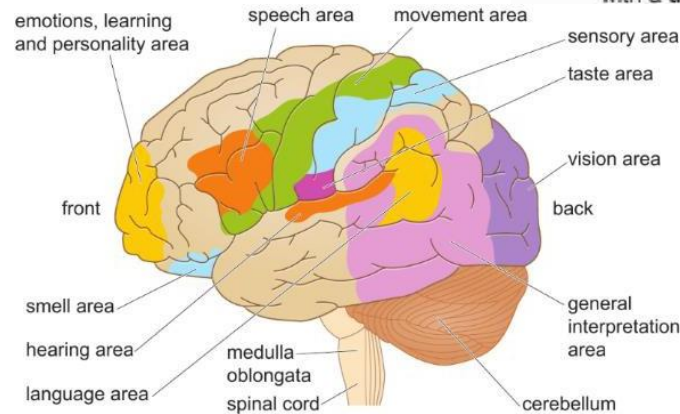
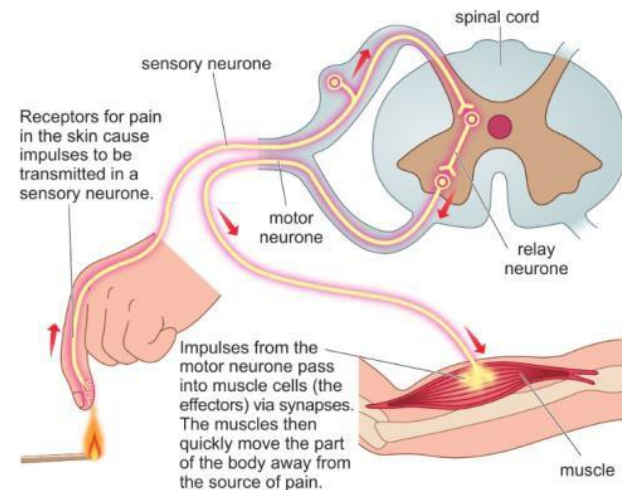
**8/9 Brain and spinal cord problems separate only**

<b>Cerebral cortex</b>	Conscious thought, Memory, language. Divided into 2 cerebral hemispheres
<b>Cerebellum</b>	Voluntary movement- posture and balance. Controls speech
<b>Medulla oblongata</b>	Regulates breathing, heart rate, and reflexes such as sneezing and swallowing
<b>CT Scan</b>	Uses x-rays and a computer to create detailed pictures of the inside of your body.
<b>PET Scan</b>	Positron emission tomography (PET) scan is an imaging test that uses a special dye containing radioactive tracers.
<b>Tumour</b>	A groups of abnormal cells that form lumps or growths.
<b>Chemotherapy</b>	An aggressive form of chemical drug therapy meant to destroy rapidly growing cells in the body.
<b>Radiotherapy</b>	A cancer treatment that uses high doses of radiation to kill cancer cells and shrink tumours.



**8. The eye separate only**

<b>Pupil</b>	A hole located in the centre of theiris of the eye that allows light to strike the retina.
<b>Iris</b>	Controls the diameter and size of thepupil and thus the amount of light reaching the retina.
<b>Cornea</b>	The transparent front part of the eye that covers the iris and pupil.
<b>Lens</b>	A transparent biconvex structure in the eye that, along with the cornea, helps to refract light to be focused on the retina.
<b>Retina</b>	is to receive light that the lens has focused, convert the light into neuralsignals, and send these signals on to the brain for visual recognition.
<b>Ciliary muscle</b>	Muscles capable of modifying thecurvature of the lens and thereby affecting the focal length of the lens.
<b>Cones</b>	Photoreceptor cells in the retinas. They respond differently to light of different or colour vision and function best in relatively bright light.
<b>Rods</b>	Photoreceptor cells in the retina ofthe eye that can function in lower light.
<b>Short-sighte d</b>	Unable to see things clearly unless they are relatively close to the eyes.



**Combined and Separate lessons**

1. Meiosis
2. DNA
3. DNA extraction
4. Alleles
5. Inheritance
6. Gene mutation
  
7. Variation

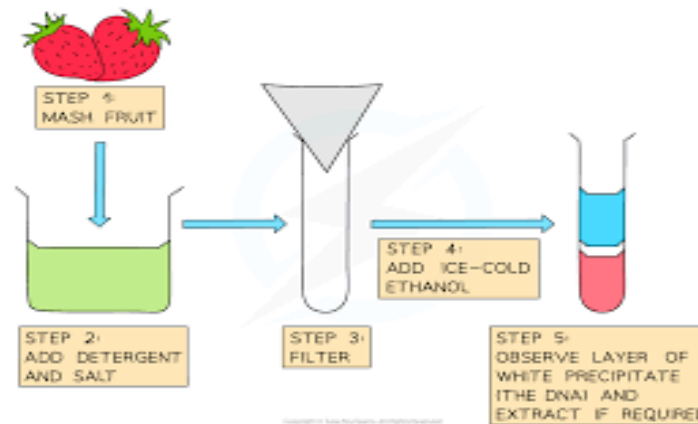
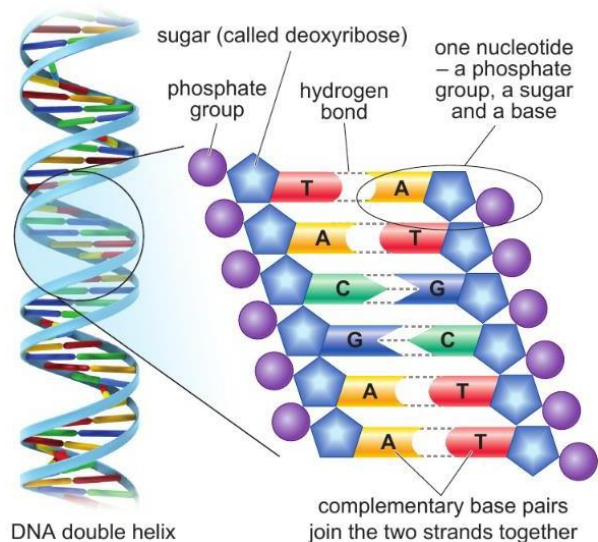
**Separate only lessons**

8. Sexual and asexual reproduction
9. Protein synthesis
10. Genetic variants and phenotypes
11. Mendel
12. Multiple and missing alleles

**1. Meiosis**

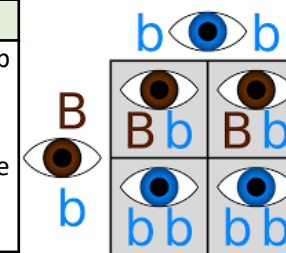
<b>Gametes</b>	Egg cell and sperm cell.
<b>Fertilisation</b>	Sperm cell fuses with egg cell and nuclei combine.
<b>Zygote</b>	Single cell formed by fertilisation.
<b>Gene</b>	Length of DNA coding for a protein. Controls your characteristics.
<b>Genome</b>	All the DNA and genes in an organism.
<b>Protein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

2. DNA	
<b>Chromosome</b>	Large DNA molecule made into a small package by tightly coiling DNA around a protein.
<b>DNA structure</b>	Two strands, double helix, complementary base pairs, sugar-phosphate backbone
<b>DNA bases</b>	Adenine, A; thymine, T; cytosine, C; guanine, G
<b>Complementary base pairs</b>	A pairs with T C pairs with G
<b>Hydrogen bonds</b>	Weak force holding the two strands of DNA together.



**3. DNA extraction**

<b>Mix water, salt and detergent.</b>	Salt makes DNA clump together, detergent breaks down cell membranes to release DNA
<b>Mash fruit/veg</b>	Increases the surface area
<b>Filter the mixture</b>	To remove unwanted lumps
<b>DNA extraction: Add two drops of protease solution</b>	Protease breaks down proteins around the DNA
<b>DNA extraction: Gently add ice-cold ethanol</b>	DNA is insoluble in ethanol so precipitates
<b>DNA extraction: Leave for several minutes</b>	So white DNA layer forms



**4. Alleles**

<b>Allele</b>	Different version of the same gene. We have two alleles of each gene.
<b>Homozygous</b>	We have two copies of the same allele
<b>Heterozygous</b>	We have two different copies of an allele
<b>Dominant allele</b>	One copy needed for characteristic to show. Written as a capital.
<b>Recessive allele</b>	Two copies for the characteristic to show. Written as lowercase.
<b>Genotype</b>	The combination of alleles in an organism.
<b>Phenotype</b>	The characteristics produced by the alleles.
<b>Genetic diagram</b>	Shows the likelihood of offspring produced by parents with certain genotypes

**5. Inheritance**

<b>Sex chromosomes</b>	Female: XX Males: XY
<b>Inheriting sex</b>	All eggs are X, 50% of sperm are X and 50% are Y, so 50% of zygotes are XX and 50% are XY
<b>Punnett squares</b>	Uses the genotypes of male and female gametes to predict the genotypes of the offspring.
<b>Probability and Punnett squares</b>	Punnett squares tell you the likelihood of certain offspring, not what will actually happen.
<b>Cystic fibrosis</b>	Illness caused by an inheriting two copies of a faulty recessive allele.
<b>Family pedigree chart</b>	Chart showing how genotypes are inherited down through a family.



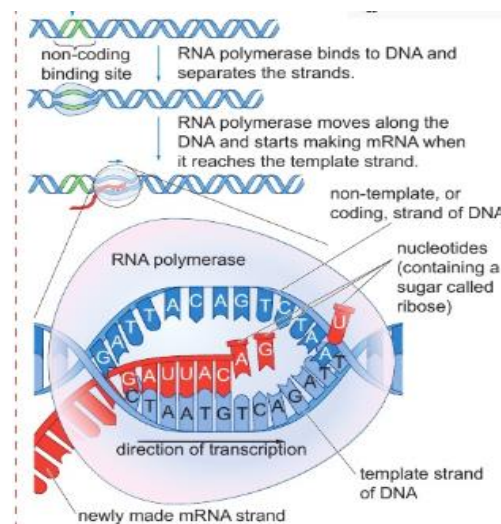
# Combined and Separate Biology B3: Genetics

6. Gene mutation	
<b>Mutation</b>	A change to the bases in a gene.
<b>Effect of mutations</b>	Change the structure of a protein and how it works. Sometimes harmless, normally harmful, very rarely beneficial
<b>Cause of mutations</b>	Mistakes copying DNA during cell division, DNA damage from chemicals or radiation
<b>Human Genome Project</b>	(HGP) Project involving many scientists from many countries to find the order of bases in human DNA
<b>How is the HGP useful?</b>	To tailor drugs to genes, to design better drugs

7. Variation	
<b>Variation</b>	Natural differences between members of a species that affect the chance of survival.
<b>Genetic variation</b>	Variation caused by genes
<b>Environmental variation</b>	Caused by interaction with the surroundings – such as food, climate etc.
<b>Continuous variation</b>	Can be anywhere within a range, such as height, following a normal distribution.
<b>Discontinuous variation</b>	Can be only one of a few possibilities, such as blood type: A, B, AB, O
<b>Normal distribution</b>	Bell-shaped curve with more in the middle and fewer either side.

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

9. Protein synthesis separate only	
<b>Transcription</b>	The process by which the information in a strand of DNA is copied into a new molecule of messenger RNA (mRNA).
<b>RNA polymerase</b>	An enzyme that is responsible for making RNA from a DNA template.



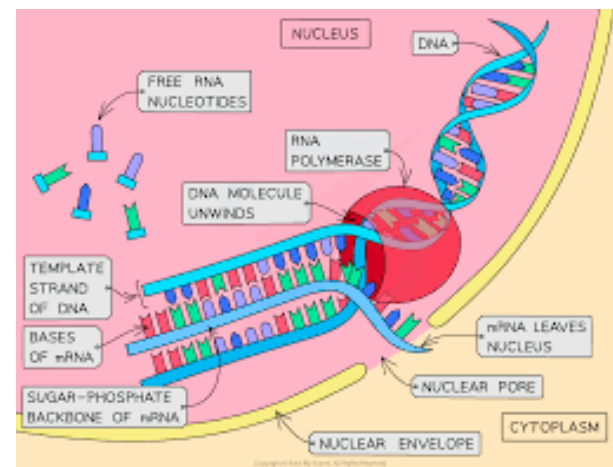
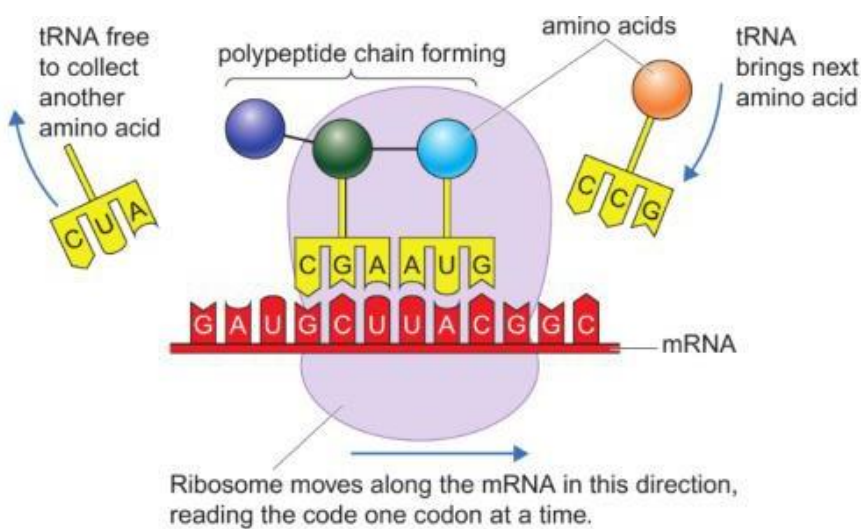
<b>Messenger RNA (mRNA)</b>	A single-stranded RNA molecule that corresponds to the genetic sequence of a gene
<b>Uracil</b>	In RNA, thymine is replaced by the base uracil.
<b>Translation</b>	The process in which ribosomes in the cytoplasm synthesize proteins after the process of transcription.
<b>Ribosomes</b>	A structure found in the cytoplasm which translates a genetic code into chains of amino acids.
<b>Transfer RNA (tRNA)</b>	A type of RNA molecule that helps decode a messenger RNA (mRNA) sequence into a protein.
<b>Codon</b>	A sequence of three bases that code for an amino acid.
<b>Triplet code</b>	Another name for a codon. A sequence of three bases.
<b>Polypeptide</b>	A chain of amino acids.
<b>Protein</b>	Made up of one or more polypeptide molecules.

10. Genetic variants and phenotypes separate only	
<b>Mutation</b>	A change to the bases in a gene.
<b>Allele</b>	Different version of the same gene. We have two alleles of each gene.
<b>Phenotype</b>	The characteristics produced by the alleles.

11. Mendel- separate only	
<b>Inherited variation</b>	Variation caused by genes.
<b>Gregor Mendel</b>	The 'god father' of genetics. He discovered the basic principles of heredity through experiments with garden peas.

12. Multiple and missing alleles separate only	
<b>Codominant</b>	Occurs when two versions, or "alleles," of the same gene are present in a living thing, and both are expressed.
<b>Sex-linked genetic disorders</b>	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.
<b>Haemophilia</b>	A bleeding disorder that slows the blood clotting process.
<b>Colour-blindness</b>	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.



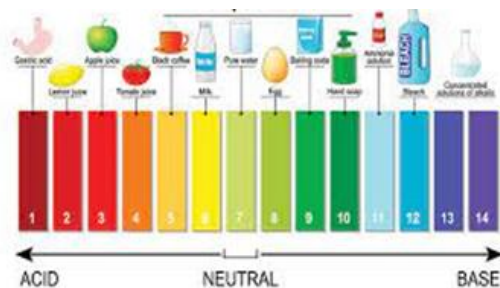


## Lesson sequence

1. Acids, bases and indicators
2. Acids in detail (HT)
3. Bases and salts
4. Core practical – preparing copper sulfate
5. Alkalis and balancing equations
6. Core practical – investigating neutralisation
7. Alkalis and neutralisation
8. Reactions of acids with metals and carbonates
9. Solubility

## 1. Acids, bases and indicators

pH scale	A scale running from 0 to 14 that measures how acid or alkaline a solution is.
Acid	A solution with a pH less than 7.
Base	A substance with a pH greater than 7.
Neutral	A substance with a pH equal to 7.

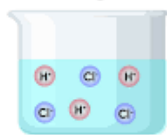


Indicator	A substance that changes colour depending on the pH.
Common indicators	Litmus: red in acid, blue in alkali Methyl orange: red in acid, orange in alkali Phenolphthalein: colourless in acid, pink in alkali
Universal indicator	Can be used to measure pH. It is red in strong acid, green when neutral and purple in strong alkali.
Acids and ions	Acids dissolve in water to produce an excess of hydrogen ions (H <sup>+</sup> ).
Alkalis and ions	Alkalis dissolve in water to produce an excess of hydroxide ions (OH <sup>-</sup> ).

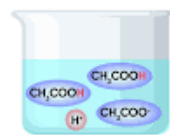
Hydrochloric acid	Formula: HCl
Nitric acid	Formula: HNO <sub>3</sub>
Sulfuric acid	Formula: H <sub>2</sub> SO <sub>4</sub>
Ions and pH	The higher the hydrogen ion concentration the lower the pH.

## 2. Acids in detail (HT)

<b>Concentrated solution</b>	A solution with a large amount of solute dissolved in a given volume.
<b>Dilute solution</b>	A solution with a small amount of solute dissolved in a given volume.
<b>pH and hydrogen ion concentration</b>	Every step down the pH scale is a ten-fold increase in hydrogen ion concentration and vice versa.  - pH 3 to 1 = 100 times increase - pH 4 to 7 = 1000 times decrease
<b>Dissociation</b>	When an acid dissolves in water, it splits up into positive hydrogen ions and negative anions.
<b>Strong acids</b>	Acids that dissociate fully when dissolved in water – every single molecule splits up.
<b>Weak acids</b>	Acids that do not fully dissociate when dissolved in water – only some molecules split up.
<b>Acid examples</b>	<b>Strong:</b> hydrochloric, sulfuric <b>Weak:</b> ethanoic



HCl Strong Acid



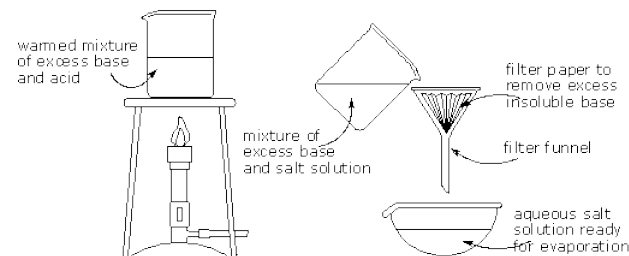
CH<sub>3</sub>COOH Weak Acid

## 3. Bases and salts

<b>Base</b>	A solid substance that neutralises an acid to form a salt and water.
<b>Salt</b>	A compound formed when an acid is neutralised
<b>Naming salts</b>	Sulfuric acid → sulfate  Nitric acid → nitrate  Hydrochloric acid → chloride
<b>Reaction of metal oxides with acid</b>	Metal oxide + acid → salt + water  E.g. Magnesium oxide + hydrochloric acid → magnesium chloride + water  $MgO(s) + 2HCl(aq) \rightarrow MgCl_2(aq) + H_2O(l)$
<b>Preparing soluble salts</b>	- Gently warm a beaker of acid - Add a spatula of metal oxide and stir until dissolved - Repeat until it no longer dissolves - Filter to remove excess oxide - Allow water to evaporate to produce pure crystals

## 4. Core practical – preparing copper sulfate

<b>Video of practical</b>	You tube-Search 'Edexcel core practical preparing copper sulfate'
<b>Aim</b>	To see how the pH of an acid changes as you gradually add a base.
<b>Setup</b>	Place 20 cm <sup>3</sup> of dilute sulfuric acid in a beaker and warm to 50 °C.



Stage 1

Stage 2

<b>Adding excess copper oxide</b>	Add a spatula of black copper oxide and stir until dissolved. Repeat this process until a spatula does not fully dissolve.
<b>Filtration</b>	Filter the solution and collect the filtrate.
<b>Crystallisation</b>	- Place the filtrate in an evaporating basin - Heat the evaporating basin by placing above a beaker of boiling water. - Remove from heat when crystals start to form. - Leave somewhere warm to dry.
<b>Results</b>	As the copper oxide dissolves the sulfuric acid turns blue. When there is copper oxide remaining, the solution looks black from the copper oxide floating in it. Blue diamond-shaped crystals should form.

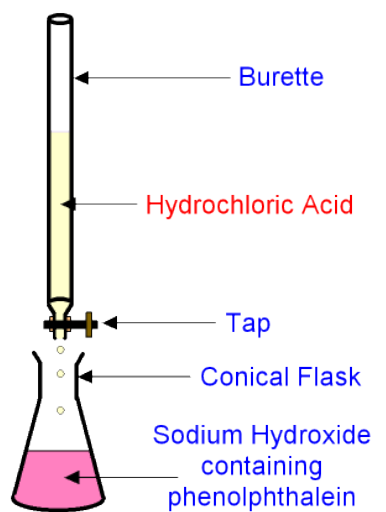
## 5. Alkalis and balancing equations

<b>Bases and alkalis</b>	A base is a substance that neutralises an acid to form a salt and water. An alkali is a base that is soluble in water.
<b>Common alkalis</b>	Sodium hydroxide, NaOH Potassium hydroxide, KOH Calcium hydroxide, Ca(OH) <sub>2</sub>
<b>Reaction of alkalis with acids</b>	Acid + alkali → salt + water  Eg: Sodium hydroxide nitric acid → sodium nitrate + water  $NaOH(aq) + HNO_3(aq) \rightarrow NaNO_3(aq) + H_2O(l)$
<b>Balancing equations</b>	- Use a tally chart to keep track of the number of atoms on each side.  - Change the coefficients (the big numbers) to add more of things that are missing.  - DO NOT TOUCH the little numbers

6. Core practical – investigating neutralisation	
<b>Video of practical</b>	You tube-Search 'Edexcel core practical investigating neutralisation'
<b>pH meter</b>	An instrument that can measure pH more accurately than universal indicator.
<b>Aim</b>	To see how the pH of an acid changes as you gradually add a base.
<b>Setup</b>	Place 50 cm <sup>3</sup> of hydrochloric acid in a beaker and estimate its pH using a pH meter or universal indicator paper.
<b>Run the experiment</b>	Add 0.3 g of calcium hydroxide powder, stir to dissolve and re-measure the pH. Repeat 7 more times.
<b>Graph of your results</b>	Plot a graph with mass of calcium on the x-axis and pH on the y-axis.
<b>Results</b>	The pH will increase slowly at first, then very rapidly, then more slowly again.

7. Alkalis and neutralisation	
<b>Acid and alkali ions</b>	Acids produce hydrogen ions, H <sup>+</sup> , alkalis produce hydroxide ions, OH <sup>-</sup> .
<b>Ions and neutralisation</b>	The H <sup>+</sup> ion and OH <sup>-</sup> ion react together to form H <sub>2</sub> O (water).
<b>Producing a salt by neutralisation</b>	The salt is produced from the ions left over once the H <sup>+</sup> and OH <sup>-</sup> ions have reacted together.
<b>Burette</b>	A tall glass tube with 0.1 cm <sup>3</sup> markings on it and a tap at the bottom used for accurately adding variable amounts of liquid.

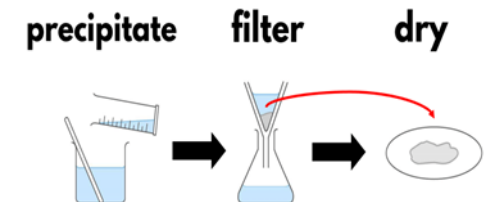
<b>Pipette</b>	A piece of glassware used to very accurately measure a fixed amount of liquid.
<b>Titration</b>	A method used to find out exactly how much acid is needed to neutralise an alkali
<b>Titration method for making a salt</b>	<ul style="list-style-type: none"> <li>- Add alkali to conical flask with a pipette</li> <li>- Add an indicator to the beaker</li> <li>- Gradually add acid from a burette</li> <li>- Note how much has been added when indicator changes colour</li> <li>-repeat without the indicator</li> <li>-evaporate the water from the solution by crystallisation</li> </ul>
<b>Titration indicators</b>	Use indicators with a sharp colour change – such as phenolphthalein – rather than a gradual one such as universal.



8. Reactions of acids with metals and metal carbonates	
<b>Reaction of acid with metal</b>	Metal + acid → salt + hydrogen E.g. magnesium + hydrochloric acid → magnesium chloride + hydrogen $Mg(s) + 2HCl(aq) \rightarrow MgCl_2(aq) + H_2(g)$
<b>Metal and acid observations</b>	- Bubbles of hydrogen gas - Metal dissolves - Warms up
<b>Ionic equation</b>	A chemical equation that shows changes to the ions in a reaction.
<b>Ionic equation for magnesium and acid</b>	$Mg + 2H^+ \rightarrow Mg^{2+} + H_2$
<b>Hydrogen gas test</b>	Lit splint Squeaky pop
<b>Spectator ion</b>	An ion that does not change during a chemical reaction.
<b>Reaction of metal carbonates with acid</b>	Carbonate + acid → salt + water + carbon dioxide E.g: Calcium carbonate + hydrochloric acid → calcium chloride + water + carbon dioxide $CaCO_3(s) + 2HCl(aq) \rightarrow CaCl_2(aq) + H_2O(l) + CO_2(g)$
<b>Carbonate and acid observations</b>	- Bubbles of CO <sub>2</sub> gas - Solid carbonate dissolves
<b>Carbonate and acid ionic equation</b>	$2H^+ + CO_3^{2-} \rightarrow H_2O + CO_2$
<b>Carbon dioxide test</b>	Bubble gas into limewater Limewater turns cloudy

9. Solubility	
<b>Soluble</b>	When a substance can be dissolved by a liquid.

<b>Insoluble</b>	When a substance cannot be dissolved by a liquid.
<b>Soluble in water</b>	-All common sodium, potassium and ammonium salts - All nitrates - Most chlorides - Most sulfates
<b>Insoluble in water</b>	- Silver and lead chlorides - Lead, barium and calcium sulfates - Most carbonates - Most hydroxides
<b>Precipitate</b>	A solid (insoluble) product formed by mixing two solutions. Turns the solution cloudy.
<b>Precipitation reaction</b>	A reaction that produces a solid precipitate by mixing two solutions.
<b>Predicting precipitation</b>	When mixing two solutions, swap the names of the salts around to find the possible products. If one is insoluble a precipitate forms.
<b>Precipitation equations</b>	$AB + YX \rightarrow AX + YB$ E.g: Sodium chloride + silver nitrate → silver chloride + sodium nitrate $NaCl(aq) + AgNO_3(aq) \rightarrow AgCl(s) + NaNO_3(aq)$
<b>Precipitation ionic equations</b>	Only include the ions that make the solid precipitate E.g: $Ag^+(aq) + Cl^-(aq) \rightarrow AgCl(s)$
<b>To prepare insoluble salts</b>	- Mix your two solutions - Filter the mixture - Wash the residue by pouring distilled water through the filter - Leave somewhere warm to dry



# Separate Chemistry C17 to C19: Groups, rates and heat changes

## Lesson sequence

1. Group 1
2. Group 7
3. Reactivity of halogens
4. Group 0
5. Rates of reaction
6. Collision theory
7. Core practical – rates of reaction
8. Catalysts
9. Exothermic and endothermic
10. Explaining energy changes

### 1. Group 1 – The Alkali Metals

<b>Group 1 symbols</b>	Li – lithium Na – sodium K – potassium
<b>Reaction of alkali metals with water</b>	Metal + water → metal hydroxide + hydrogen  sodium+water→sodiumhydroxide + hydrogen  $2\text{Na} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{H}_2$



<b>Lithium</b>	Lithium floats and bubbles vigorously
<b>Sodium</b>	Sodium melts into a ball and moves around the surface bubbling vigorously.
<b>Potassium</b>	Potassium melts into a ball, catches fire (lilac) and moves around the surface bubbling vigorously.
<b>Group 1 reactivity</b>	Reactivity increases as you move down the group.

**Explaining group 1 reactivity** When metals react they lose their outer electrons. Further down the group there are more shells of electrons so the outer electrons are less attracted to the nucleus and easier to remove.

### 2. Group 7 – The Halogens

<b>Chlorine</b>	Cl <sub>2</sub> . A pale green gas.
<b>Bromine</b>	Br <sub>2</sub> . A red-brown liquid.
<b>Iodine</b>	I <sub>2</sub> . A shiny purple-black solid.
<b>Reaction: halogens + metals</b>	Halogen + metal → metal halide Bromine + sodium → sodium bromide $\text{Br}_2 + 2\text{Na} \rightarrow 2\text{NaBr}$
<b>Reaction: halogens with hydrogen</b>	Halogen+ hydrogen->hydrogen halide Chlorine + hydrogen-> hydrogen chloride $\text{Cl}_2 + \text{H}_2 \rightarrow 2\text{HCl}$
<b>Hydrogen halides</b>	Hydrogen halides dissolve in water to form acids, for example hydrogen chloride makes hydrochloric acid.
<b>Chlorine test</b>	Chlorine gas turns damp blue litmus red then quickly bleaches it white.

### 3. Reactivity of halogens

<b>Group 7 reactivity</b>	Reactivity increases as you go up the group.			
<b>Explaining group 7 reactivity</b>	When non-metals react they complete the outer shell. Further up the group the elements have fewer shells so the nucleus attracts electrons more strongly.			
<b>Displacement reactions of halogens</b>	A more reactive halogen displaces a less reactive halide ion by taking its electrons.  bromine + sodium iodide → iodine + sodium bromide			
	Start With: Add	Potassium Chloride KCl – Colourless	Potassium Bromide KBr – Colourless	Potassium Iodide KI – Colourless
Chlorine Water Cl <sub>2</sub> – Colourless	no reaction	orange solution (Br <sub>2</sub> ) Cl has displaced Br	brown solution (I <sub>2</sub> ) Cl has displaced I	
Bromine Water Br <sub>2</sub> – Orange	no reaction	no reaction	brown solution (I <sub>2</sub> ) Br has displaced I	
Iodine Water I <sub>2</sub> – Brown	no reaction	no reaction	no reaction	

**Redox reactions of halogens** The more reactive halogen oxidises the less reactive halide by taking its electrons. The more reactive halogen is reduced.  
  
 $\text{Br}_2 + 2\text{I}^- \rightarrow 2\text{Br}^- + \text{I}_2$

### 4. Group 0 The Noble gases

<b>Melting point of noble gases</b>	They are all gases at room temperature but the melting and boiling point increase down the group.
<b>Reactivity of group 0</b>	The noble gases do not (easily) do any reactions – they are inert.
<b>Explaining reactivity of group 0</b>	When elements react they try to complete their outer shells. Because group 0's outer shells are already complete, they do not react.
<b>Uses of noble gases</b>	Helium is used in airships because it is inert and has low density Argon is used in welding as it is inert and denser than air. Neon is used in lighting because it glows red when electricity is passed through it.

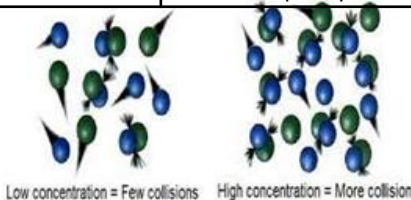


### 5. Rates of reaction

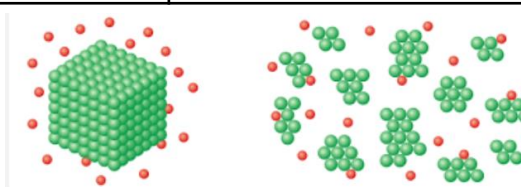
<b>Rate of reaction</b>	The rate at which reactants are used up or products are made.
<b>Concentration vs time graph</b>	Steeper line = faster rate.  
<b>Measuring rates – reactions that produce gas</b>	Collect gas in a gas syringe and measure the volume every 30 secs.  Collect gas over water (up-turned measuring cylinder full of water) and measure volume every 30 secs.
<b>Measuring rates – reactions that go cloudy</b>	Do reaction on a balance and record the change in mass every 30 secs.  Do the reaction in a beaker placed on piece of paper with a cross marked on it. Looking down through the beaker, time how it takes for the cross to disappear.

### 6. Collision theory

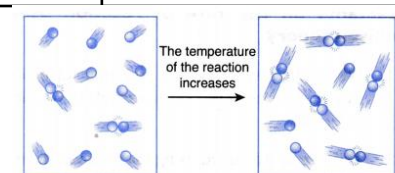
<b>Collision theory</b>	States that for two particles to react they must: - Collide with each other - Collide with enough energy to react
<b>Activation energy</b>	The minimum energy that two particles must have when they collide in order to react.
<b>Effect of concentration on rate</b>	Increasing the concentration increases the rate because there are more particles in same volume so there is an increased collision frequency.



<b>Effect of surface area on rate</b>	Increasing the surface area (by decreasing particle sizes) increases the rate by increasing collision frequency.
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<b>Effect of pressure on rate</b>	Increasing the pressure increases the rate because particles are pushed closer together so there is increased collision frequency.
<b>Effect of temperature on rate</b>	Increasing the temperature increases the rate because particles move faster so they collide more frequently, and collide with more energy so more collisions are successful.



- At a lower temperature, the particles move slower. Frequency of collision is lower.
- At a higher temperature, the particles move faster. Frequency of collision is higher.



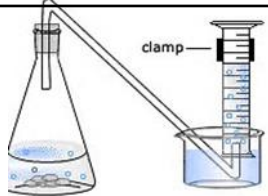
## Separate Chemistry C17 to C19: Groups, rates and heat changes

### 7. Core practical – rates of reaction

**Video of practical** Search you tube – ‘Edexcel core practical rates of reaction’

**Aim** To explore the rate of two reactions by collecting gas and observing a colour change.

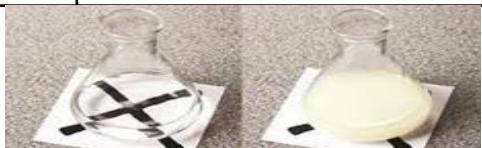
**Gas collection – setup** Place a measuring cylinder full of water upside down in a basin of water. Place 5 g of marble chips in a conical flask with 40 cm<sup>3</sup> hydrochloric acid. Insert a bung with delivery tube and insert the delivery tube into the measuring cylinder.



**Gas collection – measurement** Record the volume of gas collected every 15 seconds until it stops.

**Gas collection – results** The amount of gas collected increases quickly at first and then more slowly. The smaller marble chips produce gas more quickly, but the same amount in total.

**Colour change – setup** Draw a cross on a piece of paper and place a beaker on it. Measure out 50 cm<sup>3</sup> of sodium thiosulfate solution and 5 cm<sup>3</sup> of hydrochloric acid into two test tubes and leave to warm in a water bath at 30°C.



**Colour change – run the experiment** Quickly pour both test tubes into the beaker, mix and start the stopwatch. Looking down through the beaker, stop when you can no longer see the cross.

**Colour change – variations** Repeat with water baths set to 35°C, 40°C, 45°C and 50°C.

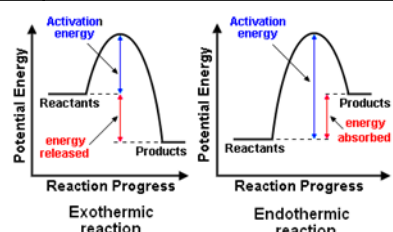
**Colour change – results** The cross disappears most quickly at 50°C and least quickly at 30°C.

### 8. Catalyst

**Catalyst** A substance that speeds up a chemical reaction without being used up.

**Effect of catalysts on rate** Catalysts increase the rate of reaction by reducing the activation energy so that a greater proportion of collisions lead to reactions.

**Reaction profile** A graph that shows the changes in energy during a reaction. Starts with large ‘hump’ that represents the activation energy.



**Effect of catalysts on reaction profiles** The ‘hump’ representing the activation energy is smaller.



**Enzyme** A protein that works as a catalyst to speed up the reactions in our cells.

**Enzymes in alcohol production** Alcoholic drinks are produced using enzymes found in yeast which catalyse a reaction that turns glucose into ethanol.

### 9. Endothermic and exothermic reactions

**Exothermic reaction** A reaction that transfers energy to the surroundings (gets hotter).

**Exothermic reaction examples**

- Neutralisation
- Displacement
- Combustion
- Some precipitation
- Respiration

**Endothermic reaction** A reaction that absorbs energy from the surroundings (gets colder)

**Endothermic reaction examples**

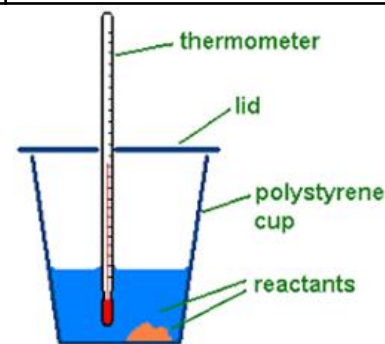
- Dissolving (most) salts
- Some precipitation
- Photosynthesis

**Exothermic reaction profile** The reactants have more energy than the products, so their line on the graph is higher.

**Endothermic reaction profile** The reactants have less energy than the products, so their line on the graph is lower.

**Measuring energy changes**

- Sit a polystyrene beaker inside a glass beaker (insulation)
- Measure the starting temperature of the reactants.
- Mix the reactants in the polystyrene beaker
- Cover with lid fitted with a thermometer
- Monitor and record the lowest temperature.



### 10. Explaining energy changes

**Chemical bonds in reactions** During chemical reactions, old chemical bonds are broken and new ones are formed.

**Energy changes and bond formation** The energy change in a reaction is the difference between the energy required to break the old bonds and the energy released by making the new ones.

**Exothermic reactions and bonds** Exothermic reactions give out more energy making bonds than is needed to break bonds.

**Endothermic reactions and bonds** Endothermic reactions gives out less energy making bonds than is needed to break bonds.

**Bond strength** The energy required to break one mole of a particular covalent bond in kJ/mol.

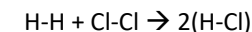
**Calculating energy changes from bond strengths** Add up the total strength of reactant bonds broken and subtract the total strength of product bonds made.

A negative answer is exothermic.  
Positive = endothermic

#### Energy change example:

Hydrogen and chlorine react to form hydrogen chloride. The bond strengths are as follows:  
H-H = 436 kJ/mol, Cl-Cl = 240 kJ/mol, H-Cl = 428 kJ/mol.

Calculate the energy change of the reaction



**Bonds broken** = 436 + 240 = 676

**Bonds made** = 2 x 428 = 856

Reaction energy = bonds broken – bonds made

Reaction energy = 676 – 856 = -180 kJ/mol

The reaction is exothermic because the answer is negative.

# Combined and Separate Physics P4: Waves

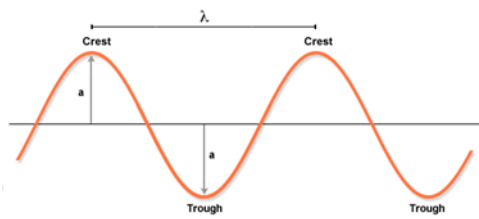
## Combined and Separate Lessons

1. Waves
2. Wave speed
3. Core practical – investigating waves
4. Refraction

### Separate only lessons

5. Waves crossing boundaries
6. Ears and hearing
7. Ultrasound
8. Infrasound

<b>Medium</b>	The material that waves travel through. Light waves are the only waves that have no medium.
<b>Seismic waves</b>	Waves of vibrating rock caused by earthquakes.
<b>Frequency</b>	The number of waves that pass a point every second.
<b>Hertz</b>	The unit of frequency. 1 Hz = 1 wave per second.
<b>Period</b>	The length of time it takes for a single wave to pass.
<b>Wavelength</b>	The distance in m from the top of one wave to the top of the next.
<b>Amplitude</b>	The maximum distance a particle vibrates away from its resting point,



$a = \text{amplitude}$       $\lambda = \text{wavelength}$

**Velocity**     The speed of a wave in m/s.

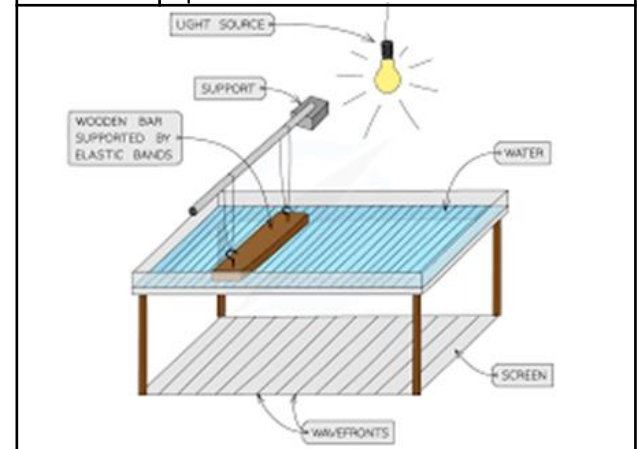
## 2. Wave speed

<b>Speed, distance and time</b>	$\text{wave speed (m/s)} = \frac{\text{distance (m)}}{\text{time (s)}}$ $V = d/t$
<b>Speed, frequency and wavelength</b>	$\text{wave speed } \left(\frac{m}{s}\right) = \text{frequency (Hz)} \times \text{wavelength (m)}$ $V = f \times \lambda$
<b>Measuring wave speed</b>	Time how long they take to travel a certain distance.

<b>Measuring speed of sound</b>	Measure the time it takes for a sound to travel a certain distance. e.g echo of a loud sound
<b>Measuring speed of waves on water</b>	Measure the time it takes for a wave to travel between two fixed points such as buoys.
<b>Changing speed</b>	Waves travel at a different speed in a different medium. Light is slower in water than air.

## 3. Core practical – investigating waves

<b>Video for practical</b>	You tube search 'Edexcel core practical investigating waves'
<b>Aim</b>	To measure the speed of waves in a liquid and a solid.

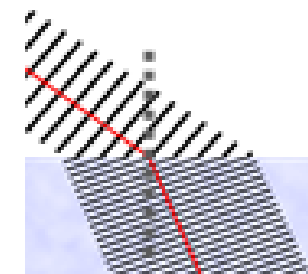


<b>Measuring water waves 1</b>	<ol style="list-style-type: none"> <li>1. Set up ripple tank with dipper near one side</li> <li>2. Count the number of waves in 10 s and use this to find the frequency.</li> <li>3. Measure the wavelength with a ruler</li> <li>4. Wave speed = frequency x wavelength</li> </ol>
--------------------------------	---

<b>Water waves 2</b>	<ol style="list-style-type: none"> <li>1. Time how long a wave takes to pass two points marked on ripple tank.</li> <li>2. Wave speed = distance / time</li> </ol>
<b>Waves in a solid</b>	<ol style="list-style-type: none"> <li>1. Hit suspended metal bar with hammer and measure the frequency using an app.</li> <li>2. Measure the metal bar – double the length gives the wavelength</li> </ol>

## 4. Refraction

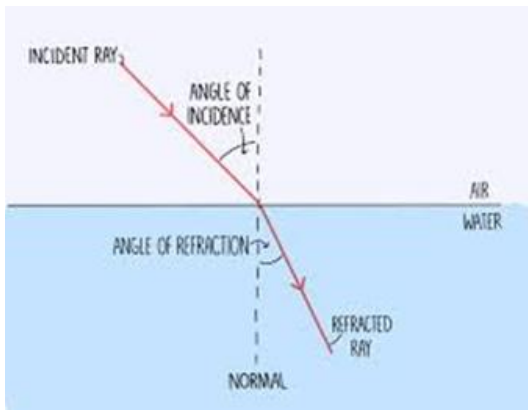
<b>Refraction</b>	Bending of waves when they enter a new medium at an angle.
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<b>Interface</b>	The boundary between two media (mediums) such as air and water.
<b>Normal</b>	An imaginary line drawn at 90° to where light hits an interface (boundary).
<b>Travelling from air to glass or water</b>	Light bends towards the normal
<b>Travelling from glass or air to water</b>	Light bends away from the normal.

1. Waves	
<b>Waves</b>	Transfer energy without transferring matter.
<b>Oscillate</b>	When particles vibrate backwards and forwards or up and down.
<b>Transverse waves</b>	Waves in which particles oscillate at right angles to the direction of energy movement. E.g. water waves and light waves.
<b>Longitudinal waves</b>	Waves in which particles oscillate parallel to the direction of energy movement. E.g. sound waves.

# Combined and Separate Physics P4: Waves



**Explaining refraction**  
Light waves slow down as they go from air to water. The 'bottom' of the wave hits the water and slows down first, causing refraction.

## 5. Waves crossing boundaries (separate only)

**absorb**  
When a wave disappears as the energy it is carrying transfers to the medium through which it is travelling.

**transmit**  
When a wave passes through a material and is not absorbed or reflected.

## 6. Ears and hearing (separate only)

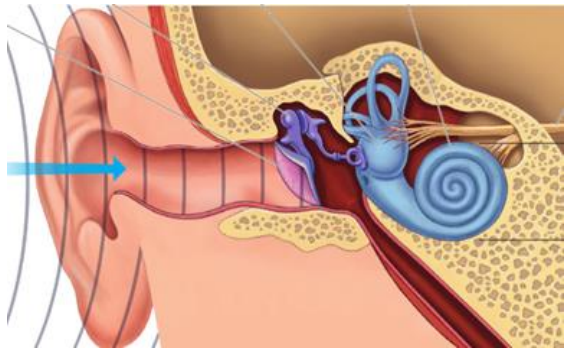
**amplify**  
Make bigger

**auditory nerve**  
The nerve that carries impulses from an ear to the brain.

**ear canal**  
The tube in the head that leads to the eardrum.

**cochlea**  
The part of the ear that changes vibrations into electrical impulses.

**eardrum**  
A thin membrane inside the ear that vibrates when sound reaches it.



**impulse**  
An electrical signal that travels in the nervous system.

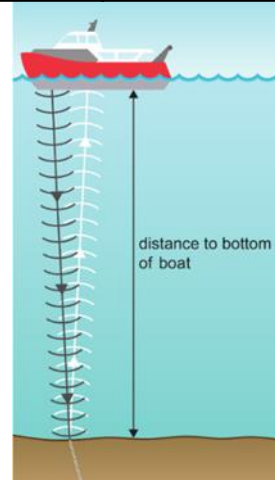
**neurone**  
A cell that transmits electrical impulses in the nervous system.

## 7. Ultrasound (separate only)

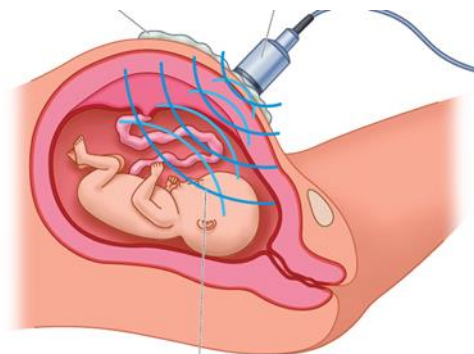
**ultrasound**  
Sound waves with a frequency above 20 000 Hz, which is too high for the human ear to detect



**sonar**  
A way of finding the distance to an underwater object (such as the sea bed) by timing how long it takes for a pulse of ultrasound to be reflected.



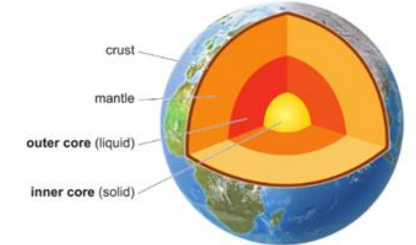
**Ultrasound scan**  
A way of making an image of part of the body (usually a fetus) using ultrasound waves reflected from parts of the inside of the body.



## 8. Infrasound (separate only)

**infrasound**  
Sound waves with a frequency below 20 Hz, which is too low for the human ear to detect

**Seismic waves**  
Waves produced by an explosion or earthquake and that travel through the Earth. They include P waves and S waves.

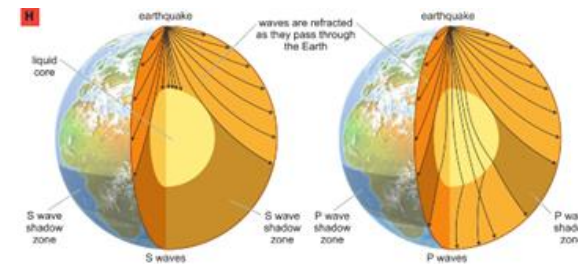


**P- waves**  
Longitudinal seismic waves that travel through the Earth

**S - Waves**  
Transverse seismic waves that travel through the Earth.

**seismometer**  
An instrument that detects seismic waves.

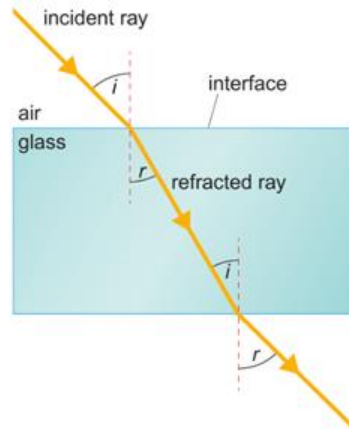
**Shadow zone**  
A part of the Earth's surface that P waves or S waves from an earthquake do not reach because of the way they have been reflected or refracted within the Earth.



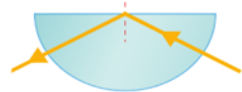


**Lesson sequence**

1. Ray diagrams (separate only)
2. Core practical - Investigating refraction
3. Colour (separate only)
4. Lenses (separate only)
5. Electromagnetic waves
6. The electromagnetic spectrum
7. Using the long wavelengths
8. Radiation and temperature (separate only)
9. Core practical – investigating radiation (separate only)
10. Using the short wavelengths
11. Dangers of EM radiation



**total internal reflection** The reflection of a ray of light inside a medium such as glass or water when it reaches an interface. Total internal reflection only happens when the angle of incidence inside the material is greater than the critical angle.



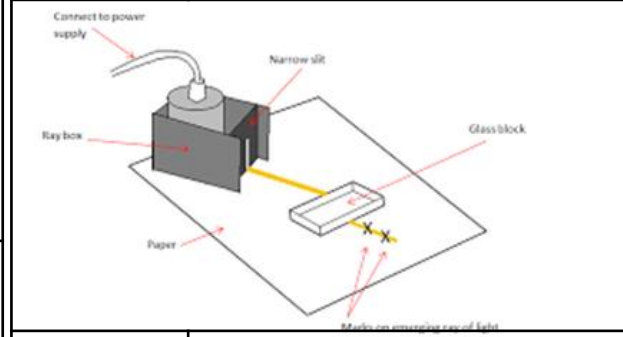
**2. Core practical – Investigating refraction**

<b>Video for practical</b>	Search you tube 'Edexcel core practical investigating refraction'
<b>Angle of incidence</b>	Angle between the incident ray and the normal
<b>Angle of refraction</b>	Angle between the refracted ray and the normal.
<b>Aim</b>	To explore how changing the angle of incidence changes the angle of refraction

**Setup**

Place a glass block on a sheet of paper, point a beam of light from a ray box at it, trace around the block and draw crosses to mark the rays.

Join crosses with a ruler



**Measurement**

Use a protractor to draw a normal, then measure the angles of incidence and refraction.

**Variations**

Repeat 5 times, from 5 different angles, including head-on.

**Results**

The greater the angle of incidence, the greater the angle of refraction.

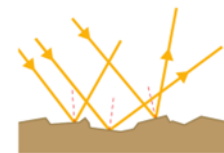
**3. Colour (separate only)**

**absorb**

Soak up or take in

**diffuse**

Reflection from rough surface



**filter**

Transmits certain colours and absorbs the rest

**luminous**

Makes its own light

**specular**

Reflection from smooth surface

**transmit**

Passes through and not absorbed

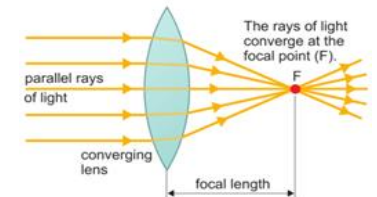
**Visible spectrum**

7 colours of white light

**4. Lenses (separate only)**

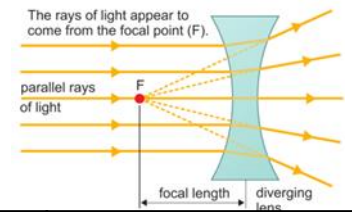
**converging**

Brings rays together



**diverging**

Spreads rays apart



**Focal length**

Distance from lens to focal point

**Focal point**

Where rays converge or appear to come from

**object**

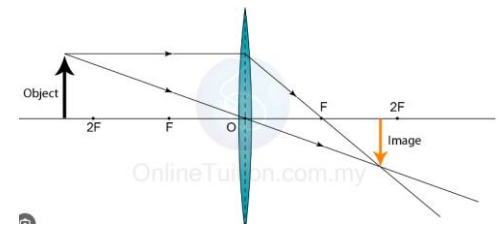
Thing looked at by lens

**Power (lens)**

Bend rays more and shorter focal length if stronger

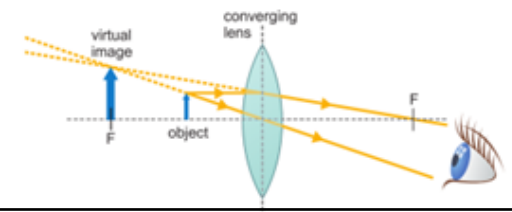
**Real image**

Can form on a screen



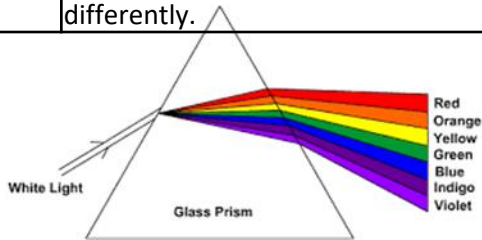
**Virtual image**

Rays only appear to come from image



# Separate Physics P5: Light and the electromagnetic spectrum

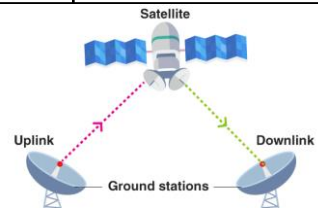
5. Electromagnetic waves	
<b>Electromagnetic waves</b>	Transverse waves that travel at the speed of light.
<b>Speed of light</b>	300,000,000 m/s ( $3 \times 10^8$ m/s)
<b>Frequency</b>	The number of waves that pass a point every second.
<b>Wavelength</b>	The distance in m from the top of one wave to the top of the next.
<b>EM wave similarities</b>	All are transverse, all travel at the speed of light.
<b>EM wave differences</b>	Different frequencies, different wavelengths.
<b>Visible light</b>	The only type of EM radiation that our eyes can detect.
<b>Refraction and wave speed</b>	Light travels at different speeds in different materials causing it to refract when hitting the interface at an angle.
<b>Prisms and the colour spectrum</b>	Different wavelengths slow down by different amounts when they hit glass causing each colour to refract differently.



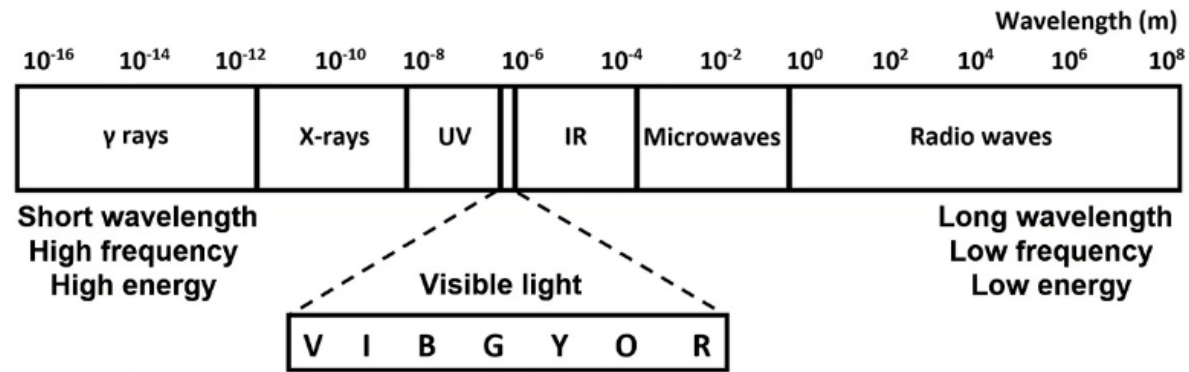
<b>Infrared discovery</b>	Light split into a spectrum. Thermometer placed in every colour and next to red. Red was hot, next to red was hottest.
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6. The electromagnetic spectrum	
<b>EM spectrum</b>	The full range of types of EM radiation.
<b>EM spectrum</b>	<b>R</b> ubbish <b>M</b> emories <b>I</b> nclude <b>V</b> isiting <b>U</b> r <b>X</b> Girlfriend
<b>EM Radiation in atmosphere</b>	Some EM radiation (visible, radio) passes through the atmosphere, most is absorbed.
<b>Space telescopes</b>	For radiation absorbed by the atmosphere, a telescope must be placed in space.

7. Using the long wavelengths	
<b>Visible light uses</b>	Illumination, photography
<b>Infrared uses</b>	Short-range communications (TV remotes), fibre optics, cooking (grills and toasters), security cameras.
<b>Microwave uses</b>	Microwave ovens, mobile phone and satellite communications.

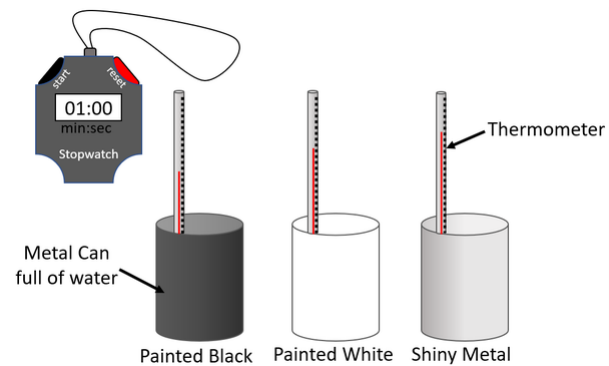


<b>Radio wave uses</b>	Radio and TV signals.
<b>Producing radio waves</b>	Oscillating electricity in a metal rod produces radio waves.
<b>Receiving radio waves</b>	Radio waves absorbed by a metal rod cause electrical oscillations.



8. radiation and temperature (separate only)	
<b>Greenhouse effect</b>	Warming of Earth by gases absorbing Earth's energy and reemitting it back
<b>Greenhouse gas</b>	Carbon dioxide, water vapour or methane -
<b>Power (energy transfer)</b>	Amount of Joules transferred every second
<b>Watts (W)</b>	Unit to measure power (1W = 1J/s)

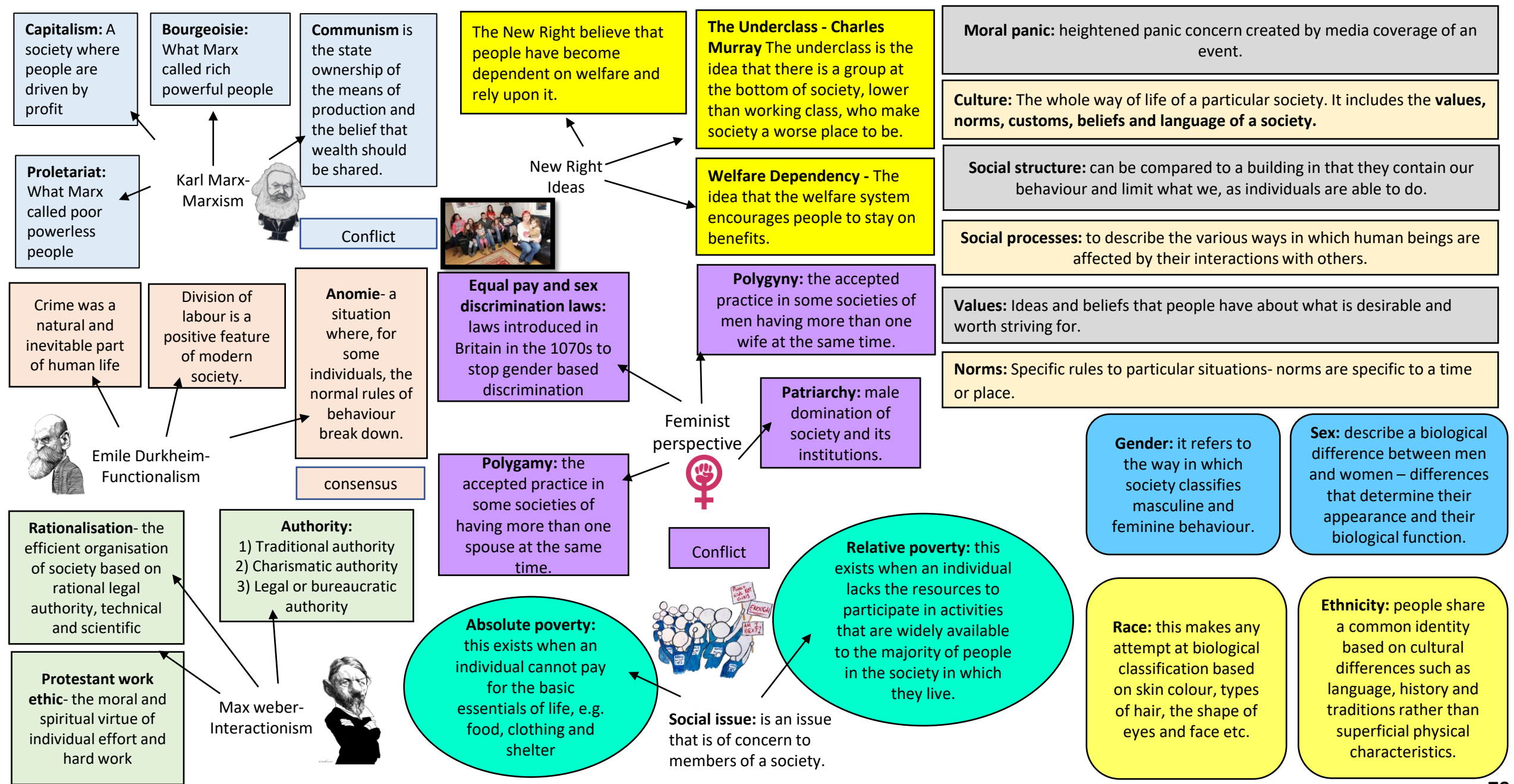
9. Core practical – investigating radiation (separate only)	
<b>Video for practical</b>	Search you tube 'Edexcel core practical investigating radiation'



10. Using the short wavelengths	
<b>Fluorescence</b>	Absorbing ultraviolet and re-emitting it as visible light.
<b>Ultraviolet uses</b>	Fluorescent security inks, fluorescent light bulbs, sterilising water.
<b>X-ray uses</b>	Hospital x-rays, baggage scanners.
<b>Gamma ray uses</b>	Killing bacteria on food or surgical instruments, detecting and treating cancer.

11. EM radiation dangers	
<b>Infrared dangers</b>	Surface heating causing burns.
<b>Microwave dangers</b>	Absorbed by water causing it to heat up → burns under the skin.
<b>Ionisation</b>	High energy radiation causes ions to form in our cells, damaging DNA and causing cancer.
<b>Ultraviolet dangers</b>	Skin cancer, snow blindness.
<b>X-ray dangers</b>	Cancer
<b>Gamma ray dangers</b>	Cancer

# SOCIOLOGY: Year 10 - Sociological Approaches Knowledge Organiser





# SOCIOLOGY: Year 10 - Research Methods Knowledge Organiser

**Postal / Email Questionnaires:**

- ✓ Quick
- ✓ Easy to send to lots of people (representative & reliable).
- ✗ Response rate is about 10%
- ✗ Might not understand the questions (less valid).

**Structured/ Semi-structured Interviews:**

- ✓ All participants are asked the same questions (reliable)
- ✓ Can explain what questions mean (valid);
- ✓ Ability to explain answers further in a semi-structured interview (valid).
- ✗ Interviewer bias

**Informal (Unstructured) Interviews:**

- ✓ Participants can talk about what is important to them (valid)
- ✓ The researcher can ask the participant what their answers mean (valid).
- ✗ Every interview is different, hard to compare the results of all the interviews (less reliable)

**Group interviews**

- ✓ Access a wide range of views and experiences
- ✓ Participants may feel more at ease.
- ✓ Save time and money
- ✗ Some may dominate discussion/everyone might not be heard
- ✗ Cannot assure confidentiality

**Participant observation**

- ✓ Watch how participants behave (valid)
- ✓ Can see the world from participants' point of view (valid).
- ✗ If participants know they are being observed, then they will not act naturally
- ✗ The researcher might have to get involved in criminal behaviour (unethical)
- ✗ If participants do not know they are being observed, then they can not give their permission (consent – unethical).

**Official Statistics**

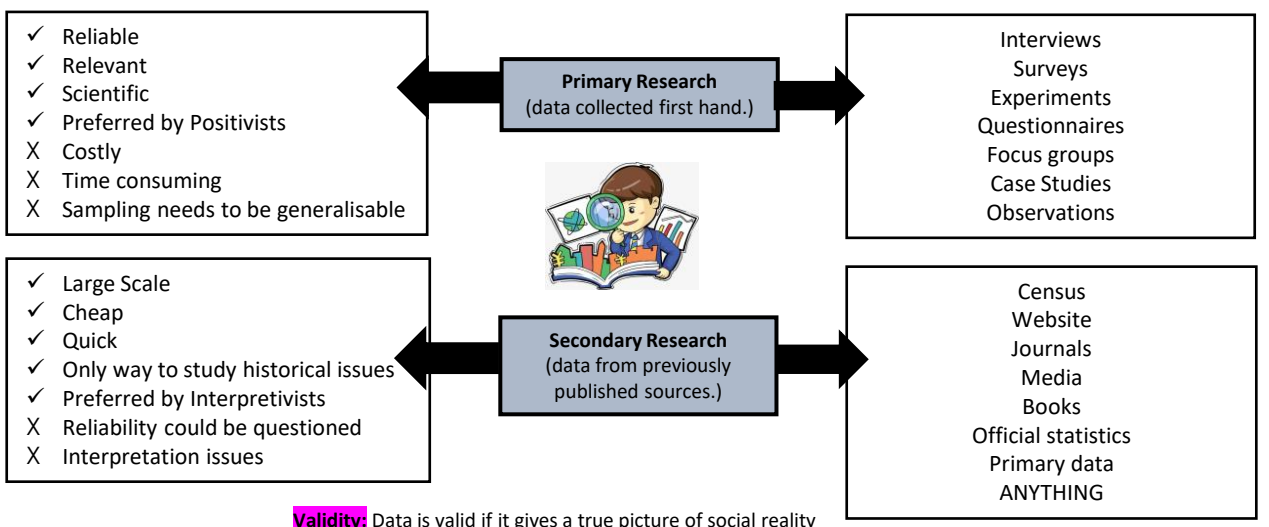
- ✓ The data is usually based on the whole population (representative).
- ✓ May be the only source of data
- ✓ Can investigate trends over time
- ✗ Cannot check the validity
- ✗ Could be politically biased

**Qualitative Data:**  
Data presented in words or visual form e.g. diary, photographs, mass media

**Quantitative Data:**  
Data presented in numerical form presented in graphs, pie charts or tables of statistics e.g. official statistics

**Overt:**  
The group is aware of the researcher and knows that he or she is watching the behaviour of the group

**Covert:**  
The researcher joins the group without telling the members that he or she is researching them.



<b>Closed (or fixed-choice) questions</b>	<ul style="list-style-type: none"> <li>✓ Easy to process and present</li> <li>✗ Doesn't allow for the respondent to expand on their answer</li> </ul>
<b>Open-ended questions</b>	<ul style="list-style-type: none"> <li>✓ Able to give a more detailed answer</li> <li>✗ Difficult to convert into statistics</li> <li>✗ More time consuming to process</li> </ul>

**An unrepresentative sample:** difficult to generalise. Some Groups are overrepresented

**A representative sample:** typical of the wider population

Sampling Methods						
Probability (or random) sampling			Non-probability sampling			
random sampling	Systematic sampling	Stratified sampling	Snowball sampling	Quota sampling	Purposive sampling	Voluntary sampling
Use a computer to generate a random sample, everyone has as much chance as the other.	The researcher uses a system to pick the participants (e.g. every 10th name on the register).	This involves picking people from different groups within the population	The researcher selects one person, then asks them to put them in touch with other people, etc.	Each interviewer has an exact number of people from categories that they need e.g. females, teenagers.	The sample is collected according to a known characteristic e.g. a teacher.	use the participants that are self-selected.

## La familia Family

el padre / la madre	father / mother
el padrastro / la madrastra	step-father / step-mother
el hermano / la hermana	brother / sister
el hermanastro / la hermanastra	step-brother / step-sister
el abuelo / la abuela	grandfather / grandmother
el bisabuelo / la bisabuela	great grandfather / great grandmother
el tío / la tía	uncle / aunt
el primo / la prima	male cousin / female cousin
el sobrino / la sobrina	nephew / niece
el marido / la mujer	husband / wife
el hijo / la hija	son / daughter
el nieto / la nieta	grandson / granddaughter
mayor / menor	older / younger

## ¿Te llevas bien con tu familia?

Do you get on well with your family?

(No) Me llevo bien con...porque...	I (don't) get on well with... because...
me apoya	he/she supports me
me acepta como soy	he/she accepts me as I am
nunca me critica	he/she never criticises me
tenemos mucho en común	we have a lot in common
Me divierto con...	I have a good time with...
Me peleo con...	I argue with...
Nos llevamos superbién.	We get on really well.
Nos llevamos como el perro y el gato.	We fight like cat and dog.
Nos divertimos siempre.	We always have a good time.

## ¿Cómo es? What is s/he like?

Tiene los ojos...	S/He has .....eyes
azules / verdes / marrones / grises	blue / green / brown / grey
grandes / pequeños / brillantes	big / small / bright
Tiene el pelo...	S/he has... hair
moreno / rubio / castaño / rojo	dark brown / blond / mid-brown / red
corto / largo	short / long
rizado / liso / ondulado	curly / straight / wavy
fino / de punta	fine / spiky
Tiene...	S/he has...
la piel blanca / morena	fair / dark skin
la cara redonda / alargada	a round / oval face
los dientes prominentes	big teeth
pecas	freckles
Lleva...	S/he wears / has...
gafas	glasses
barba	a beard
bigote	a moustache
Es...	S/he is...
alto/a / bajo/a	tall / short
delgado/a / gordito/a / gordo/a	slim / chubby / fat
calvo/a	bald
moreno/a	dark-haired
rubio/a	fair-haired
castaño/a	brown-haired
pelirrojo/a	a redhead
español / española	Spanish
inglés / inglesa	English
peruano / peruana	Peruvian
Mide 1,60.	S/he is 1m60 tall.
No es ni alto ni bajo.	S/he is neither tall nor short.
(No) Nos parecemos físicamente.	We (don't) look like each other.



## Carácter Character

Como persona, es...	As a person, s/he is...
optimista / pesimista	optimistic / pessimistic
simpático/a / antipático/a	nice / nasty
trabajador(a) / perezoso/a	hard-working / lazy
generoso/a / tacaño/a	generous / mean
hablador(a) / callado/a	chatty / quiet
divertido/a / gracioso/a / serio/a	fun / funny / serious
fiel / infiel	loyal / disloyal
feliz / triste	happy / sad
ordenado/a / caótico/a	tidy / chaotic
enérgico/a / animado/a / tranquilo/a	energetic / lively / calm
pensativo/a	thoughtful
comprensivo/a	understanding
honesto/a	honest
alegre	cheerful
molesto/a	annoying
ambicioso/a	ambitious
egoísta	selfish
Está feliz / triste.	S/he is happy / sad.

## Un buen amigo A good friend

Un buen amigo es alguien que...	A good friend is someone who...
te escucha	listens to you
te apoya	supports you
te conoce bien	knows you well
te acepta como eres	accepts you as you are
te da consejos	gives you advice
te hace reír	makes you laugh
te quiere mucho	likes / loves you a lot
no te critica	doesn't criticise you
nunca te juzga	never judges you
Conocí a mi mejor amigo/a...	I met my best friend...
Nos conocimos	We met / got to know each other
Nos hicimos amigos	We became friends
Nos hicimos novios	We started going out
convivimos	we lived together
nos casamos	we got married
Es el amor de mi vida	He/She is the love of my life
Tenemos ... en común.	We have ... in common.
nos gustan (las mismas cosas)	we like (the same things)
nos encantan (las películas)	we love (films)

# Module 3

# SPANISH



Soy / Es adicto/a a...	I am / S/he is addicted to...
Estoy / Está enganchado/a a...	I am / S/he is hooked on...
Lo único malo es que...	The only bad thing is that ...
te engancha	it gets you hooked



## ¿Qué aplicaciones usas? What apps do you use?

Uso ... para...	<i>I use ... (in order) to...</i>		
ver mis series favoritas	<i>watch my favourite series</i>		
organizar las salidas con mis amigos	<i>organise to go out with my friends</i>		
controlar mi actividad física / las calorías	<i>monitor my physical activity / my calory intake</i>		
contactar con mi familia	<i>get in touch with my family</i>		
chatear con mis amigos	<i>chat with my friends</i>		
La tengo desde hace ... meses.	<i>I've had it for ... months</i>		
Es una aplicación buena para...	<i>It's a good app for...</i>		
buscar y descargar música	<i>looking for and downloading music</i>		
pasar el tiempo / el rato	<i>passing the time</i>		
sacar / editar / personalizar fotos	<i>taking / editing / personalising photos</i>		
estar en contacto	<i>keeping in touch</i>		
conocer a nueva gente	<i>meeting new people</i>		
subir y ver vídeos	<i>uploading and watching videos</i>		
chatear y mandar mensajes	<i>chatting and sending messages</i>		
Es / No es...	<i>It is / It isn't...</i>		
una red social	<i>a social network</i>		
amplio/a	<i>extensive</i>	rápido/a	<i>quick</i>
cómodo/a	<i>convenient</i>	fácil de usar	<i>easy to use</i>
divertido/a	<i>fun</i>	popular	<i>popular</i>
necesario/	<i>necessary</i>	útil	<i>useful</i>
peligroso/a	<i>dangerous</i>	gratis	<i>free</i>
práctico/a	<i>practical</i>		
un canal de comunicación	<i>a channel / means of</i>		
una pérdida de tiempo	<i>a waste of time</i>		

## ¿Qué estás haciendo? What are you doing?

Estoy...	<i>I am...</i>
actualizando mi página de Facebook	<i>updating my Facebook page</i>
editando mis fotos	<i>editing my photos</i>
Estás / Está / Están...	<i>You are / S/he is / They are...</i>
escuchando música	<i>listening to music</i>
esperando a (David)	<i>waiting for (David)</i>
descansando	<i>relaxing</i>
pensando en salir	<i>thinking about going out</i>
preparando algo para merendar	<i>preparing something for tea</i>
repasando para un examen	<i>revising for an exam</i>
tomando el sol	<i>sunbathing</i>
haciendo footing	<i>jogging</i>
haciendo el vago	<i>lazing about</i>
leyendo	<i>reading</i>
viendo una peli	<i>watching a film</i>
escribiendo	<i>writing</i>
¿Quieres salir conmigo?	<i>Do you want to go out with me?</i>
No puedo porque...	<i>I can't because...</i>
está lloviendo	<i>it's raining</i>
tengo que...	<i>I have to...</i>
salir	<i>go out</i>
visitar a (mi abuela)	<i>visit (my grandmother)</i>
cuidar a (mi hermano)	<i>look after (my brother)</i>
hacer los deberes	<i>do homework</i>
quiero...	<i>I want to...</i>
subir mis fotos a...	<i>upload my photos to...</i>
quedarme en casa	<i>stay at home</i>
¡Qué rollo!	<i>What a pain!</i>
¿A qué hora quedamos?	<i>What time shall we meet?</i>
¿Dónde quedamos?	<i>Where shall we meet?</i>
en la Plaza Mayor	<i>in the main square</i>
debajo de	<i>underneath</i>
detrás de	<i>behind</i>
delante de	<i>in front of</i>
enfrente de	<i>opposite</i>
al lado de	<i>next to</i>

## Ir al cine, al teatro, etc.

*Going to the cinema, theatre, etc.*

¿Qué vamos a hacer...	<i>What are we going to do...</i>
esta tarde?	<i>this afternoon / evening?</i>
esta noche?	<i>tonight?</i>
mañana / el viernes?	<i>tomorrow / on Friday?</i>
¿Tienes ganas de ir...	<i>Do you fancy going...</i>
a un concierto / un festival?	<i>to a concert / a festival?</i>
a un espectáculo de baile?	<i>to a dance show?</i>
al cine / al teatro / al circo?	<i>to the cinema / theatre / circus?</i>
¿Qué ponen?	<i>What's on?</i>
Es una película / obra de...	<i>It's a ... film / play</i>
¿A qué hora empieza / termina?	<i>What time does it start / finish?</i>
Empieza / Termina a las...	<i>It starts / finishes at...</i>
Dos entradas para..., por favor.	<i>Two tickets for ..., please.</i>
para la sesión de las...	<i>for the ... showing / performance</i>
No quedan entradas.	<i>There are no tickets left.</i>
¿Hay un descuento para estudiantes?	<i>Is there a discount for students?</i>
Aquí tiene mi carné de estudiante.	<i>Here is my student card.</i>



## ¿Qué te gusta leer?

*What do you like reading?*

los blogs	<i>blogs</i>
los tebeos / los cómics	<i>comics</i>
los periódicos	<i>newspapers</i>
las revistas	<i>magazines</i>
las poesías	<i>poems</i>
las novelas de ciencia ficción	<i>science fiction novels</i>
las novelas de amor	<i>romantic novels</i>
las historias de vampiros	<i>vampire stories</i>
las biografías	<i>biographies</i>



## Leer es un placer Reading is a pleasure

¿Qué es mejor,	<i>What is better,</i>
leer en papel o en la red?	<i>reading paper books or online?</i>
Leer en formato digital...	<i>Reading in digital format...</i>
protege el planeta	<i>protects the planet</i>
no malgasta papel	<i>doesn't waste paper</i>
cansa la vista	<i>tires your eyes</i>
depende de la energía eléctrica	<i>relies on electricity</i>
te permite llevar contigo miles de libros	<i>allows you to take thousands of books with you</i>
cuesta mucho menos	<i>costs a lot less</i>
fastidia porque no hay numeración de páginas	<i>is annoying because there is no page numbering</i>
Los libros electrónicos / Los e-books...	<i>Electronic books / E-books...</i>
son fáciles de transportar	<i>are easy to transport</i>
son más ecológicos / baratos	<i>are more environmentally-friendly /cheaper</i>
no ocupan espacio	<i>don't take up space</i>
Una desventaja es...	<i>One disadvantage is...</i>
el uso de batería	<i>the battery use</i>
Me gusta / prefiero...	<i>I like / I prefer...</i>
tocar las páginas	<i>to touch the pages</i>
pasar las páginas a mano	<i>to turn the pages by hand</i>
escribir anotaciones	<i>to write notes</i>
leer horas y horas	<i>to read for hours and hours</i>
un ratón de biblioteca	<i>a bookworm</i>
un fan del manga	<i>a manga fan</i>
un libro tradicional	<i>a traditional book</i>
un libro de verdad	<i>a real book</i>

## ¿Con qué frecuencia lees?

*How often do you read?*

cada día / todos los días	<i>every day</i>
a menudo	<i>often</i>
generalmente	<i>generally</i>
de vez en cuando	<i>from time to time</i>
una vez a la semana	<i>once a week</i>
dos veces al mes	<i>twice a month</i>
una vez al año	<i>once a year</i>
nunca	<i>never</i>



## Mis ratos libres My free time

las actividades de ocio	leisure activities
Tengo muchos pasatiempos.	I have lots of hobbies.
A la hora de comer...	At lunchtime...
Cuando tengo tiempo...	When I have time...
Después del insti...	After school...
Los fines de semana...	At weekends...
Mientras desayuno / como...	Whilst I have breakfast / lunch...
juego al billar / fútbolín	I play billiards / table football
monto en bici / monopatín	I ride my bike / I skateboard
quedo con mis amigos	I meet up with friends
voy de compras	I go shopping
mi pasión es la música / la lectura	my passion is music / reading
Suelo...	I tend to / I usually ...
descansar	rest
escuchar música / la radio	listen to music / the radio
hacer deporte	do sport
ir al cine	go to the cinema
leer libros / revistas / periódicos	read books / magazines / newspapers
salir con amigos	go out with friends
usar el ordenador	use the computer
ver la tele	watch TV
Es divertido / relajante / sano	It's fun / relaxing / healthy
Soy creativo/a / perezoso/a / sociable	I'm creative / lazy / sociable
Soy adicto/a a...	I'm addicted to...
me ayuda a relajarme	it helps me to relax
me ayuda a olvidarme de todo	it helps me to forget everything
me hace reír	it makes me laugh
necesito comunicarme / relacionarme	I need to communicate
con otra gente	with other people



## Mis ratos libres My free time

Soy / Era...	I am / I used to be...
(bastante / muy) deportista	(quite / very) sporty
miembro de un club / un equipo	a member of a club / a team
aficionado/a / hincha de...	a fan of...
un(a) fanático/a de...	a ... fanatic
juego al... /jugué al.../jugaba al...	I play.../I played.../I used to play....
bádminton / baloncesto	badminton / basketball
béisbol / balonmano	baseball / handball
críquet / fútbol	cricket / football
hockey / ping-pong	hockey / table tennis
rugby / tenis / voleibol	rugby / tennis / volleyball
hago.../hice.../hacia...	I do.../I did.../I used to do...
baile / boxeo / ciclismo	dancing / boxing / cycling
deportes acuáticos	water sports
equitación / escalada	horseriding / climbing
gimnasia / judo	gymnastics / judo
kárate / natación	karate / swimming
patinaje sobre hielo	ice skating
piragüismo / remo	canoeing / rowing
submarinismo	diving
tiro con arco	archery
voy... / fui.../ iba....	I go.../I went..../I used to go...
a clases de...	to ... classes
de pesca	fishing
ya no (juego)...	(I) no longer (play)...
todavía (hago)...	(I) still (do)...
batir un récord	to break a record
correr	to run
entrenar	to train
jugador un partido contra...	to play a match against...
marcar un gol	to score a goal
montar a caballo	to go horseriding
participar en un torneo	to participate in a tournament
patinar	to skate
mi jugador(a) preferido/a es...	my favourite player is...
su punto culminante fue cuando...	the highlight (of his/her career) was when..
el campeón / la campeona	the champion
la temporada	the season



## Los modelos a seguir Role models

Admiro a...	I admire...
Mi inspiración / ídolo es...	My inspiration / idol is...
...es un buen / mal modelo a seguir	...is a good / bad role model
Un buen modelo a seguir es alguien que...	A good role model is someone who...
apoya a organizaciones benéficas	supports charities
recauda fondos para...	raises money for...
tiene mucho talento / éxito	is very talented / successful
trabaja en defensa de los animales	works in defence of animals
usa su fama para ayudar a los demás	uses his / her fame to help others
se emborrachan	they get drunk
se comportan mal	they behave badly
se meten en problemas con la policía	they get into trouble with the police
es amable / cariñoso/a / fuerte	he/she is nice / affectionate / strong
lucha por / contra...	he/she fights for / against...
la pobreza / la homofobia	poverty / homophobia
los derechos de la mujer	women's rights
los derechos de los refugiados	the rights of refugees
los niños desfavorecidos	underprivileged children
la justicia social	social justice
a pesar de sus problemas...	despite his/her problems...
ha batido varios récords	he/she has broken several records
ha creado...	he/she has created...
ha ganado ... medallas / premios	he/she has won ... medals / awards
ha sufrido varias enfermedades	he/she has suffered several illnesses
ha superado sus problemas	he/she has overcome his/her problems
ha tenido mucho éxito como...	he/she has had lots of success as...
siempre sonríe	he/she always smiles
solo piensa en los demás	he/she only thinks of other people



## Highly frequent verbs

Preterite		Imperfect		Present		Immediate future		Future		Conditional	
fui	<i>I was</i>	era	<i>I used to be</i>	soy	<i>I am</i>	voy a ser	<i>I am going to be</i>	seré	<i>I will be</i>	sería	<i>I would be</i>
fue	<i>S/he/it was</i>	era	<i>s/he/it used to be</i>	es	<i>S/he/it is</i>	va a ser	<i>You are going to be</i>	será	<i>S/he will be</i>	sería	<i>S/he would be</i>
fuiamos	<i>We were</i>	éramos	<i>We used to be</i>	somos	<i>We are</i>	vamos a ser	<i>We are going to be</i>	seremos	<i>We will be</i>	seríamos	<i>We would be</i>
fueron	<i>They were</i>	eran	<i>They used to be</i>	son	<i>They are</i>	van a ser	<i>They are going to be</i>	serán	<i>They will be</i>	serían	<i>They would be</i>
hice	<i>I did</i>	hacía	<i>I used to do</i>	hago	<i>I do</i>	voy a hacer	<i>I'm going to do</i>	haré	<i>I will do</i>	haría	<i>I would do</i>
hizo	<i>S/he did</i>	hacía	<i>S/he used to do</i>	hace	<i>S/he does</i>	va a hacer	<i>S/he is going to do</i>	hará	<i>S/he will do</i>	haría	<i>S/he would do</i>
hicimos	<i>We did</i>	hacíamos	<i>We used to do</i>	hacemos	<i>We do</i>	vamos a hacer	<i>We are going to do</i>	haremos	<i>We will do</i>	haríamos	<i>We would do</i>
hicieron	<i>They did</i>	hacían	<i>They used to do</i>	hacen	<i>They do</i>	van a hacer	<i>They are going to do</i>	harán	<i>They will do</i>	harían	<i>They would do</i>
fui	<i>I went</i>	iba	<i>I used to go</i>	voy	<i>I go</i>	voy a ir	<i>I'm going to go</i>	iré	<i>I will go</i>	iría	<i>I would go</i>
fue	<i>S/he went</i>	iba	<i>S/he used to go</i>	va	<i>S/he goes</i>	va a ir	<i>S/he is going to go</i>	irá	<i>S/he will go</i>	iría	<i>S/he would go</i>
fuiamos	<i>We went</i>	íbamos	<i>We used to go</i>	vamos	<i>We go</i>	vamos a ir	<i>We are going to go</i>	iremos	<i>We will go</i>	iríamos	<i>We would go</i>
fueron	<i>They went</i>	iban	<i>They used to go</i>	van	<i>They go</i>	van a ir	<i>They are going to go</i>	irán	<i>They will go</i>	irían	<i>They would go</i>

# SPANISH



### 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.

(2nd Type)

### Si + Imperf subj + condicional

### If + imperfect subjunctive + conditional \*\*Hypothetical situation\*\*

Si **podiera**, **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.

(3rd Type)

### Si + pluperfe subj + condicional pasado

### If + pluperfect subjunctive + past conditional \*\*Hypothetical situation in the past\*\*

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.