The Trafalgar School at Downton

# Knowledge Organiser

**Year 11: Terms 1 and 2**

**2025/2026**

Name……Tutor ……

# Contents

**Use fronted adverbials:**

**Rather slowly**, (manner)
**During the night**, (time/temporal)
**Every minute or two**, (frequency)
**At the end of the corridor**, (spatial)

**Just beyond the stairwell on his left**, he opened the door.

**Use a two and then three word sentence:**

It hurt. I was dying!

Snow fell. Flakes floated precariously.

**Use anaphora:**

**Now is the time** for action. **Now is the time** to take up arms. **Now is the time** to fight for your country.

**Use epiphora (epistrophe)**

I can't believe I was robbed. Everything is **gone**. My television and electronics are **gone**. The money I left on my nightstand is **gone**.

**Use a range of sentence structures:**

The spotted green frog jumped into the pond.
**(simple)**

The spotted green frog jumped into the pond **and** he splashed water on me.
**(compound – coordinating conjunction: for, and, nor, but, or, yet, so)**

The spotted green frog jumped into the pond **when** the hawk flew overhead.
**(complex – subordinating conjunction: if, although, as, before, because, when, after, since, until, so that, while etc.)**

**When the hawk flew overhead**, the spotted green frog jumped into the pond.
(subordinate/dependent clause start)

The frog, **which had been lurking underwater,** jumped on the lily pad.
**(embedded clause)**

**Use a past participle - 'ed' start:**
**Glazed** with barbecue sauce, the rack of ribs lay nestled next to a pile of sweet coleslaw.

**Use a present participle - 'ing' start:**
**Whistling** to himself, he walked down the road.

**Use a tricolon (tripartite list):**

'I stand here today **humbled** by the task before us, **grateful** for the trust you have bestowed, **mindful** of the sacrifices borne by our ancestors.'

Snap! Crackle! Pop! **(Rice Krispies slogan)**

**Use a conditional sentence:**

When people smoke cigarettes, their health suffers.

If I had cleaned the house, I could have gone to the cinema.

**Use paired adjectives to describe a noun:**

Take a look at this bright red spider.

Luckily, it isn't a wild, dangerous one.

**Use anadiplosis (yoked sentence):**

Building the new motorway would be **disastrous, disastrous** because many houses would need to be destroyed.

'Fear leads to **anger**. **Anger** leads to **hate**. **Hate** leads to suffering.'
Yoda, *Star Wars*.


**Use different sentence types:**
The wind is blowing. **(declarative)**

Put your pen down. **(imperative)**

Who do you trust most in the world? **(interrogative)**

Pollution is killing us! **(exclamation)**

**Use discourse markers to begin paragraphs and start/link some sentences:**
First of all, To begin with, Firstly,

Therefore, Consequently, Hence, As a result,

Furthermore, In addition, Additionally, Moreover,

Meanwhile, Later that day, Seconds later, Subsequently, That afternoon,

On the whole, Interestingly, Basically, In short, Broadly speaking,

Alternatively, Conversely, Similarly, On the other hand, Despite this, Likewise, However,

To conclude, Finally, In conclusion, Eventually, In the end,

# PUNCTUATION PIT STOP

## Full Stop

**Full stops are used to:**

1) **mark the end of a sentence.**

Carefully, he kicked the ball into the goal.

**2) show when a word has been abbreviated.**

Saint Peter's Road is on the High Street.

→ St. Peter's Road is on the High Street.

## COMMAS

**Commas are used to separate:**

**1) items in a list .**

Bert, Ernie and Elmo are my three pet rats.

**2) dependent clauses and phrases.**

While I was in the bath, the cat scratched at the door. That meant, because I was on my own in the house, I had to get out to let him in. Thankfully, I had a towel handy!

## Quotation Marks

**Quotation marks show exact words that are spoken or written by someone.**

'Don't be late!' shouted Mrs Smith.

'I will be,' Molly said, and added, 'so don't expect me before 11.'

## Question Mark

**Question marks are used at the end of direct questions instead of a full stop.**

What is your favourite food?

How do you feel today?

**An indirect question ends with a full stop rather than a question mark:**

I'd like to know what you've been doing all this time. I wonder what happened.

## Exclamation Mark

**Exclamation marks express strong emotions: forcefulness, commands, anger, excitement, surprise etc.**

Don't buy that car! Stop telling me what to do! I'm free! You're late! She actually won!

**They're also used for most interjections:**

'Hi! What's new?' 'Ouch! That hurt.'

'Oh! When are you going?'

## Semi-colon

**Semi-colons are used to separate two sentences that are closely related:**

It was winter; the snow was falling heavily.

**They can also be used to separate items in a list made of longer phrases.** I have been to Newcastle, Carlisle, and York in the North; Bristol, Exeter, and Portsmouth in the South; and Cromer, Norwich, and Lincoln in the East.

## Colon

**Colons are used to:**

1) **begin a list.**

I have three pet rats: Bert, Ernie and Elmo.

2) **indicate that what follows it is an explanation or elaboration of what precedes it.**

Unfortunately, the weather forecast was wrong: it rained all day!

## Apostrophe

**An apostrophe is used to show:**

1) **omission - where a letter or letters has been missed out.**

does not → doesn't I am →I'm

**2) possession – when some thing/one owns something.** Thankfully, they played Susan's game. Interestingly, David's house has no garden, but Susan's ~~house~~ does.

## Dash –

**Dashes are used for parenthesis: a word or phrase inserted as an explanation or afterthought into a passage which is grammatically complete without it. E.g.**

Last year, they roasted the winning brisket — the size of a pillow — in a mighty clay oven. Paul felt hungry – more hungry than he'd ever been.

## Brackets

**Brackets are used in pairs for parenthesis: a word or phrase inserted as an explanation or afterthought into a passage which is grammatically complete without it. E.g.**

Andrew Jacklin (last year's losing finalist) is expected to win this heat.

Tigers are carnivores (meat eaters)!

## Ellipsis ...

**Ellipsis is used to:**

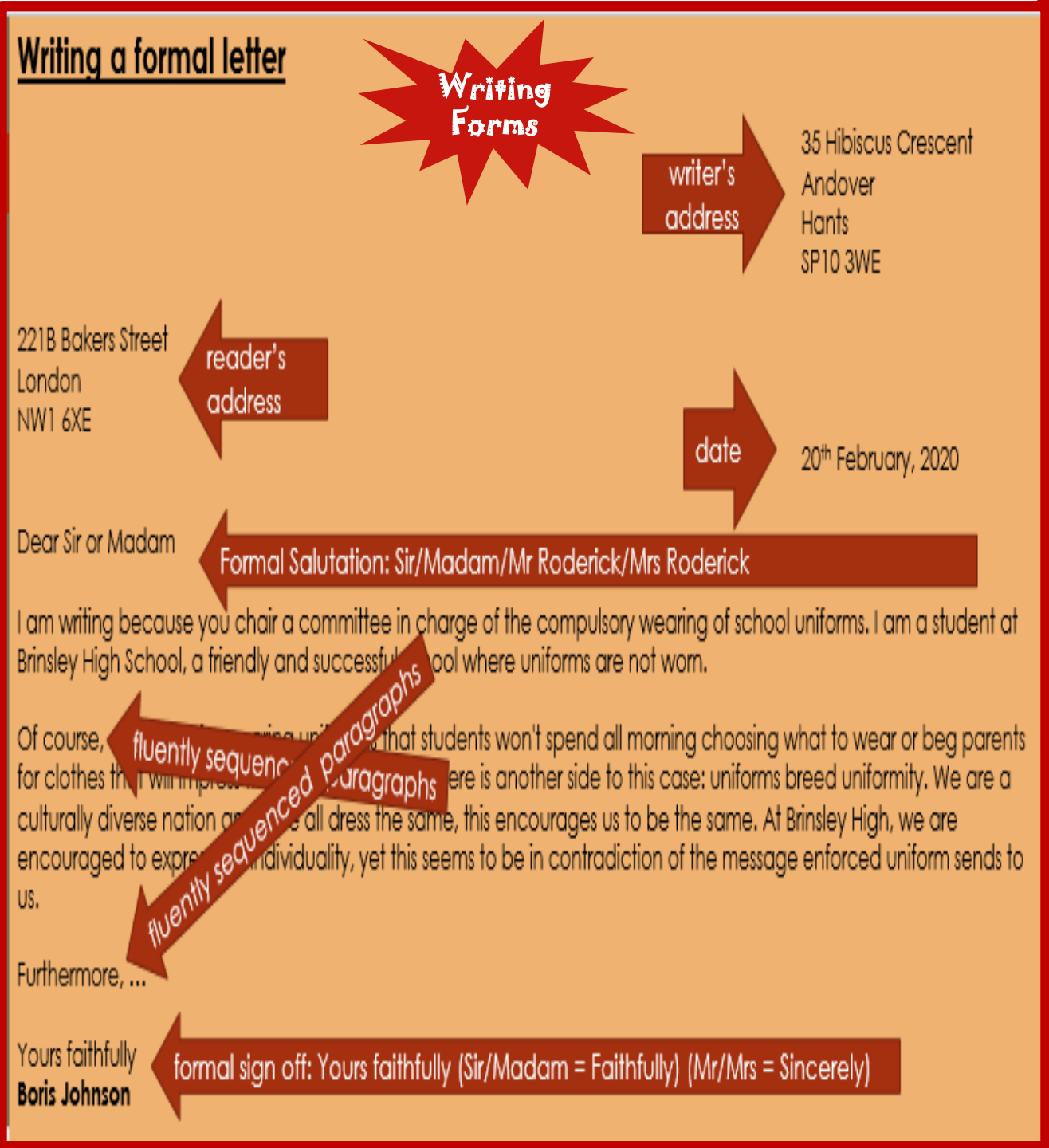
1) **show a pause or hesitation in someone's speech or thought.**

I don't know … I'm not sure.

**2) build tension or show that something is unfinished.**

Looking up, Paul couldn't believe what he saw …

# Writing a formal letter




**Dystopian Narrative: *The Machine Stops* by E.M. Forster**

Above her, beneath her, and around her, the Machine hummed eternally; she did not notice the noise, for she had been born with it in her ears. The earth, carrying her, hummed as it sped through silence, turning her now to the invisible sun, now to the invisible stars. She awoke and made the room light.

"Kuno!"

"I will not talk to you," he answered, "until you visit me."

"Have you been on the surface of the earth since we spoke last?"

His image faded.

Again she consulted the book. She became very nervous and lay back in her chair palpitating. She directed the chair to the wall, and pressed an unfamiliar button. The wall swung apart slowly. Through the opening she saw a tunnel that curved slightly, so that its goal was not visible. Should she go to see her son, this would be the beginning of the journey.

Of course she knew all about the communication-system. There was nothing mysterious in it. She would summon a car and it would fly with her down the tunnel until it reached the lift that communicated with the air-ship station: the system had been in use for many, many years, long before the universal establishment of the Machine. Those funny old days, when men went for change of air instead of changing the air in their rooms! And yet — she was frightened of the tunnel: she had not seen it since her last child was born.

**Writing a Narrative: extract is from The Silent Land, by Graham Joyce.**

It was snowing again. Gentle six-pointed flakes from a picture book were settling on her jacket sleeve. The mountain air prickled with ice and the smell of pine resin. Several hundred metres below lay the dark outline of Saint-Bernard-en-Haut, their Pyrenean resort village; across to the west, the irregular peaks of the mountain range.

...

If there are few moments in life that come as clear and as pure as ice, when the mountain breathed back at her, Zoe knew that she had trapped one such moment and that it could never be taken away. Everywhere was snow and silence. Snow and silence; the complete arrest of life; a rehearsal and a pre-echo of death. She pointed her skis down the hill. They looked like weird talons of brilliant red and gold in the powder snow as she waited, ready to swoop. I am alive. I am an eagle.

...

The noise itself filled her ears and muffled everything, and then there was silence, and the total whiteness faded to grey, and then to black!

**Climax (turning point, height of action/problem at its worst):**

- use exciting adverbs and verbs;
- accelerate pace and heighten tension using lots of shorter sentences.

Fail to Plan
Plan to Fail!

**Rising Action (build towards conflict):**

- build on character, setting, plot;
- introduce a complication/problem;
- build tension/ excitement;
- use interesting adjectives, sensory description, figurative language etc.

**Freytag's Pyramid/ the Story Mountain is the best for planning narratives (stories).**

**Falling action (turning point, height of action/problem at its worst):**

- what events happen to solve the problem?

**Exposition (Introduction):**

- use an opening hook to grab attention e.g. mysterious atmosphere, in medias res, etc.
- use descriptive vocabulary to set the scene and describe the main character/setting;
- foreshadow what is to come.

**Dénouement/Resolution (ending):**

- link back to the start (circular);
- what has the character learned?
- how are things different now?
- is there an exciting twist or cliff-hanger ending?

**Intro:** My address right hand side, + date, school address left,
Dear Mr Cole
Should we consider discontinuing wearing a school uniform, you've asked? Quite simply, yes! Within this letter, you will find several arguments setting out precisely why we should make this change.

**Conclusion**: To conclude, repeat RQ, Quite simply, yes!

Yours Sincerely

**Form:** Letter
**Audience**: Headmaster
**Purpose**: Argue change uniform

P1

**Counter reason:** old-fashioned tradition, so easier to continue
**Argument reason**: other traditions - burnt witches, slept on straw, walked barefoot – now discontinued so …
**Supporting example**: anecdote, use experts

P2

**Counter reason:** all look same so no prejudice/bullying over clothes,
**Argument reason**: no individualism, learning who we are
**Supporting example**: RQ +triple
Isn't part of our learning at school about learning how to dress appropriately, learning who we are, learning how to judge people on what is inside, not what wear?

P3

**Counter reason:** cost cheaper as not designer or from shops making huge profit
**Argument reason**: cost of blazers, trousers and skirts from school uni shop expensive as no competition, own clothes mix 'n' match so fewer outfits needed, wear weekends so more use,
**Supporting example**: emotive language: force poorer families to go without, statistics

**Mind maps/spider diagrams, allow you to jot down content ideas in no particular order and then decide on the best order to write them up in – so they're ideal for non-fiction writing. Each leg = a paragraph**

## Context: *Macbeth* was written by William Shakespeare, and was first performed around 1606.

**Shakespeare wrote across the periods of two monarchs**: **Elizabeth I** (Elizabethan) and **James I** (Jacobean). His plays written during Elizabeth's reign are generally happy and joyful, reflecting the mood of her time. However, darker plays such as ***Macbeth*** reflect the more unstable era of **King James I**. Only a year before the play was written, there had been an attempt to kill him: **the Gunpowder Plot**. Therefore ***Macbeth's plot,*** the torment and punishment of a traitor who committed regicide (kill a King) and the restoration of a 'rightful' heir, would have appealed to **King James I**.

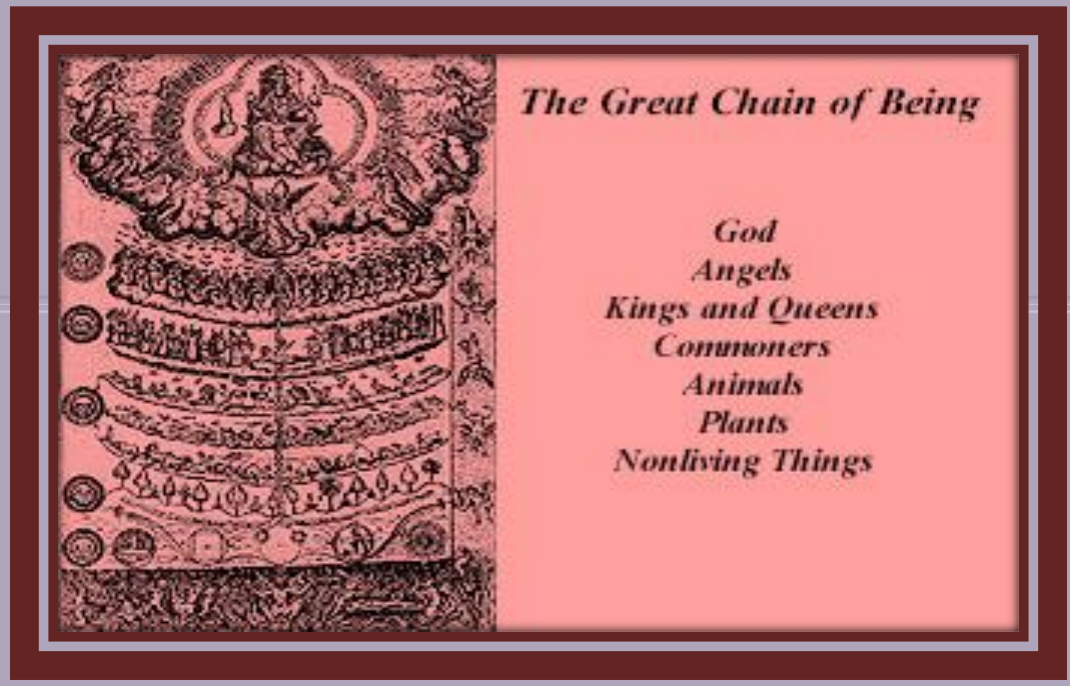
He had been **King of Scotland** for 36 years when he became **King of England** (1603). He was an admirer of Shakespeare's plays, and then a patron of his acting company. **King James's** family claimed to have descended from an historical figure named Banquo, as Shakespeare alludes to in the Witches' prophesy 'you shall get Kings', so there's no doubt he had **King James I** in mind when writing a play about Scottish ancestry.

Despite the strength and popularity of Elizabeth I, society was **patriarchal:** women were **inferior** to men, the **weaker** sex, expected to be **obedient**. They **belonged** to their fathers (bothers if fathers had died) and then their husbands. Their role was clearly defined: marry, bear children, be **subservient** to men. Lady Macbeth's more masculine traits of strength, intelligence, political ambition and violent cruelty, asking to be 'unsexed', and referred to by Macbeth as his 'partner of greatness', would have been perceived as **unnatural**, **dangerous,** and shocked the audience.

# Year 11 Terms 1&2

# Macbeth KNOWLEDGE ORGANISER

At the time, **superstition**, the belief in **witches and the supernatural** was very strong; many so-called 'witches' were burnt at the stake. King James came to believe that he and his wife had been personally targeted by **witches** who conjured dangerous storms to try to kill them during their voyages across the North Sea, and that a **witchcraft** conspiracy threatened his reign! He passed a law to execute witches, and wrote a book, ***Demonology,*** a study of the conspiracy between humans and demons, and evils of magic. The **Witches' prophecies**, Macbeth seemingly **possessed**, and his vivid **hallucinations,** would have been taken very seriously by the audience, and of course appealed to the interests and ego of **King James I**!




People believed they were part of a strict hierarchy, **The Great Chain of Being**, with God at the top. Kings were thought to have been appointed by **divine right** (selected by God), so higher than the rest of mankind; to question this was to question God himself. King James I (James VI of Scotland) often quoted the **divine right of Kings**, his right to rule deriving directly from the will of God, to establish his authority with an assertive English Parliament. A play about a 'God-given' king being usurped, and the ensuing punishment of the king-slayer, would have gone down well with **King James I**!

# Scene-by-Scene Summary and Key Quotations:

| | | |
|---|---|---|
| **Act 1 Sc 1** | Three witches meet on a heath. They plot to trick Macbeth at a later time. | ***'Fair is foul, foul is fair; Hover through the fog and filthy air.'*** |
| **Act 1 Sc 2** | King Duncan is told of Macbeth's bravery in battle. He tells a messenger to greet Macbeth with news of his promotion to Thane of Cawdor. | ***'No more that Thane of Cawdor shall deceive ... ... And with his former title greet Macbeth.'*** |
| **Act 1 Sc 3** | The witches confront Macbeth and Banquo, and deliver their prophecies. The messenger arrives to tell Macbeth that he is the new Thane of Cawdor! | ***'All hail Macbeth, hail to thee, Thane of Glamis! All hail Macbeth, hail to thee, Thane of Cawdor! ... king hereafter!'*** |
| **Act 1 Sc 4** | King Duncan pronounces Malcolm (his eldest son) to be his successor. | ***'that is a step, On which I must fall down, or else o'erleap'*** |
| **Act 1 Sc 5** | At Macbeth's castle, Lady Macbeth receives a letter from him outlining the witches' prophecies. She plans King Duncan's murder, but fears Macbeth too kind to fulfil his ambition. | ***'you spirits That tend on mortal thoughts, unsex me ..., And fill me from the crown to the toe top - full Of direst cruelty'*** |
| **Act 1 Sc 6** | King Duncan arrives at Macbeth's castle. He is full of compliments for the Macbeths. | ***'Conduct me to mine host, we love him highly, And shall continue our graces towards him.'*** |
| **Act 1 Sc 7** | Macbeth has doubts about the assassination. Lady Macbeth talks him around! | ***'If it were done, when 'tis done, then 'twere well It were done quickly'*** |
| **Act 2 Sc 1** | Banquo and Fleance arrive. When they depart to bed, Macbeth sees a vision of a dagger leading him towards King Duncan's chamber – views it as a positive sign. | ***'Is this a dagger which I see before me, The handle toward my hand? Come let me clutch thee.'*** |
| **Act 2 Sc 2** | Macbeth kills the King, and emerges from the chamber shaken. He has forgotten to place the daggers with the chamberlains to absolve himself of blame. Lady Macbeth has to return them. | ***'Sleep no more! Macbeth does murder sleep ... Will all great Neptune's ocean wash this blood Clean from my hand?'*** |
| **Act 2 Sc 3-4** | Macduff arrives and finds King Duncan dead. Macbeth explains that he killed the guilty-looking chamberlains in rage! King Duncan's sons flee. Macbeth is named King! | ***'The night has been unruly...strange screams of death ... the earth Was feverous and did shake.'*** |
| **Act 3 Sc 1** | Macbeth, fearing the prophecies about Banquo's descendants sitting on the throne, arranges to have Banquo and Fleance killed. | ***'It is concluded. Banquo, thy soul's flight, If it find heaven, must find it out tonight.'*** |
| **Act 3 Sc 2-3** | Macbeth tells his wife of his plan to kill Banquo, but not the details. Elsewhere, the murderers kill Banquo, but Fleance escapes. | ***'We have scorched the snake not killed it ...O full of scorpions is my mind ...Be innocent of the knowledge, dearest chuck'*** |
| **Act 3 Sc 4** | Macbeth holds a banquet. He sees the ghost of Banquo and becomes hysterical. Lady Macbeth eventually asks the guests to leave. | ***'But now I am cabined, cribbed, confined, bound in ... Which of you have done this?'*** |
| **Act 3 Sc 5-6** | The witches are scolded by Hecate for their meddling. Elsewhere, Lennox tells of Macduff gathering an army to fight Macbeth. | ***'May soon return to this our suffering country Under a hand accursed.'*** |
| **Act 4 Sc 1** | Macbeth again visits the witches, and through terrible apparitions is given several new prophecies regarding his fate. The witches then vanish. | ***'beware Macduff; ... none of woman born Shall harm Macbeth ... never vanquished be, until Great Birnam wood to ... Dunsinane hill'*** |
| **Act 4 Sc 2-3** | Macduff's wife and children are murdered by Macbeth's assassins. Macduff and Malcom unite in order to fight Macbeth. | ***'Macbeth Is ripe for shaking, and the powers above Put on their instruments.'*** |

## Scene-by-Scene Summary and Key Quotations:

| | | |
|---|---|---|
| **Act 5 Sc 1** | A doctor and gentlewoman watch Lady Macbeth sleepwalk. She talks of the murders of Duncan and Banquo, and imagines stubborn blood on her hands. | ***'Out damned spot, out I say! … Yet who would have thought the old man to have had so much blood in him?'*** |
| **Act 5 Sc 2** | Lords discuss how the rebel army will gather at Birnam Wood. | ***'What does the tyrant?'*** |
| **Act 5 Sc 3-4** | Macbeth boasts that none of woman born can harm him. Malcolm's forces gather at Birnam Wood. | ***'I will not be afraid of death and bane, Till Birnam forest come to Dunsinane.'*** |
| **Act 5 Sc 5** | A scream is heard at Macbeth's castle. Lady Macbeth is dead (suicide). Macbeth reacts numbly. A messenger reveals that the trees of Birnam Wood are advancing! | ***'Out, out brief candle! Life's but a walking shadow, a poor player …heard no more.'*** |
| **Act 5 Sc 6-7** | The battle begins. Macbeth fights without fear. The castle is breached. | ***'abhorred tyrant'*** |
| **Act 5 Sc 8-9** | Macbeth and Macduff finally meet. Macduff reveals that he was born by caesarean section (not 'by woman born.') He kills Macbeth. Malcolm is proclaimed King. | ***'Macduff was from his mother's womb Untimely ripped… Hail, King of Scotland!'*** |

## The Structure of a Tragedy Play:

The **tragic hero** is established as a character of noble stature and greatness, a good man.

He suffers from **hamartia:** a fatal flaw - a personal failing or wrong judgement - that eventually will cause his downfall. Macbeth's **hamartia** is his 'vaulting ambition' which leads to his death.

He experiences **hubris**: excessive pride/confidence and disrespect for the natural order of things. Macbeth kills a King and believes 'none of woman born shall harm' him.

There is a **peripeteia**: turning point. In Act 3.1 Macbeth believes he must now keep killing in order to protect his power.

**Anagnorisis** occurs: crucial discovery. Macbeth realises he is not invincible as 'Macduff was from his mother's womb untimely ripped'.

The tragic hero cannot escape his **nemesis**: a punishment that the protagonist cannot avoid, usually occurring as a result of his **hubris.** Macbeth's inevitable death is a punishment for regicide.

The audience experience **catharsis**: some feelings of pity, and relief for the downfall of the protagonist. We experience this when Macbeth is killed, justice is done and a moral balance is restored.

## Main Characters: remember each character has been constructed by Shakespeare for a purpose.

**Macbeth** represents bravery, ambition, betrayal and guilt. He is the lead protagonist of the play, the tragic hero. He is introduced as a Scottish general who is a loyal warrior, a brave and skilled soldier. However, he is easily persuaded to commit the murder of a king that he loves as the witches' prophecies and his wife's goading transform him into a morally weakened and psychotic tyrant. He becomes a cruel and destructive king, who responds to all threats (including his own insecurities) through violence and murder.

**Lady Macbeth** represents ambition, cunning, manipulation and guilt. She's a rebel who challenges the submissive role of women, and the **divine right of kings** . At the beginning of the play, she seems stronger than Macbeth, urging and aiding him to kill Duncan. Later, however, she becomes tormented with guilt and madness, unable to come to terms with what they have done. Her conscience affects her to such a degree that she eventually commits suicide.

**King Duncan**, King of Scotland, symbolises nobility, dignity and trust. A compliment to royalty, he is respected, trusting, but then betrayed as Macbeth murders him in order to fulfil his ambition and the witches' prophecy. He is a virtuous King, kind and loved, who is both compassionate and rational. When he dies, order in Scotland is shown to be shattered and only restored when his son, Malcolm, eventually takes the throne. **King Duncan** forms a stark contrast with Macbeth as king.

The **Macduffs** symbolise family, loyalty and vengeance, serving as a contrast to the Macbeths. **Macduff**, a Scottish nobleman, is dubious and hostile towards Macbeth's reign from the beginning. His wife and young son are murdered by Macbeth. **Macduff** leads the battle against Macbeth's tyrannical reign, eventually becoming the man who kills him (in line with the witches' prophecy as he was not of 'woman born.') In doing so, he helps Malcolm to the throne.

**Banquo** symbolises nobility, loyalty and trust. He is a brave and noble gentleman who is a friend and fellow soldier to Macbeth. **Banquo** is also given prophecies by the witches, but he chooses not to act on them and so is a **foil** to the character of Macbeth. After being murdered, **Banquo's** ghost returns to haunt Macbeth.


The **Witches** represent the supernatural, evil, trickery, and manipulation. They use charms, spells and prophecies to prompt Macbeth to murder and never give the full answer (they 'equivocate'), tempting him towards his tragic end; they pleasure in toying with human lives and emotions.


## Shakespeare's use of dramatic methods and meter in *Macbeth:*

| | |
|---|---|
| **dramatic irony** | Dramatic irony is when the audience is aware of something one or more character is not. Duncan trusts Macbeth while the audience know he's plotting his murder. |
| **soliloquy** | A soliloquy is a speech said by a character alone on stage. Shakespeare uses Macbeth's soliloquies to reveal his inner torment. |
| **aside** | An aside is intended to be heard by the audience, but not heard by other characters nearby on stage. Shakespeare reveals Macbeth's ambitions through asides. |
| **iambic pentameter & blank verse** | He writes most of the play in iambic pentameter and blank verse (not rhyming): da-DUM/ da-DUM/ da-DUM/ da-DUM /da-DUM. This controlled meter conveys power and authority. |
| **prose** | Normal speech. Shakespeare uses it to show **lack of power** (Lady M's attendants, the Murderers), **loss of formality** (M's letter to LM) or **loss of control** (LM sleepwalking). |
| **trochaic tetrameter** | A rhythmic pattern of four 'trochees' per line: DUM-da/DUM-da/DUM-da/DUM-da. He uses this when the witches speak their spells, making it sound like eerie chanting: DOUble/ DOUble/ TOIL and / TROUble |

# The main themes and ideas that lie beneath the surface of *Macbeth:*

**Ambition and Power**: Shakespeare exposes the dangers of ruthless ambition when it is not held by moral constraints. Ambition turns Macbeth from a brave and loyal Scottish general into a murderous tyrant. Lady Macbeth is another example of this, but she is unable to deal with the acts that she and Macbeth have committed to fuel their ambition, and so commits suicide. Shakespeare does not allow even a moment of enjoyment for the couple once the initial crime is committed, and Macbeth's actions become more bloody and cruel as he desperately attempts to hold on to power.

**Fate versus Free Will:** Throughout the play, the audience is frequently forced to question the notion of fate vs free will – does the story pan out the way that it does because it was destiny, or because of the actions that Macbeth chose to take?

**Inversion of the Natural Order:** Wherever the natural order is disturbed in ***Macbeth*** (the three supernatural witches, the murder of a king) disorder and chaos ensue. There is only peace when the natural order is restored (Malcolm is seated on the throne). In line with the beliefs of King James, **The Divine Right of Kings**, and **The Great Chain of Being**, through ***Macbeth***, Shakespeare conveys how the inversion of the natural order is dangerous and destructive.


**Gender:** The Macbeths' relationship challenges expectations of the time period. Lady Macbeth challenges what it means be a woman (be submissive, bear children, lack ambition etc.) and challenges Macbeth's masculinity when he doesn't want to kill Duncan.

**Appearance versus Reality**: From the very first scene ('Fair is foul, foul is fair') things are not what they seem. The natural order of the world is being challenged: people are being deceitful (Macbeths pretend to be welcoming/angry at Duncan's murder); the supernatural are interfering in the natural world; people are experiencing visions (dagger, blood, ghost,); Macbeth disrupts the natural succession of royalty; Lady Macbeth breaks gender norms!


# Language and structural methods Shakespeare frequently uses in *Macbeth:*

| | |
|---|---|
| **alliteration** | A number of words having the same first letter or sound placed close together in a series of words. |
| **allusion** | An indirect reference to a person, place, thing or idea of historical, cultural, literary or political significance. The writer would expect the reader to recognise the reference and so understand what's being alluded to. |
| **an Act** | A main division of a drama. Shakespeare's plays consist of five acts that are subdivided into scenes. |
| **foil** | A secondary character who contrasts with a major character and, in so doing, highlights various facets of the main character's personality. |
| **foreshadow** | A hint of what is to come in the story. This is often used to keep the audience in a state of expectancy. |
| **a Scene** | A small unit of a play in which there is no shift of locale or time. |
| **metaphor** | A figure of speech in which a word or phrase is applied to an object or action to which it is not literally applicable but suggests a comparison. Unlike similes, metaphors do not use 'like' or 'as'. |
| **simile** | A figure of speech that states a comparison between two unlike things which are similar in one aspect. Similes are introduced by 'like' or 'as'. |
| **symbolism** | One object representing another to give an entirely different meaning that is much deeper and more significant. |
| **personification** | A figure of speech in which a thing, an idea or an animal is given human attributes. |
| **repetition** | Using a word or phrase more than once. |

# Knowledge organiser *Macbeth* GCSE English Literature

## Key themes

| | |
|---|---|
| **Ambition** | Macbeth cannot resist the power of his ambition (his fatal flaw). Lady Macbeth's ambition is also limitless. Both characters disobey God to fulfil their ambitions. |
| **Appearance and reality** | The play is one where people's outward appearances cannot be trusted. For example, Lady Macbeth's reaction to hearing the news that Duncan was dead. |
| **Guilt** | Guilt plagues both Macbeth and Lady Macbeth. Lady Macbeth underestimates the level of guilt she will feel and pays for this with her life. |
| **Power** | Some of the most powerful characters are female, the Witches and Lady Macbeth. Both manipulate Macbeth. |
| **Chaos and disorder** | The events that follow Duncan's murder are marked by chaos and disorder, for example, the mental state of Macbeth and Lady Macbeth, the weather and the state of Scotland itself. Order is finally restored when Malcolm becomes the rightful King at the end of the play. |

## Setting – Scotland

Shakespeare presents Scotland after the murder as a godless, hell-like country, to match its new king. Failed crops, awful cries fill the air, and the country lives in darkness. Macbeth's declining mental state mirrors the state of the kingdom. Shakespeare suggests that challenging the natural order and living without God is the worst fate a man can have.

## Quotations

Decide which quotations you want to use to prove your points.

Remember that using short, integrated quotations is more effective than writing out large chunks of text.

## Key quotations

| | | |
|---|---|---|
| 'Look like the innocent flower but be the serpent under it.' | 'Fair is foul, foul is fair.' | 'Pour my spirits in thine ear' |
| 'I have no spur to prick the side of my intent, only vaulting ambition.' | 'Would all great Neptune's ocean wash this blood from my hands?' | 'Macbeth does murder sleep' |
| 'Black and midnight hags?' | 'My children too?'<br>'And I must be from thence!<br>My wife killed too?' | 'All the perfumes of Arabia' |
| 'She should have died hereafter;<br>There would have been time for such a word.' | 'Tomorrow and tomorrow and tomorrow' | 'Turn hell-hound, turn' |

## Some useful phrases

Shakespeare presents / hints / suggests / creates ...

Through the character of ... Shakespeare explores/questions ...

Shakespeare challenges the belief that ...

Shakespeare asks the audience to question/consider ...

Shakespeare reinforces this idea earlier/later in the play when ...

If you need some extra revision material, or you are absent for some reason during the *Macbeth* unit of work, scan the QR code for the EDUQAS blended learning resources.

## Key ideas

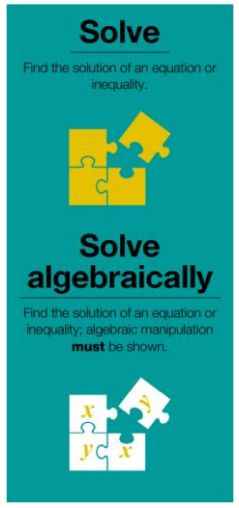
| | |
|---|---|
| **Religion** | Jacobean England was very religious. Heaven and Hell play heavily on Macbeth's mind and implies he is concerned about the destination of his immortal soul. |
| **Violence** | The play is filled with violence and conflict. The conflicts between good and evil, and between supernatural and the natural go across Scotland. |
| **Supernatural** | The inclusion of the witches is contextually significant as James I, the king at the time, believed in witchcraft and was wary of witches – like the audiences watching. |
| **Gender** | Shakespeare explores masculinity through the character of Macbeth. However, Macbeth's fear of being emasculated also allows Shakespeare to use his character to explore femininity. A complex idea. |
| **Regicide** | Shakespeare condemns regicide (the killing of a king). By presenting regicide as controlled by the witches, Shakespeare is implying that it is related to the devil and has severe religious consequences. |

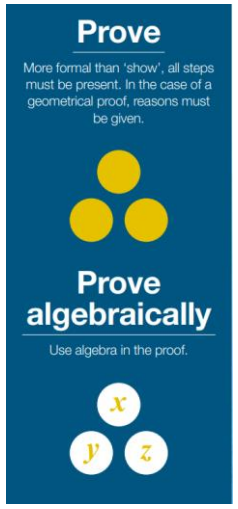
Year 11 Maths

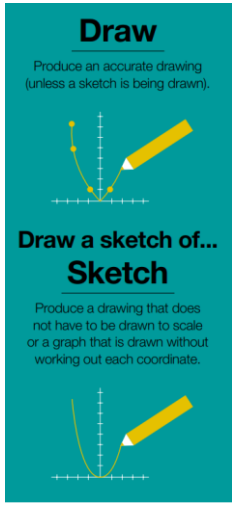
# Command Words in Maths questions

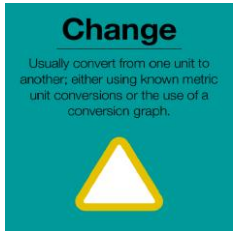
These words are the clue to what the examiner expects you to do. Remember to always show your workings. You can get marks for it, even if you get the final answer wrong.

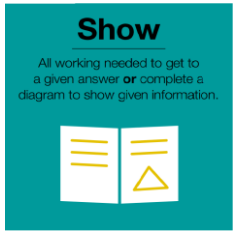


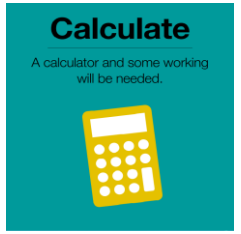



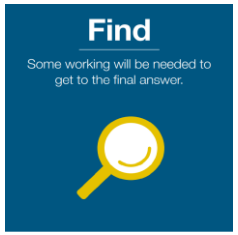



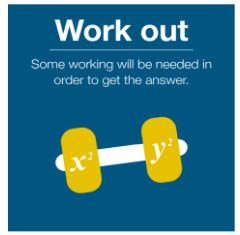



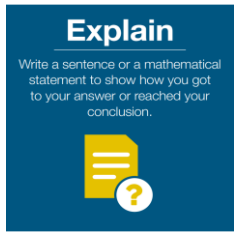




| TECHNICAL VOCABULARY | |
|---|---|
| Factor | A number which divides exactly into another. |
| Multiple | A multiple is a number made by multiplying two other numbers. |
| Prime | A prime number has exactly two factors. |
| Integer | The positive and negative whole numbers. |
| Estimate | Usually a calculation where the numbers have been rounded before the operation is performed. |
| Index (indices plural) | An index is a power or exponent. |
| Square root | Is the number that was multiplied by itself to get the square number. |
| Square number | Is a number that has been multiplied by itself. |
| Cube number | Is a number that is multiplied by itself then again by the original number. |
| Cube root | Is the number that was multiplied by itself and itself again to get the cube number |
| Numerator | The number on the top of the fraction. Shows how many part there are. |
| Denominator | The number on the bottom of the fraction. Shows how many equal parts the item is divided into. |
| Common denominator | When two or more fractions have the same denominator. |
| Equivalent | Having the same value |
| Inverse | The opposite mathematical operation. |
| Reciprocal | The number produced by dividing 1 by a given number |
| Odd | An integer that cannot be divided exactly by two. |
| Even | An integer that can be divided exactly by two. |

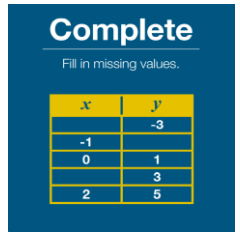










Websites to help you with understanding and revision

SparxMaths.com

CorbettMaths.com

Trafalgar Maths Site

Maths Genie

OnMaths

# Year 11 Term 1 Rounding, Estimation and Bounds

Sparx U298

## Rounding to a decimal place (d.p.)

Decimal places are the digits after the decimal point.

3 . 2 6 4

1st Decimal Place | 2nd Decimal Place | 3rd Decimal Place

**3.264 to 1 dp = 3.3**

The first decimal place is the first number after the decimal point, in this case the 2. After the 2 is a 6, which is bigger than 5 so we round the 2 up to a 3.

**3.264 to 2 dp = 3.26**

The second decimal place is 6. Because there is a 4 after, which is less than 5, we keep the 6 the same.

Sparx U731, U965

## Rounding to significant figures (s.f.)

This rounds to the most important figure in a number. To round to 'so many' significant figures, we start at the first non-zero number and count from left to right.

**7 639 to 1 sf = 8000**

1st significant figure is 7, there is a 6 after it so we increase the 7 to an 8 to become 8000.

**10 240 to 3 sf = 10 200**

3rd significant figure is 2, there is a 4 after it, which is less than 5 so we keep the 2 the same.

**0.0749 to 2 sf = 0.075**

2nd significant figure is the 4 as the first zeros do not count. After the 4 is a 9 so we round up.

Sparx U225

## Estimation

To Estimate round all numbers to one significant figure. It is a good strategy to work out a rough size of a calculation.

Example
**Estimate 0.724 + 0.849**
Round each of them to 1 s.f.
Answer: **0.7 + 0.8 = 1.5**

Example
**Estimate 374 + 297**
Round each of them to 1 s.f.
Answer: **400 + 300 = 700**

## Keywords:

Place value
Decimal
Inequality
Round
Significant Figure
Estimate – Round to 1 s.f.
Integer = whole number

## Rounding to the nearest..

- Decide which is the last digit to keep, eg if you are rounding to the nearest ten, focus on the number in the tens column.
- Leave it the same if the next digit is less than 5 (rounding down)
- But increase it by 1 if the next digit is 5 or above (rounding up)

Example
**Round 293 to the nearest 10**
The 9 is in the tens column, the number after it is 3 which is less than 5 so we leave the 9 the same.
Answer: **290**

Example
**Round 1 572 to the nearest 100.** The 5 is in the hundreds column, the number after it is 7, which is more than 5, so we increase 5 by 1.
Answer: **1 600**

Sparx U657, U587

## Error Interval and Upper & Lower Bounds

An Error Interval is the range of values that a number could have taken before being rounded or truncated.

An error interval is written using inequalities, with a **lower bound** and an **upper bound.**

$<$ less than
$\leqslant$ less than or equal to
$>$ greater than
$\geqslant$ greater than or equal to
$=$ equal to
$\neq$ not equal to

If 0.6 **has been rounded to 1 decimal place.**

**The error interval is:**

$0.55 \leq x < 0.65$

The **lower bound** is 0.55
The **upper bound** is 0.65

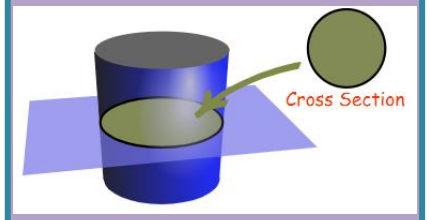
Note: the lower bound inequality can be 'equal to', but the upper bound cannot be 'equal to'.

Rounded Value ≤ actual value < Rounded value
- half a unit + half a unit

# Year 11 Term 1 Working in 3D

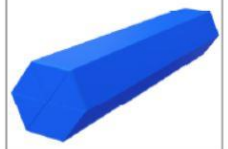
Faces = flat surfaces
Edges = sides/lengths
Vertices = corners

A prism is a 3D shape which has a continuous cross-section.




The surface area of an object is the sum of the area all of its faces. It is measured in units squared e.g. $cm^2$.

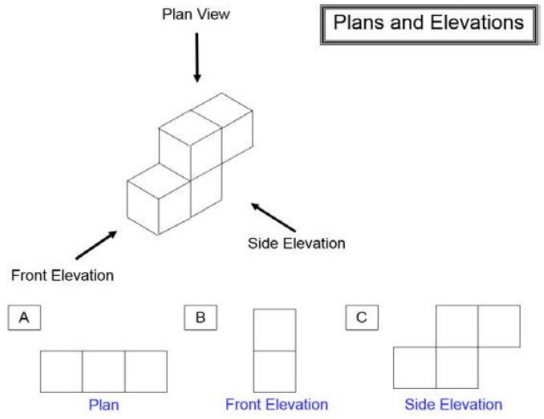
**Know the names**

| | | | | |
|---|---|---|---|---|
|  |  |  |  |  |
| sphere | cube | square based pyramid | cuboid | cone |
| 1 curved surface | 6 faces | 5 faces | 6 faces | 1 face 1 curved surface |
| no edges | 12 edges | 8 edges | 12 edges | 1 edge |
| no vertices | 8 vertices | 5 vertices | 8 vertices | 0 vertices |
|  |  |  |  |  |
| triangle based pyramid | triangular prism | cylinder | hexagonal prism | octahedron |
| 4 faces | 5 faces | 2 faces 1 curved surface | 8 faces | 8 faces |
| 6 edges | 9 edges | 12 edges | 18 edges | 12 edges |
| 4 vertices | 6 vertices | no vertices | 12 vertices | 6 vertices |

## Plans and Elevations

Sparx U743

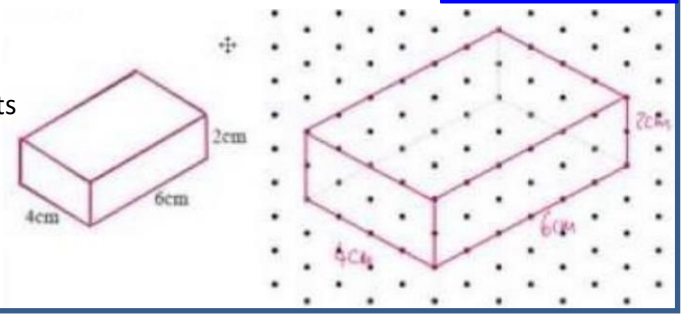
A plan is like the birds eye view of the shape. The front is the view as if someone was stood in front of the shape and the side is the view from the side. The plan, front and side should always be drawn in 2D. If the shape is made from cubes, it must have the correct number of squares in the diagram.



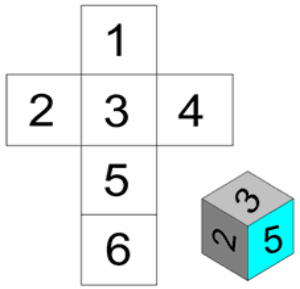

## Isometric Drawing

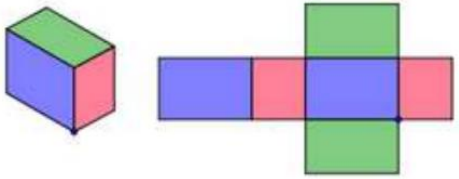
Sparx U743

A method for visually representing 3D objects in 2D. You might be asked to draw the 3D object from the plan view and elevations.

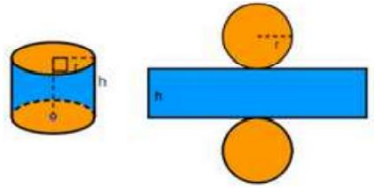



Sparx U761, M884



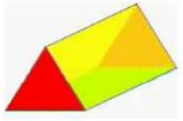



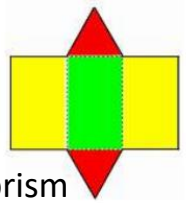
Net of a cuboid



Net of a cylinder

Net of Cube





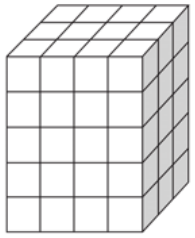
Net of a triangular prism

A **Net** shows which 2D shapes can be folded and joined to make a 3D shape. When you are drawing a net, or solving a problem involving a shape net, think carefully about where the edges of the faces meet.

## Volume

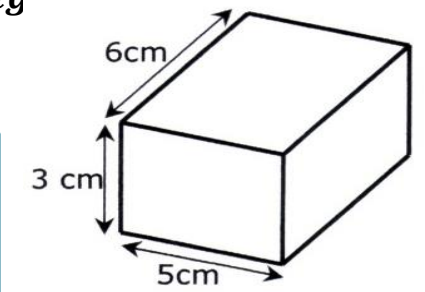
$$V = Length \times Width \times Height$$

$$V = L \times W \times H$$



Units: $mm^3, cm^3, m^3$ etc.

The volume of an object is the amount of 3D space that it occupies. It is measured in units cubed e.g. cm3.




volume = 6 x 5 x 3
= 90 $cm^3$

Sparx U786, U174

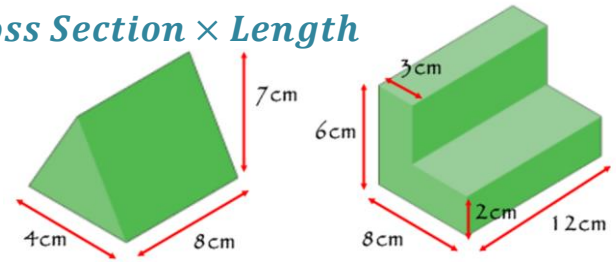
# Year 11 Term 1 Working in 3D – Volume Surface area

## Volume of Prisms

Sparx U174

$V = Area\ of\ Cross\ Section \times Length$

$V = A \times L$



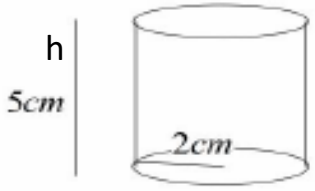




Sparx U915, U464

## Volume of Cylinder

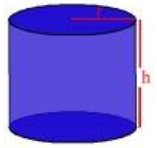
$V = \pi r^2 h$




$V = \pi(4)(5)$

$= 62.8cm^3$

## Surface area of Cylinder



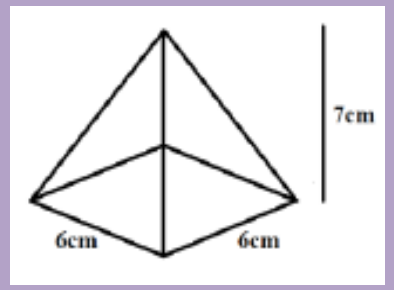

$SA = 2\pi r^2 + 2\pi rh$

A cylinder is a prism with the cross section of a circle.

## Volume of Pyramid

$Volume = \frac{1}{3}Bh$

where B = **area** of the base

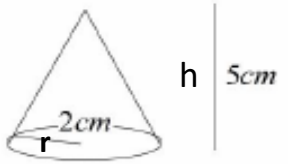



$V = \frac{1}{3} \times 6 \times 6 \times 7 = 84cm^3$

Sparx U484

## Volume of Cones

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

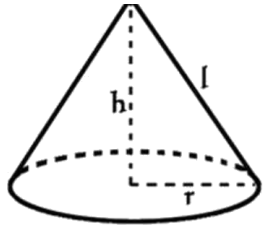



$V = \frac{1}{3}\pi(4)(5)$

$= 20.9cm^3$

Sparx U116, U523

## Surface Area of Cones




$A = \pi r^2 + \pi rL$

l =length of the slope

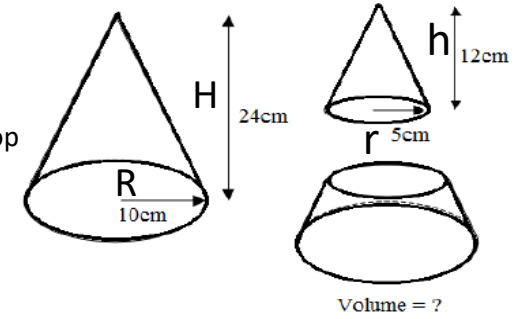
## Frustrums

A frustum is a solid (usually a cone or pyramid) with the top removed.

Find the volume of the whole shape, then take away the volume of the small cone/pyramid removed at the top.

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

H = height of whole thing
R = radius of whole thing
h = height of the smaller top
r = radius of smaller top

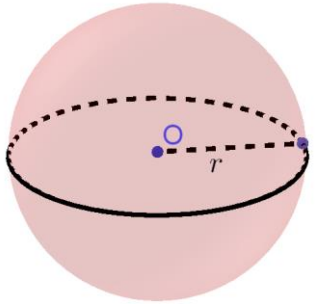



Sparx U350

## Volume of Sphere

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

r is radius




## Surface area of Sphere

$SA = 4\pi r^2$

This is the curved surface area. Think how much paint it would take to cover the outside.

You may or may not be given the formula for each of these in the exam so best to learn them. You must know how to substitute into them and use them.

Sparx U617

Sparx U893

# Year 11 Term 2 Number – Factors Powers and Roots

## Multiples

The multiples of a number are the numbers in its times-table.

**Examples**

1) List the first 5 multiples of 4.
Answer: 4, 8, 12, 16, 20

2) What is the 7th multiple of 5? = 35

**Common multiples** of 2 or more numbers are multiples that appear in BOTH times tables.

The **lowest common multiple** is the smallest number that appears in both tables.

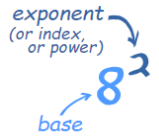
Example
What is the Lowest Common Multiple of 3 and 4?
**= 12**

| Multiples of 3 | Multiples of 4 |
|---|---|
| 3 | 4 |
| 6 | 8 |
| 9 | 12 |
| 12 | 16 |

Sparx U250

## Exponent or Power or Index Number

The exponent of a number tells us how many times to use the number in a multiplication.




**Examples**

1) $5^2 = 5 \times 5 = 25$
2) $4^3 = 4 \times 4 \times 4 = 64$
2) $2^4 = 2 \times 2 \times 2 \times 2 = 16$

Remember:
$2^0 = 1$
$n^0 = 1$

| | | |
|---|---|---|
| 10 000 | = | $10^4$ |
| 1 000 | = | $10^3$ |
| 100 | = | $10^2$ |
| 10 | = | $10^1$ |
| 1 | = | $10^0$ |
| 0.1 | = | $10^{-1}$ |
| 0.01 | = | $10^{-2}$ |
| 0.001 | = | $10^{-3}$ |
| 0.0001 | = | $10^{-4}$ |

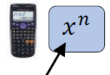
**Squares**

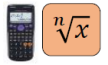
| | | |
|---|---|---|
| $1^2 = 1 \times 1 = 1$ | $5^2 = 5 \times 5 = 25$ | $9^2 = 9 \times 9 = 81$ |
| $2^2 = 2 \times 2 = 4$ | $6^2 = 6 \times 6 = 36$ | $10^2 = 10 \times 10 = 100$ |
| $3^2 = 3 \times 3 = 9$ | $7^2 = 7 \times 7 = 49$ | $11^2 = 11 \times 11 = 121$ |
| $4^2 = 4 \times 4 = 16$ | $8^2 = 8 \times 8 = 64$ | $12^2 = 12 \times 12 = 144$ |


$\sqrt{9} = 3$
and we say *"square root of 9 equals 3"*

**Square Roots**

| | | |
|---|---|---|
| $\sqrt{1} = \pm 1$ | $\sqrt{25} = \pm 5$ | $\sqrt{81} = \pm 9$ |
| $\sqrt{4} = \pm 2$ | $\sqrt{36} = \pm 6$ | $\sqrt{100} = \pm 10$ |
| $\sqrt{9} = \pm 3$ | $\sqrt{49} = \pm 7$ | $\sqrt{121} = \pm 11$ |
| $\sqrt{16} = \pm 4$ | $\sqrt{64} = \pm 8$ | $\sqrt{144} = \pm 12$ |




Sparx U739, U250

## Write 24 as the product of its prime factors

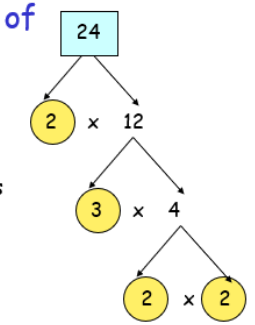
Step 1: Find two numbers which multiply together to make the number

Step 2: Circle any prime factors

Step 3: Continue to break down any factors until they are prime factors.

Step 4: Write the original number as the product of its prime factors

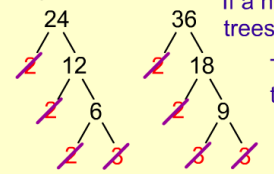
Step 5: Can you simplify using index notation?




$24 = 2 \times 2 \times 2 \times 3$
$= 2^3 \times 3$

Example: Find the HCF of 24 and 36

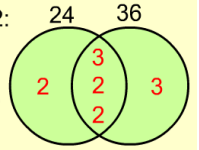
Step 1:




If a number is in both trees it goes in the middle

The leftovers go into their group

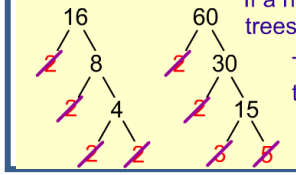
Step 2:




Step 3: HCF = 3 x 2 x 2 = 12

Example: Find the LCM of 16 and 60

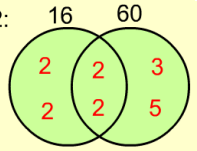
Step 1:




If a number is in both trees it goes in the middle

The leftovers go into their group

Step 2:




Step 3: LCM = 2 x 2 x 2 x 2 x 3 x 5

**Prime numbers** have only 2 factors – 1 and itself.

2
3
5
7
11
13
17
19
23
29
31
37
41
43
47
53
59
61
67
71
73
79
83
89
97

**Keywords:**

**Standard (index) Form**: A system of writing very big or very small numbers

**Commutative**: an operation is commutative if changing the order does not change the result.

**Base**: The number that gets multiplied by a power

**Power/exponent:** –or the number that tells you how many times to use the number in multiplication

**Indices**: The power or the exponent.

**Negative**: A value below zero..

**Coefficient:** The number used to multiply a variable

**Standard form**

$a \times 10^n$, where $1 \leq a < 10$

Sparx U330, U534, U264, U290

The **highest common factor** is the biggest number that is a factor of both numbers in question.

**Example**

What is the highest common factor of 24 and 30? List the factors of both numbers and circle the biggest one in both lists.

24 and 30

| | |
|---|---|
| 1, 24 | 1, 30 |
| 2, 12, | 2, 15 |
| 3, 8 | 3, 10 |
| 4, 6 | 5, 6 |

1, 2, 3, 4, (6) 8, 12, 24
1, 2, 3, 5, (6) 10, 15, 30

HCF = 6

Sparx U529

## Adding and subtracting Standard form

Convert in to ordinary numbers, calculate and then convert back in to standard form

$$2.7 \times 10^4 + 4.6 \times 10^3$$
$$= 27000 + 4600 = 31600 \qquad = 3.16 \times 10^4$$

## Standard Form multiplying and dividing

Multiply: Multiply the numbers and add the powers.

$$(1.2 \times 10^3) \times (4 \times 10^6) = 8.8 \times 10^9$$

Divide: Divide the numbers and subtract the powers.

$$(4.5 \times 10^5) \div (3 \times 10^2) = 1.5 \times 10^3$$

Sparx U330, U534

# Year 11 Term 2 Indices and Surds

**Key Words**
- **Integer**: a whole number
- **Rational Number**: a number which can be expressed in the form, where $\frac{a}{b}$ and b are integers.
- **Irrational Number**: a number which cannot be expressed in the form $\frac{a}{b}$ here a and b are integers
- **Expand**: multiply out the brackets
- **Square Number**: the result of multiplying an integer by itself

**Skills required**
- Simplify surds
- Add and subtract surds, leaving your answer in the simplest form
- Multiply and divide surds, leaving your answer in the simplest form
- Expand brackets involving surds
- Calculate exactly with surds
- Rationalise denominators

## Index Laws

$$a^n \times a^m = a^{n+m}$$
$$a^n \div a^m = a^{n-m}$$
$$(a^n)^m = a^{nm}$$
$$a^0 = 1$$
$$a^{-n} = \frac{1}{a^n}$$
$$a^{\frac{n}{m}} = \sqrt[m]{a^n}$$

Sparx U338, U872, U633, U499

Remember $a = a^1$

## Surds – (Higher GCSE)

### Examples and Non-Examples

$\sqrt{5}$ ✓ $\sqrt{4}$ (this can be simplified to 2, which is a rational number)

$5\sqrt{6}$

$\sqrt{2}$ ✗ $\sqrt[3]{27}$ (this can be simplified to 3, which is a rational number)

$3\sqrt{2}$

$\sqrt{3}$ $(\sqrt{5})^2$ (this can be simplified to 5, which is a rational number)

$\sqrt{11}$ $\sqrt{197}$

### Multiplying & Dividing Surds

$\sqrt{2} \times \sqrt{5} = \sqrt{2 \times 5} = \sqrt{10}$

$\sqrt{3} \times \sqrt{7} = \sqrt{3 \times 7} = \sqrt{21}$

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

$\sqrt{a} \times \sqrt{a} = a$

$\sqrt{2} \times \sqrt{2} = \sqrt{2 \times 2} = \sqrt{4} = 2$

$\sqrt{5} \times \sqrt{5} = \sqrt{5 \times 5} = \sqrt{25} = 5$

### Dividing Surds

$\sqrt{10} \div \sqrt{2} = \sqrt{10 \div 2} = \sqrt{5}$

$\sqrt{12} \div \sqrt{3} = \sqrt{12 \div 3} = \sqrt{4} = 2$

$\sqrt{a} \div \sqrt{b} = \sqrt{\frac{a}{b}}$

Sparx U338, U872, U633, U499

## Simplifying Surds

### Method 1

Simplify $\sqrt{24}$

Here we are looking for the largest square number which is also a factor of 24

Factors of 24:
1 x 24
2 x 12
3 x 8
4 x 6

So $\sqrt{24} = \sqrt{4 \times 6}$
$= \sqrt{4} \times \sqrt{6}$
$= 2\sqrt{6}$

Simplify $\sqrt{96}$

Here we are looking for the largest square number which is also a factor of 96

Factors of 96:
1 x 96
2 x 48
3 x 32
4 x 24
6 x 16
8 x 12

So $\sqrt{96} = \sqrt{6 \times 16}$
$= \sqrt{6} \times \sqrt{16}$
$= 4\sqrt{6}$

### Method 2

Simplify $\sqrt{24}$

Using prime factor decomposition and our knowledge that $\sqrt{a}\sqrt{b} = \sqrt{a} \times \sqrt{b}$, we can say:

24 = 3, 8; 8 = 4, 2; 4 = 2, 2

$24 = 2 \times 2 \times 2 \times 3$

So $\sqrt{24} = \sqrt{2} \times \sqrt{2} \times \sqrt{2} \times \sqrt{3}$
$= 2 \times \sqrt{2} \times \sqrt{3}$
$= 2\sqrt{6}$

Simplify $\sqrt{96}$

96 = 8, 12; 8 = 4, 2; 12 = 3, 4; 4 = 2, 2

$96 = 2 \times 2 \times 2 \times 3 \times 2 \times 2$

So $\sqrt{96} = \sqrt{2} \times \sqrt{2} \times \sqrt{2} \times \sqrt{3} \times \sqrt{2} \times \sqrt{2}$
$= 2 \times 2 \times \sqrt{2} \times \sqrt{3}$
$= 4\sqrt{6}$

## Rationalising the denominator

**Rationalising the denominator** means we are making the denominator of the fraction a RATIONAL number (eg, not a surd!).

### Example 1

Rationalise the denominator and simplify $\frac{1}{\sqrt{6}}$

We don't want to CHANGE the value of the fraction but we need to find an equivalent fraction with a rational denominator.

We do this by multiplying by '1', in this case;

$\frac{1}{\sqrt{6}} \times \frac{\sqrt{6}}{\sqrt{6}} = \frac{\sqrt{6}}{6}$

### Example 2

Rationalise the denominator and simplify $\frac{2}{3 + \sqrt{2}}$

Remember $(x+y)(x-y) = x^2 - y^2$? This result is very important here! We are left with only two square numbers, and we know that means no surds!

We call (x-y) the conjugate of (x+y), the conjugate of $3 + \sqrt{2}$ is $3 - \sqrt{2}$.

$\frac{2}{3 + \sqrt{2}} \times \frac{3 - \sqrt{2}}{3 - \sqrt{2}}$ ← Special kind of '1'

$= \frac{2(3 - \sqrt{2})}{(3 + \sqrt{2})(3 - \sqrt{2})} = \frac{6 - 2\sqrt{2}}{9 - 2} = \frac{6 - 2\sqrt{2}}{7}$

# KS4 Biology: B11 Hormonal Coordination

| Key word | Definition |
|---|---|
| Homeostasis | Maintaining the body's conditions within narrow physical and chemical limits so enzymes and cell functions can work. E.g. blood glucose levels, temperature, water levels. |
| Endocrine system | The glands that produce hormones. |
| Hormones | Chemicals made in glands that travel through the blood to effect the function of another part of the body. |
| Stimulus | Change in the environment e.g. sound, heat, light. |
| Receptors | Detect stimuli. |
| Coordination centre | e.g. brain, spinal cord, pancreas. These receive and process information from the receptors. |
| Effector | Muscles or glands which bring about response. (Muscles contract) (Glands secrete/release hormones). |

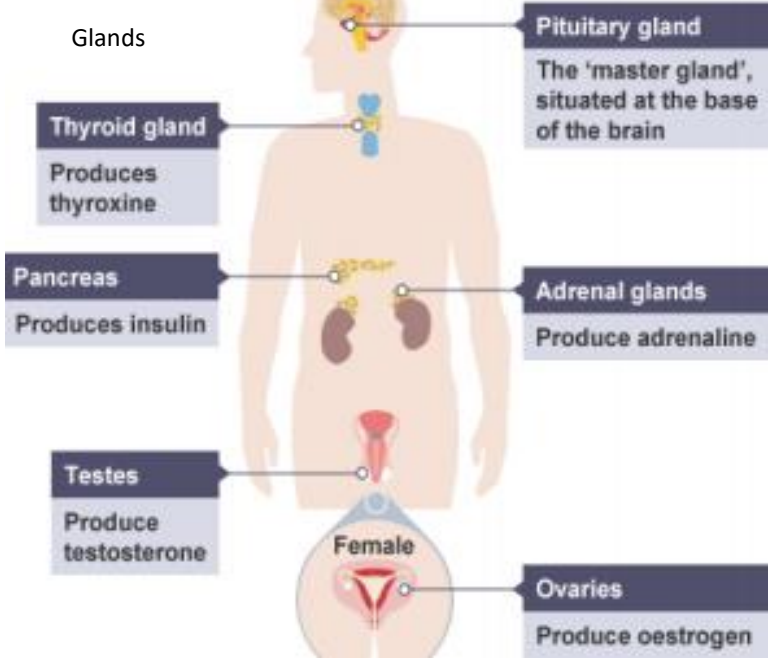
| Hormone | Where is it produced | Response caused | Interaction with other hormones [HT only] |
|---|---|---|---|
| FSH | Pituitary gland | Matures the egg. | Stimulates the production of oestrogen. |
| Oestrogen | Ovaries | Thickens the lining of the uterus. | Stimulates production of LH.<br>Inhibits the production of FSH. |
| LH | Pituitary gland | Ovulation (at around day 14 of the cycle). | Indirectly stimulates the production of progesterone. |
| Progesterone | Ovaries | Maintains the lining of the uterus. | Inhibits the production of LH |

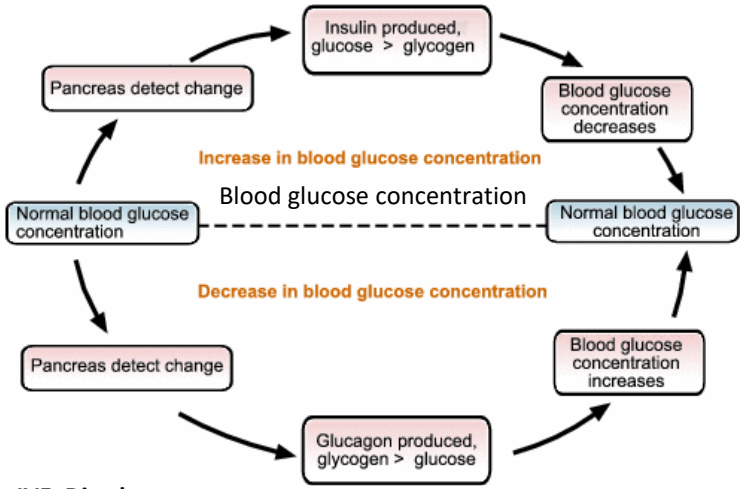
<u>Blood glucose disorders</u>

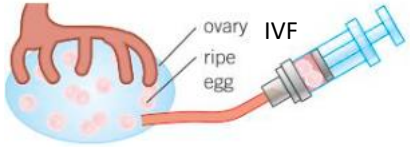
Type 1 diabetes: Disorder where the pancreas does not produce enough insulin to control blood glucose levels. Treated with injections of insulin.

Type 2 diabetes: Disorder of effector cells which do not respond to insulin released from the pancreas. Managed through carbohydrate controlled diet and exercise. Higher risk if BMI >30.

Insulin is the hormone used to lower blood glucose levels.
Glucagon is the hormone used to increase blood glucose levels.
Both released by the pancreas

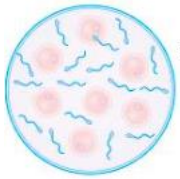


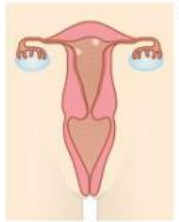

1 Fertility drugs are used to make lots of eggs mature at the same time for collection.

2 The eggs are collected and placed in a special solution in a Petri dish.



3 A sample of semen is collected and the sperm and eggs are mixed in the Petri dish.

4 The eggs are checked to make sure they have been fertilised and the early embryos are developing properly.



5 When the fertilised eggs have formed tiny balls of cells, 1 or 2 of the tiny embryos are placed in the womb of the mother. Then, if all goes well, at least one baby will grow and develop successfully.

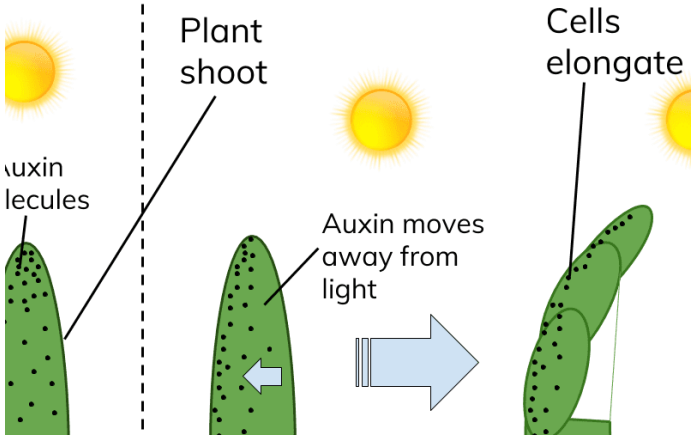
**IVF: Disadvantages**

- Expensive
- Not always successful
- The older the parents, the less likely it is that they will have a baby
- Use of fertility drugs can have health risks for mother
- Increases the chances of multiple pregnancy which increases risks to both mothers and babies, which can lead to premature births and stillbirths
- Emotional and physical stress
- Ethical issues with stored eggs

**IVF: Advantages**

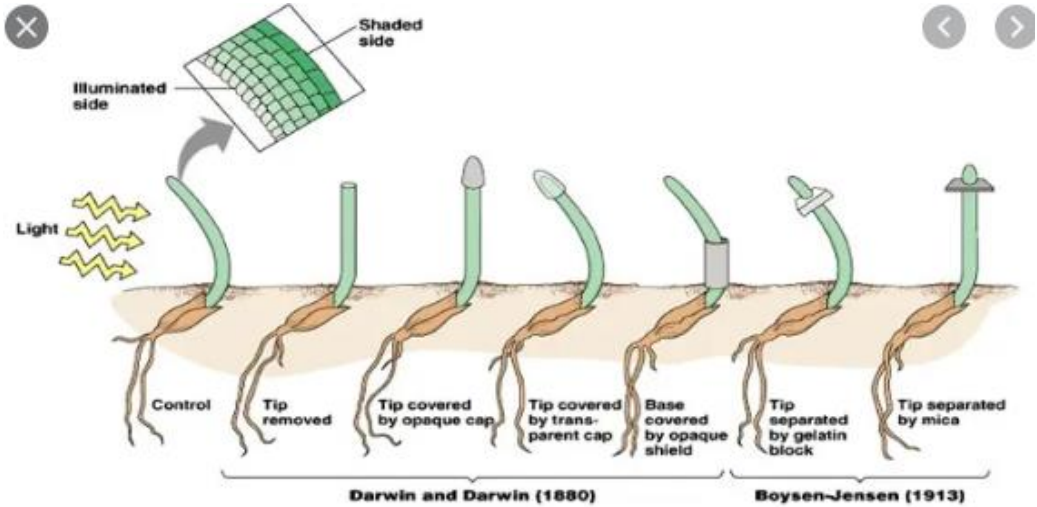
- Mature eggs can be collected and stored
- Using donor eggs or sperm from younger people increases the success rate

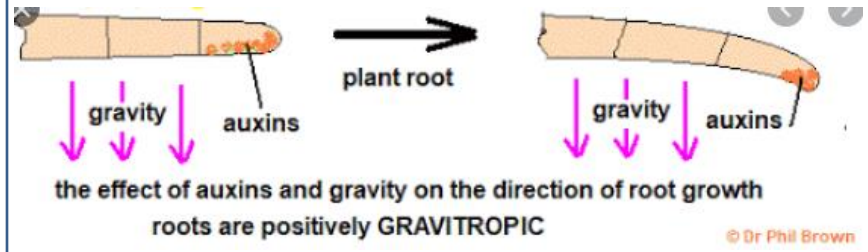
# KS4 Biology: Separate Science only




**Auxins: plant hormones** that control plant growth**. Auxins** are found in the **tips (meristems),** roots and shoots and are sensitive to **light.**

**Phototropism – a plan's response to light.**
**Auxins** move **away from light** so become unequally distributed. **Auxin** causes **SHOOT CELLS to GROW QUICKER** so the shoot grows **TOWARDS THE LIGHT.**




**Geotropism – a plan's response to gravity.**
**Auxins** are **heavy** so become unequally distributed in new roots and shoots. **Auxin** causes **ROOT CELLS to GROW SLOWER** so the root grows downwards.
Auxin causes SHOOT cells to grow faster so shoots grow upwards (until they go above the soil when phototropism takes over).

| Hormone | Uses | Commercial uses |
|---|---|---|
| Auxins | Controlling plant growth | Kill broad leaved plants eg weeds in lawn but not kill grass.<br>Growing plants from cuttings using auxin rooting powder.<br>Tissue culture medium containing auxin. |
| Gibberellin | Start seed germination, and flowering | Add gibberellin to seeds to make them germinate at a specific time of the year – makes them all germinate at the same time |
| Ethene | A gas produced when a plant ages. It controls cell division, growth and fruit ripening | Use to speed up ripening of fruit. Pick fruit when unripe – ship it around the world then add ethane at destination to ripen fruit ready for sale on the supermarket shelf eg bananas. |

**REQUIRED PRACTICAL: Investigate the effect of light or gravity on newly germinated seedlings.**
**IV: light intensity (windowsill or dark cupboard)**
**DV: Height of seedling (mm)**
**CV: Volume of water, type of seed, number of seeds.**
Method – germination of seedlings.
1. Place 10 seeds in a Petri dish of cotton wool.
2. Add 10ml water.
3. Place in a warm place to germinate.
4. Water with same volume if necessary

Method – growth of seedling
1. Once germinated ensure there is the same number of seedlings (some may not have germinated so others may need to be removed).
2. Place Petri dish in a dark, partially shaded or light area.
3. Every day for 5 days measure the height of the seedlings.
4. Calculate a mean height each day.

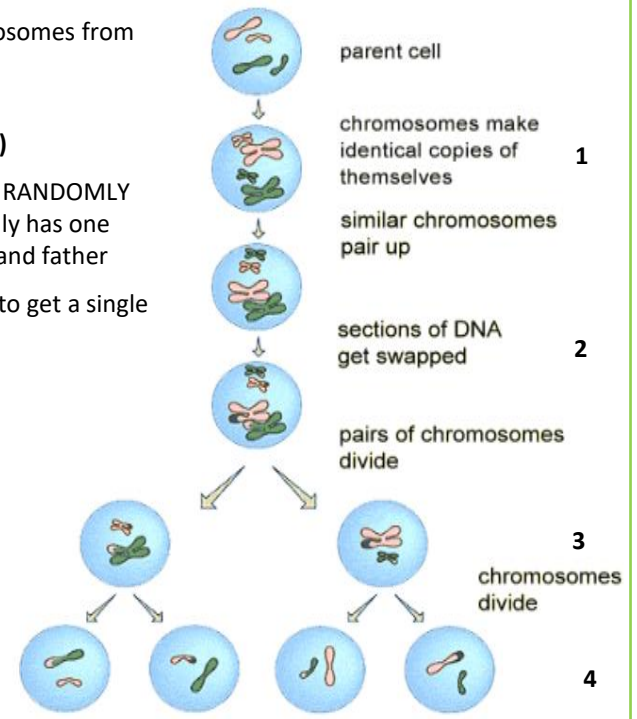
# KS4 Biology: B13 Reproduction

| Key word | Definition |
|---|---|
| Sexual reproduction | Two parents, mixing of genetic information which leads to variety in the offspring. Involves the formation of **gametes** by **meiosis.** |
| Asexual reproduction | One parent, no fusion of **gametes.** No mixing of genetic information. Genetically identical offspring **(clones). Only mitosis involved.** |
| Gamete | Sex cells, sperm and eggs (animals) pollen and ovule (egg cell) (flowering plants). Formed by **meiosis**. |
| Meiosis | Cell division to make 4 non-identical cells with half the number of chromosomes (to make gametes). |
| Mitosis | Cell division to make 2 genetically identical cells (clones) to make all cells except gametes). Cells are needed for growth, repair and replace old cells. |
| Fertilisation | Fusion of gametes to restore the full number of chromosomes. After fertilisation, **mitosis** occurs and cells **differentiate** to form an embryo |
| Differentiate | The process in which cells become specialised for a particular function. |

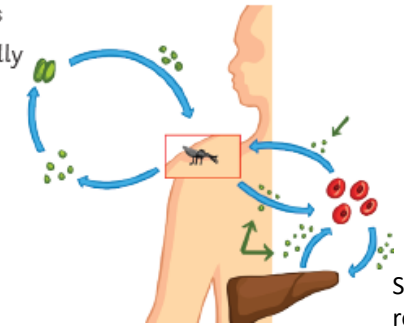
**Meiosis → produces gametes ONLY**
Causes genetic variation because random chromosomes from each gamete go into each new cell

1. **DNA replicates ( genetic information copied)**
2. **First division**: The chromosome pairs line up RANDOMLY and are pulled apart so that each new cell only has one copy of each chromosome from the mother and father
3. **Second division** Chromosomes divide again to get a single set of chromosomes in each cell.

4. Four genetically different daughter cells will be produced with only 23 chromosomes each

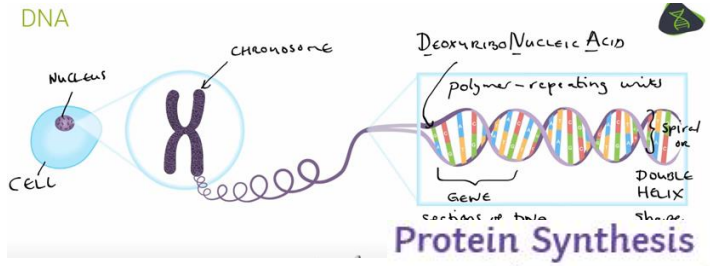



Malarial parasites reproduce asexually in the human host but sexually in the mosquito.



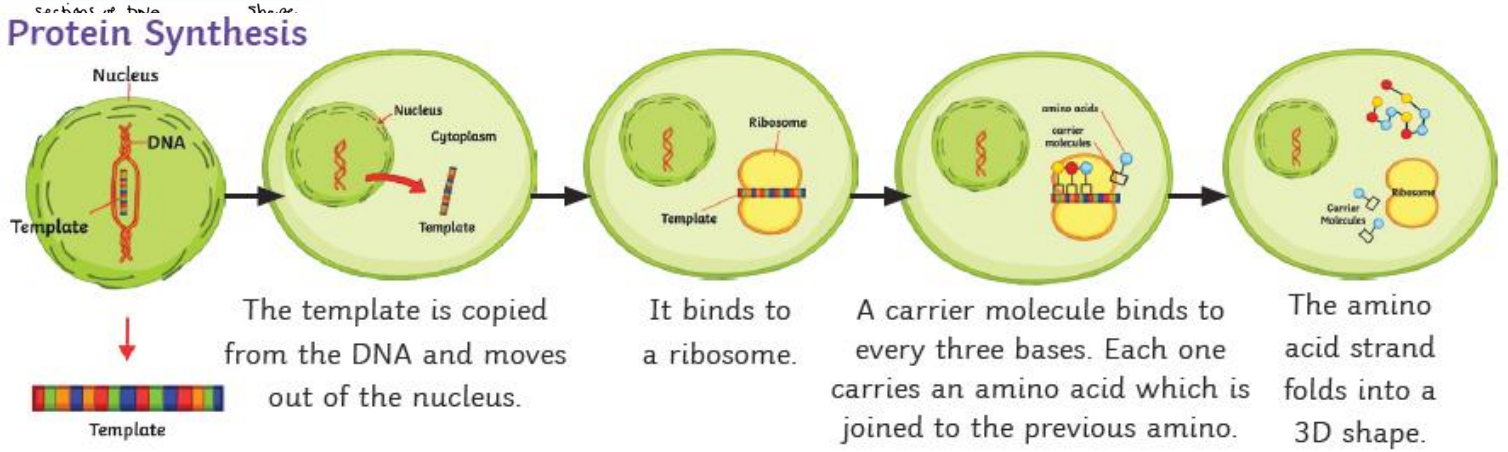
Many fungi reproduce asexually by spores but also reproduce sexually to give variation.

Daffodils can reproduce sexually or by bulb division (asexual).




Strawberry plants can reproduce sexually and send off runners to reproduce asexually.

**/ Expression Biology Higher Tier Only**



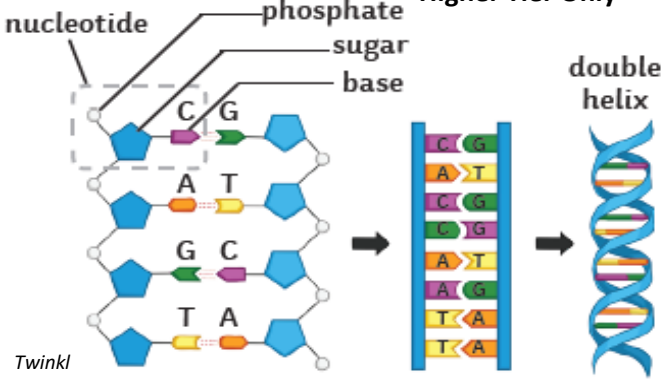
# KS4 Biology: B13 Reproduction

The human **genome** was sequenced in a world wide collaboration in 2003.
It is available for all scientists to use to study:

- The genes linked to different types of disease
- Understanding the treatment of inherited disorders
- Use in tracing human migration patterns from the past

## DNA Structure

**Higher Tier Only**




- DNA has a double helix shape and has a sugar phosphate backbone and complimentary bases, C matches to G and A matches T.
- The bases are adenine, thymine, cytosine and guanine.
- The two strands are held together by weak hydrogen bonds

**Higher Tier Only**

- **Mutations** occur continuously. Most do not alter the **protein** only alter it slightly so that its appearance or function is not changed.
- A few **mutations** code for an altered **protein** with a different shape. An **enzyme** may no longer fit the substrate in its active site or a structural protein may lose its strength.
- Not all parts of **DNA** code for **proteins.** Non-coding parts of DNA can switch genes on and off, so variations in these areas may affect how genes are expressed.
- A change in coding DNA can alter the activity of a protein and in non-coding DNA by altering how genes are expressed.

| Key word | Definition |
|---|---|
| DNA | The molecule of inheritance. A polymer made up of two strands forming a double helix. **DNA** is contained in structures called **chromosomes.** |
| Gene | A small section of **DNA** on a **chromosome**. Each **gene codes** for a particular sequence of **amino acids** to make a specific **protein**. The gene gives the organisms their characteristics like eye colour |
| Chromosome | Found in pairs, one inherited from biological father and one from biological mother. Humans should have 46 chromosomes in each body cell and 23 chromosomes in each gamete ( sperm and egg cell) |
| Genome | The entire genetic material of that organism. |
| Nucleotide | A molecule made up a sugar, a phosphate group and one of four different **bases**. |
| Bases | Bases make up part of a **nucleotide** which make up **DNA** and **RNA.** They are represented by the letters A, T, G and C. |
| Dominant allele | The **phenotype** will be apparent in the offspring even if only one copy is inherited. Eg AA or Aa |
| Recessive allele | A phenotype that will only show up in the offspring if both **alleles** coding for that characteristic are inherited eg aa |
| Homozygous | Two identical **alleles** for a characteristic eg AA or aa |
| Heterozygous | Two different **alleles** for a characteristic eg Aa |

*Twinkl*

| | X | X |
|---|---|---|
| X | XX | XX |
| Y | XY | XY |

<u>Sex determination: Male or female?</u>
Ordinary human body cells contain 46 chromosomes (23 pairs).
22 pairs control characteristics only, but one pair carries the genes that determine sex.

- Females the sex chromosomes are XX
- Males the sex chromosomes are XY

<u>Inherited disorders</u>

- Polydactyly (having extra fingers or toes) is caused by a **dominant allele.**
- Cystic fibrosis (a disorder of a cell membrane protein) is caused by a **recessive allele.**

<u>Embryo screening</u> – cells are harvested from the embryo and screened for genetic diseases.
PROS:
Parents are informed of any diseases so can make a choice to terminate.
Costly to society to support a disabled person so screening may help prevent these costs.

CONS:
The harvesting risks miscarriage, so in some rare cases a healthy foetus can be terminated.
Screening is expensive.
Difficult emotional/religious choices to terminate.

# KS4 Biology: B18 Biodiversity and Ecosystems

| Key term | Definition |
|---|---|
| Biodiversity | The variety of all the different species of organisms on earth or within an ecosystem. |
| Deforestation | The removal and destruction of trees in forest and woodland. |
| Ecosystem | The interaction between the biotic and abiotic factors in an environment |
| Species | Organisms with similar morphology (characteristics) that can interbreed to produce fertile offspring. |
| Sewage | Bodily waste and waste water from our homes. |
| Bio indicator | Key species that are only found in very clean or polluted water to monitor pollution. |
| Peat | Forms over thousands of years originally in peat bogs. Peat is made from plant material that cannot decay properly as the conditions are acidic and lack oxygen. Peatlands act as a massive carbon store and are a unique ecosystem for species that like acidic conditions. |

A great **biodiversity** ensures the **stability of ecosystems** by **reducing** the **dependence of one species** on another for **food, shelter** and the **maintenance of the physical environment**. Human population is growing and human activity is reducing biodiversity.

As human population grows we are using **more resources** and producing more **waste** and **pollution.**

- **Water pollution –** sewage, fertiliser, toxic chemicals.
- **Air pollution** – smoke, acidic gases.
- **Land pollution** – landfill, toxic chemicals.

## Human Population Growth

In the past 200 years the human population has grown very quickly.

In 2015 the human population passed 7 billion people and is still growing.

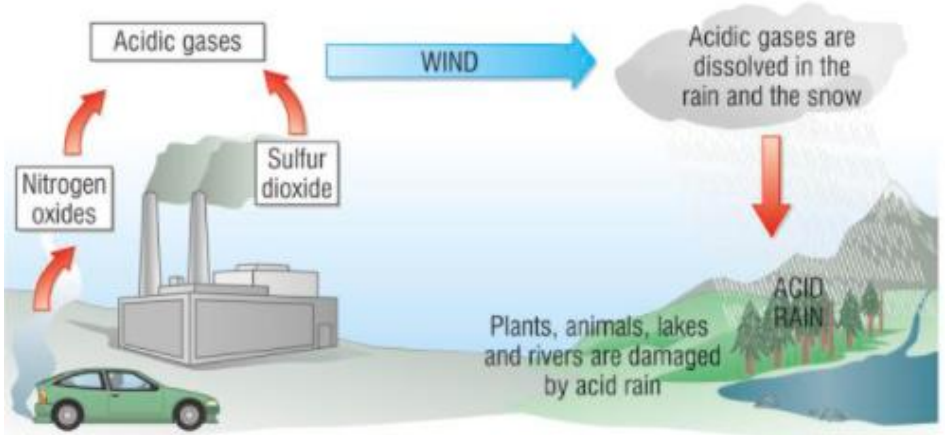
If any other species of animal or plant suddenly increased, nature would tend to restore the balance.

Predators lack of food, build up of waste products or diseases would reduce the population again.

The more people there are, the more resources are used: e.g fossil fuels and the more waste is produced. This can pollute the land, water and air.

The feeding relationships between different organisms can lead to dangerous levels of toxins building up the top predators.


**Figure 1** *The accident at Chernobyl nuclear power plant polluted the land a long way away – including areas of the UK*




## Air Pollution

A major source is burning fossil fuels:

1. Formation of acid rain
2. Smoke pollution
3. Smog

## Deforestation

Large-scale deforestation is taking place to obtain timber and to clear the land for farming.

Main reasons:
1. To grow staple foods such as rice
2. To rear more cattle
3. To grow crops that can be used to make biofuels based on ethanol

It increases the concentration of carbon dioxide in the atmosphere in two ways:
1. Burning the trees
2. Dead vegetation decomposes and the microorganisms are use up oxygen and release carbon dioxide as they respire
3. Reduces the rate at which carbon dioxide is removed from the atmosphere

Deforestation reduces biodiversity, as many species of animals and plants become extinct.

## Peat Bog Destruction

Peat is made of plant material that cannot decay completely because the conditions are very acidic and lack oxygen.

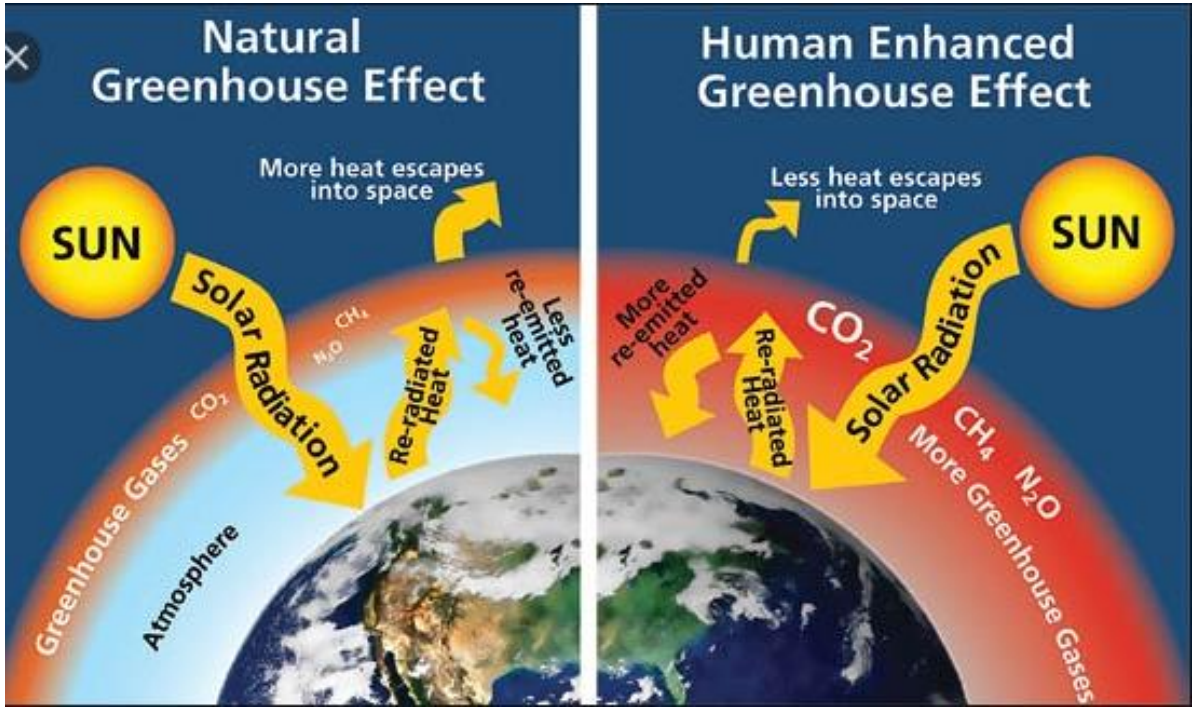
Acts as a massive carbon store.

Unique ecosystems, home to a wide range of plants, animals and microorganisms that have evolved to grow and survive in the acidic conditions.

**Greenhouse effect** is a natural process where some of the Sun's radiation is trapped within the insulating layer of **carbon dioxide** in the atmosphere. Most of the radiation from the Sun is absorbed by the Earth, the rest is reflected into the atmosphere and re-emitted in all directions.

**Humans are increasing carbon dioxide and methane which trap more heat around the Earth.**
**Leads to melting ice caps, rising sea levels, flooding, changes to climate, changes in migration patterns, changes in species distribution, reduction in biodiversity.**

**Maintaining Ecosystems and Biodiversity**
- **Breeding programmes** for endangered species e.g. pandas.
- **Protection** and **regeneration** of **rare habitats.**
- **Reintroduction of field margins** and **hedgerows** in agricultural areas where farmers only grow one type of crop.
- **Reduction** of **deforestation** and **carbon dioxide** emissions by some governments.
- **Recycling** resources rather than dumping waste in landfill.




**Higher Tier Only**
**Impact of environmental change**

**Distribution** of species in an ecosystem impacted by environmental change e.g. **temperature, water availability, atmospheric gases.**

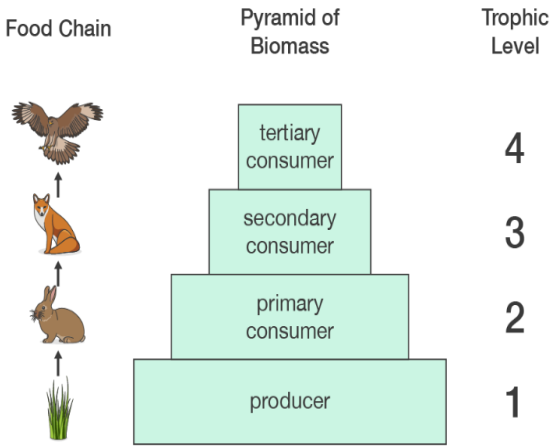
Change may be **seasonal** (e.g. bird migration), **geographic** (e.g. soil structure or pH), **cause by human interaction** (e.g. global warming, acid rain, pollution).

**Separate Science Only**

**Trophic levels**

- **Level 1: Plants** and **algae** make their own food (by photosynthesis) and are called **producers.**
- **Level 2: Herbivores** eat plants/algae and are called **primary consumers**.
- **Level 3: Carnivores** that eat herbivores and are called **secondary consumers.**
- **Level 4: Carnivores** that eat other carnivores are called **tertiary consumers.** **Apex predators** are carnivores with **no predators.**
- **Decomposers:** microorganisms that break down dead organisms by secreting enzymes into the environment. Small soluble food molecules then **diffuse** into the microorganism.

*Pyramid of biomass:*
*Symmetrical*
*Label each trophic level*
*Producer at the bottom*




**TRANSFER OF BIOMASS**

Produces transfer about 1% of the incident energy from light for photosynthesis.
Only ~10% of the biomass from each level is transferred due to:
Not all the ingested material is absorbed – some lost in **faeces.**
Some absorbed material lost as **carbon dioxide and water in respiration** and **water and urea in urine.**
Large amounts of glucose are used in **respiration** to **move** or **keep warm**.

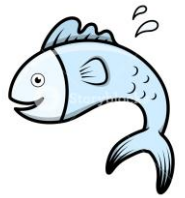
**FOOD PRODUCTION**

Biological factors affecting food security:

- Increased birth rate
- Changing diet in developed world -> scare food resources shipped around the world
- New pests and pathogens that affect farming
- Climate change eg drought
- Cost of farming technologies
- Conflicts/wars

Farming techniques (battery farms)

- Efficiency of food production can be improved by restricting energy transfer from food animals to the environment.
  - Limit animals movement
  - Control temperature
  - Feed high protein diet



Sustainable fisheries

- Fish stocks in oceans are going down so we must maintain fish stocks at a level where breeding continues to prevent extinction in some areas.
  - Control **net size**
  - Introduce **fishing quotas** (how much fisherman can catch)

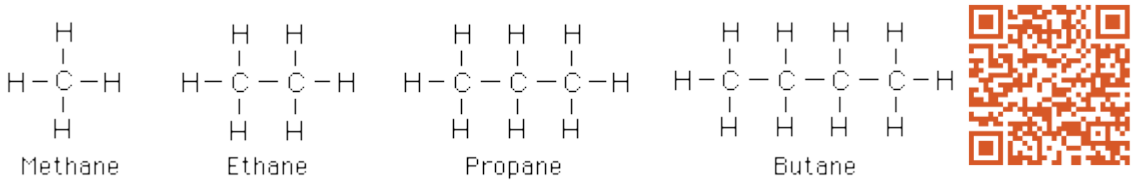
Biotechnology

- Genetic modification to improve nutrition in crops eg **golden rice**.
- Produce mycoproteins (eg Quorn) from the fungus *Fusarium* ***= protein rich food suitable for vegetarians.***
  - The **fungus is grown on glucose syrup** in **aerobic** conditions
  - The biomass is harvested and purified
- Genetically modified bacterium produces **insulin** which is **harvested and purified** to treat people with **diabetes.**

# KS4 Science – C9 Crude Oil and Fuels

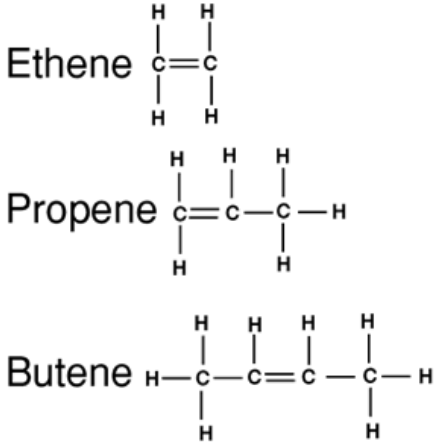
**Crude oil** is a mixture of hydrocarbon fractions with different boiling points.

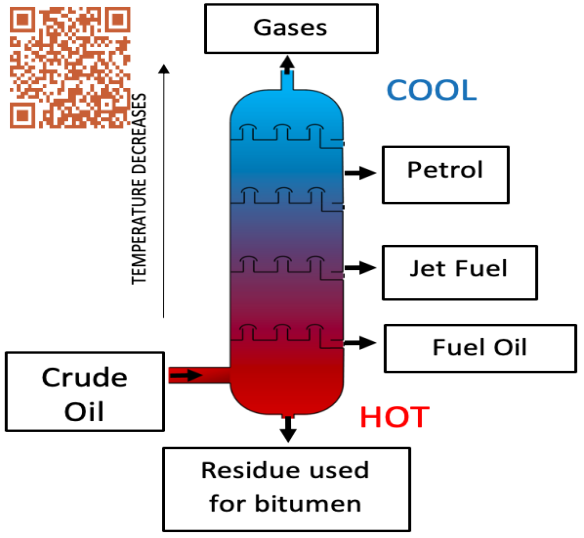
The first 4 alkanes look like this:




You need to learn their names..

The alkenes all have a double bond between 2 carbon atoms.

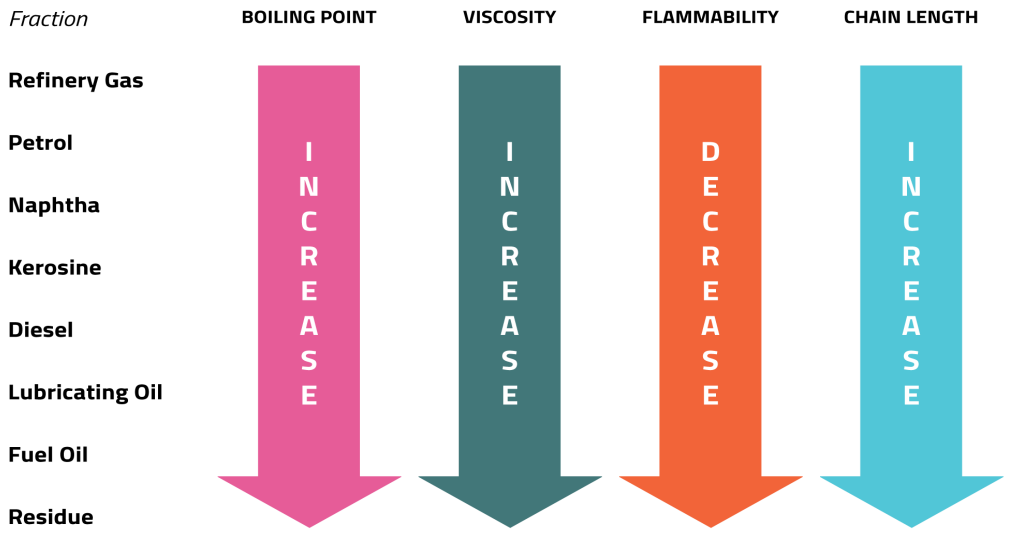


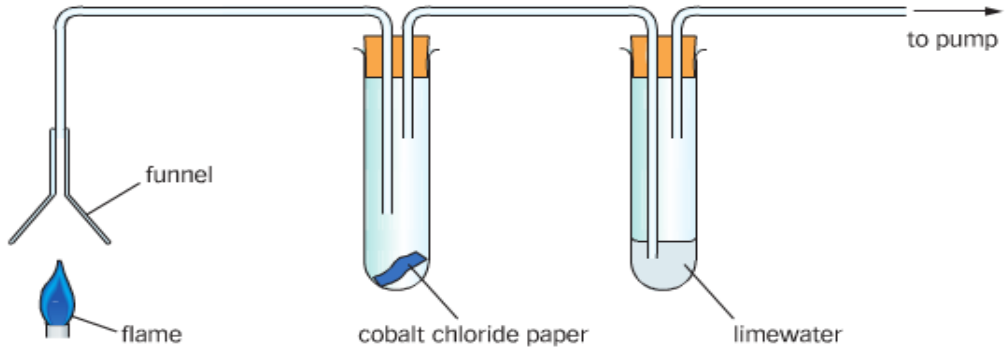

The fractions are separated using the process of FRACTIONAL DISTILLATION. Each fraction has a different boiling point. The crude oil is heated until all the fractions are vaporised. Then each fraction CONDENSES at its boiling point. It is cooler at the top of the column.

The smaller molecules are MORE VOLATILE and have lower boiling points: they condense at the top of the column or come out as gases. The larger molecules are MORE VISCOUS and have higher boiling points. They condense at the bottom of the column.

| Key Word | Definition |
|---|---|
| Mixture | Made of two or more substances not chemically bonded together. |
| Hydrocarbon | A compound containing only hydrogen and carbon. |
| Fraction | Hydrocarbons with similar boiling points separated from crude oil. |
| Distillation | Separation of 2 or more liquids with different boiling points. |
| Fractional Distillation | Using evaporation and condensation to separate liquids from a mixture. |
| Alkane | Saturated hydrocarbon with the general formula $C_nH_{2n+2}$ |
| Alkene | Unsaturated hydrocarbon containing a double C=C bond with the general formula $C_nH_{2n}$ |
| Flammable | Easily ignited and capable of burning rapidly. |
| Viscous | A liquid resistant to flow or pouring (or 'thick'). |
| Volatile | A liquid with a low boiling point. |
| Oxidised | Describes a substance that has had oxygen added to it, or has lost electrons. |
| Complete combustion | The reaction that occurs when fuels are burnt in plenty of air (oxygen), producing carbon dioxide and water as products. |
| Incomplete combustion | The reaction that occurs when fuels are burnt in not enough oxygen, producing carbon monoxide and water as products. |
| Cracking | The reaction that breaks down long hydrocarbons into smaller, more useful ones. |
| Saturated | A hydrocarbon with only single bonds between its carbon atoms. |
| Unsaturated | A hydrocarbon whose molecules contain at least one carbon-carbon double bond. |
| Thermal decomposition | The breakdown of a compound by heating it. |
| Bromine Water | An orange liquid that turns colourless in the presence of alkenes. |



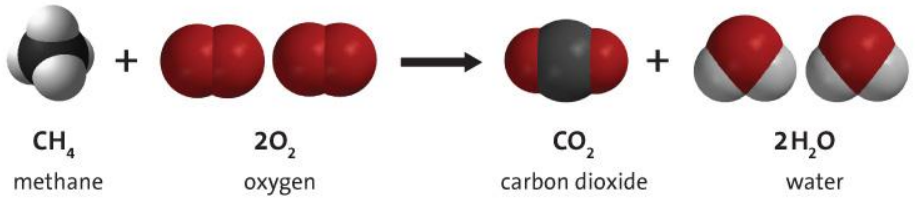

You can test for the **products of combustion** using the apparatus below:




Limewater changes from colourless to milky in the presence of carbon dioxide.
Blue cobalt chloride paper turns pink in the presence of water.
You can also use white anhydrous copper sulfate powder to test for water; it turns bright blue when it is hydrated.

## Complete Combustion

When there is sufficient oxygen, hydrocarbons burn to release water and carbon dioxide. The carbon and water are completely oxidised.
This is the balanced equation for the complete combustion of methane.




## Incomplete Combustion

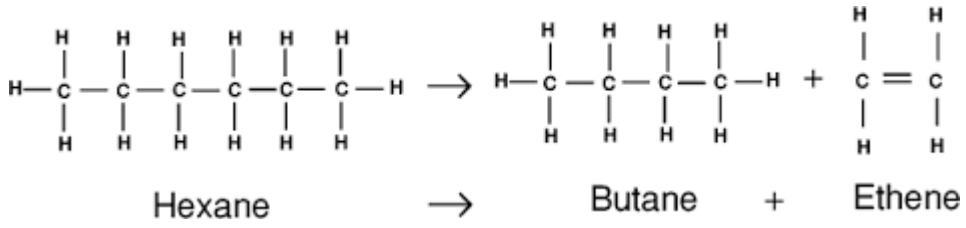
When there is not enough oxygen, carbon monoxide (CO) is produced instead of $CO_2$. CO is a toxic, colourless and odourless gas.
This is the balanced equation for the incomplete combustion of methane.

$$4CH_4 + 5H_2O \longrightarrow 2CO + 8H_2O + 2C$$

## Cracking

This is the process used to break large hydrocarbon molecules into smaller, more useful ones.
Thermal decomposition is used in an oil refinery to split the large molecules into smaller ones.
A heavy fraction is heated and vaporised. It is then either:
1 – Passed over a hot catalyst OR
2 – Mixed with steam and heated to a very high temperature.

**Cracking** produces saturated hydrocarbons, used as fuels, and unsaturated hydrocarbons (alkenes)
For example hexane could be cracked to produce butane and ethene.
TIP: The total number of Carbon and Hydrogen atoms on each side of the arrow must be the same.



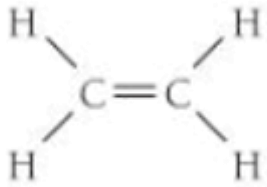

**Bromine water** (an orange liquid) turns colourless in the presence of ALKENES

# KS4 Chemistry: Separate Science
# C10 Organic Reactions

| Key word | Definition |
|---|---|
| Alkene | Unsaturated hydrocarbon which contains a carbon-carbon double bond. Its general formula is $C_nH_{2n}$. |
| Fermentation | The reaction in which the enzymes in yeast turn glucose into ethanol and carbon dioxide. |
| Functional group | An atom or group of atoms that give organic compounds their characteristic. |
| Homologous series | A group of related organic compounds that have the same functional group. |
| Hydrocarbon | A compound containing only hydrogen and carbon. |
| Hydration | Where water is used to chemically change a substance- (where water is bonded to the substance) |
| Condensation reaction | Where a bond is formed from the removal of hydrogen and oxygen to form water |

## Reactions of alkenes

Alkenes contain a C=C functional group. This functional group makes the alkenes much more reactive than alkanes.



**Combustion of alkenes**

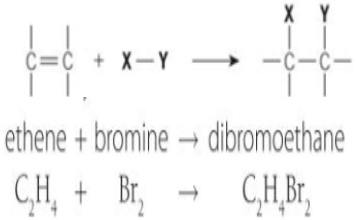
Alkenes burn with a smokier, yellow flame compared to alkanes due to incomplete combustion. This means they release less energy and are not as useful as fuels. The products however still remain the same – carbon dioxide and water

ethene + oxygen → carbon dioxide + water

$C_2H_4 + 3O_2 \rightarrow 2CO_2 + 2H_2O$

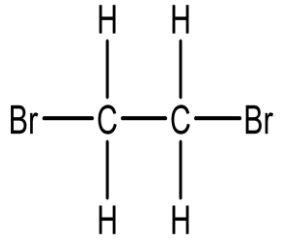
**Reaction with halogens**

When an alkene reacts with any halogen ($Cl_2$, $Br_2$, $I_2$) the C=C double bond breaks and the halogen atoms are added to the alkane chain. As the halogen is now incorporated into the hydrocarbon, coloured water such as bromine water would turn colourless



ethene + bromine → dibromoethane

$C_2H_4 + Br_2 \rightarrow C_2H_4Br_2$



**Reaction with hydrogen**

Alkenes do not contain the maximum number of hydrogen atoms possible. When a hydrogen molecule, $H_2$ is added the C=C double bond breaks to form the corresponding alkane. Typically a nickel catalyst is used.

pentene + hydrogen $\xrightarrow{\text{catalyst}}$ pentane

$C_5H_{10} + H_2 \longrightarrow C_5H_{12}$

**Reaction with water (steam)**

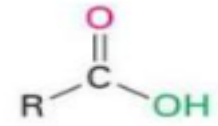
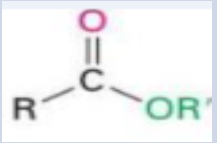
Alcohols such as ethanol can be made from ethene gas when reacted with steam. This is known as an hydration reaction

The reaction requires energy to heat the gases and a high pressure (hence why steam is used instead of liquid water).

ethene + steam $\rightleftharpoons$ ethanol

$C_2H_4 + H_2O \rightleftharpoons C_2H_5OH$

## Functional groups

| Homologous series | Functional group | diagram | suffix |
|---|---|---|---|
| Alcohol | -OH |  | -ol |
| Carboxylic acid | -COOH |  | -oic acid |
| Ester | -COO- |  | -ate |

## Alcohols and their reactions

Alcohols are made by removing one hydrogen atom from an alkane molecule and replacing it with the -OH group. They are used as solvents, fuels and in alcoholic drinks.

Ethanol can be made by the fermentation of glucose with yeast:

glucose $\xrightarrow{\text{yeast}}$ ethanol + carbon dioxide

$C_6H_{12}O_6(aq) \rightarrow 2C_2H_5OH(aq) + 2CO_2(g)$

When reacted with sodium metal, hydrogen gas, is released. This reaction is less vigorous than the reactions with water. And produces as strong alkali solution (from the sodium alkoxide salt formed).

sodium + ethanol → sodium ethoxide + hydrogen

$2Na + 2C_2H_5OH \rightarrow 2C_2H_5ONa + H_2$

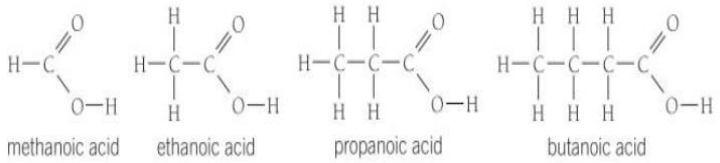
Alcohols can be oxidised to a carboxylic acid when boiled with an acidified oxidising agent which is shown in reactions as [O], for instance ethanol will oxidise to ethanoic acid (which is the main component in vinegar).

ethanol + oxygen atoms from oxidising agent → ethanoic acid + water

$C_2H_5OH + 2[O] \rightarrow CH_3COOH + H_2O$

## Carboxylic acids

**Carboxylic acids** contain the functional group **-COOH**.




All carboxylic acids are weak acids and will react with carbonates an bases in a similar manner- producing a salt, water and carbon dioxide.

ethanoic acid + sodium carbonate → sodium ethanoate + water + carbon dioxide

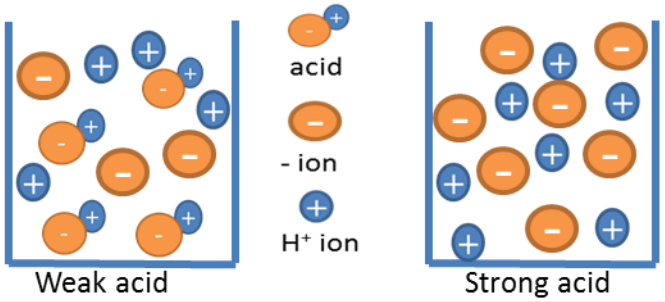
$2CH_3COOH(aq) + Na_2CO_3(s) \rightarrow 2CH_3COONa(aq) + H_2O(l) + CO_2(g)$

**HT only**

Carboxylic acids are weak acids as they do not fully ionise (split into its constituent positive $H^+$ and negative ions), as pH is a measure of the concentration of $H^+$ ions a low concentration of these would equate to a acidic pH closer to 7

$CH_3COOH(aq) \rightleftharpoons CH_3COO^-(aq) + H^+(aq)$

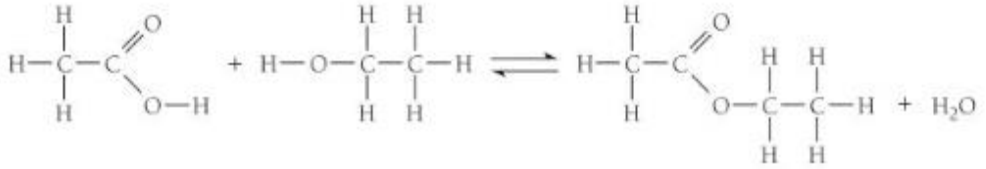
ethanoic acid (high proportion) ⇌ ethanoate ions (low proportion) + hydrogen ions




## Esters

**Esters** contain the functional group **-COO-**.

An ester is made by reacting together a carboxylic acid and an alcohol, along with a sulfuric acid catalyst.



In general:

**carboxylic acid + alcohol ⇌ (acid catalyst) ester + water**

Esters have a distinctive fruity smell and are volatile (evaporate easily). They are mainly used in perfumes and flavourings.

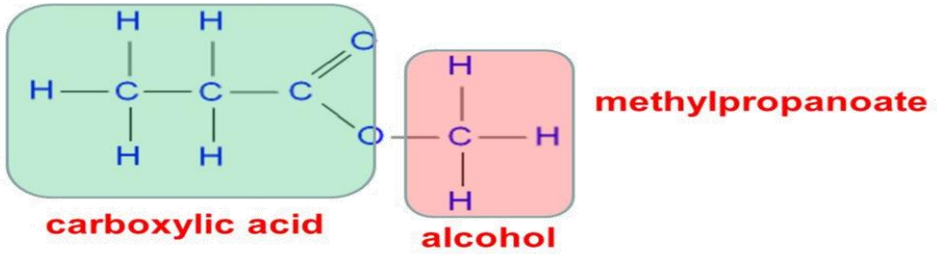
The first part of the ester name comes from the alcohol (ethyl) and the second part from the carboxylic acid (ethanoate).

(alcohol) (acid-anoate)

Drop –anol, replace with "yl"

Change from "-oic acid" to "-oate"

Example:

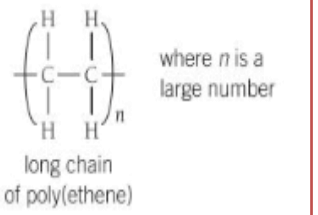


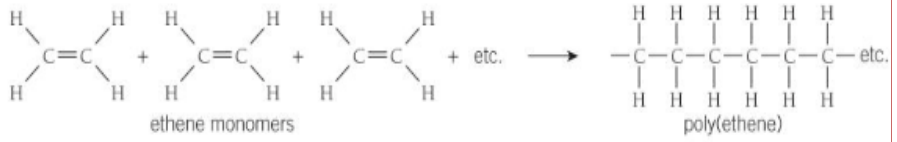
# KS4 Chemistry: C11 Polymers

| Key word | Definition |
|---|---|
| Polymer | A substance that is composed of many repeating subunits. |
| Monomer | The small repeating molecules that make up polymers |
| Addition polymerisation | A form of polymerisation reaction where two substances react together to form one new substance |
| Condensation polymerisation | A form of polymerisation reaction which forms two products – the now extended polymer and a small molecule of either water or HCl |
| Polyester | Where a reaction between an alcohol and a carboxylic acid react to form a longer ester which can further polymerise via "ester link" |
| Polysaccharides | A polymer made of smaller simple sugars as monomers. |
| Proteins | Where water is used to chemically change a substance- (where water is bonded to the substance) |
| Natural polymer | A polymer that can be made naturally such as silk, wool and DNA |
| Nucleotide | The organic monomer that makes up DNA |

## Polymers

Polymers are typically long chain molecules that are made up of up to thousands of smaller molecules called monomers. These polymers take the name of the monomers with poly- as the prefix

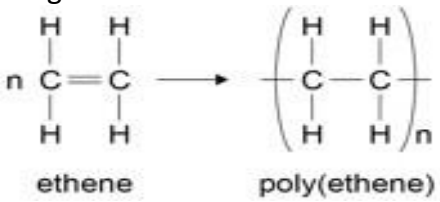



## Addition Polymerisation

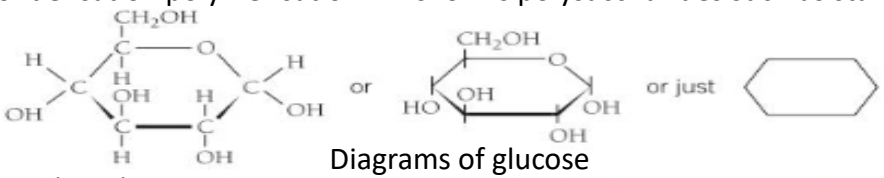
Alkenes are great to make polymers such as poly(ethene) (durable and transparent for drinks bottles) and poly(propene) (strong and is used to make ropes) by addition polymerisation.

This reaction takes multiple reactants to make one product, the double bond in the monomer "opens up"/ is broken allowing new bonds to be made to extend the polymer. The repeating unit in the polymer is then shown in brackets with a single bond leaving each end.



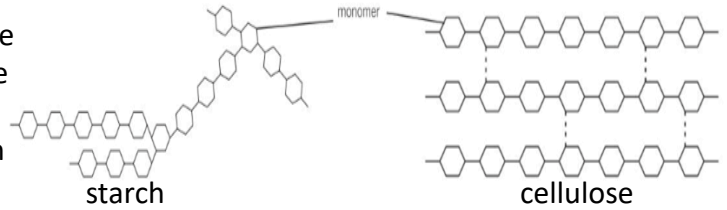

## Natural Polymers

Natural polymers are found in all living things, we specifically need to know about the polymers that make up starch, cellulose and proteins. Glucose is a simple sugar found in foods, and is a monomer called a monosaccharide. These monosaccharides are polymerised via condensation polymerisation. This forms polysaccharides such as starch




Diagrams of glucose

Starch and cellulose can be used as storage for glucose to later be broken down

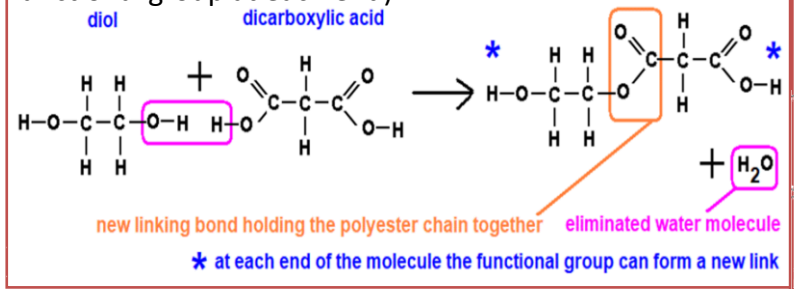



## Higher Tier only- Condensation Polymerisation

Another form of polymerisation reaction is condensation polymerisation, as the name suggests- water is usually formed in this process.

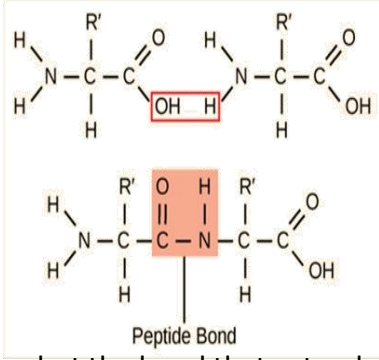
| | |
|---|---|
| addition polymerisation → | the addition polymer |
| condensation polymerisation → | the condensation polymer + a small molecule |

For this reaction, we do not need a C=C bond, instead we use a diol (molecule with a alcohol functional group at each end) and a dicarboxylic acid (molecule with a carboxylic acid functional group at each end)



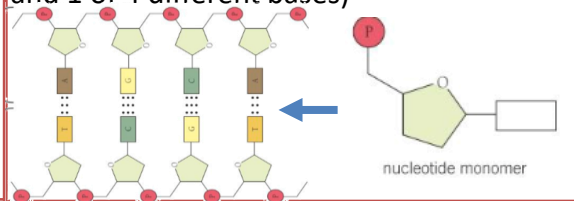

## HT only- Making polypeptides from amino acids

Polypeptides are the building blocks for protein and the monomers for polypeptides are called amino acids. They are named as such as they have a amine ($NH_2$) group at one end and a carboxylic acid group (-COOH) at the other end, meaning both an acid an base are in the same molecule. This reaction is a condensation polymerisation reaction, but the bond that extends the polymer is called a peptide bond as a peptide is made




## DNA

DNA is another example of a natural polymer made of monomers called nucleotides (made of sugars bonded to phosphate groups and 1 of 4 different bases)




Nucleotides bond together via **condensation polymerisation**

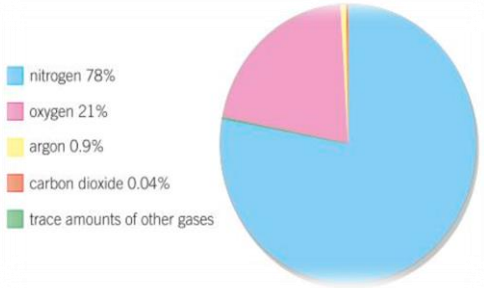
# KS4 Chemistry: C13 The Earth's Atmosphere

| Keyword | Definition |
|---|---|
| Atmosphere | The relatively thin layer of gases that surround planet Earth |
| Carbon capture and storage | A technique that involves capturing carbon dioxide produced by burning fossil fuels and pumping it underground to be absorbed by porous rocks so that it is not released into the atmosphere |
| Carbon footprint | The total amount of carbon dioxide and other greenhouse gases emitted over the full life cycle of a product, service or event |
| Global dimming | A process that reduces the amount of sunlight reaching the Earth's surface. It is caused by particulates in the atmosphere reflecting light back into space before it can reach Earth |
| Incomplete combustion | when a fuel burns in insufficient oxygen, producing carbon monoxide as a toxic product |
| Nitrogen oxides | Chemical compounds produced when high temperatures cause nitrogen gas in the air to react with oxygen. Nitrogen oxides are toxic and can cause acid rain |
| Particulate | small solid particle given off from motor vehicles as a result of incomplete combustion of its fuel |

**Earth's Early Atmosphere.** Intense volcanic activity first released the gases that formed the Earth's early atmosphere.
At that time, the Earth's atmosphere consisted mainly of carbon dioxide with little or no oxygen.
Volcanoes produced nitrogen that gradually built up in the atmosphere, along with methane and ammonia.
Water vapour in Earth's early atmosphere would have condensed to create the seas and oceans.
Evidence is limited since it is thought this occurred 4.6 billion years ago.

## Earth's Modern Atmosphere

- 78% nitrogen
- 21% oxygen
- 0.9% Argon
- 0.04% Carbon Dioxide




**How did the levels of carbon dioxide decrease?** Algae and plants decreased the percentage of carbon dioxide in the atmosphere by photosynthesis. Carbon dioxide was also decreased by the formation of **sedimentary rocks** (limestone) linked to ocean formation and fossil fuels.

**How did the levels of oxygen increase?**
2.7 billion years ago, algae first produced oxygen. Gradually over time, the levels of oxygen in our atmosphere increased as plants evolved. Oxygen is produced by plants in the process of photosynthesis.

## Sulfur dioxide

Sulfur dioxide is an atmospheric pollutant. It is a gas that is produced from the burning of fossil fuels. Sulfur dioxide dissolves in rainwater and produces acid rain. Acid rain causes damage to forests, kills plants and animals that live in aquatic environments and damages buildings.

## Nitrogen

Nitrogen and oxygen react together to make oxides of nitrogen. This occurs inside a car engine where there is a high temperature and pressure. Nitrogen compounds are grouped together with the general formula NOx.
Nitrogen compounds, along with sulfur dioxide, are also responsible for acid rain.

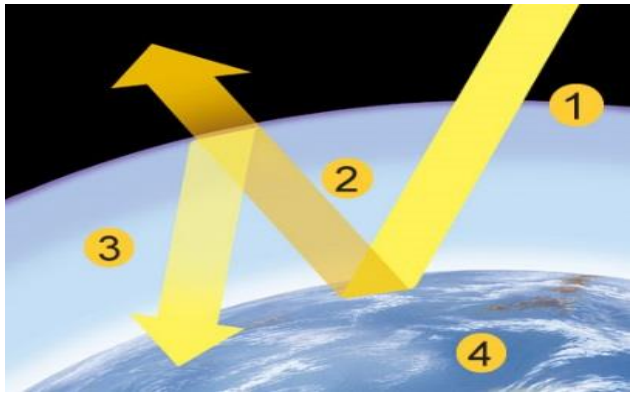
**Carbon monoxide** is a poisonous gas. It is colourless and odourless. Carbon monoxide works by binding to the haemoglobin in your red blood cells. This prevents them from carrying oxygen to the cells around your body. Carbon monoxide detectors are used to detect levels of the gas in the surrounding air and are often placed near gas-powered boilers to detect gas leaks.

**Particulate carbon** (soot) irritates the lining of the lungs making asthma worse and could cause cancer. Global dimming is caused by particulates of carbon blocking out the Sun's rays and may reduce rainfall.

## The greenhouse effect

1. The earth and its atmosphere are very similar to that of a greenhouse. The greenhouse gases ($CO_2$, water vapour and methane) in the atmosphere trap the heat and keep the earth warm. 1. The electromagnetic radiation at most wavelengths from the sun **passes** through the Earth's atmosphere.

2. The Earth **absorbs electromagnetic radiation with short wavelengths** and so warms up. Heat is **then radiated** from the Earth as longer wavelength infrared radiation.




3. Some of this infrared radiation is absorbed by greenhouse gases in the atmosphere.

4. The atmosphere warms up

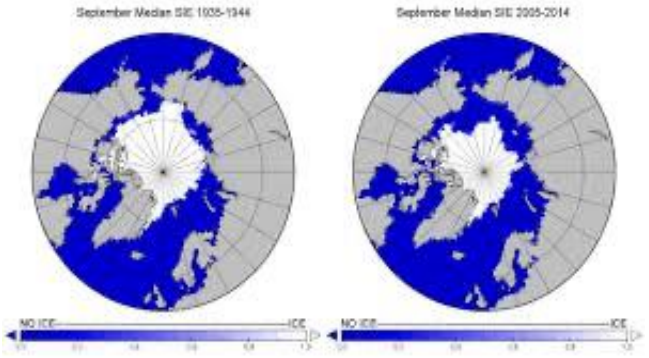
## What is the link between carbon dioxide and global warming?

There is a strong correlation between the percentage concentration of carbon dioxide in the atmosphere and increased global temperatures. The impact of this is that the polar ice caps are melting, sea levels are rising and habitats and rainfall patterns are changing.

**Human activities** can increase the amounts of greenhouse gases in the atmosphere.
- More farming: Increased farming of crops and farm animals such as cattle are leading to an increase in levels of methane.
- More landfills: Garbage in landfills undergoes decay (decomposition) and releases methane.
- Energy consumption: Fossil fuels are being burnt to keep up with energy demands, leading to increase in levels of carbon dioxide and methane.
- Deforestation: Forests are cleared for agriculture or development, so most of the carbon in the burned trees escapes to the atmosphere.

## Global climate change

Based on peer-reviewed evidence, many scientists believe that human activities will cause the temperature of the Earth's atmosphere to increase at the surface and that this will result in global climate change.




A rise of just a few degrees in world temperatures can cause **drought**, **flooding** in others, **melting of polar ice caps** leading to **raised sea levels, increased coastal destruction.**

## Combustion

Combustion is the burning of fuels. When burnt, these fuels release gases (carbon dioxide, water vapour, carbon monoxide, sulfur dioxide and oxides of nitrogen) into the atmosphere.

**Complete combustion** occurs when there is enough oxygen for a fuel to burn.

propane + oxygen ⟶ carbon dioxide + water

$C_3H_8 + 5O_2 \longrightarrow 3CO_2 + 4H_2O$

**Incomplete combustion** occurs when there isn't enough oxygen for a fuel to burn. The products in this reaction are water and poisonous carbon monoxide. Carbon particles (soot) may also be seen.

ethane + oxygen ⟶ carbon monoxide + water

$2C_2H_6 + 5O_2 \longrightarrow 4CO + 6H_2O$

The **carbon footprint** is the total amount of carbon dioxide and other greenhouse gases emitted over the full life cycle of a product, service or event. The carbon footprint can be reduced by reducing emissions of carbon dioxide and methane.

# KS4 Chemistry C14 – The Earth's Resources

Humans use the Earth's natural resources for a number of purposes, including:

- energy and fuels for warmth
- building materials for shelter
- food through farming
- fuels for transport
- materials for clothing

The human population is growing very quickly and many people argue that humans are using up the Earth's finite resources at a rate which is too fast and therefore unsustainable

## Making water Safe to Drink

Potable water must have low levels of SALTS and MICROBES (it isn't PURE water)

Rainwater in lakes, rivers and reservoirs

Sewage

Screening and grit removal

Why? To remove insoluble solids

Filter

Sedimentation

**Sterilise** – chlorine, ozone, or UV light

Why? To kill microbes

Anaerobic digestion of sludge

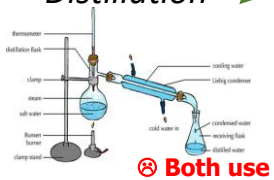
Aerobic treatment of effluent

Industrial and agricultural waste water – remove organic matter and harmful chemicals

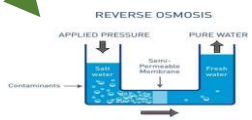
Salt water

Desalination

*Distillation*



☹ Both use a lot of energy




*Using membranes e.g. Reverse osmosis*

## Finite and Renewable Resources

Finite resources from the Earth's crust, oceans and atmosphere will one day run out. They can be processed to provide energy and useful materials. Renewable resources are those which will not run out in the foreseeable future.

Finite resources are processed to get us

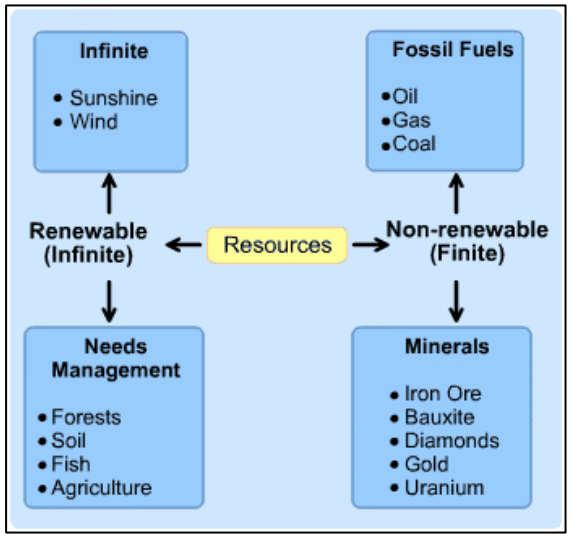
- Energy
- materials


e.g. Coal, oil and gas are used for energy.
e.g. metal ores are mined to get metals.

'Natural resources' + agriculture provides:

- Food
- Timber
- Clothes

e.g. Cotton is natural and we grow cotton plants. OR we can use synthetic materials e.g. nylon



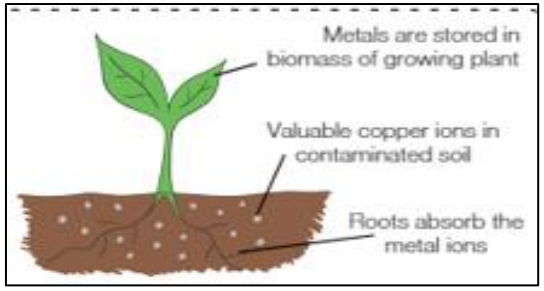

| Key Term | Definition |
|---|---|
| Finite | Will run out eventually |
| Renewable | We can replace them as we use them |
| Sustainable | meets the needs of the current generation without compromising the ability of future generations to meet their needs. |
| Potable | Safe to drink, Drinkable |
| Pure | a pure substance consists of only one element or one compound |
| Distillation | A method of purifying a liquid by first heating it then cooling it. |
| Reverse Osmosis | A water purification process that uses a partially permeable membrane to remove ions, unwanted molecules and larger particles from drinking water |
| Sewage | Waste water and excrement transported in sewers |
| Aerobic | In the presence of oxygen |
| Anaerobic | Without oxygen being present |
| Bioleaching | A method of extracting copper from low-grade copper ores using bacteria |
| Phytomining | A method of extracting copper from low-grade copper ores using plants that absorb the copper ions |
| Life Cycle Assessment | A process that assesses the impact of a product, process or service on the environment |
| Recycling | The process in which waste materials are processed to be used again |
| Blast Furnace | The huge reaction vessels used in industry to extract iron from its ore |

## Alternative Metal Extraction

Why bother? Running out of high grade metal ores

## Phytomining

1. Plants are grown in soils rich in metals.
2. Plants take in copper.
3. BURN plants
4. Metal is then extracted from the ASH




## Bioleaching

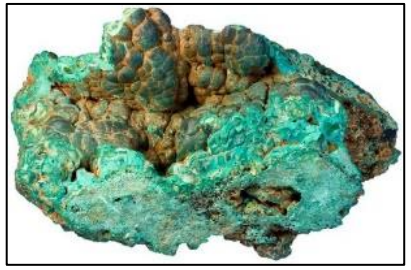

→ 'leachate solution' contains copper compounds

## How to get the copper from the compound

↓ Displacement using scrap iron

↓ Electrolysis

Copper comes from a rock called malachite



Electrolysis only works on molten or dissolved ions

Copper sulphate solution (aq)

## Life Cycle Assessments

LCA's are carried out in order to find the impact of a product on the environment.

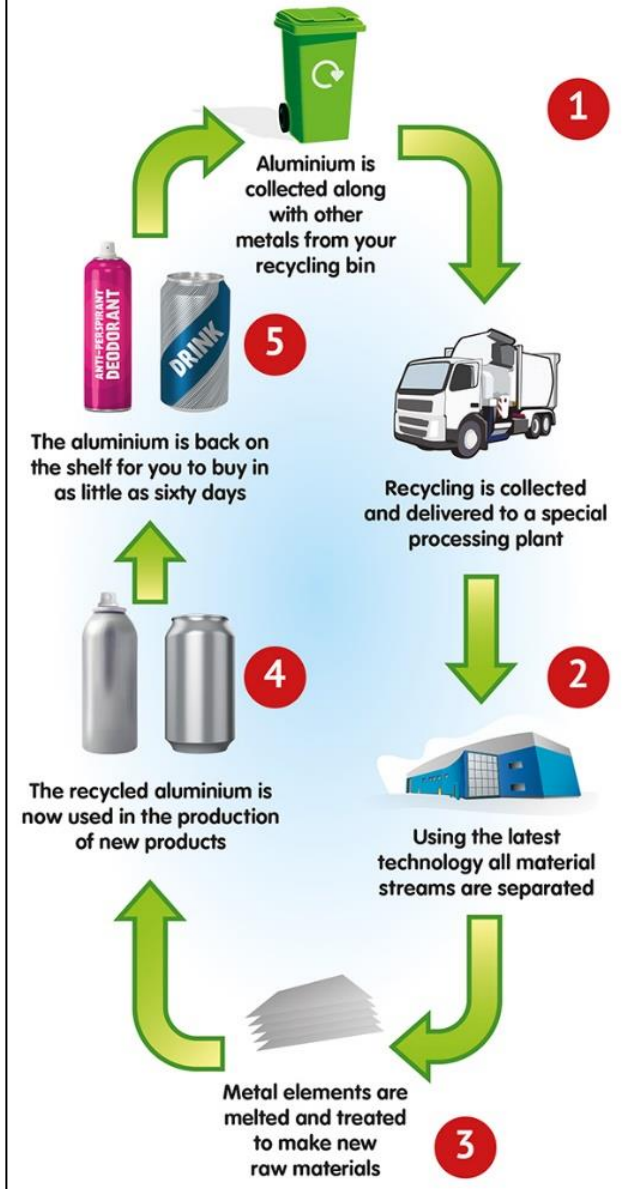

## Reducing use of resources

**Reduce…**use of limited resources

**Reduce…**use of energy resources

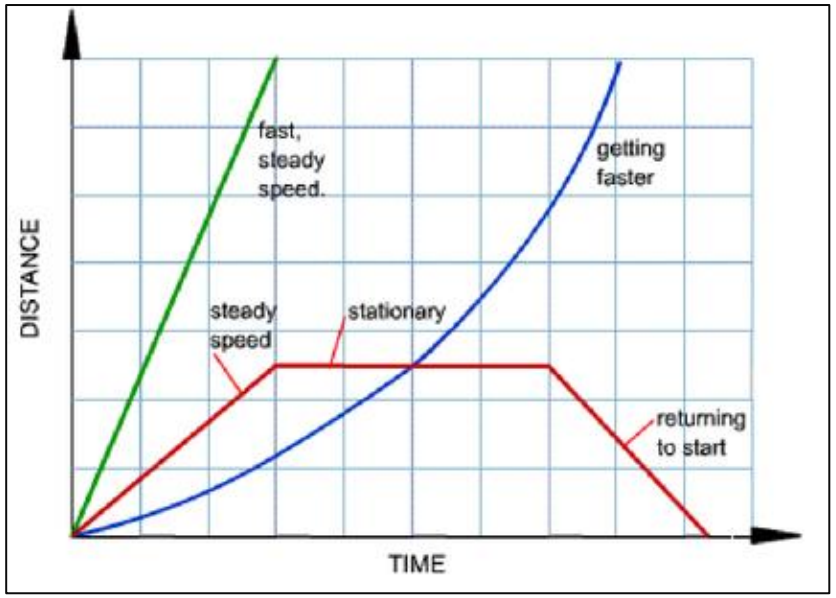
**Reduce…**waste and environmental impacts


## HOW IS ALUMINIUM RECYCLED?



# KS4 Physics: P9 speed and motion

## Distance time graphs




| Shape | description |
|---|---|
| ——— | stationary |
| / | Constant speed |
| \ | Constant speed |
| ⌒ | Slowing down - deceleration |
| ⌒ | Speeding up - acceleration |
| gradient | The gradient at any point is the speed. You can measure the gradient at any point on a curve by taking a tangent. |

## Equations

$$Acceleration = \frac{change\ in\ speed}{time}$$

$$a = \frac{\Delta v}{t} \quad \text{or} \quad a = \frac{v - u}{t}$$

$$speed = \frac{distance}{time}$$

$$v = \frac{s}{t}$$

a = acceleration (m/s$^2$ or ms$^{-2}$)
v = final velocity (m/s)
u = initial velocity (m/s)
t = time (s)
s = distance or displacement (m)
Δ = change in

$$final\ velocity - initial\ velocity = 2\ x\ acceleration\ x\ distance$$

$$v^2 - u^2 = 2as$$

**HT: Gradients and tangents**

The gradient on a distance time graphs is the speed. The gradient on a velocity time graph is the acceleration.

If the line is curved you can calculate the **gradient** at a certain point by taking a **tangent**. For example:

What is the acceleration of the object at 10s?

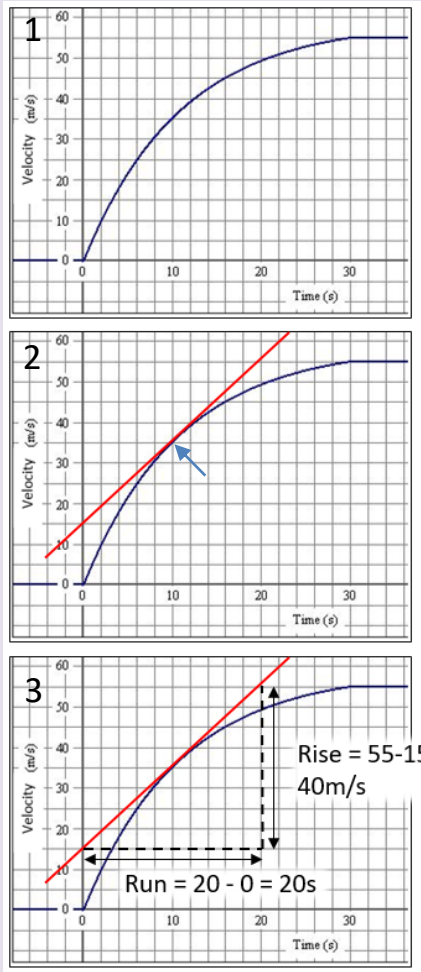
Take a tangent to the curve at the 10s point

(a tangent is a line that runs parallel to that exact part of the curve, it should just touch the curve but not cut through any other part)

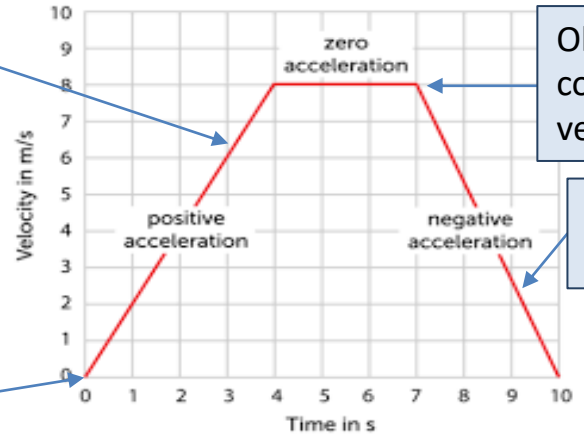
$$gradient = \frac{chenge\ in\ y}{change\ in\ x} \quad \text{or} \quad gradient = \frac{rise}{run}$$

Calculate the gradient of the tangent, draw vertical and horizontal lines to the tangent. Measure rise and run.

$$gradient = \frac{rise}{run} = \frac{40}{20} = 2m/s^2$$



# Velocity time graphs




constant acceleration

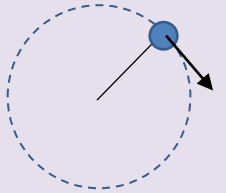
Object at a constant velocity

Constant deceleration

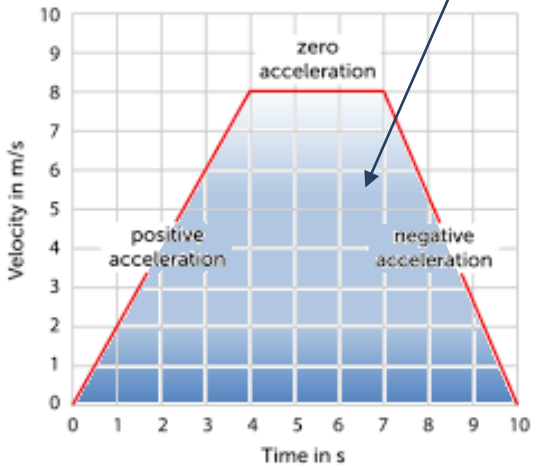
Object stationary

| Shape | description |
|---|---|
| ——— | Constant speed |
| / | acceleration |
| \ | deceleration |
| ⌒ | Increasing deceleration |
| ⌒ | Decreasing acceleration |
| gradient | Acceleration or deceleration |

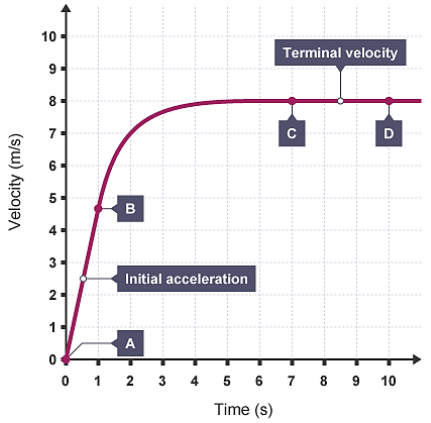
**HT: Circular motion** – an object moving in a circular motion can have a constant speed but its velocity is constantly changing as it changes direction (remember velocity is a vector quantity with a magnitude and direction)



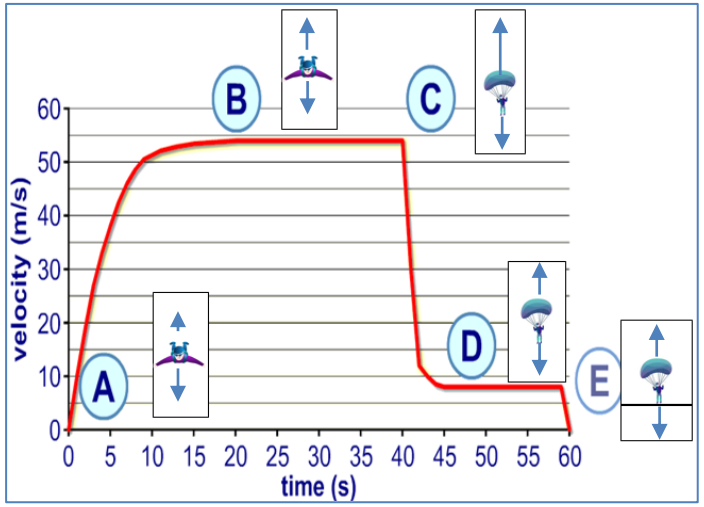
**HT:** The area under a velocity time graph = displacement




Falling objects start with an initial acceleration (A-B). Acceleration decreases due increasing air resistance (B-C). They reach a terminal velocity as weight and air resistance forces become equal and opposite (C-D).




Uniform acceleration means accelerating at the same rate. The graph above shows non-uniform acceleration. Uniform acceleration will give a straight line on a velocity time graph.




A) The weight force is greater than the air resistance force therefore the sky diver is accelerating. The sky diver continues accelerating, but at a decreasing rate due to the increasing air resistance caused by their increasing velocity.

B) The weight force and the force of air resistance is the same (resultant force = zero) so the sky diver travels at a constant speed. The Sky diver reaches terminal velocity, travelling at a constant velocity.

C) On opening the parachute the air resistance becomes greater than the weight force. The skydiver opens the parachute and the sky diver decelerates.

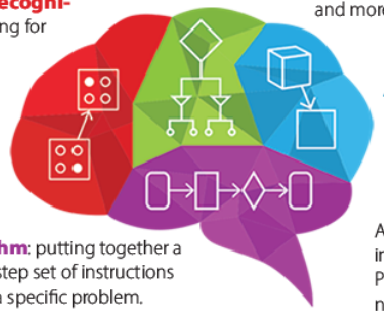
D) As the skydiver slows, the air resistance decreases until it becomes the same as the weight force. The sky diver reaches a new terminal velocity (constant velocity)

E) The skydiver reaches the ground. The weight force is balanced by the normal reaction force exerted by the ground. Their velocity drops to zero.

## 2.1 ALGORITHMS

**Pattern recognition**: looking for patterns.

**Decomposition**: breaking a problem down into smaller, and more manageable parts.

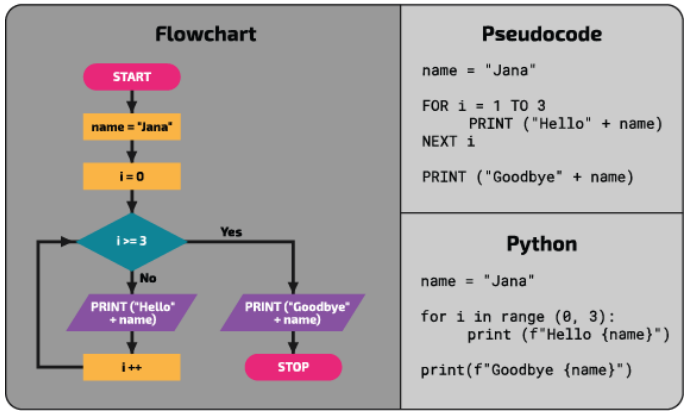


**Abstraction**: removing unnecessary detail.

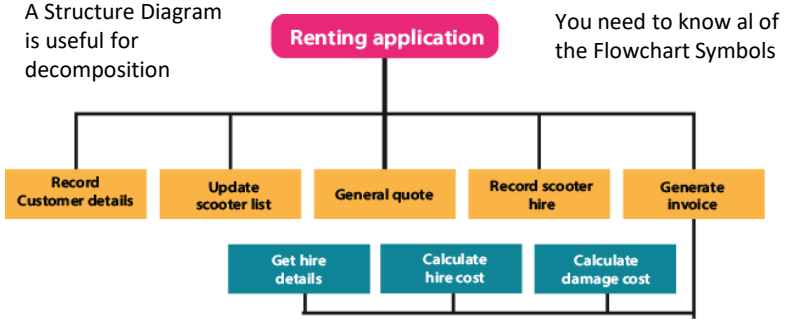
**Algorithm**: putting together a step-by-step set of instructions to solve a specific problem.

Algorithms can be represented in either Flowchart form, in Pseudocode (real code but not) or in a programming language like Python.

### 2.1.2 Designing, creating and refining algorithms




A Structure Diagram is useful for decomposition




You need to know al of the Flowchart Symbols

Trace Tables help us determine the outcome of an algorithm. We can use

```
count = 3
PRINT(count)
FOR i = 1 TO count
    PRINT(count - i)
NEXT i
```

| count | i | OUTPUT |
|---|---|---|
| 3 | | |
| | | 3 |
| | 1 | |
| | | 2 |
| | 2 | |
| | | 1 |
| | 3 | |
| | | 0 |

Shows route through the algorithm

**PROCESS** — Represents an operation or set of operations that change the value, form, or location of data.

**INPUT/ OUTPUT** — Indicates the process of inputting and outputting data.

**NAMED PROCESS** — Indicates a named process that is defined elsewhere.

**TERMINATOR** — Marks the beginning and end of the process. A well-designed process should have only one entry point and one exit point.

**DECISION** — Shows a conditional operation that will determine which one of two paths the program will take.

### 2.1.3 Searching and sorting algorithms

#### Linear Search

You will need to know the difference between the Linear (also known as serial) Search and the Binary Search. You could be asked to perform the linear search and to identify the elements in the list that have been examined before the named search item has been identified.

FIND '20'

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| 10 | 50 | 30 | 70 | 80 | 60 | 20 | 90 | 40 |

#### Binary Search

FIND '23'

For the Binary Search, you will be asked to perform the first pass only (make sure the largest number is travelling to the end of the line).

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 5 | 8 | 12 | 16 | 23 | 38 | 56 | 72 | 91 |

| L=0 | | | | M=4 | | | | | H=9 |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 5 | 8 | 12 | 16 | 23 | 38 | 56 | 72 | 91 |

Knowing the start [0] and end (len()) we can determine the midpoint. 23 is > than 16, so we can discard the midpoint and everythng lower.

| 0 | 1 | 2 | 3 | 4 | L=5 | 6 | M=7 | 8 | H=9 |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 5 | 8 | 12 | 16 | 23 | 38 | 56 | 72 | 91 |

23 is < than the new midpoint, so we discard the upper half from the midpoint.

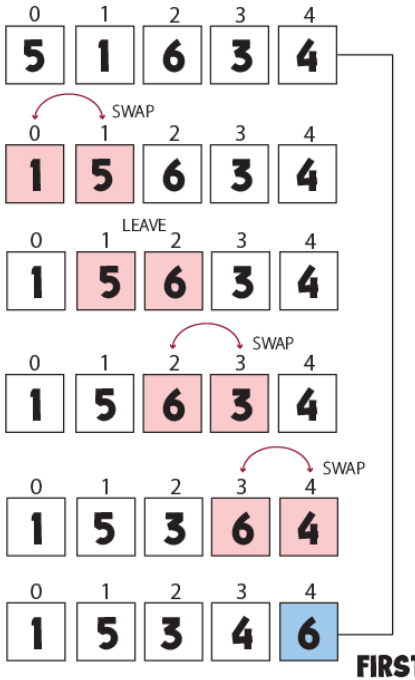
| 0 | 1 | 2 | 3 | 4 | L=5, M=5 | H=6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 5 | 8 | 12 | 16 | 23 | 38 | 56 | 72 | 91 |

We have found the value of '23' at the midpoint. Return [5].

**Questions in this section may ask you to perform the following:**

- **Recall the different stages of Computational Thinking and be able to define each one.**
- **Be able to read/write algorithms in Flowchart, Pseudocode, or structure diagram formats.**
- **Be able to recognise the symbols used in a flowchart.**
- **Be able to follow a trace table to determine the output of a given algorithm and also determine the algorithm's purpose.**
- **Know the operations of the two searching algorithms (linear search/binary search).**
- **Understand that the linear search searches for an item by examining every item in the list before determining that an item is or is not there.**
- **Understand that the linear search algorithm is a simple search algorithm, but that it is also inefficient as its effectiveness deteriorates as there are more items to search.**
- **Understand that the binary search is a divide an conquer algorithm that gets more and more efficient (as it halves each time).**
- **Can perform a a binary search, showing each of the stages.**

## Bubble Sort

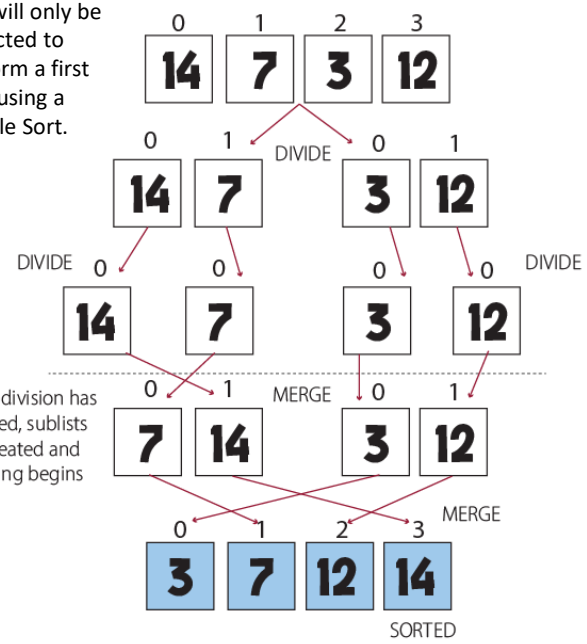



FIRST PASS

Largest item in place

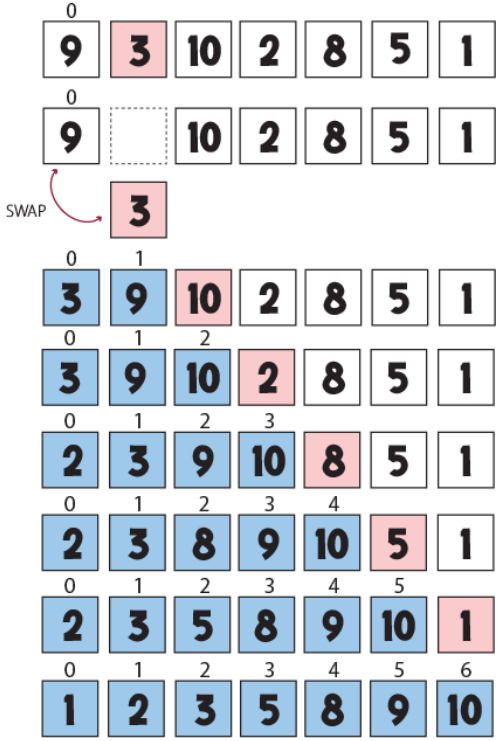
You will only be expected to perform a first pass using a Bubble Sort.

## Merge Sort




Once division has finished, sublists are created and merging begins

## Insertion Sort




| Symbol | Meaning |
|---|---|
| + | Addition |
| - | Subtraction |
| * | Multiplication |
| / | Division |
| ^ | Exponent |
| MOD | Modulo (Remainder) |
| DIV | Integer Division |
| < | Less Than |
| > | Greater Than |
| <= | Less Than/Equal To |
| >= | Greater Than/Equal To |
| != | Not Equal To |
| == | Equivalent To |
| AND | True if all parts True |
| OR | True if any part/whole is True |
| NOT | Is True if False and vice versa |

## Selection

### IF/ELSE STATEMENT

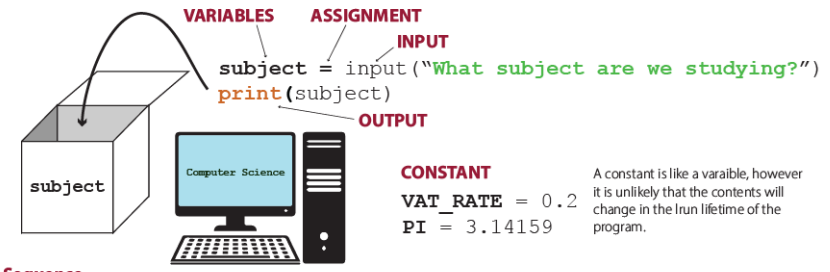
```
if result >= 68:
   print("Grade 9")
elif result >= 62:
   print("Grade 8")
elif result >= 56:
   print("Grade 7")
elif result >= 49:
   print("Grade 6")
elif result >= 42:
   print("Grade 5")
elif result >= 35:
   print("Grade 4")
elif result >= 26:
   print("Grade 3")
elif result >= 18:
   print("Grade 2")
elif result >= 10:
   print("Grade 1")
else:
   print("FAIL")
```

### SWITCH CASE STATEMENT

```
case 9:
   print("Grade 9")
case 8:
   print("Grade 8")
case 7:
   print("Grade 7")
case 6:
   print("Grade 6")
case 5:
   print("Grade 5")
case 4:
   print("Grade 4")
case 3:
   print("Grade 3")
case 2:
   print("Grade 2")
case 1:
   print("Grade 1")
default:
   print("FAIL")
```

## 2.2 PROGRAMMING FUNDAMENTALS

A variable is a unit of memory that is likely to change in the run lifetime of the program.




**CONSTANT**

```
VAT_RATE = 0.2
PI = 3.14159
```

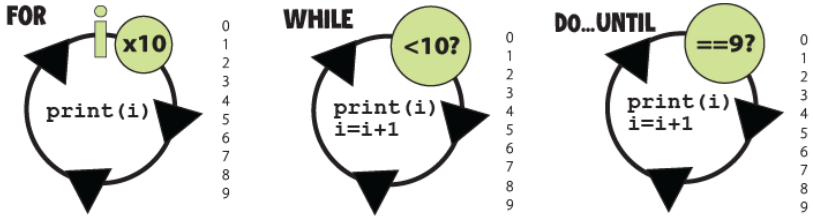
A constant is like a varaible, however it is unlikely that the contents will change in the lrun lifetime of the program.

### Sequence


A sequence is definied as a set of instructions of staements that must be performed in that order.

```
1 age = input("Enter age")
2 age = int(age)
3 print("You have", 67-age,"years left to retire.")
```

In the example shown, we cannot calculate the retirement age (STEP 3) until we have received it (STEP 1) and then cast it (STEP 2).




```
for i in range(10):
   print(i)
```

```
while i <10:
   print(i)
   i = i+1
```

```
do
   print(i)
   i = i+1
until i == 9:
```

### 2.2.2 Data types

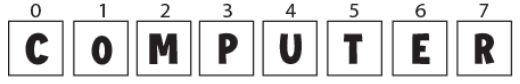
| | | |
|---|---|---|
| **Integer** | a whole number e.g. 50 | `int()` |
| **Real** | a fractional/decimal number e.g. 3.17 | `float()` |
| **Boolean** | True/False e.g. TRUE | `real()` |
| **String** | Text e.g. "Hello World" | `str()` |
| **Character** | A single character e.g. "C" or "S" | `chr()` |

The main programming constructs are: **Sequence**, **Selection**, and **Iteration**.
- Selection methods include the use of **IF...THEN...ELSE** and the **SWITCH CASE** statement.
- Iteration methods include: **WHILE**, **FOR**, and **DO...UNTIL**.

### 2.2.3 Additional programming techniques

#### String Manipulation

```
a = "Computer"
```

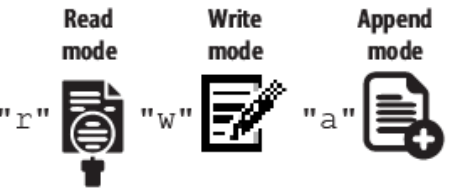



```
print(a[0]+a[1]+a[4]+a[7]+a[5])
print(a[0:3]+a[6])
```


Strings (text) can referenced like an array. In the above example, 'Computer' is the string. We can use the index to concatenate letters and slicing to create new output.

## Basic file handling

1. Open/Create the file
2. Read or Write to file
3. Close the file




File open — name of file — Access mode

```
f = open("demofile.txt", "r")
```

```
print(f.readline())
f.write("Write to the file")
```

```
f.close()
```

## Arrays

A one-dimensional array is a data structure that contains a set of elements of the same data type. To access an element of an array, you use an index number. This specifies the position of the element in the array. If you think of a one-dimensional (1D) array as a single row of data, you could think of a two-dimensional (2D) array as a table with rows (the first dimension) and columns (the second dimension).

1D Array:

```
10TimesTbl = [10,20,30,40,50,60,70,80]
```

| Row \ Column | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|
| 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 |
| 1 | 11 | 22 | 33 | 44 | 55 | 66 | 77 | 88 |
| 2 | 12 | 24 | 36 | 48 | 60 | 72 | 84 | 96 |

2D Array:

```
10-12TimesTbl =
[[10,20,30,40,50,60,70,80],
[11,22,33,44,55,66,77,88],
[12,24,36,48,60,72,84,96]]
```

```
print(10TimesTbl[0,2]) ⟶ 30
print(10-12TimesTbl[1,5]) ⟶ 66
```

**Arrays** are a data structure which allow you to store *multiple items of data* of the same type within one **identifier**. By using **indexing**, you can access the different types of data directly, and you can also replace an **individual element** within the array just by accessing it. In **Python**, we use a **List structure** which differs from an **Array** structure as it is **changeable** (***mutable***) whereas an **Array** is fixed in size. A **List** can also contain data of different types, whereas an **Array** will always contain data of the same type.

Once you have written a **program** (and it is now doing what you want it to do) you will want to store the results in **secondary storage** (as it is not volatile). This means you may choose to output the contents of your program as a **txt file**.

The main modes for opening a file are in **Read mode** (you can only read the file), **Write mode** (you will end up replacing the contents of the file) or **Append mode** (you will end up adding to the next blank line in the already populated file).

If you separate your output with **commas** you create a **csv** (**comma separated values**) file that can be used to import into applications such as **spreadsheets** or **databases** – effectively turning those lines of data into **records**.

**Subprograms** are very useful for **decomposing** your programs as they allow you to break up different parts of the program and also allow you to **reuse** those parts again and again.

The key main differences are that a **procedure** simply runs through a series of **statements**, whereas a **function** is expected to return some form of **value**. We pass data to **functions** in the form of **parameters**, and it is good practice to handle and deal with these variables **locally** (within the subroutine itself).

**Questions from this section will largely be either definitions OR questions on why a programmer would use each construct OR it will be expected that you will be able to read and write out the code in answer to one of the Paper 2 questions. The key to Paper 2 is to make sure that you have programmed A LOT. The more challenges you have solved, the better prepared you will be for the Paper.**

## Records

Fields

| FilmID | Title | Genre | Rating | Duration |
|---|---|---|---|---|
| 1234 | Thor | Fantasy/Action | 12A | 114 |
| 1235 | Minions | Animation | U | 91 |
| 1236 | Jumanji | Adventure | PG | 104 |

Records

A record is a collection of data for one object, person, or thing. For example, in the Film table above, a record is a single row in this table about an individual film.
Fields are used in a database to provide category headings for each item of data in the record.

```
SELECT Title, Genre, Rating
FROM Film
WHERE Rating = '12A';
ORDER BY Rating = '12A';
```

The '*' wildcard can be used in place of all fields e.g. **SELECT ***. You can also use Boolean and Logical Operators to build up your queries e.g. **WHERE Rating = '12A' OR Duration > '100'**.

## Subprograms (Functions and Procedures)

```
def display_menu():
    print("1: Log in")
    print("2: Sign up")
    print("9: Quit")
```

A procedure is a set of instructions that will be executed when the procedure is called.

```
def calculate_area_of_square(length):
    area = length * length
    return area

length = 12
result = calculate_area_of_square(length)
print(result)
```

A function also contains a set of instructions that will be executed when the function is called and it will also return a value when it has finished executing.

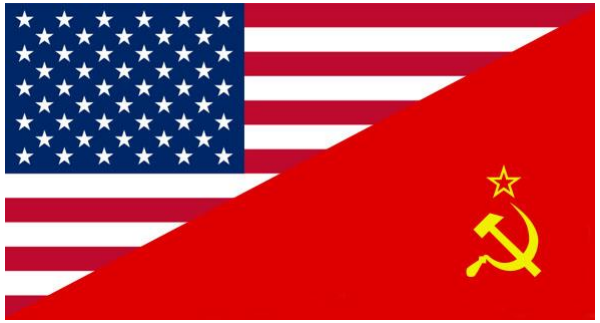
# History Terms 1 & 2: The Cold War

## Background Context

At the end of World War II, the world was split into two factions; The **Western Bloc** a group of countries under capitalist rule, comprised of the United States and its allies, some of whom would later become **NATO,** and the **Eastern Bloc** - led by the USSR (known as the Soviet Union) and communist countries, some of whom would later sign the **Warsaw Pact.** An imaginary **Iron Curtain** divided east and west.

These two factions would spend the next 40+ years engaged in a stand-off - both the United States and the USSR had developed nuclear weapons - and knew that attacking the other would lead to **M.A.D. (mutually assured destruction).** There were incidents of **brinkmanship** and **proxy wars** fought in Korea and Vietnam, as the USA became increasingly concerned about a **domino** effect as neighbouring countries would fall to **communist** rule.

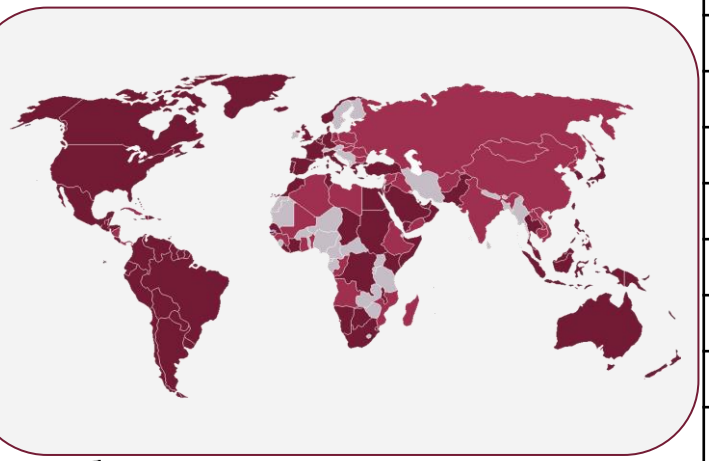
With the fall of the **Berlin Wall** in 1989, and the collapse of the USSR in 1991, the Cold War came to an end, as the world sought a more harmonious approach to co-existence.



USA, NATO & Its Allies

USSR & Its Allies

Neutral/Non-aligned



Cold War Video Library

https://tinyurl.com/ColdWarVids

| Key Vocabulary | |
|---|---|
| **Capitalism** | An economic system based on private ownership |
| **Communism** | An economic system based on community ownership |
| **Democracy** | A political system where people vote for their representatives |
| **Totalitarianism** | A political system where one person holds complete power |
| **Government** | A group of people responsible for running a country |
| **Rebellion** | Fighting against someone who is in power |
| **Guerilla Warfare** | A method of fighting using ambushes, raids and surprise. |
| **Nuclear Weapon** | A weapon of mass destruction powered by a nuclear reaction. |
| **Soviet Union** | A communist country comprised of Eastern European republics. |
| **Missile** | A weapon that is projected (fired) at a target. |
| **Blockade** | Sealing off a place to prevent movement of goods or people. |
| **Brinkmanship** | Pushing a situation to the brink of disaster to achieve an advantage. |
| **Domino Theory** | A theory that if one country fell to communism, others would follow. |
| **Iron Curtain** | The imaginary line dividing free and communist countries in Europe. |
| **Satellite Nations** | Nations under the control of the Soviet Union. |
| **Détente** | Lessening of military and diplomatic tensions between countries. |
| **M.A.D** | Mutually Assured Destruction. |
| **NATO** | North Atlantic Treaty Organisation. |
| **Warsaw Pact** | A defence pact between the USSR and neighbouring countries |
| **Allies** | Countries that are committed to military cooperation and defence. |

**Iron Curtain divides East and West** 1945

**Truman Doctrine** 1947

**USSR tests nuclear bomb** 1949

**Vietnam War begins** 1955

**U-2 Plane Incident** 1960

**Bay of Pigs botched invasion** 1961

**Strategic Arms Limitation Talks** 1969

**Fall of the Berlin Wall** 1989

**Potsdam Conference** 1945

**Containment leads to Domino Theory** 1945

**Berlin Blockade** 1948

**Korean War** 1950-53

**Space Race** 1955-75

**Berlin Wall erected** 1961

**Cuban Missile Crisis - brink of WW3** 1961

**Soviets invade Afghanistan** 1979

**Fall of the USSR End of Cold War** 1991

## The Three Conferences 1943-45

| The Tehran Conference, November 1943 | The Yalta Conference, February 1945 | The Potsdam Conference, July 1945 |
|---|---|---|
| **Representatives**:<br>Franklin D. Roosevelt (USA)<br>Joseph Stalin (USSR)<br>Winston Churchill (UK)<br><br>**Focus**: Develop relationship between three powers in the Grand Alliance; strategy to win the war.<br><br>**Level of cooperation**: High, Roosevelt and Stalin agreed on most major issues.<br><br>**Agreements**:<br>Britain and US would open up a second front in WWII by invading France in 1944.<br>The Soviet Union would join the US in declaring war on Japan after Germany's defeat.<br>The United Nations would be set up after the war to resolve disputes and guarantee international security.<br>An area of Poland would become part of the USSR. | **Representatives**:<br>Franklin D. Roosevelt (USA)<br>Joseph Stalin (USSR)<br>Winston Churchill (UK)<br><br>**Focus**: What to do with Europe after Allied victory in WWII.<br><br>**Level of cooperation**: Medium, Stalin had started to push his luck on some issues and the other leaders put their foot down.<br><br>**Agreements**:<br>Both Germany and its capital Berlin would be divided into four zones administered by the US, USSR, Britain and France.<br>To give liberated countries formerly occupied by the Nazis full freedom to choose their own governments without pressure or interference.<br>That each of the three powers would join the new United Nations<br>That Eastern Europe was in the Soviet 'sphere of influence' and this would be respected by the US and Britain.<br><br>**Disagreements**:<br>How much in reparations Germany should pay (Stalin wanted more)<br>Where Germany's eastern border should be (Stalin wanted Germany to be as small as possible)<br>What kind of government Poland should have (Stalin wanted a 'friendly' Polish government to act as a buffer against Germany). | **Representatives**:<br>Harry S. Truman (USA)<br>Joseph Stalin (USSR)<br>Winston Churchill then Clement Attlee (UK)<br><br>**Focus**: Resolving issues left incomplete at Yalta; dealing with changing situation after Germany's surrender.<br><br>**Level of cooperation**: Low, Stalin had ignored some previous agreements, and now that the war was over the US saw the USSR as more of a threat than an ally. Truman didn't get on with Stalin the way Roosevelt had.<br><br>**Agreements**:<br>Established borders of the zones of Germany and Berlin<br>Germany demilitarised<br>Democracy, freedom of speech and a free press would be established in Germany<br>Most of Germany's reparations would go to the USSR as they had suffered most.<br>The Nazi party was banned.<br><br>**Disagreements**:<br>Stalin wanted to disable Germany with huge reparations but Truman saw a strong Germany as a useful ally against the threat of the USSR<br>Truman wanted free elections across Eastern Europe but Stalin argued that as this was the Soviet sphere of influence this shouldn't happen. |

## Timeline of the arms race 1945-1962

| | |
|---|---|
| 1945 | The USA tests its first atomic bomb. It is used twice, against Japan. Joseph Stalin demands the USSR develop its own nuclear capability, and triples the pay of scientists working on the project. |
| 1949 | The USSR carries out its first successful nuclear test. In the US, Truman massively increases defence spending and work commences on a new, more powerful 'hydrogen bomb' (H-bomb) |
| 1953 | The US and USSR both conduct their first successful H-Bomb tests. Both sides are now in possession of powerful nuclear weapons. |
| 1954 | The US explodes its largest ever H-Bomb – the equivalent of 15 million tons of TNT, and capable of wiping out Moscow, the Soviet capital. The USSR had similar capability to wipe out American cities. |
| 1957 | The Soviet Union launches the first satellite into space. The US fears that this could eventually lead to a military threat, and diverts resources to its own space program. |
| 1962 | The Cuban Missile Crisis – the US discovers Soviet nuclear missiles in Cuba, 90 miles off the coast of Florida. The USA has 63 inter-continental missiles, 21 nuclear submarines, 24 aircraft carriers and 96 missiles capable of being launched from submarines. The USSR had more than 50 inter-continental missiles, and no aircraft carriers, no sub-launched missiles and only 2 nuclear submarines. The USA had started to pull ahead in the arms race, but both sides possessed enough nuclear weapons to wipe the other side out many times over. |

# Three Cold War Crises

## The Berlin Crisis 1961

**Key individuals**:
- Eisenhower and Kennedy (USA)
- Khrushchev (USSR)

**Causes**:
- 'Brain drain' refugee crisis - hundreds of thousands of highly qualified workers leaving East Germany for the West

**Key events**:
- Berlin ultimatum 1958
- Vienna Summit 1961
- Construction of the Berlin Wall 1961

**Outcomes**:
- West Berlin isolated and migration ended
- Heightened tensions between USA and USSR

## Cuban Missile Crisis 1962

**Key individuals**:
- Kennedy (USA)
- Khrushchev (USSR)
- Castro (Cuba)

**Causes**:
- USSR placed missiles on Cuba in response to US Jupiter missiles in Turkey.

**Key events**:
- Communist revolution led by Castro 1959
- Bay of Pigs invasion 1961
- Missiles discovered by USA
- Kennedy ordered removal + blockaded Cuba

**Outcomes**:
- Increased rivalry between USA and USSR
- Hotline installed for instant communication
- Various treaties between 1963 and 1968

## Czechoslovakia 1968

**Key individuals**:
- Brezhnev (USSR)
- Dubcek (Czechoslovakia)
- Johnson (USA)

**Causes**:
- Czechs demanded greater freedoms and economic reform. Dubcek appointed leader

**Key events**:
- Dubcek announced Prague Spring reforms
- Opposition to Communism increase
- USSR invades and arrests Dubcek, reversing reforms

**Outcomes**:
- Brezhnev Doctrine
- Other communist countries condemned USSR
- US condemnation but no intervention

Cold War Video Library

https://tinyurl.com/ColdWarVids

# Ending the Cold War

| Date | Summit, Meeting or Treaty | Key points |
|---|---|---|
| 1972 | **Nixon visits Moscow** | Nixon agreed to participate in European Security Conference which led to Helsinki Agreements. |
| 1972 | **SALT 1** | Restrictions on new nuclear weapons |
| 1974 | **Nixon visits Moscow** | Commitment to reduce tensions further |
| 1975 | **Helsinki Agreements** | Agreements on security, cooperation and human rights |
| 1985 | **Geneva Summit** | Commitment to abolish chemical weapons, Reagan refused to cancel SDI |
| 1986 | **Reykjavik Summit** | Talks collapse over continued refusal to cancel SDI |
| 1987 | **INF Treaty** | Large scale reduction of nuclear weapons |

| | |
|---|---|
| **Carter Doctrine** | **A US vow to go to war if their interests in Middle East threatened** |
| **Second Cold War** | Reagan's escalation of the Cold War after the failure of detente |
| **NUTS** | Targeting nuclear weapons at USSR warheads, not cities |
| **START** | Talks focused on reducing total nuclear weapons on both sides |
| **SDI** | 'Star Wars' – high tech laser guided missile protection system |
| **New Thinking** | A series of reforms proposed by Gorbachev to modernise USSR |
| **Perestroika** | 'Restructuring' – economic changes to the USSR and communism |
| **Glasnost** | 'Openness' – greater freedoms within the USSR and E Europe |
| **Dissidents** | Political opponents to a regime that often experience persecution |
| **Sinatra Doctrine** | Nickname of plan for E European countries to do things 'their way' |

# Urban issues and challenges

| Key idea | Key knowledge |
|---|---|
| Patterns in urbanisation | 1. HICs were the first to urbanise, and generally have the largest proportion of their population living in towns and cities.<br><br>2. LICs currently have lower amounts of urbanisation, but are urbanising rapidly. Megacities, cities with over 10 million people, are almost exclusively emerging in poorer nations.<br><br>3. Cities of world importance for commerce and trade are predominantly in HICs, regardless of size. World cities include Tokyo, London and New York.<br><br>4. Many old colonies (e.g. in South America) have high percentages of urbanisation as the colonising countries such as France and the UK favoured city growth to help administration.<br><br>5. Asia has the highest number of Megacities. |
| Urbanisation is affected by 2 things – Migration and Natural Increase: | • **Migration** is the movement of population from one area to another. The type of migration that we are principally interested in is rural to urban migration which happened in HICs from the 18th Century onwards on a large scale, and has gradually slowed down. In fact in many HICs the movement of people has reversed, and people are moving from urban areas back into the countryside as they search for the quiet life (this is known as **counter-urbanisation**). However, many LICs are experiencing massive rural to urban migration, mainly of young males, into the major cities. The major reasons for this movement can be classified into push and pull factors.<br>A. Push factors are something that can force or encourage people to move away from an area. Including famine (Ethiopia, 1980s), drought, flooding (Bangladesh, were people are becoming climate change refugees and having to move to Dhaka), a lack of employment opportunities, population growth and over-population, and conflict.<br>B. Pull factors encourage people to move to an area and include the hope of a better job, access to education and services, and a higher standard of living. These factors have contributed to millions of people in LICs moving to cities, creating mass urbanisation.<br>• **Natural Increase** affects urbanisation as death rates fall in cities because of better access to medical care, improved water supplies, sanitary conditions and wealth. However, it is important to note this isn't always the case – see urban challenges. At the same time, birth rates take longer to reduce and indeed more babies survive as infant mortality falls. Also, young people move to towns and cities, which also boosts the birth rate..!<br>These 2 factors have pushed world urbanisation above 50% and have led to more Megacities. |

| Key terms | Definitions |
|---|---|
| Urbanisation | The increase number of people living in towns and cities. |
| Distribution | The way in which something is spread over an area. |
| Population Density | The number of people per square kilometre. |
| Densely populated | High number of people per $km^2$ |
| Sparsely populated | Low number of people per $km^2$ |
| Urban sprawl | The rapid outward expansion of cities and towns. |
| Infrastructure | The basic physical and organisational structures and facilities (e.g. buildings, roads, power supplies) needed for the operation of an urban area. |
| Brownfield sites | An area that has been used before and tends to be disused or derelict land. Such sites are usually abandoned areas in towns and cities which have been used previously for industrial and commercial purposes. |
| Greenfield sites | Areas of land, usually agricultural, which are being considered for urban development where previously they have not. |
| Skills shortages | Not enough people with the appropriate skills to do the jobs required. |
| Favela | Brazilian word for a slum settlement. |
| Sewage | Untreated human waste. |
| Rural to urban migration | People moving from the countryside to the city in search of work and a better quality of life. |
| Natural increase | Population growing due to more births than deaths. |

# Urban issues and challenges – Rio de Janeiro

| Key idea | Key knowledge |
|---|---|
| **Where?** | Rio de Janeiro (Rio) is the second most populated city in Brazil (South America) after Sao Paulo. Rio is located in the southeast of Brazil on the Atlantic coast. |
| **Importance** | The city holds much regional and international significance:<br>• It provides schools, hospitals and universities as well as opportunities for employment, leisure and recreation. It is an important centre for research due to universities.<br>• Rio is important for its art and culture scene and this plays into tourism. The Statue of Christ the Redeemer is one of the Seven New Wonders of the World. The city is one of the most visited places in the world. Hosted the 2016 Olympic and Paralympic games and in 2014 was a host city for the World Cup. Also beaches, architecture and favela tours.<br>• It is an important transport hub, with its three airports and five ports which enable trade. The ports are very important for the export of iron ore, sugar and coffee. |
| **Reasons for growth** | • Many of Brazil's largest companies have their headquarters located there. These include mining, oil and telecommunications companies.<br>• Millions of people from rural areas have migrated to major cities such as Rio de Janeiro to seek better opportunities. See 'pull factors' above. |
| **Economic challenges** | • The city suffers from high crime rates – linked to high unemployment. This means an increase in policing costs.<br>• Most people work in the informal sector, with no job security or pension. This also reduces taxes collected, meaning it is harder for authorities to implement change. |
| **Social challenges** | The rapid growth of Rio de Janeiro's population has led to a severe shortage of housing. Millions of people have been forced to construct their own homes from scrap materials such as wood, corrugated iron and metals. Large squatter settlements are known as favelas appear on wasteland on very steep hillsides around the edges of the bay. Over time residents seek to improve these properties however due to them not owning the land, there is always a risk of then being demolished by the authorities. They are also at risk from landslides. Following heavy rain in 2010 one such slide destroyed thousands of homes and 200 people were killed.<br>• In the poorest areas, 10% of people do not have access to fresh piped water and 50% lack proper sanitation, which means human waste can follow through the streets.<br>• 30% of people have no electricity. In some areas where there is a lack of electricity residents tap into mains electricity illegally which causes frequent power cuts.<br>• Due to the very high population density in favelas, disease can spread very quickly. Infant mortality rates are very high at 50 per 1000. Often there is limited waste collections.<br>• Half of the population doesn't have a local health clinic.<br>• Only half of children continue education beyond 14 due to a lack of schools and a need to work. • The city suffers from high crime rates – linked to high unemployment. |
| **Environmental challenges** | • Heavy pollution due to industrialisation and poor sanitation.<br>• 3.1 million tons of waste is generated in Rio every year. Most of this is taken to landfill. In favelas there is often no bin collection at all, as they are illegal dwellings and the streets so narrow and steep, bin lorries cannot get there. Meanwhile, 200 tons of raw sewage enters Guanabara Bay every day.<br>• Due to its physical geography with steep slopes and mountains, Rio is one of the most congested locations in South America. This has led to high levels of air pollution and commuters spending a lot of time travelling, which also costs businesses money through delays and fuel expense! 5000 die every year due to air pollution. |
| **Solutions** | Self-help medical kits sees [people able to rteat 20 common illnesses without waiting for Doctor – Schools for Tomorrow puts teenage parents back into education (good for economy in long term)– 12 new water treatment works – Police Pacification Units in Favelas – Funicular railway and cable cars up steep hillsides to increase transport. |
| **Helping the Urban poor** | **Self-help schemes – Favela Bairro Project**: the local authority provide local residents with the materials needs to construct permanent accommodation. This includes breeze blocks and cement. The local residents provide the labour. The money saved can be spent on providing basic amenities such as electricity and water. |

# Urban issues and challenges – Portsmouth

| Key idea | Key knowledge |
|---|---|
| **Where?** | South Coast of England, between Southampton and Chichester. |
| **Importance** | Currently, the fastest growing cities are in South East England, which is also the region with the fastest growing economy. Portsmouth is the most densely populated city outside of London. It has always been a key settlement, due to it's coastal location and sheltered waters (the Solent is sheltered from the English Channel by the Isle of Wight, which also made it easier to defend). It became a town in 1180, and grew rapidly after 1495 when Henry VII founded Portsmouth Dockyard. It has had a strong association with the **British Navy** and **sailing** expertise ever since, and in more recent times this has led to a development in the **tourism industry** too, with the historic dockyard, Spinnaker Tower and Gun Wharf Quay shopping centre at the heart of this and ferries to France, Spain and the Isle of Wight also being integral. |
| **Reasons for growth** | Importantly, Portsmouth is on a mainline railway to London, and motorway links are good to – so lots of people live in the Portsmouth area and commute in to London, because it is so much cheaper than living in London. The transport, defence and tourism industries, along with education (University of Portsmouth) offer a wide variety of employment opportunities. Given it's international transport connections and proximity to London, it has become home to lots of migrants from elsewhere in the UK, Europe and the rest of the world. They are often aged between 18-40, while the total population remains fairly even in structure – indicating that they come for work and often later leave Portsmouth again. People may also move here for an improved quality of life (usually overseas migrants), or facilities and attractions. |
| **Economic challenges** | • Loss of jobs with reduced traditional industries (boat building) and reduced size of Royal Navy.<br>• Disparity of wealth between the South West of the city (e.g. Charles Dickens ward) and the North East of the city.<br>• Gentrification of the older seafront areas prices out locals. |
| **Social challenges** | • Integration of different cultures and ideologies into the community - this can often create tension and conflict within a community.<br>• Language barriers in schools – additional workload for staff (and lack of training) as well as frustration amongst native speakers.<br>• Pressure of housing and employment – there isn't enough houses or jobs for everyone within the area and this can cause conflict. |
| **Environmental challenges** | • Brownfield sites derelict, meanwhile increased population creates more waste issues.<br>• Building on greenfield sites is an environmental issue in itself (loss of habitat) but also causes urban sprawl, leading to more traffic (air pollution) and further loss of greenfield land to build new services, infrastructure and recreational facilities. |
| **Solutions** | • Regeneration of Gun Wharf Quays injected a tourism boost and added weight to Portsmouth as a city destination – the historic dockyards, Spinnaker Tower etc also.<br>• Integrated transport system ('The Hard Interchange') to make accessing public transport easier. |
| **Helping the Urban poor** | • Regeneration of Gun Wharf Quays has seen improvements in some areas of housing which in turn increases aspirations and well being (but hasn't happened everywhere)<br>• Urban greening creates useful and precious spaces of quiet and calm which can be used for recreational activities (e.g. Parkrun) to improve quality of life. |
| **Regeneration of an urban area** | The area was a disused, derelict part of the naval dockyard, close to the historic dockyards, ferry/rail terminals and historic areas of Portsmouth. The shopping areas in the city centre (NOT at Gun Wharf) were not attracting 'high-end' brands, and one of the shopping centre buildings was condemned and knocked down. The city wanted to attract further inward investment. The council wanted to open up the waterfront for public use (previously inaccessible due to Navy use) and to create jobs.<br>However, while it has done this, it has led to closure of shops in the old high street, and the urban poor cannot afford to buy homes, or shop at, Gun Wharf Quays. |

# Features of sustainable urban living - Freiburg

## Freiburg, Germany

Freiburg is located in South West Germany with a population of about 220,000 people. In 1970 it set the goal of focusing on social, economic and environmental sustainability.

## WASTE

- Financial rewards are given to people who compost their green waste and use textile nappies.
- The city uses biogas to provide energy for 28,000 homes. This gas comes from a biogas digester which uses garden and food waste, which is collected weekly.
- The city has more than 88% of packing waste recycled. There are over 350 recycling collection points around the city.
- These three strategies have been instrumental in reducing landfill waste from 140,000 tons to 50,000 tons in a 12 year period.

## ENERGY CONSERVATION

- Local people are encouraged to invest in renewable energy.

Investors get financial returns on their investments and even free season tickets at the football club!

- A solar factory making solar panels, employs over 250 people.
- More than 10000 people are employed in over 1500 renewable energy companies within the city, with many companies having their HQ in the city.
- The city regularly hosts renewable energy conferences.
- Solar panels are regularly incorporated as unusual design features in buildings, such as vertical cladding.
- One community has invested over £5 million in 8 renewable energy schemes, including a micro HEP scheme, solar energy systems at the football stadium, and wind turbines.

**The city plans to be 100% renewable energy-powered by 2050.**

## SUSTAINABLE TRAFFIC MANAGEMENT STRATEGIES

- The city has integrated public transport strategy (ITS) which is updated every ten years.
- The tram network is an important part of the ITS, as it provides cheap and accessible public transport.
- There are 400km of cycle paths with 9000 parking spaces for bikes.
- Areas of the city have restrictions on car parking spaces. A car park space in one area cost £20,000!! This discourages people to own, or use, a car.
- Tram journeys increased by over 25,000 in one year, while car journeys reduced by nearly 30,000.

## WATER CONSERVATION

- Rainwater is retained and reused to reduce the amount of water used.

Houses have 'green roofs' which aid rainwater collection.

- Residents are given financial incentives for using less water pumped from the reservoir (to their tap – 'mains' water).
- Wetland areas near the river reduce flood risk.

## CREATING GREEN SPACES

The provision of open spaces contributes to the sustainability of the city in many ways. They act as the city's 'green lungs', reducing air pollution. Additionally, they serve as a free recreational resource for people and create valuable habitat for wildlife.

- 44,000 trees have been planted in parks and streets to provide more green spaces but to also reduce pollution.
- Green spaces are left between houses to give space for children to play.

## SOCIAL SUSTAINABILITY

- There is a focus on providing people with affordable housing.
- Local people are involved in urban planning at both local and city level. Sites for building are considered by the local council and interest groups.
- Cycle and walking paths aim to encourage exercise and healthy living.

## Christian Practices: Role of Church around the world

| | |
|---|---|
| Community work | **Street Pastors**: Christian groups who go out Friday / Saturday nights into town / city centres to support the police. They work in 270 towns/cities in the UK.<br>**Trussell Trust**: Professionals such as police, social services, doctors recommend people in need; People are given vouchers to spend at food banks (240 Trussell Trust food banks in UK). Food is donated by supermarkets and the public |
| Evangelism | Spreading faith through **missionaries**. **Discipleship** is the belief of continuing spreading the work and faith of Jesus. **Church Army** is a UK group that spreads faith; providing hope, comfort and the love of Jesus to vulnerable groups such as prisoners, elderly, drug addicts, people in hospital. **Bear Grylls** a Christian who has written a book called "Soul Fuels" about sharing his faith. |
| Reconciliation | **Corrymeela**: Christian group that works to get Protestants and Catholics in Ireland talking and building reconciliation, during the Irish troubles. It focuses on working with families and children and those that were affected by the troubles/violence in Ireland.<br>**Andrew White:** The 'Vicar of Baghdad' works in the Middle East working for peace between religious groups. He has worked in Israel between Jews and Muslims, in Iraq with Sunni and Shi'a Muslims to bring reconciliation during wars.<br>Both examples of **interfaith dialogue** (reconciliation btwn religions) |
| Against Persecution (discrimination) | **Open Doors**: Training given to its Christian member to counsel those gone through persecution. Practical support given to those fleeing from persecution violence e.g. medical kits, food, helping find work. Delivers Bibles to those Christians living in areas where religious freedom banned e.g. North Korea. |
| Charity worldwide | **Christian Aid**: Responds in short term aid for natural disasters around the world. Long term projects in poor countries like education, health, sanitation etc e.g. Burma – project helping fight against Malaria. Christian Aid work in 50 countries worldwide. |

## Christian Practices: Key Teachings and Quotes

"Forgive those who trespass against us" Lord's Prayer
"Blessed are the peacemakers" Jesus "Love your enemies and pray for those that persecute you" Jesus
"Lets not love with words … but with actions" Bible
"Go make disciples of all nations" Jesus (Said at the Great Commission)
"There is neither Jew nor Greek… male nor female we are all one in Jesus Christ" Bible
Parables: Good Samaritan, Widows Offering, Prodigal Son.

# Crime and Punishment

| Key terms | Definitions |
|---|---|
| **Capital Punishment** | Death Penalty e.g. stoning, execution, lethal injection |
| Conscience | Your inner sense of right or wrong |
| Community Service | Punishment for small crimes to give back to the community. Form of **Reformation** |
| **Corporal Punishment** | Physical punishments e.g. caning, flogging |
| **Deterrent** | When a punishment deters (puts off) people from committing that crime. Usually harsh punishments like death penalty, corporal punishment and prison |
| Hate crime | Crimes targeted to particular group based on prejudice |
| **Justice** | Making a situation fair e.g. equal or equivalent punishment |
| Morality | A persons or a religious belief to what is right or wrong |
| Parole | Release of a criminal from prison, but continuing to monitor their behaviour |
| Payback | Name for Community Service |
| Reconciliation | To restore a relationship, often with forgiveness |
| **Reformation** | When a punishment aims to reform or change the criminal; to improve them |
| Reoffend | Criminal commits another crime |
| **Retribution** | When a punishment aims to get justice |


## Beliefs: Crime and Sin

| | |
|---|---|
| Crime | • **3 Types**: Crime against… people, property, state<br>• **Reasons for crime**: poverty, injustice, retaliation, greed, mental/phycological health, addiction, influences (people/environment) |
| Sin and Evil: - Christianity | • **Temptation** e.g. Adam and Eve. A test from God. People sin because of **Free Will**. Evil is the action, not the person, therefore **repent and forgiveness** possible.<br>• Islam: **Iblis** when banished by God for refusing to bow to Adam, was intent on tempting humans to evil.<br>• Christianity: **Original Sin** can cause sin within us from birth (**St Augustine**). |

## Facts: Crime and Punishment

| | |
|---|---|
| Community Service | • **FOR**: 40-300 hours payback to community; not mix harder criminals, free up prisons<br>• **AGIANST**: Not a deterrent |
| Prisons | • **FOR**: Protects society, retribution and deterrent, reformation / rehabilitation<br>• **AGAINST:** Life sentences not life (av. 16yrs), reoffending rate 29% in 2019, poor conditions: assault, drugs, inexperience staff, overcrowding |
| Death penalty | • **FOR:** Retribution, deterrent, no reoffending, crime rates down, protects society<br>• **AGAINST:** Murder, contradiction, inhumane, final |

## Beliefs: Punishments

| | |
|---|---|
| Christianity | • Law should **punish fairly**, without use of violence / harm. Many **against capital and corporal** punishments<br>• Criminal should be given a **second chance after reforming** as God is omnibenevolent e.g. **rehabilitation** at prison<br>• However… Belief in **retribution as God is just** and fair. |
| Islam | • Punishments should **protect** citizens, act as **deterrents** and provide **retribution** for crimes.<br>• Islamic countries under **Shari'ah Law** have **capital punishment** e.g. stoning, beheading and **corporal punishment** like thieves hands cut off, caning (gambling, selling alcohol).<br>• Forgivable crimes under Shariah. Victims encouraged to forgive for compensation and imprisonment of offender, instead of death penalty. |
| Buddhism | • Law should punish fairly, **without use of violence / harm**. **No corporal or capital** punishment. Prisons should have good conditions to **avoid suffering** |

## Crime and Punishment AND Conflict Teachings and Quotes

| | |
|---|---|
| Christianity | • Parables: Prodigal Son, Good Samaritan, Lazarus and the Rich man<br>• Teachings of Original Sin – God punishing sin<br>• "As we forgive those that trespass against us" Lords Prayer<br>• "Love your enemies and pray for those that persecute you" Jesus<br>• "There is neither Jew nor Greek… male mor female you are all one in Jesus Christ" Bible<br>• "Let's not love with words … but with actions" Bible<br>• "I your God, give life and take it away" Bible<br>• "Thou shall not kill" 10 Commandments<br>• "An eye for an eye, a tooth for a tooth" Old testament<br>• "Blessed are the peacemakers" Jesus<br>• "Declare a Holy War, call the troops to arms" Old Testament<br>• "Money is the root of all kinds of evil" Bible<br>• 10 Commandments "Thou shall not covert" (be jealous/envy) |
| Islam | • "A life for a life" Qur'an<br>• "Do not take life, which God has made sacred" Qur'an<br>• "Fight in the cause of Allah, those that fight you" Qur'an<br>• "Stand firm for justice" Qur'an<br>• "Let them pardon and forgive… God is most merciful" Qur'an<br>• "We will show you the truth of what you have done" Qur'an<br>• "The person who struggles… is the one serving Allah's cause" (Jihad) Qur'an<br>• "Cut the hands off thieves" Qur'an |
| Buddhism | • "Hatred will not cease by hatred, but by love alone" Dali Lama<br>• 5 Precepts – do not harm any living thing, do not take what is not given<br>• Eightfold path – Right Action and Intention<br>• 4 Noble Truths – avoid suffering by following the Middle Way and things that cause suffering like Greed and Craving (addiction) |

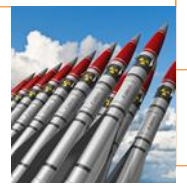
# Religion, peace and conflict

## Beliefs: PEACE: Forgiveness & Peace

| | |
|---|---|
| Christianity | • Follow Jesus' teachings of forgiveness and peace.<br>• **Christian Peace Making Teams**: group works to support victims in war zones, providing relief e.g. food etc Work in areas such as **Palestine and Iraq** to bring about peace. |
| Islam | • Teaches Allah is merciful and to forgive.<br>• Muslims greet each other saying 'peace be with you'.<br>• **Muslim Aid:** Organisation using donations and Zakah to support victims of War. 2014 set up an **orphanage for Syrian children** whose parents had been killed in war. |
| Buddhism | • Are **pacifists** and promote peace.<br>• Many teaching by Buddha that promote peace and non violence. |

| Key term | Definition |
|---|---|
| CCND | Christian Campaign for Nuclear Disarmament, campaigns to abolish nuclear weapons throughout the world |
| Holy War | Fighting for a religious cause or God. Terms for Holy War:<br>➢ Authorised by Holy leader<br>➢ To defend faith – which is under attack<br>➢ Fight for duty and to gain salvation |
| Lesser Jihad | Outer struggle to preserve and defend Islam |
| Just war | Reasons people give to justify or accept going to war |
| Pacifism | People who refuse to use violence or go to war |
| Radicalisation | Being influenced or brainwashed into having extreme views |
| Reconciliation | Restoring a relationship after conflict |
| WMD | Weapons of Mass Destruction: Nuclear, chemical, biological. 9 countries have nuclear weapons (incl. UK) |





## Beliefs: VIOLENCE: War, Holy War, Weapons of Mass Destruction

| | |
|---|---|
| Christianity | • Are against war and WMD (Weapons of Mass Destruction) as Jesus promoted peace and love. War causes suffering, harm and damage to Gods creation.<br>• BUT: **Thomas Aquinas** came up with the **terms for a JUST war** in the 1200's:<br>○ Be for a **just** cause<br>○ Have a good chance of **success**<br>○ Be legally approved by a **legitimate government**<br>○ Not **harm innocent civilians**<br>○ Be a **last resort** – disputes should have tried to be sorted out peacefully<br>• **Holy War** is also acceptable under religious terms (see glossary) |
| Islam | • Are against war for selfish reasons as it takes life created by God and destroys his creation. They are against WMD for this reason; Muslims should be protecting Gods creation.<br>• BUT: War is justified if it is in defence of Allah and Islam. This links to **Lesser Jihad** – the outer struggle to defend Islam.<br>• **Terms for a JUST war** are:<br>○ Be for a **just** cause<br>○ **Self Defence** (enemy attacked first)<br>○ In **Lesser Jihad** (defend Islam or Muslims being attacked)<br>○ Not **harm innocent civilians**<br>○ Be a **last resort**<br>• **Holy War** is also acceptable under religious terms (see glossary) |
| War | • Causes: Greed, retaliation, self defence, fight injustice, Holy War<br>• Examples: Arab Israeli Conflict: Muslims v Jews fighting over Holy Land (Palestine). Russian invasion of Ukraine. |
| Terrorism | • Unlawful use of violence, usually against innocent civilians for political gain.<br>• **Vulnerable** people are **radicalised** and groomed into doing acts of terrorism. With religion, **beliefs are used to manipulate** such as religious quotes, ideas like Lesser Jihad, a belief of entry to paradise to give a **sense of purpose, importance and belonging** to vulnerable people. |
| Protest | • Religions will agree with the use of peaceful protest to speak out against unjust causes e.g. equality, climate change, slavery etc |

## Key Grammar

**Using 'on'**

This very useful word can be used to say what '**people**' do, or what '**they**' do. It conjugates the same as il / elle For example:

In France, they start school at 8 in the morning = **En France, on commence à huit heure du matin**

In France, they don't go to school on Wednesday = **En France on ne va pas au collège mercredi**

**Comparatives and superlatives**

Use '**plus**, '**moins** and '**que**' to compare things.

La France est plus grande que l'Angleterre = *France is bigger than England*

Le sport est moins interessant que la lecture = *sport is less interesting than reading*

Note:

Mon frère est le plus intelligent dans le collège = *my brother is* ***the most intelligent*** *in his school*

**The imperfect tense**

Used to describe what things **were** like, or what they **used to be** like.

Note the different endings on the verbs:

**j'** é**tais** = *I used to be / I was*

**je jouais** = *I used to play*

**j'allais** = *I used to go / I was going*

**c'** é**tait** = *it was / it used to be*

**Il y avait** = *there was / used to be*

**Nous** é**tudiions** = *we used to study*

**Nous mangeions** – *we used to eat*

**Before and after**

**Avant de** + infinitive

**Aprè**s **avoir** + past participle

Avant de quitter le college je vais passer mes examens

*= before leaving school, I'm going to take my exams*

Aprè**s** avoir pass**é** mes examens, j'ai quitt**é** le collège

*= After sitting / taking , having sat my exams, I left school*

**The simple future**
This is how we say that we **'will'** do something in the future.
Typically, take the **infinitive** of the verb and add on the following endings.
Add the endings **–ai, -as, a;  -ons, -ez, ont**
There are some **exceptions**, usually with irregular verbs (to do , to be, to have, to go etc)
**Je verrai** – *I will see*
**Tu écouteras** – *you will listen*
**Elle jouera –** *s/he will play*
**Nous mangerons** – *we will eat*
**Vous boirez –** *you (pl) will drink*
**Ils travailleront** – *they will work*
**Exceptions**:
**J'aurai** – I will have
**Je ferai** – I will do
**Je serais** – I will be
**J'irai** – I will go

| **person** | **ending** |
|---|---|
| je | **-ai** |
| tu | **-as** |
| Il /elle | **-a** |
| nous | **-ons** |
| vous | **-ez** |
| Ils / elles | **-ont** |

**Adverbs of time for referring to the future**
**L'année prochaine**– *next year*
**Dans deux ans**– *in two years (time)*
**Après mes etudes** – *after my studies*
**Apres avoir finit au collège–** *after finishing at college*
**Avant de trouver un emploi**– *before finding a job*
**Quand j'aurai vingt ans** – *when I'm twenty years old (NB note the use of 'aurai' here)*
**Dans le futur /** à **l'avenir**– *in the future*

**Examples:**
**Quand j'aurai vingt ans je travaillerai pour Google!**
*= When I'm twenty years old I will work for Google!*
**Après mes etudes  j'irai en France pour trouver un employ** = *After my studies I will go to France to find a job!*
**L'année prochaine  j'etudierai les maths et l'anglais**= *next year I will study maths and English*

## Key Grammar

**Talking about jobs / occupations**

*We don't use the word 'a' when talking about a job we do.*

**Je veux être professeur** = *I want to be **a** teacher*

**Ma soeur travaille comme chef de cuisine** = *my sister works as **a** chef*

**Ma tante travaille comme policière dans un commissariat** = *my aunt works in a police station - she's **a** policewoman*

**Modal verbs**

Reminder: modal verbs use a second verb in a sentence.

They help us to state what we CAN, MUST, OUGHT TO do etc

**Devoir** – *to have to / to must*

**Pouvoir** – *to be able to / to can*

**Je dois aider dans le magasin** = *I have to help in the shop*

**Mon oncle peut construire de grandes maisons** = *my uncle can build big houses*

**Je dois** – I must
**Tu dois** – you must
**Il doit** – he / she / one must

**Nous devons** – we must
**Vous devez** – you must
**Ils doivent** – they must

**Je veux** – I want
**Tu veux** – you want
**Il veut** – he / she / one wants

**Nous voulons** – we want
**Vous vouxez** – you want
**Ils veulent** – they want

**Je peux** – I can
**Tu peux** – you can
**Il peut** – he / she / one can

**Nous pouvons** – we can
**Vous pouvez** – you can
**Ils peuvent** – they can

The **subjunctive** is a form of the verb used to express opinions, emotions, doubts, hopes and preferences.

### 1. When to Use the Present Subjunctive:

The subjunctive is used in specific situations. These include:

- **Wishes or desires** (e.g. "I wish that...")
  - *Je souhaite que tu réussisses.* (I wish that you succeed.)
- **Emotions or feelings** (e.g. "I'm happy that...")
  - *Je suis content qu'il vienne.* (I'm happy that he's coming.)
- **Doubts or uncertainty** (e.g. "I don't think that...")
  - *Je doute qu'il soit là.* (I doubt that he is here.)
- **Necessity or obligation** (e.g. "It's important that...")
  - *Il est nécessaire que tu étudies.* (It's necessary that you study.)
- **Impersonal expressions** (e.g. "It's good that...")
  - *Il est important que tu fasses tes devoirs.* (It's important that you do your homework.)
- **After certain conjunctions** (e.g. "so that...", "before...")
  - *Il faut que je parte avant qu'il arrive.* (I have to leave before he arrives.)

Example with regular verbs:

- Parler (to speak)
  - Ils parlent → *que je parle* (that I speak)
  - Ils parlent → *que tu parles* (that you speak)
  - Ils parlent → *qu'il/elle parle* (that he/she speaks)
  - Ils parlent → *que nous parlions* (that we speak)
  - Ils parlent → *que vous parliez* (that you speak)
  - Ils parlent → *qu'ils/elles parlent* (that they speak)
- Finir (to finish)
  - Ils finissent → *que je finisse* (that I finish)
  - Ils finissent → *que tu finisses* (that you finish)
  - Ils finissent → *qu'il/elle finisse* (that he/she finishes)
  - Ils finissent → *que nous finissions* (that we finish)
  - Ils finissent → *que vous finissiez* (that you finish)

### 2. Forming the Present Subjunctive:

To form the subjunctive, start with the **third person plural (ils/elles) form** of the verb in the present tense, then drop the **-ent** ending, and add the following endings:

- **-e** (je)
- **-es** (tu)
- **-e** (il/elle/on)
- **-ions** (nous)
- **-iez** (vous)
- **-ent** (ils/elles)

### 3. Irregular Verbs in the Subjunctive:

Some verbs have irregular stems in the subjunctive, meaning you don't follow the regular pattern. For example:

- **Être (to be):** que je sois, que tu sois, qu'il/elle soit, que nous soyons, que vous soyez, qu'ils/elles soient
- **Avoir (to have):** que j'aie, que tu aies, qu'il/elle ait, que nous ayons, que vous ayez, qu'ils/elles aient
- **Aller (to go):** que j'aille, que tu ailles, qu'il/elle aille, que nous allions, que vous alliez, qu'ils/elles aillent
- **Faire (to do/make):** que je fasse, que tu fasses, qu'il/elle fasse, que nous fassions, que vous fassiez, qu'ils/elles fassent

### 4. Common Phrases Requiring the Subjunctive:

Here are some common phrases or expressions that trigger the use of the subjunctive:

- **Il faut que** (it's necessary that)
- **Il est important que** (it's important that)
- **Je veux que** (I want that)
- **Bien que** (although)
- **Pour que** (so that)
- **Avant que** (before)
- **J'ai peur que** (I'm afraid that)
- **Il est possible que** (it's possible that)

## Key Grammar

**Using 'se'**
This very useful word can be used to say what '**people**' do, or what '**they**' do. It conjugates the same as él / ella For example:
In Spain, they start school at 8 in the morning = **En España se empieza a las ocho por la mañana**
In Spain, they don't go to school on Wednesday = **En España no se va al insti los miércoles**

**Comparatives and superlatives**
Use '**más**, '**menos** and '**que**' to compare things.
España es **más grande que** Inglaterra = *Spain is bigger than England*
El deporte es **menos intersante que** la lectura = *sport is less interesting than reading*
Note:
Mi hermano es el más inteligente en su insti = *my brother is* ***the most intelligent*** *in his school*

**The imperfect tense**
Used to describe what things **were** like, or what they **used to be** like.
Note the different endings on the verbs:
**era** = *I used to be / I was*
**jugaba** = *I used to play*
**iba** = *I used to go / I was going*
**era** = *it was / it used to be*
**había** = *there was / used to be*
**estudiabamos** = *we used to study*
**comíamos** – *we used to eat*

**Before and after**
**Antes de** + infinitive
**Después de** + infinitive
Antes de terminar al insti, voy a pasar mis exámenes
*= before leaving school, I'm going to take my exams*
Después de pasar mis exámenes, dejé el insti
*= After sitting / taking my exams, I left school*

**The simple future**
This is how we say that we **'will'** do something in the future.
Typically, take the **infinitive** of the verb and add on the following endings.
Add the endings **–é, -ás, á;  -emos, -éis, án**
There are some **exceptions**, usually with irregular verbs (to do , to be, to have, to go etc)
**Veré** – *I will watch*
**Escucharás** – *you will listen*
**Jugará –** *s/he will play*
**Comeremos** – *we will eat*
**Beberéis –** *you (pl) will drink*
**Trabajarán** – *they will work*
**Exceptions**:
**Tendrá** – I will have
**Hará** – I will do

| person | ending |
|---|---|
| yo | **-é** |
| tú | **-ás** |
| ella / él | **-á** |
| nosotros | **-emos** |
| vosotros | **-éis** |
| ellas / ellos | **-án** |

**Adverbs of time for referring to the future**
**El año próximo** – *next year*
**En dos años** – *in two years (time)*
**Después mis estudios** – *after my studies*
**Después de terminar al insti –** *after finishing at college*
**Antes de encontrar un trabajo** – *before finding a job*
**Cuando tenga veinte años** – *when I'm twenty years old (NB note the use of 'tenga' here)*
**En el futuro** – *in the future*

**Examples:**
**Cuando tenga veinte años trabajaré para Google!**
*= When I'm twenty years old I will work for Google!*
**Después mis estudios iré a Francía para encontrar un trabajo**
*= After my studies I will go to France to find a job!*
**El año próximo estudiaré las matemáticas y el inglés** = *next year I will study maths and English*

# Key Grammar

**Talking about jobs / occupations**

*We don't use the word 'a' when talking about a job we do.*

**Quiero hacerme profesor** = *I want to be **a** teacher*

**Mi hermana trabaja como cocinera** = *my sister works as **a** chef*

**Mi tia trabaja en una estación de policía – es policía** = *my aunt works in a police station - she's **a** policewoman*

**debo**– I must
**debes**– you must
**debe**– he / she / one must

**deberemos**– we must
**deberéis**– you must
**deberen**– they must

**Modal verbs**

Reminder: modal verbs use a second verb in a sentence.

They help us to state what we CAN, MUST, OUGHT TO do etc

**deber** – *to have to / to must*

**poder** – *to be able to / to can*

debo ayudar en la tienda = *I have to help in the shop*

mi tío puede construir casas grandes = *my uncle can build big houses*

**puedo** – I can
**puedes**– you can
**puede** – he / she / one can

**podemos**– we can
**podéis** – you can
**poden** – they can

The **subjunctive** is a form of the verb used to express opinions, emotions, doubts, hopes and preferences.

### 💬 Expressing Opinions and Emotions

- Me alegra que... → I'm happy that...
- Me molesta que... → It annoys me that...
- Me sorprende que... → It surprises me that...
- Es una pena que... → It's a shame that...
- Me encanta que... → I love that...
- Me da miedo que... → I'm scared that...

### ✅ Expressing Desires, Hopes and Preferences

- Quiero que... → I want that...
- Espero que... → I hope that...
- Prefiero que... → I prefer that...
- Ojalá que... → Hopefully... / I wish that...
- Deseo que... → I wish that...

### 📢 Giving Advice or Recommendations

- Es importante que... → It's important that...
- Es mejor que... → It's better that...
- Es necesario que... → It's necessary that...
- Recomiendo que... → I recommend that...
- Sugiero que... → I suggest that...

**1. HABLAR (to speak) → yo hablo**

Remove -o → habl-
Add -e endings:

- yo **hable**
- tú **hables**
- él/ella **hable**
- nosotros **hablemos**
- vosotros **habléis**
- ellos/ellas **hablen**

**2. COMER (to eat) → yo como**

Remove -o → com-
Add -a endings:

- yo **coma**
- tú **comas**
- él/ella **coma**
- nosotros **comamos**
- vosotros **comáis**
- ellos/ellas **coman**

**3. VIVIR (to live) → yo vivo**

Remove -o → viv-
Add -a endings:

- yo **viva**
- tú **vivas**
- él/ella **viva**
- nosotros **vivamos**
- vosotros **viváis**
- ellos/ellas **vivan**

### 🏫 1. School / Education

- Es importante que los alumnos **estudien** todos los días.
  (It's important that students study every day.)

### 💻 2. Technology

- Mis padres quieren que yo no **pase** tanto tiempo en mi móvil.
  (My parents want me not to spend so much time on my phone.)

### 🌎 3. Environment

- Espero que la gente **recicle** más en el futuro.
  (I hope people recycle more in the future.)

### 💬 4. Opinions / Feelings

- Me molesta que mis amigos no **me escuchen**.
  (It annoys me that my friends don't listen to me.)

### 💪 5. Health

- Es necesario que tú **comas** más frutas y verduras.
  (It's necessary that you eat more fruits and vegetables.)

### 🌞 6. Holidays

- Ojalá que nosotros **vayamos** a España este verano.
  (I hope we go to Spain this summer.)

### 👨‍👩‍👧 7. Family / Relationships

- Mis padres prefieren que yo **llegue** a casa temprano.
  (My parents prefer that I arrive home early.)

### 💼 8. Future plans / Work

- Es posible que mi hermana **trabaje** en una oficina.
  (It's possible that my sister works in an office.)

### 🏠 9. House & Home

- Quiero que mi dormitorio **sea** más grande.
  (I want my bedroom to be bigger.)

### 📱 10. Social Media

- Es mejor que no **compartas** demasiada información personal.
  (It's better that you don't share too much personal information.)

### 🚭 11. Healthy Living

- Mi médico recomienda que yo **deje** de fumar.
  (My doctor recommends that I stop smoking.)

### 🎓 12. Exams / Stress

- Es una pena que los exámenes **causen** tanto e
  (It's a shame that exams cause so much stress.

# GCSE Business Studies (Edexcel)

## Topic 2.1.1 Business Growth

### Core Knowledge

A business can grow internally by expanding its own activities, i.e. opening more outlets, selling more, targeting new markets or increasing the range of products.

External growth is quicker but more expensive and riskier.

Mergers & takeovers could be between competitors, suppliers, customers or unrelated businesses.

A business may choose to finance growth through becoming a PLC and selling shares on the stock exchange.

A quicker way to open lots of outlets is through offering franchises – when you allow entrepreneurs to use your business name.

Larger firms benefit from economies of scale, so can reduce their unit costs.

Growing too large can increase costs and lead to diseconomies of scale.

**BUSINESS**: ***Creating informed, discerning employees, consumers and future leaders***

## Topic 2.1.2 Changing Business Aims & Objectives

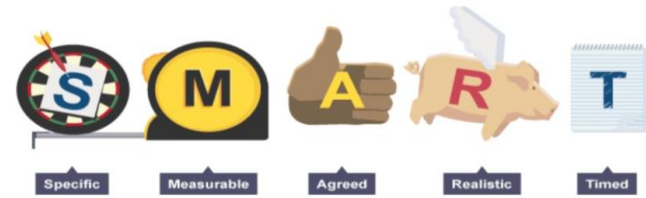
### Core Knowledge

A business has to continually change and evolve over time. Therefore, what it is attempting to achieve will also change. Aims change because of:

- Changing **market conditions** – an increase or decrease in the number of competitors
- Changing **technology** – the rise of e-commerce led to businesses introducing online sales; click and collect, self-service tills
- Changing **performance** – if a business is not making as much profit as before, it will need to change its aims
- Changing **legislation** – new laws can affect costs and so a business may need to change aims
- **Internal** reasons – an arrival of a new CEO can affect the direction of the business

How aims change:

- Focus on survival or growth
- Entering or exiting markets
- Growing or reducing a workforce
- Increasing or decreasing a product range




## Topic 2.1.3 Globalisation

### Core Knowledge

Types of imports into the UK:

- Goods we cannot grow or produce, e.g. olive oil
- Goods that require a lot of labour, so is cheaper to make where wages are lower
- Goods that are made in the UK, and elsewhere, but consumer may prefer a foreign produced item, e.g. Audi cars

To export successfully a business must:

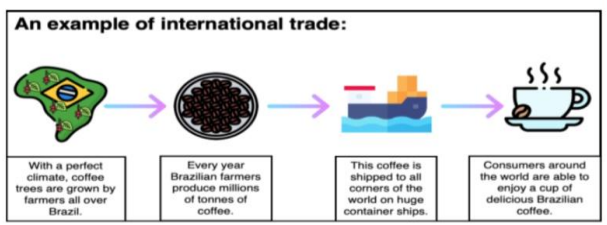
- Keep costs down to be competitive
- Produce original, well-designed and well-made items
- Deliver on time and provide excellent service and after-sales service

Barriers to international trade can be set as a government might want to protect domestic industry and reduce competition. On way is to charge a tax or tariff on all imported goods increasing the cost of imports

How to compete internationally

- Use of the internet and e-commerce
- Changing the marketing mix
  - Different products for different counties, e.g. left- and right-hand drive cars
  - Charging different prices based on popularity and reputation
  - Adapting promotion to reflect cultural differences

Using retailers in countries where e-commerce is not well established




## Topic 2.1.4 Ethics & Environmental Constraints

### Core Knowledge

Ethics are moral guidelines – it is doing MORE than the legal minimum.

Ways for a business to be ethical:

- Pay a fair wage to workers
- Pay suppliers a fair price and on time
- Ensure production does not harm the environment, animals or people
- Label products clearly and correctly

Ways to consider the environment:

- Reduce / minimise pollution
- Only use sustainable resources
- Reduce packaging

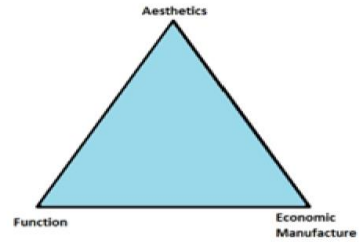
Being ethical and environmentally friendly can increase costs leading to a reduction in profit. This can be considered a trade-off.

Benefits can include improving customer image and easier recruitment

# GCSE Business Studies (Edexcel)

## Topic 2.2.1 Product

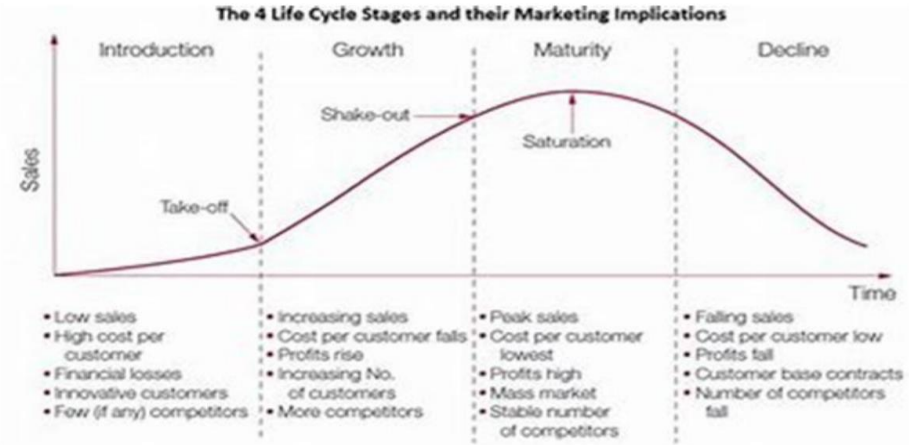
### Core Knowledge




The **design mix** is a diagram to show how a business must consider the aesthetics and function of a product as well as the cost.

When creating a product a business will want it to stand out from rivals. This is known as **product differentiation**. Businesses can use **branding** or **USPs**.

The **Product life cycle** shows the stage that every product goes through. A business will use **extension strategies** to extend the life cycle.




## Topic 2.2.2 Price

### Core Knowledge

Price is what consumers pay for the product. It is essential that the price charged is appropriate for the product and for the **target market**

A business can use a variety of strategies:

- **Penetration** – setting a low price to start with to enter a market
- **Skimming** – setting a high price to start to recoup research costs
- **Competition based** – setting a price based on what rival products are charging

Influences on pricing strategies:

- **Technology** – consumers can compare prices easily so it is important a business is competitively priced
- **Competition** – the fewer rivals a business has, the more they are able to set their own price
- **Market segments** – the business needs to consider the income levels of their customers and how sensitive they are to price changes
- **Product life cycle** – price will change throughout the life cycle of the product

**BUSINESS**: ***Creating informed, discerning employees, consumers and future leaders***

## Topic 2.2.3 Promotion

### Core Knowledge

Promotion methods are used to inform consumers about products and persuade them to buy them.

**Mass market** products can use mass media, such as Television, national newspapers or radio. These are expensive, but *cheap per customer*. **Niche market** products, or smaller businesses can use local radio, local newspapers or social media.

Businesses may use **sponsorship** to build their **brand** through selecting a business that reflects their values, e.g. Red Bull sponsors extreme sports.

New products may offer **product trials**, e.g. free tastes or samples.

**Impact of technology**:

- Targeted advertising online through the use of cookies
- Viral advertising via social media, e.g. the Ice bucket challenge to raise awareness and donations to ALPS
- Apps for engaging with customers
- E-newsletters and emails

## Topic 2.2.4 Place

### Core Knowledge

Place is NOT to be confused with location. *It is about how the product gets to the consumer and which other businesses it needs to pass through, not the physical location of the premises.*

The more third parties in the channel, the greater the mark-up and so the higher the price for the consumer

# MAJOR PROJECT

TERM 1 and 2

**Your major project title will be given to you in lessons.**
**It is expected that you work more independently within the chosen theme – this means you can use various media, explore lots of ideas and artists.**
**Be bold and brave with your work and outcomes!**

**Artists you could research:**
Jon Measures
John Piper
Billy Kidd
Elly Smallwood
Georgia O'Keeffe
Liz Orton
David Hockney
Yayoi Kusama
Helen Ahpornsiri
Mat Collishaw
Micheal Brennand-Wood
Angie Lewin
Henry Moore
Jean Faucheur
Polly Morgan
David Theron
Kehinde Wiley
Abigail Reynolds
Alexander Calder

MONOPRINT

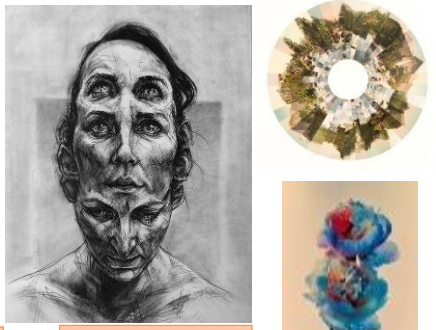
PHOTOGRAPHY

LINO PRINT

PAINTING

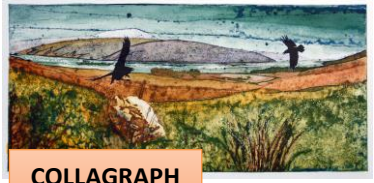
SCREEN PRINT

PEN AND INK

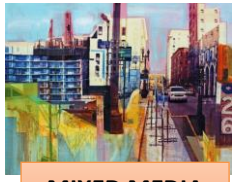




COLLAGRAPH



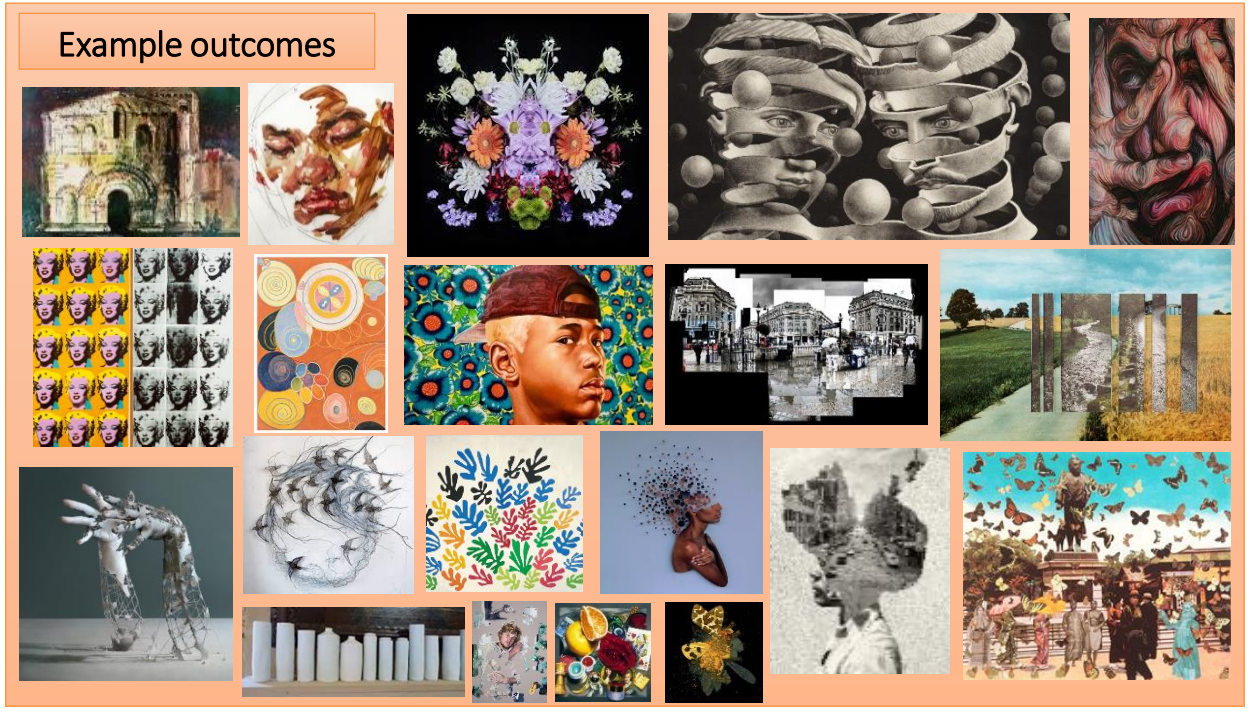
MIXED MEDIA

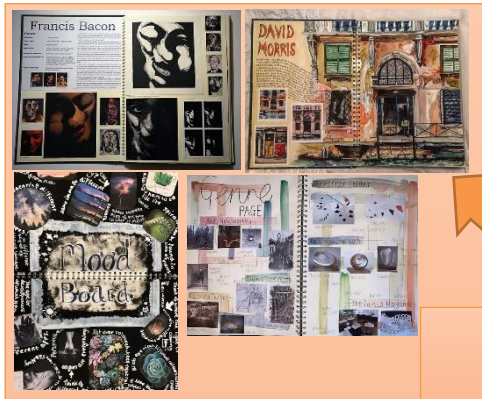


PHOTOSHOP

EXPERIMENTAL DRAWING

## Example outcomes







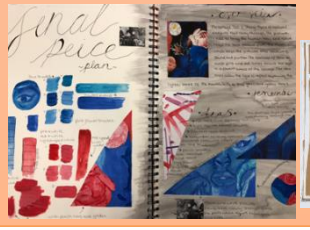
AO1

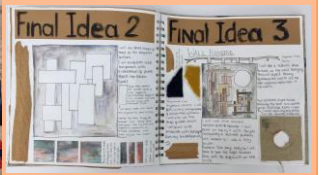
AO2

**Strong sketchbook presentation**

AO3

AO4



# ART ANALYSIS GUIDE

## CONTENT/DESCRIPTOPN OF AN IMAGE

- What is it? (portrait/landscape/painting/mixed media etc)
- What is it about? What is happening? (describe the contents)
- Type of image? (black and white/colour/pencil etc)
- What is the theme of the image? Is there a greater meaning to the image?
- Materials/techniques used?
- Is there greater context to the image?
- What message does the image communicate?
- Do you know the year of the piece? What was happening in the world at the time? Does that have an influence on the piece?

| COLOUR | LINE | SHAPE/FORM/SPACE | PATTERN AND TEXTURE | TONE |
|---|---|---|---|---|
| BRIGHT | FLUENT | CLOSED | REPEATED | BRIGHT |
| BOLD | CONTINUOUS | OPEN | UNIFORM | DARK |
| VIBRANT | CONTROLLED | DISTORTED | GEOMETRIC | FADED |
| PRIMARY | LOOSE | FLAT | RANDOM | SMOOTH |
| SECONDARY | POWERFUL | ORGANIC | SYMMETRICAL | HARSH |
| TERTIARY | STRONG | POSITIVE | SOFT | CONTRASTING |
| RADIANT | ANGULAR | NEGATIVE | IRREGULAR | INTENSE |
| VIVID | FLOWING | FOREGROUND | UNEVEN | SOMBRE |
| DULL | LIGHT | BACKGROUND | ROUGH | STRONG |
| CONTRASTING | DELICATE | COMPOSITION | BROKEN | POWERFUL |
| COMPLIMENTARY | SIMPLE | ELONGATED | GRID | LIGHT |
| HARMONIOUS | THICK | LARGE | FLAT | MEDIUM |
| MONOCHROME | THIN | SMALL | WOVEN | DARK |
| NATUARL | BROKEN | 2D | ORGANIC | LAYERED |
| SATURATED | OVERLAPPING | 3D | SMOOTH | DEPTH |
| PASTEL | LAYERED | TWISTED | ABSTRACTED | DEVELOPED |
| COOL | MARK MAKING | JAGGED | | SOFT |
| WARM | | | | |

## PROCESS

- What type and direction of light was used/created? (harsh, soft, artificial lamp/natural lighting)
- How was this image 'built'?
- What materials were used in this image and does that impact how you will work/experiment?
- What kind of patterns and/or textures are in the image? How would you describe them?
- Describe the use of tone/texture/detail/scale/ perspective/composition/colour within the image.

## FORM/VISUAL ANALYSIS

- What do you look at first?
- How does your eye move around the frame?
- How is the image composed: lines, shapes, areas of tone?
- What was the artist's viewpoint? (worms eye view/birds eye view)
- Tone – is the image high or low contrast? How and why?
- Line – describe the lines in the image? How have they been positioned in relation to the rest of the composition? What effect does his have?

## PERSONAL OPINION

- What was your first reaction?
- What is the mood of the image?
- What is the message of the image?
- What do you like or dislike and why? Use art specific language and justify your opinions.
- How will this work influence your own work? Create a clear link between them.
- How does the image make you feel? Why do you think you feel like this?
- Does the colour, texture, form, detail, tone or theme of the image affect your mood? How and why?

# MAJOR PROJECT

Below is an outline of the very basics of how to build a successful project – repeat steps to build depth to your project.

This sketchbook plan is the MINIMUM required for this (and most) projects. If you have gaps in your work please attend catch up sessions.

1. MOOD BOARD/MIND MAP: an initial starting point of images and keywords for your theme.
2. GENRE PAGE (EXTRA TASK): 4-8 different 'mini' artist analysis sections. Choose artists from your knowledge organiser, one or two images per artist and a short sentence about them and their work.
3. INITIAL IDEAS: This is a written paragraph setting out your intentions for your project; artists you'll look at and why, materials you want to work with, any greater theme or meaning you would like to explore. There is a support booklet on RM Unify, Art if needed.
4. ARTIST ANALYSIS 1: Including studies in the style of the artist's work. This should be an in depth research page looking at an artist linked to your theme. Include: images, your own work in the style of the artist, information and opinion. Use you art analysis guide in your knowledge organiser.
5. PHOTO SHOOT 1: This shoot should be linked to or inspired by all previous research and/or artist 1. You must present annotated contact sheets, 3-6 larger images to show critical analysis of images and annotation. You should have a small shoot plan to accompany this shoot.
6. STUDIES FROM SHOOT 1: This should be a minimum of a double page/3-8 drawings, paintings, pen, ink, collage, mixed media, printing, Photoshop, anything in response to your photo shoot.
7. RECORDING AND EXPERIMENTATION: Drawing, painting, collage, printing, mixed media, mono-prints, poly-prints, lino cuts, manual manipulations of photos. This work links to both AO2 and AO3.
8. ARTIST ANALYSIS 2: Including studies in the style of the artist's work. This should be an in depth research page looking at an artist linked to your theme. Include: images, your own work in the style of the artist, information and opinion. Use you art analysis guide in your knowledge organiser.
9. BIRO/PEN STUDIES FROM SHOOT 1: 3-5 smaller studies or 2/3 smaller studies and one larger study in biro or fine liner pen from images from shoot 1.
10. PHOTOSHOP/PIXLR E (www.pixlr.com/e): Using either digital platform to create 3-5 digital experimentations. Layer images together, use filters, alter colours and compositions.
11. STUDIES FROM PHOTOSHOP: Experiments can be created using any media of your choice. Aim to complete 3-5 studies, ranging from A5 to A3.
12. PHOTO SHOOT 2: This shoot should be linked to or inspired by all previous research and/or artists. You must present annotated contact sheets, 3-6 larger images to show critical analysis of images and annotation. You should have a shoot plan to accompany this photo shoot.
13. ARTIST ANALYSIS 3: Including studies in the style of the artist's work. This should be an in depth research page looking at an artist linked to your theme. Include: images, your own work in the style of the artist, information and opinion. Use you art analysis guide in your knowledge organiser.
14. STUDIES FROM PHOTO SHOOT 2: This should be a minimum of a double page/3-8 drawings, paintings, pen, ink, collage, mixed media, printing, Photoshop, anything in response to your photo shoot.
15. PLANNING FOR FINAL OUTCOME: This should include 3 different sketched plans, paint trials, exploration of colour schemes and/or mark making to be used within your final outcome. You need to make clear notes about each idea showing a clear understanding of how your ideas link to your book work. This should be roughly 2-3 pages.
16. FINAL OUTCOME PRACTICE PIECE: This is a smaller piece to be completed in your sketchbook/for your boards where you fully explore and practice using the materials and techniques you plan to use for your final outcome.
17. FINAL OUTCOME: A final piece to be completed.


**ASSESSMENT OBJECTIVES SPECIFICS**

**AO1**
**AIM TO HAVE AT LEAST 4-8 DIFFERENT ARTIST ANALYSIS PAGES (THESE CAN BE SMALLER INSERTS TO EXPERIMENTS)**

**AO2**
**YOU SHOULD DEMONSTRATE A WIDE RANGE OF EXPERIMENTAION. AIM TO EXPLORE AT LEAST 6 OF THE EXPERIMENTAION EXAMPLES ON THIS PAGE.**

**AO3**
**YOU NEED TO SHOW INITIAL DRAWINGS/STUDIES EXPLORIONG THE WORK OF YOUR ARTISTS. YOU MUST HAVE A PHOTOGRAPHY ELEMENT – PLEASE CONTINUE TO DEVELOP STUDIES FROM SHOOTS.**

**AO4**
**YOU MUST INCLUDE AT LEAST 3-5 DIFFERENT FINAL OUTCOME IDEAS, SKETCHED WITH NOTES. THIS MUST INFORM YOUR FINAL OUTCOME WHICH SHOULD BE REFLECTED ON THROUGH AN EVALUATION AFTER IT IS COMPLETE.**

# Welcome Back to the GCSE Music Journey

## AOS1 Musical Forms and Devices Revision

### Topic 1 – The Development of Music

**The Baroque Era: 1600-1750**

Main composers: Bach, Handel, Vivaldi, Purcell

Main features of the music:

- Use of ornaments and terraced dynamics.
- Energetic rhythmic movement.
- Major/Minor key system (diatonic).
- Orchestras are mainly strings.
- Use of harpsichord, recorders, flute and horns.
- Use of basso continuo (see AOS 2).

**The Classical Era: 1750-1810**

Main composers: Mozart, Beethoven, Haydn

Main features of the music:

- Four sections to the orchestra.
- Melodies less complex than Baroque.
- More variety and contrast in the music.
- Frequent changes in mood, timbre and dynamics.
- Harpsichord replaced by piano.

**The Romantic Era: 1810-1910**

Main composers: Chopin, Liszt, Wagner, Tchaikovsky

Main features of the music:

- Thematic ideas and use of the leitmotif (see AOS 3).
- Increased variation in dynamics.
- Use of chromatic notes and extended chords.
- Further expansion of the orchestra.
- Development of the brass section.
- Descriptive music and links to other art forms

### Topic 2 – Musical Form and Structure

In GCSE music, you must be able to identify the following forms:

**Binary from –** A B

**Ternary form –** A B A

**Rondo form –** A B A C A

**Minuet and Trio –** Minuet Trio Minuet

**Variation from –** Theme Variation 1, 2, 3 etc

**Strophic form –** A A A A

### Other key terms

- **Monophonic** – One unaccompanied part or voice.
- **Homophonic** – Many parts that move together. Melody and accompaniment is a type of homophonic texture.
- **Polyphonic** – 2 or more different parts that are of equal importance.
- **Unison** – All together. Could be considered monophonic if played at the same pitch.
- **Parallel motion** – Parts move in the same direction.
- **Contrary motion** – Parts move in different directions.
- **Interval** – The gap/space between 2 different notes.

### Topic 3 – Devices

- **Repetition** – The exact repeat of a musical idea.
- **Contrast** – A change in the musical content.
- **Anacrusis** – A lead in. A note or beat before the first full bar of a piece.
- **Imitation** – When a musical idea is copied in another part.
- **Sequence** – The repetition of a motif (short melody) in the same part but at a different pitch.
- **Ostinato** – A musical pattern repeated many times. This is known as a riff in modern music.
- **Syncopation** – Off beat or where the weaker beats of a rhythm are emphasised.
- **Dotted rhythms** – A dot placed after a note. This increases the note by half its own value, giving a jagged effect to the rhythm.
- **Drone** – A repeated or sustained note or notes held throughout a passage of music. The drone will be diatonic and use either the Tonic or the Tonic and Dominant notes.
- **Pedal** – A held or repeated note, against which changing harmonies are heard.
- **Canon** – A device in which a melody is repeated exactly in an other part while the initial melody continues and develops.
- **Conjunct movement** – When the melody mainly moves in step.
- **Disjunct movement** – When the melody 'leaps' from one note to another.
- **Broken chord/Arpeggio** – A chord played as separate notes.
- **Alberti bass** – A type of broken chord accompaniment.
- **Regular Phrasing** – The balanced parts of melody.
- **Motif** – A short melodic or rhythmic idea that has a distinctive character.
- **Chord progressions** – A sequence or series or chords related to each other and in a particular key.
- **Modulation** – The process of changing key.

MUSIC GCSE

## Essential Listening

TRAFALGAR MUSIC

## SONORITY

Flute, String orchestra (violins, violas, cellos, double basses) and harpsichord
**(basso continuo)**

## STRUCTURE

BINARY FORM

A → B

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

# BADINERIE

## Knowledge Organiser

7th movement of orchestral suite No. 2 by **J.S BACH**
**Composed in 1738-1739**

## TEXTURE

Homophonic

*melody and accompaniment*

## DYNAMICS

Mostly forte, including terraced dynamics

*f*

## TEMPO

Allegro

## RHYTHM & METRE

2/4

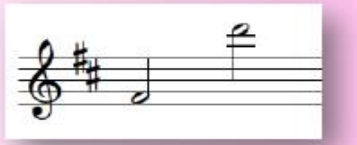
Anacrusis

Ostinato rhythms

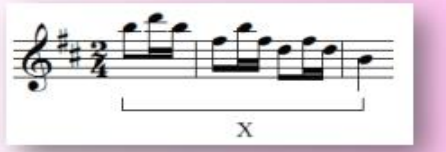
mainly Quavers / semiquavers

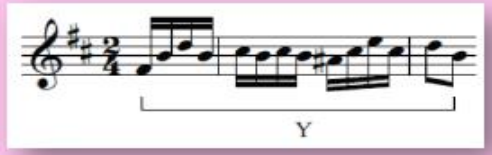
## MELODY

Flute range (2 octaves pitch range):



2 main musical ideas. Use of ornaments and melodic devices (motifs, sequences). Triadic, disjunct and conjunct in places




## HARMONY & TONALITY

Diatonic with modulation to dominant minor B minor to dominant minor: F# minor

MUSIC GCSE

AOS1 Musical Forms and Devices

Revision

# AOS2 Music for Ensembles Revision

## Topic 1 – Timbre, Sonority and Texture

**Timbre** - The tone colour or tone quality associated with a particular instrument. Refer to your instrument recognition sheet for more detail.

**Sonority** – The relative loudness and 'feel' of a sound when compared with other sounds.

**Texture** – The number of layers/parts in a piece and how they relate to each other:

- **Monophonic** – A single melodic line with no accompaniment
- **Homophonic** – Many parts that move together (same rhythm)
- **Polyphonic** – A number of different melodic lines heard independently of each other.

**Unison** – When 2 or more musical parts that are the same, are played together (monophonic).

**Chordal** – A type of texture where the parts move together producing a series of chords (homophonic).

**Layered** - when more parts are added on top of each other to produce a richer texture.

**Melody and accompaniment** – A type of homophonic texture, where the tune is the main focus and is accompanied by other parts that move together.

**Countermelody** – When a new melody is heard at the same time as a previous melody.

**Round** – A type of **canon** in which voices sing the same melody but beginning at different times. The music repeats (goes round & round).

## Topic 2 – Musical Ensembles

The word ensemble applies to the number of performers in a group. If there are lots of performers in an ensemble it becomes a choir or an orchestra.

An ensemble may group together any combination of instruments from the same family or different families.

- **Duet** – 2 performers
- **Trio** – 3 performers
- **Quartet** – 4 performers
- **Quintet** – 5 performers
- **Sextet** – 6 performers
- **Septet** – 7 performers
- **Octet** – 8 performers

## Topic 3 – Chamber Music

**Basso Continuo** – A type of accompaniment used in the Baroque era. The term means 'continuous bass' and consisted of a bass instrument and a chordal instrument.

**Baroque Sonata** – A piece of music that is played rather than sung.

**Trio Sonata** – A piece of instrumental music for 3 parts.

**String quartet** – One of the most popular types of ensemble with in the Classical era. It consisted of 2 violins, a viola and a cello.

## Topic 4 – Musical Theatre

In musical theatre, the music helps tell and support the storyline and characterisation. The audience will see the storyline or plot unfolding through the music, the acting and the dance, supported by the accompanying orchestra/band.

**Different types of musical. Can you research an example of a musical for each type?**

- Musical drama
- Disney musical
- Classic musical
- Romantic musical
- Musical comedy
- Sung-through musical
- Juke box musical
- Film-to-stage musical

## Topic 5 – Jazz and Blues

Jazz and Blues are styles of music that emerged at the start of the 20th century in America.

- **Pentatonic scale** – A scale consisting of 5 notes.
- **Blues scale** – A minor pentatonic scale with an extra note (flattened 5th).
- **Improvisation** – When music is spontaneously created during a performance.
- **12 Bar Blues** – A type of structure used in Jazz and Blues that consists of 12 bars.
- **Swing style** – Characteristic of Jazz, in which notes are played with a relaxed dotted feel.
- **Riff** – A short motif or pattern that is repeated.
- **Rhythm section** – Typically consists of a bass player, a drummer and someone playing chords (pianist or guitarist).
- **Standard** – A Jazz or Blues song that is really popular.

MUSIC GCSE

## Essential Viewing

TRAFALGAR MUSIC

## STRUCTURE

VERSE – CHORUS FORM

| Intro | Verse1 | Chorus1 | Link1 | Verse2 | Chorus2 | Link2 | Instru | Chorus3 | Outro |
|---|---|---|---|---|---|---|---|---|---|

## TEXTURE

Homophonic

*melody and accompaniment*

# TOTO - AFRICA

## Knowledge Organiser

Recorded by American rock band Toto in **1981** for their fourth album Toto IV.
Written by David Paich & Jeff Porcaro

## SONORITY

Lead male singer, male backing vocals, lead guitar, bass guitar, synthesizers, drum kit and additional percussion

## DYNAMICS

Mostly mezzo-forte but choruses forte

*mf* *f*

## TEMPO

Moderately fast

## RHYTHM & METRE

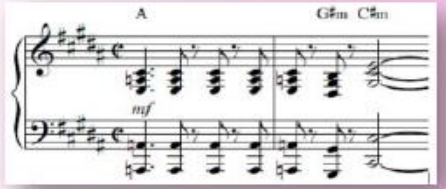
2/2 (split common)
Syncopations
Ostinato rhythms
Mainly quavers
Anacrusis for riff B

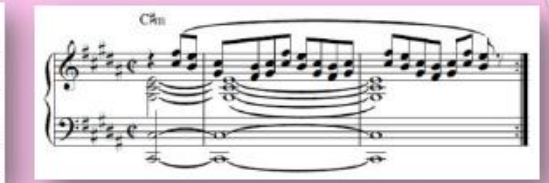
## MELODY

Vocal range (less than 2 octaves (printed))

Mainly conjunct
Use of pentatonic scale in places
Vocal improvisation at the end of the song

A Use of riffs B





## HARMONY & TONALITY

**B Major** for the majority of the song
**A Major** for choruses
Diatonic throughout

MUSIC GCSE

AOS4 Popular Music
Revision

TRAFALGAR MUSIC

AQA GCSE Physical Education – Paper 2

# Chapter 4: Sports Psychology

## 4.1 Skill and ability

| |
|---|
| Skill |
| Ability |
| Trait |
| Basic skill |
| Complex skill |
| Open Skill |
| Closed skill |
| Self Paced skill |
| Externally paced skill |
| Gross movement skills |
| Fine movement skills |

## 4.3 Information processing


## 4.2 Goals Setting

| |
|---|
| Performance Goals |
| Outcome Goals |

## 4.2 SMART Targets

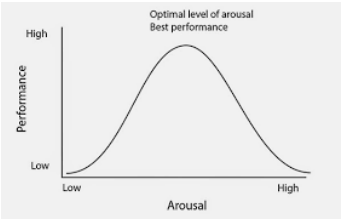
| |
|---|
| Specific |
| Measurable |
| Accepted |
| Realistic |
| Time-bound |

## 4.4 Guidance

| |
|---|
| Verbal guidance |
| Visual guidance |
| Manual guidance |
| Mechanical guidance |

## 4.5 Arousal

Inverted U Theory




## 4.5 Stress Management Techniques

| |
|---|
| Deep Breathing |
| Positive Self-Talk |
| Mental Rehearsal |
| Visualisation/ Imagery |

## 4.4 Feedback

| |
|---|
| Positive Feedback |
| Negative Feedback |
| Knowledge of results |
| Knowledge of Performance |
| Extrinsic Feedback |
| Intrinsic Feedback |

## 4.7 Personality Types

| Introvert | Extrovert |
|---|---|
| • Shy and quiet<br>• Associated with individual sports | • Active, talkative<br>• Sociable Associated with team sports |

## 4.6 Aggression

| Direct Aggression | Indirect Aggression |
|---|---|
|  |  |

## 4.8 Motivation

| Intrinsic Motivation | Extrinsic Motivation |
|---|---|
| • Pride<br>• Satisfaction<br>• Accomplishment<br>• Self-worth<br>• Achievement | Tangible rewards:<br>• Those that you can touch - Trophy<br>Intangible rewards<br>• Those that you can't touch - Applause |

AQA GCSE Physical Education – Paper 2

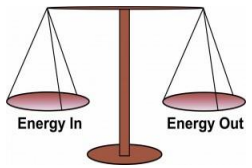
# Chapter 6: Health and Wellbeing

## 6.1 Physical, emotional and social health and well-being, and fitness

| | |
|---|---|
| **Physical** | • Improved heart function<br>• Reduce the risk of some illness<br>• Avoid being obese |
| **Mental** | • Reduced stress/tension,<br>• Increased serotonin levels,<br>• Emotional control<br>• Increased self-confidence |
| **Social** | • Meet new people and make new friends<br>• socialise with our friends<br>• Improve our cooperation skills |
| **Fitness** | • Improved fitness<br>• Reduced chance of injury<br>• Support physical ability to work |

## 6.4 Energy Use

| **Factors affecting calories required:** |
|---|
| Age |
| Energy expenditure |
| Gender |
| Height |




## 6.2 Consequences of a Sedentary Lifestyle

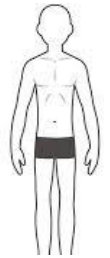
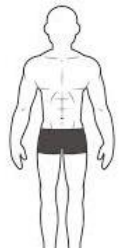
| ***Health risks due to a sedentary lifestyle*** |
|---|
| Obesity/ excessive weight gain |
| Poor Self-esteem |
| Hypertension (High BP) |
| Poor Sleep |
| Type 2 diabetes |
| Heart disease and stroke |
| Lethargy (lacking energy) |

## 6.5 Balanced diet

- Eating the right foods in the right amounts. This will allow us to exercise and work properly
- Insufficient nutrients can cause ill health such as anaemia, rickets and scurvy

| ***Nutrients*** |
|---|
| Carbohydrates |
| Fats |
| Protein |
| Vitamins & Minerals |

## 6.3 Somatotypes

| **Ectomorph** | **Mesomorph** | **Endomorph** |
|---|---|---|
| Tall and thin<br>Narrow shoulders and hips | Wide shoulders<br>Narrow hips | Wide hips<br>Narrow shoulders |
|  |  |  |

## 6.6. Maintaining Water Balance - Hydration

**Dehydration:** excessive loss of body water, such that it interrupts the function of the body
**Hydration:** having enough water to enable normal functioning of the body

| ***Effects of Dehydration*** |
|---|
| Blood thickening (increased viscosity) |
| Increase in heart rate causing irregular rhythm |
| Increase in body temperature |
| Slowing of reactions |
| Muscle fatigue |

## Natural timbers: hardwoods

A **hardwood** comes from a broad-leaved tree whose seeds are enclosed in a fruit, such as an acorn. Hardwood trees grow quite slowly, often taking more than 100 years to be big enough to use for timber. This means hardwoods are rarely planted and they are increasingly rare and expensive.

| Type | Description | Advantages | Disadvantages | Common uses |
|---|---|---|---|---|
| **Oak** |  | • Strong and durable<br>• Has an attractive grain when well finished | • Expensive<br>• Becoming rarer<br>• Harder to work with than some woods<br>• Corrodes iron and steel | • Used a lot for building houses and boats in the past<br>• Now used for high-end furniture and wine and whisky barrels |
| **Mahogany** |  | • Has a very attractive finish<br>• Quite easy to work | • Expensive<br>• Environmental problems with sourcing from tropical forests<br>• Oils in the wood can give some people a skin rash or breathing problems | • High-quality furniture, jewellery boxes, windows |
| **Beech** |  | • A tough wood<br>• Does not crack or splinter easily<br>• Hard | • Expensive<br>• Not very resistant to moisture<br>• Not suitable for exterior use | • Toys, cooking implements, solid and laminated furniture |
| **Balsa** |  | • Very lightweight<br>• Easy to cut | • Much too soft and weak for most products | • Model making, primary school projects, surf board cores<br>• Used for rafts in ancient times |
| **Jelutong** |  | Even, close grain is easy to cut and shape | Soft and not very strong, so not good for structural uses | Model making, moulds for casting or vacuum forming |
| **Birch** |  | Regular, even grain and easy to work | Low resistance to rot and insect attack | Veneers: to make plywood and to surface cheaper materials that are used for interior door and furniture |
| **Ash** |  | Strong, tough, flexible and finishes well | Low resistance to rot and insect attack | Handles for tools, sports equipment, ladders |

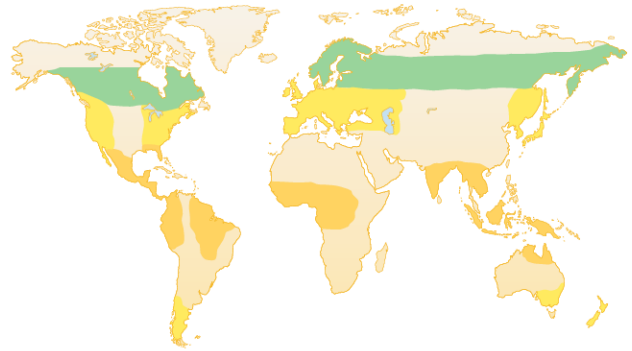



**Figure 7.2.1** Where different types of timber can be found in the world

### Stock forms/types

Timber is available in a variety of stock forms.

| Name | Availability | Picture |
|---|---|---|
| **Regular sections** | • Timber is sold in a standard range of cross-sectional shapes and sizes – sawmills do this for convenience, so there is a limited range of sizes to cut<br>• Designers can use the standard sizes when designing products |  Commonly available sizes and shapes of timber |
| **Mouldings** | • Lengths of timber cut into decorative shapes<br>• There are lots of shapes available for different purposes, such as skirting boards or decorative edging<br>• Saves time but can be relatively expensive |  Common moulding shapes |
| **Dowels** | • Wooden rods that are round in cross-section<br>• Have a variety of uses, from model making to furniture construction – can be used to strengthen simple joints<br>• Short lengths of dowel are used to join pieces of wood with a dowel joint<br>• Requires accurate drilling of holes |  Different-sized dowels |
| **Sheets** | • Manufactured boards come in standard-sized sheets in a range of thicknesses<br>• Available in large sizes but large sheets are relatively difficult to cut and edges may splinter |  A stack of manufactured boards in a warehouse |

## Natural timbers: softwoods

A **softwood** comes from a tree with needle-like leaves and seeds in a cone. Most softwood trees are **evergreen**, meaning they have leaves all year. Softwood trees grow quite quickly, and can be used for timber after about 30 years. This means they can be grown commercially, which is why softwood timber is a lot cheaper than hardwood timber.

| Type | Description | Advantages | Disadvantages | Common uses |
|---|---|---|---|---|
| **Pine** |  | • Very durable<br>• Easy to work<br>• Quite cheap as it grows quickly enough to be forested<br>• Reasonably strong, lightweight and easy to work with | • Can warp, crack and splinter more than some other woods | • House construction, for roof joists and floorboards<br>• Furniture, doors, interior woodwork |
| **Cedar** |  | • Natural oils make it resistant to water and fungal growth | • More expensive than pine and not as strong | • Outdoor furniture, fences, sheds, boats |
| **Larch** |  | • Tough, durable and resistant to water<br>• It can be used outside untreated, and fades to a silvery grey | Costs more than some other softwoods | Small boats, yachts, exterior cladding on buildings |

### Manufactured timbers

Natural timber is a useful material, but because of the size of a tree trunk, it is only available in fairly narrow planks. If you want a large, thin sheet of wooden material, you need a manufactured board. Manufactured boards use timber to make a board that has different properties to plain timber.

**Key term**

**Veneer:** a thin slice of wood, about 1 mm thick. Used as a decorative surface and to make plywood.

| Type | Description | Advantages | Disadvantages | Common uses |
|---|---|---|---|---|
| **Plywood** | • A tree trunk is sliced into thin layers called veneer<br>• These layers are glued together with the grain lines going in alternate directions | • Flat and structurally strong<br>• Surface looks like wood<br>• Resistant to warping, cracking and twisting | • Quite expensive<br>• Edges can look rather rough<br>• Susceptible to water damage if wrong grade is used | • Building and furniture panels that need some strength |
| **Medium density fibreboard (MDF)** | • Wood dust and fibres are mixed with a glue and pressed into flat sheets under extreme heat and pressure | • Cheap (made from waste wood)<br>• Smooth ungrained surface is good for painting or staining<br>• Easy to machine | • Does not look good, so needs coating<br>• Weak compared to real wood or plywood<br>• Tools blunt quickly due to the glue | • Cheap flat-pack furniture, wall panels, display cabinets, storage units |
| **Chipboard** | Wood chips are mixed with glue and pressed into flat sheets | Uses waste materials so is cheap to produce | • Not much structural strength, especially in damp conditions<br>• Surface is very rough, so usually plastic coated | Desktops, kitchen worktops, cheap flatpack furniture |

## Processes to cut and shape materials

### *Routing*

A router contains a rotating cutter. It can be used with lots of different-shaped cutters. It can be used to make a straight slot in wood, it can be used with a jig to cut shapes or it can be used with a bearing-guided cutter to profile the edge. Routing can also be carried out with a computer-controlled router/milling machine. It removes material quickly and there are a wide range of cutters available. Large cuts may burn/blacken timber so must be used with extreme care.

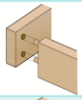
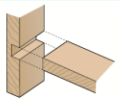
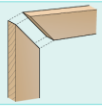
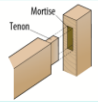
### *Sawing*

Sawing machines are used to prepare timber quickly, with the circular saw and bandsaw being the most common. Small ones are used in a workshop to cut timber to the required size and shape. Sawmills use much larger versions to cut whole tree trunks into planks. Cutting thicker timber on a bandsaw may result in edges not being square.

A table circular saw used to cut timber to size: the circular blade makes straight cuts in timber

A hand-held router being used to cut a decorative shape into the edge of a piece of timber. The man in the picture above is not following correct health and safety procedures. What is he doing wrong?

A bandsaw: the blade is one long band with teeth that can make straight and curved cuts in timber. What's wrong in this photo?

| Name | Appearance | Advantages | Disadvantages |
|---|---|---|---|
| **Butt** |  | Easy to make, it is just square ends glued together | • Weak: there is no mechanical strength, just the glue<br>• Not aesthetically pleasing |
| **Dowel** |  | Automated machines can drill the dowel holes quickly and accurately | Hard to line up the dowels accurately by hand |
| **Lap** |  | Quite easy to cut | Not very strong |
| **Housing** |  | • Holds a shelf or divider securely in the middle of a carcass (frame)<br>• Pairs well with corner lap joints | • Can be tricky to cut neatly on a wide board<br>• Very accurate marking out and cutting required to ensure a shelf is exactly level |
| **Mitre** |  | • Looks good because no end grain shows<br>• Good for picture frames | Weak, it is only a butt joint at 45° |
| **Mortise and tenon** |  | • A strong joint<br>• Good for joining a table or chair frame to legs | Time consuming to cut by hand |
| **Dovetail** |  | • A very strong joint – the dovetails lock together securely<br>• Good for a drawer front that will get pulled hard | Very tricky to cut accurately by hand |

| Name | Appearance | Use | Advantages | Disadvantages |
|---|---|---|---|---|
| **Butt hinge** |  | Used to fit doors | Hidden from sight when door is closed | Hard to fit as an accurate slot needs to be cut on both sides |
| **Flush hinge** |  | Used for small cupboard doors | Easy to fit as no slots to cut | Leaves a gap between the door and frame |
| **Butterfly hinge** |  | Screws onto the surface, often a decorative shape | Easy to fit, as it screws onto the surface with the parts lined up | The whole hinge shows on the surface |
| **T hinge** |  | Used for gates and shed doors | Long bar good for supporting the weight of a gate | Sits on the surface, so shows on the front of the gate or door |

### *Use of a mortiser*

A mortiser makes a square hole. It gets its name from the mortise (slot) half of a mortise and tenon joint. The round centre of the chisel drills a round hole, and the square chisel around it cuts the corners out to make a square. Produces mortises quickly and accurately, but requires requires accurate marking out and care to get the exact size mortise required.

### *Use of a bag press*

A bag press is a bag that can be sealed and have the air sucked out of it. A mould and laminates are put inside it. When the air is sucked out of the bag, the laminates are forced into the mould, and are held there while the glue dries. Presses equally on all surface areas but may not work with thicker laminates.

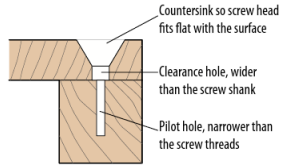



**Figure 7.7.3** Drilling timber parts ready for a countersunk screw

## Fabricating and constructing

### *Lamination*

Laminating is joining layers together. Plywood is laminated, it is layers of veneer glued together. Laminate flooring is made up of layers. Laminating is useful in the workshop because thin layers can be bent and glued together, and they stay in the bent shape when the glue has dried. The bag press on page 293 is helpful for this.

### *Veneering*

Veneer is a thin layer of wood, which means it can be more prone to damage. Plywood is made of layers of veneer laminated together. Veneer can be glued onto the surface of a cheaper material, such as MDF, to make the surface look like more expensive wood. MDF can be bought covered with hardwood veneer.

### *Use of screws*

Screws are a very useful fixing for joining pieces of wood together. They create a tight fit to make a strong joint, and they can be unscrewed and removed if necessary.

There are two main head designs: slotted (also known as flat) and Phillips (a cross shape). You need the right screwdriver tip to fit the screw head.

A countersunk screw is useful in wood, because you can make the head of the screw fit flat with the surface of the wood. A clearance hole must be drilled first to accommodate the screw head. Drilling a pilot hole as well, which must be narrower than the screw thread, will make it easier for the screw to go in.

### *Nailing*

Nails come in a range of shapes and sizes. Nails are hammered into the wood grain, which pinches tight onto them so they are hard to pull out. It is quick and nails can be driven below the surface and covered over to improve appearance. However, holes may need to be drilled to prevent wood from splitting.

- **Round wire nails** usually have a large flat head so they do not pull through thin materials.
- **Oval nails** spread the grain less, so are less likely to split the wood when hammered in.
- **Panel pins** are small nails for small workpieces and for holding thin boards onto timber.

### *Adhesives*

**PVA** (polyvinyl acetate) is a commonly used wood glue. It is a thick white liquid, but becomes clear when it dries. It makes a strong joint in wood as long as the pieces are clamped tightly together while the glue dries. It is almost impossible to disassemble a joint without destroying it when PVA has set.

**Contact adhesive** is good for sticking a flat piece of a different material onto wood. Spread a thin film onto both surfaces, wait until it is nearly dry, then press the two parts firmly together. It is fast but there is little or no opportunity to reposition the pieces and it gives off solvent fumes.

| Scale | Description | Advantages | Disadvantages |
|---|---|---|---|
| **One-off** | One product made at a time, either for a specialist product or to test an idea | • No set-up cost<br>• Made with existing equipment<br>• Product can be customised to the user's needs | Slow, so expensive to make several |
| **Batch** | Several copies of the same product are made at the same time | • Jigs, templates and moulds speed up the process and can be kept for future use<br>• Special machinery is not needed, so set-up cost is not high | • Labour intensive, so it is quite expensive per product<br>• Takes time to make jigs, moulds and templates |
| **Mass** | Factory machinery set up to make lots of identical products | Can make a product quickly and cheaply | Machinery expensive to set up, so only worthwhile for making a lot of products |
| **Continuous** | Factory machinery making the same thing 24/7 | Makes the product very quickly and cheaply | Machinery very expensive to set up, so only worthwhile for making huge quantities of a product |

### *Jigs*

A jig can be put over a piece of work and guide a drill or a saw to cut in the required place. It is a quick and accurate way to make lots of holes or cuts in exactly the right place, as long as the jig is positioned correctly. Jigs are very useful for batch production because once you have the jig you can keep using it.

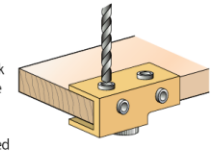


**Figure 7.6.2** A drilling jig that has been clamped to the corner of the workpiece to get the holes in the correct place

### *Fixtures*

A fixture holds the workpiece in place while it is being cut or shaped. This speeds up processes but a range of fixtures may be required, adding to initial costs.

### *Templates*

A template is a cut-out shape that you can draw around to mark out the shape you want to cut from a piece of material. A template might be made from paper or card for a single use, or it might be made from a thin sheet of wood or metal if it is going to be used a lot. A template is really useful in batch production because it allows workers to mark out the same shape quickly and accurately. Templates must be accurately produced and protected from damage.

### *Patterns*

A pattern is similar to a template, but the term is sometimes used to refer to a collection of templates used to make the complete product. The pattern for a product might include several individual templates needed to make the whole product. One pattern can result in multiple accurate replicas but the template must be accurately produced, which may be expensive.

### *Sub-assembly*

Sub-assemblies are components that have been assembled and used as an individual component in a larger product. The sub-assembly is built to a uniform specification, quality tested in its own right and can be entirely replaced. An example is a standard DVD module inserted into different desktop computers.

### *Computer-aided manufacturing*

Computer-aided manufacturing (CAM) uses a computer to guide the cutters on a computer numerically controlled (CNC) machine. The product outline will be drawn on a computer-aided design package (CAD). The computer sends cutting instructions to the CNC machine, which has cutters moved around by electric motors. This is very accurate and can operate 24/7. It has high initial costs and training is required for programmer.

CNC routers, milling machines and laser cutters can all be used in a workshop to make one of a product or a batch of lots of the same products. Factories use large machinery controlled by computers.

### *Quality control*

Quality control is a system for trying to make sure the products being manufactured are good enough for sale. It reduces waste and should help customers to receive a more reliable product. At stages through the manufacturing, a sample of the product is inspected to make sure it is correct. The more complex a product is, the more sampling is likely to take place. Careful planning and implementation is required. If the sampling finds a faulty product, the process might be stopped so it can be corrected before many more faulty ones are made.

### *Working within tolerance*

Manufactured parts will always have a tolerance. That is the range of sizes within which the part is acceptable. The designer will need to specify a tolerance for a part. If the holes on a flat-pack cupboard are the wrong size the fittings will not work. If the holes are 2 mm out of line, the pieces will not go together properly. Careful application of tolerances ensures a product with several components will always fit together and that spare/replacement parts will fit too. Manufacturing processes must be able to produce the right tolerance, and part of quality control is checking the parts are all within the required tolerance. Parts of a product are often made and assembled in different factories, so stating the acceptable tolerance for every part is essential for the parts to fit together. It requires accurate machine set-up and checking systems, for example go, no-go gauges.

### *Efficient cutting to minimise waste*

Material costs money, so it is important to use as little as possible when making products. This includes minimising waste to reduce costs and better use finite resources. When cutting out materials, the way shapes are marked out can make a big difference to waste. Using a template to mark out shapes so they are as close together as possible, and designing the part to ensure the closest possible fit to the next one, can make a big difference to the amount of material wasted, although this requires careful planning.

# GCSE D&T - Timbers: End

| Name | Appearance | Use | Advantages | Disadvantages |
|---|---|---|---|---|
| Hand saw |  | Used to cut larger pieces of wood | Can cut long, deep cuts through big planks | • Blade can bend, so it's important to saw straight<br>• Harder work than a power saw |
| Tenon saw |  | Used to cut smaller pieces of wood and accurate detail like joints | Stiffened blade makes it easier to make precise, straight cuts | Stiffened blade back means it cannot cut deeper than the blade, as the spine that keeps the blade stiff is thicker than the blade |
| Coping saw |  | Used to cut shapes out of thin wood and manufactured boards | • Thin blade can go around curves<br>• Blade can be taken out and put through a hole to cut internal shapes | • Blade snaps quite easily<br>• Small teeth saw slowly |
| Scroll saw |  | Used to cut shapes out of thin wood and manufactured boards | Can cut fine, accurate details | Large pieces of wood cannot be cut with it |
| Jigsaw |  | • The blade goes up and down<br>• Used to cut large thin pieces of wood clamped to a bench | • Can cut quite quickly<br>• Thin blade can cut curved shapes | • Difficult to cut straight lines<br>• Blade can wander in thicker materials |

## Tools and equipment

### *Hand tools*

There is a variety of useful hand tools for marking out, cutting and shaping wood.

Tools for marking out accurately are important. If you mark out your work accurately you can cut it accurately too.

A try square is used to mark a line at 90° to an edge and check if something is square – versatile, may be damaged if dropped

A marking gauge used to mark a line parallel to an edge – can mark out several pieces of timber at the same measurement, the scribing point (spur) scratches the timber so it is vital the gauge is set correctly

### *Machinery*

The first woodworkers had to do everything with hand tools, which could be quite time consuming. Nowadays we have a lot of electrically operated machinery that makes woodwork much quicker and easier. The circular saw and bandsaw in Section 7.6 on page 292 are very useful machines for cutting timber to the required size.

### *Digital design and manufacture*

Computer-aided design software is useful for drawing parts of a product accurately. It is essential if the work is going to be cut out with computer-aided manufacture, as the computer sends information from the drawing to the machine, such as a CNC router or a laser cutter. The big advantage of computer-aided design and manufacture is the speed and accuracy with which it can cut.

A pillar drill: in a workshop work is held flat on the table and the drill makes accurate 90° vertical holes. It requires various clamping methods depending on the shape and thickness of the material to be drilled

A hand-held 'cordless' battery-operated drill is very useful on site or for big pieces of work that are hard to move – no power lead so it can work away from a power source, but requires a charged battery to work

## Shaping

### *Drilling*

A drill makes a round hole in material. There are different types which all have their advantages and disadvantages.

| Name | Appearance | Use | Advantages | Disadvantages |
|---|---|---|---|---|
| Twist drill |  | • Drilling smaller-sized holes in most materials<br>• The **flutes** lift the swarf out of the hole | Readily available in a wide range of sizes from very small up | • Usually only up to 13 mm diameter<br>• Deep holes can block up the flutes |
| Flat bit |  | Drilling larger holes in wood | • Centre spur gives an accurate starting point<br>• Drills quickly | Cannot be used to make an existing hole bigger |
| Forstner bit |  | Drilling flat-bottomed holes in wood | Small centre spur can make a blind hole with a flat base | Slower than a flat bit |
| Auger |  | Drilling deep holes in wood | Can bore deep holes | Needs to be used at a slow speed |
| Hole saw |  | Cutting large holes | Can make a large hole in a sheet of manufactured board | • Only good for quite thin materials<br>• Limited range of sizes available |

| Name | Appearance | Use | Advantages | Disadvantages |
|---|---|---|---|---|
| File |  | A range of tooth sizes and shapes available | Good for smoothing and shaping the sawn edges of manufactured boards | Small teeth are quite slow on wood |
| Rasp |  | • Large individual teeth<br>• Available in different shapes, usually flat, half-round and round | • Big teeth cut soft woods quickly<br>• Good for rough shaping | Big teeth leave marks in the wood that need removing with a file or sandpaper |
| Surform |  | A frame holds the blade with pressed metal teeth, rather like a cheese grater | • Good for rough shaping of soft materials<br>• Blade can be removed from frame and replaced | • Leaves a rough surface<br>• Hard work on harder woods |

### *Planing*

A plane has a sharp blade, which must be kept sharp, protruding from a flat base plate. It is used to remove wood from the edge of a piece of timber, and is good for getting a crooked edge straight. Planes are available in different lengths and it is easy to adjust depth of cut.

A planer/thicknesser is a useful machine for preparing timber. A rotating cutter block planes the wood. The top of the table planes it to get flat, square faces and edges. Under the table the thicknesser draws the wood in and planes it to the set thickness.

### *Chiselling*

A wood chisel is used for paring wood, that is, slicing between the grains. A mortise chisel has a much thicker blade and a heavier duty handle. It is used for cutting slots in wood, so it is hammered with a mallet a lot. Chisels are hard to use across end grain. A sharp chisel is easier and safer to use.

### *Turning*

A wood-turning lathe holds a piece of wood and spins it. The operator holds a chisel on a rest and guides it over the spinning wood to chisel wood away. It requires careful preparation of material and setting up of the lathe.

| | Description | Advantages | Disadvantages |
|---|---|---|---|
| Painting | • A coloured pigment in liquid that dries out | • Available in a range of colours | • Covers up the natural wood grain |
| Staining | • A coloured liquid that soaks into the wood surface | • Makes a pale-coloured wood like pine a darker colour to mimic more expensive woods like oak or mahogany | • Does not look quite like another wood as the pine grain still shows |
| Varnishing | • A clear coating that dries to a shine | • Gives a hardwearing finish that shows the grain of the wood<br>• Can be a high gloss or a matt finish | • Can scratch or chip and expose the wood |
| Wax | • A soft solid that is rubbed into the surface with a cloth | • Easy to apply<br>• Gives a plain, natural look | • Rubs away and needs reapplying<br>• Not a glossy finish |
| Oil | • Is rubbed onto the surface and soaks in | • Good waterproofing for timber<br>• Vegetable oil on kitchen ware is non-toxic | • Surface feels oily |
| Shellac | • A cloudy liquid made from a resin secreted by a beetle<br>• Lots of layers are rubbed on and polished to create a finish called French polish | • Traditionally used on expensive furniture for its glossy lustre | • Easily damaged by water and heat |
| Veneering | • A thin layer of wood glued onto the surface | • An expensive, decorative wood like mahogany can be put onto a cheaper wood like pine or chipboard | • The veneer is natural wood, so it still needs a finish applied |

# AO1: Design Brief and Specification

Write your brief as a short paragraph. It should include what you intend to make, the context you are working in and the benefits it will bring to the clients. Start it with the phrase below.

I am going to design and make a…

Design Brief Examples:

Design Brief

Many young people choose to express their individuality through the clothes they wear, the accessories they use and the products they decorate their rooms with. Alternative, offbeat, unusual, out of the ordinary, the 'in thing', the chic, a new trend and street style are all words the inspire our nations up and coming textile designers.

I will **DESIGN** and **MAKE** a textile product suitable for the **18-23 YEAR AGE RANGE** taking your inspiration from **'THE AGE OF PUNK' and VIVIENNE WESTWOOD.**

If the product is successful it will form part of a **LIMITED RANGE** to be sold at **MUSIC FESTIVALS** throughout the country.

I am going to design and make a pair of shorts for teenagers to wear when they go to the beach.
When teens go to the beach they like to be cool, so I will use lightweight fabrics. Beach wear is usually bright as you are outside so the shorts will be bright and colourful and will have a pocket so that the wearer can keep small things such as money safe. They will have a drawstring waist to hold them up.
I have 9 weeks to design and make my shorts. The final product must fit well and be wearable.

Specification Examples:

| | |
|---|---|
| **Name/type of product** | Skateboarding Specified Hoodie |
| **Function: what does the product need to do?** | The product needs to be improve comfort when skateboarding. It also needs symbolise skateboarding, it needs to be obvious that it is a skateboarding hoodie. |
| **Situation/occasion when product will be used** | The product will be used when the client wearing is skateboarding in colder and unpleasant weather. Also the product might be warn to protect their upper body if they are attempting something risky and they are concerned that their upper body might get injured. |
| **Aesthetics (theme)** | The aesthetics of the hoodie will be shown in the logo on the front of the hoodie. I am hoping to fabric paint 'The Evolution of The Skateboarder' logo on the front of my hoodie. |
| **Sizes** | The hoodie will be Medium/Large. I thought this would be a suitable size, because I am going to make the hoodie baggy, so if someone who is Extra Large is wearing the hoodie then it should fit them too, and if someone is small then the hoodie will be baggy on them, but still seem stylish. |
| **Fabrics and components** | I am going to attempt to make my product 100% cotton. This would be the best material, because it is eco-friendly and also it can be durable and warm. I am going to have different components on my hoodie, for example: a hood, a pocket on the front and strings to tighten the hood. |
| **Target market and customer profile** | My target market is teenagers around 16 years old who are passionate skateboarders. My customer profile is of a boy who is 16 and skateboards. |
| **Minimum/maximum cost** | The minimum cost will be £20 and the maximum cost will be £40. I have chosen these prices as the boundaries, because my customer said that he will buy clothing costing £20-£40. |
| **Decorative techniques** | For my decorative technique I am going to fabric paint a logo on the front of the hoodie, as mentioned previously in the 'Aesthetics' section. |
| **Social, moral and ethical issues related to product** | To avoid social issues I will have to make sure that the people who acquired the materials were paid fairly. I will not be making my product out of an animal, this means that there will be no moral issues. I will not use material that have been made with chemicals that will damage the planet this will avoid ethical issues. |
| **Life expectancy** | My product should last around two years. If the client starts to skateboard a lot more and falls off more frequently, then the product might not last as long as a year. |
| **Other information** | The hoodie will be black. I want it to be black, because I have found out in my research that most skateboard hoodies are dark colours. I also want to make my hoodie black, because I want the white logo that I am putting on the front of it to stand out. |

The statements in your SPECIFICATION need to be justified so you will need evidence that they are required and meet the needs and wants of the user/client.

Use the **Coursework guidance** to help you and always refer to the **coursework mark scheme** to make sure you are on track.

# Design Criteria/Specification

**Function:**
The function of my garment primarily is to be a costume for a modern show of '*The Snow Queen*' to be featured in the first half of the show. The dress must be floor-length and have a small train. It must also include a fitted corseted bodice with boning to give shape, fit and easy access in and out. The skirt should include layers of dark and sinister colures to show the fate of the charter later on in the show. The garment could include beading to give the illusion of ice and snow glinting I the light. The garment must be durable so it can go through several shows and can be adapted for a different show.

**Aesthetics:**
My final garment must have the colours and feel of ice/snow and unknowing danger. It must have the heir of elegance as the character is a royal and high status. The bodice must be ridged and have harsh lines but must flow into a silky and watery skirt. The skirt should be layered with dark colours to show the fait that will befall the character. The dress should contain illusion on the bodice and sleeves and neck that is a translucent off white or bight white colour. The bodice could contain intricate bead work to give the feel of ice and snow glinting in the light.

**Size:**
The garment must be bespoke to the actress wearing the garment.

**Target market:**
My target market is the Apollo Victoria Theatre, London. They require high quality garments to fit their standards.

**Minimum and maximum cost:**
After looking at a range of garments that represented the quality of me garment and found that they ranged from £100-£5000. To deduce the cost of my garment I intend to try and find local resources for the fabric and make it not too complicated to reduce labour costs.

**Decorative techniques:**
If I have time I intend to include decorative elements on the bodice. By doing this it will glitter in the stage lights and imitate the look of ice and snow.

**Social, Moral and Ethical issues relating to products:**
My garment need to be long lasting, made from locally sourced materials as to reduce the carbon footprint. By being well made it will also be able to be used for many productions reducing the need for costumiers to remake the garment and lessening the need for the use of more fabric and resources.

**Life expectancy:**
My garment will be used for my adaptation of the 'Snow Queen' primarily but after its been used for that show it will be reused and adapted to fit other shows. The garment will have a life span of about 5 years with added adaptations that have been from other productions.

Use the Coursework guidance to help you and always refer to the coursework mark scheme to make sure you are on track.

DESIGN BRIEF

Write your brief as a short paragraph. It should include what you intend to make, the context you are working in and the benefits it will bring to the clients. Start it with the phrase below.

I am going to design and make a…

SPECIFICATION

- **Use bullet points under the headings below to state the criteria that your final design must meet.**
- **Justify each of your statements.**
- **2 or 3 points should have numbers in so they are measurable.**
- **Make reference to your 3 research sections (Client/User Interview, Product Analysis and Environment Considerations) at appropriate points to reach the higher grades.**

Use
- Give several bullet points with as much detail as possible about each of the things it should be able to do, drawing on the information in your research.
  Start each with - The product should be able to …. because …
  Eg. Where should it go? What should it store and how many? Should it be portable? Where will it be stored, What desirable features should it have? Etc.

Aesthetics (appearance)
- How important is the *style* and *colour* of the project and why ? Will it need to match or compliment any of it's surroundings ?
- Should it be made available in a range of colours or a generic colour?
- Can colour and style make it more appealing to your target population?

Ergonomics
- What features need considering which will make your solution as ***easy to use*** and ***safe*** as possible. Eg. Easily accessed / filled / fitted / carried / cleaned / stable / stored / etc.
- Including no sharp edges or parts that may trap fingers etc.

Anthropometrics
- Are there any parts of the project that need to be an appropriate size to fit people or parts of people, ie. size of hands for handles etc. State the size (or size range needed) and where appropriate use sketches to explain.

Properties
- What properties do you need from the materials you make it from and why ? The main properties are strength, durability, toughness, aesthetics and cost.
- Eg. The materials will need to be tough as the ……. is likely to be roughly handled.

Cost
- What would be a reasonable price range for the solution bearing in mind the client / user interview question.

# AO2: Generating Design Ideas

## 1. Initial Ideas

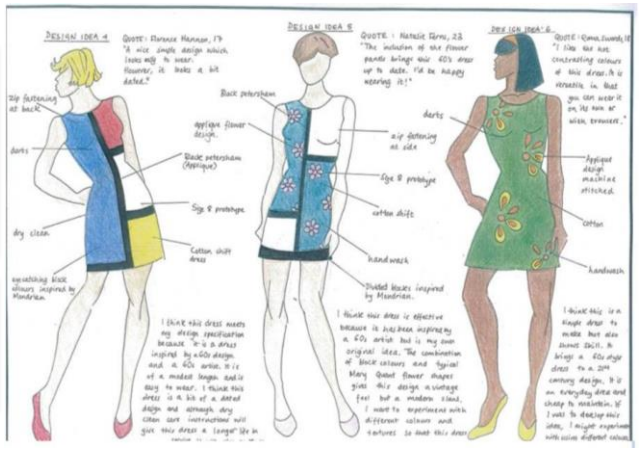
- Re-read your **DESIGN BRIEF**
- Look at your **RESEARCH**
- Re-read your **SPECIFICATION/DESIGN CRITERIA**.

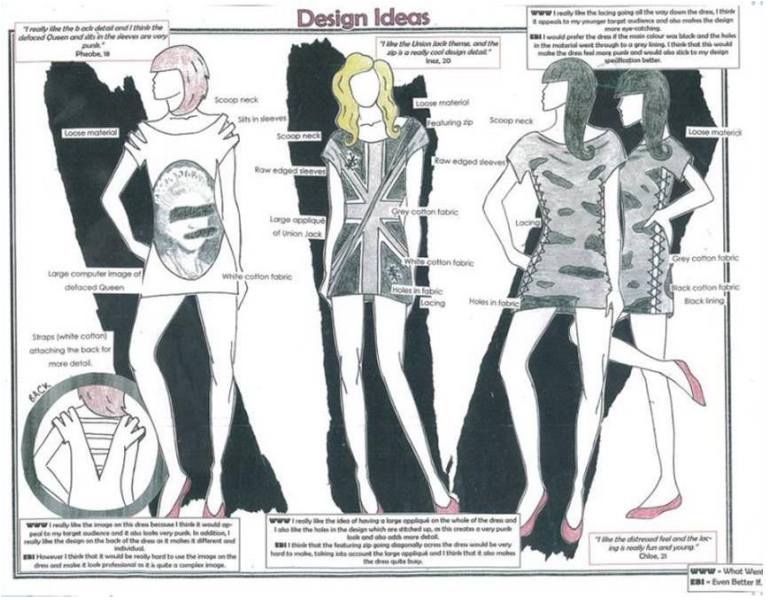
You must be very clear about what it is you are designing and **WHO IT IS FOR**!

Use an **HB** or **2B** pencil to **SKETCH** your ideas. Relax and sketch **FREELY.** Be **BOLD** and **CONFIDENT.** Let the **MODERATOR** see what you are thinking – **LABEL** your ideas, use **KEYWORDS**

The **PURPOSE** of the task is to design something **NEW, ORIGINAL** and **EXCITING**! It must be a product with a **DIFFERENCE** and something your 'Target Audience' will want to buy.

Pick out **SHAPES, PATTERNS** and **ELEMENTS** that appeal to you. **COMBINE** ideas.






If you find this difficult, it is usually because AO1 - the research element of your coursework **ISN'T GOOD ENOUGH**.
Is there any more research you could do that would help?

You will need to get feedback from your client about your first ideas so that you can develop one further into a final product.

GENERATING DESIGN IDEAS concept one

You are expected to produce a range of imaginative, creative and innovative ideas some of which take inspiration from existing designs. A good design sheet will have a mixture of rough sketches, notes/annotations, better-refined sketches, evaluative comments and colour on it.

INSERT PICTURE HERE THAT YOU WILL TAKE INSPIRATION FROM

Evaluation

Evaluate your idea making judgments about:
- How well will it work. Good points and bad points ?
- Are its aesthetics appealing to your clients?
- How difficult will it be to make?
- Will it be expensive, a reasonable cost, or cheap?

You will need three/four concept sheets.

Use the **Coursework guidance** to help you and always refer to the **coursework mark scheme** to make sure you are on track.

GENERATING DESIGN IDEAS concept two

You are expected to produce a range of imaginative, creative and innovative ideas some of which take inspiration from existing designs. A good design sheet will have a mixture of rough sketches, notes/annotations, better-refined sketches, evaluative comments and colour on it.

INSERT PICTURE HERE THAT YOU WILL TAKE INSPIRATION FROM

Evaluation

Evaluate your idea making judgments about:
- How well will it work. Good points and bad points ?
- Are its aesthetics appealing to your clients?
- How difficult will it be to make?
- Will it be expensive, a reasonable cost, or cheap?

# AO2: Developing Design Ideas

## 2. Review Of Initial Ideas

1. You need to determine which of your designs follow your design brief and specification and should be taken forward for development.

I. Compare each idea against the **SPECIFICATION** the table shown.
II. Give each idea a tick or a cross to show whether or not it meets each criteria.
III. Total up ticks for each idea.
IV. This will indicate which ideas are the strongest ones.

**Review of initial ideas**

| | Design 1 | Design 2 | Design 3 | Design 4 | Design 5 | Design 6 |
|---|---|---|---|---|---|---|
| Aesthetics | | | | | | |
| Customer | | | | | | |
| Cost | | | | | | |
| Environment | | | | | | |
| Size | | | | | | |
| Safety | | | | | | |
| Function | | | | | | |
| Materials & Manufacture | | | | | | |
| Total | | | | | | |

### 2. Client's Opinions Of Your Ideas

Ask your client what they think of your design ideas. Which one is the strongest? Why did they like it? Why did they reject the others? Does this correspond with your comparison against the SPECIFICATION?

### 3. Evaluation of Initial Ideas

Say which design was your CLIENT's favourite, which meets specification the best and which one you prefer and why.

Explain why you are going to take this design forward and how you can develop it in 3 ways to improve design for your FINAL DESIGN taking on board any of your client's suggestions.

DEVELOPMENT

Selection

Explain which concept you are going to develop into your final solution. Justify your selection.

You must refine and improve you chosen design idea, using an iterative design (the next improved version) approach.

Produce a range of 2D, 3D isometric and exploded sketches that show developments in the functionality, constructional detail and aesthetics of your design. You will also need to suggesting materials, that could be used.

Add lots of notes to your work saying what improvements you have made, and how it more closely meets your specification or user needs.

INSERT PICTURE HERE THAT YOU WILL TAKE INSPIRATION FROM E.G. HINGE ASSEMBLY.

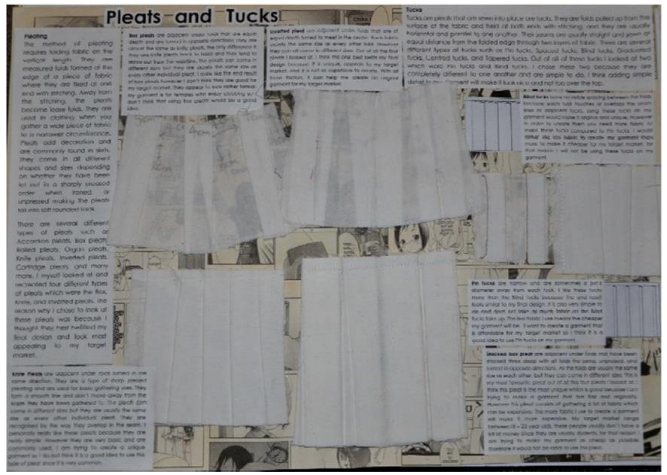
Use the **Coursework guidance** to help you and always refer to the **coursework mark scheme** to make sure you are on track.

## 3. Development And Refinement Of Design Ideas

You will now need to continually test, evaluate and refine your ideas.
Look at the 2-3 most suitable ideas from your Initial Ideas and refine them so they suit the brief and specification even better.

Develop these design ideas. Evidence everything you do, this should a mix of...

- Prototype modelling
- Client testing and feedback
- Materials testing
- Aesthetics
- Further Research




PHYSICAL MODEL

This next iteration (the next improved version) of your design will be done through modelling.

Model some aspects of your project to try and find out something you don't know or are not sure of.
- Model one of the techniques you intend to use.
- Make a part that you are not sure will work.
- Make a part that you are not sure how to do.
- Make a small scale version of your whole product to help you visualise it.

PICTURES OF MODEL

Model Construction

Describe the materials and joining methods used to make your model.

PICTURES OF MODEL

Model Evaluation

Explain what you have learnt from making this model. How will this change your design as you move forward?

## Types of establishment

| Commercial – Residential (A place that you can stay at overnight) | Commercial – Non – Residential (A place you cannot stay overnight) | Non-commercial (non-profit) (Providing a service rather than trying to make money) |
|---|---|---|
| Hotels<br>Guest houses<br>Bed and breakfasts<br>Farmhouses<br>Motels<br>Holiday parks<br>Some public houses | Restaurants<br>Fast food outlets<br>Public houses<br>Bars<br>Delicatessens<br>Take away outlets<br>School meals<br>Burger vans | Hospitals<br>Prisons<br>Meals on wheels<br>Residential care homes<br>Armed services |

## Chefs

**Head Chef: The boss**. The head chef is responsible for menu planning, food production, costing and purchasing, staff work rotas and training , hygiene of the kitchen and staff, stock control

**Sous Chef** - The Sous chef (sous=under in french) is directly in charge of food production, the minute by minute supervision of the kitchen staff, and food production

**Pantry chef** - *aka garde manger* - A pantry chef is responsible for the preparation of cold dishes, such as salads and pâtés

**Pastry chef** - *aka le patissier* - The King or Queen of the pastry section; baked goods, pastries and desserts are this chefs forte.

**Sauté chef** - *aka saucier or sauce chef* - They're responsible for sautéing foods, but their most vital role lies within the creation of the sauces and gravies that will accompany other dishes.

**Soup Chef** - *aka le potager* - Responsible for making soups and preparation of accompaniments for the dishes

**Vegetable Chef** - *aka le legumier* - The vegetable chef prepares all vegetables for dishes, in smaller restaurants the vegetable chef would also make soups.

**Fish chef** - *aka le poissonnier* - An expert in the preparation of fish dishes, and often responsible for fish butchering as well as creating the appropriate sauces.

## Styles of service

**TABLE SERVICE**

- **Plate:** Pre-plated meals from the kitchen. Can be a basic plated meal or a decorated nouveau cuisine style
- **Family:** Dishes are put on the table where spoons are provided and the customers swerve themselves. Suited to ethnic restaurants such as Indian, Chinese and Spanish tapas
- **Silver:** Food is served by the staff using spoon and fork
- **Gueridon:** Food is served from a side table or a trolley using a spoon and fork. Sometimes dishes are assembled or cooked in front of the customer

**COUNTER SERIVCE**

- **Cafeteria:** A single long display counter but can sometimes be multiple counters
- **Buffet:** Set up in a room usually along one long table. It can be self service or staff can serve customers. Carvery service is where joints of meat are carved in front of customers and plated
- **Fast Food:** Takeaway with eat-in areas where customers collect food from one small counter

**PERSONAL SERIVCE**

- **Tray or Trolley:** An assembled meal provided or a choice of food and drink from a trolley
- **Vending:** Sold from a machine
- **Home Delivery:** Delivered to house individually or on a round

Suppliers to the hospitality and catering industry:

- Specialist markets – e.g. butchers, fish markets. Some deliver
- Local suppliers – local deliveries are better for the environment but might not have a wide selection of stock
- Equipment suppliers – provide equipment and appliances to the catering industry
- Large wholesalers – large quantities of stock, can buy premade and proportioned food but can be expensive
- Independent suppliers

| Hotel job roles | Minimum Wage |
|---|---|
| Hotel manager | |
| Barmen/maids | 21-24 £7.70 p/h |
| Supervisor | 18-20 £6.15 p/h |
| Waiter/waitress | 16-17 £4.35 p/h |
| Housekeeper | Under 19 £3.90 p/h |
| Chambermaid | |
| Receptionist | |
| Porter | |
| Concierge | |

**LO1 The environment in which hospitality and catering providers operate**

| | |
|---|---|
| **Permanent (Over 36hrs a week)**<br>Have permanent jobs and work all year. Contract explaining the terms of their employment. They may work set shifts or have shifts that change daily/weekly/ monthly. Entitled to sick pay and holiday pay. Entitled to maternity pay | **Part time (4-36 hrs)**<br>Have permanent jobs and work all year. Contract. They will work mostly at the busiest times of the day/week including weekends. Entitled to sick pay and holiday pay (in proportion) Entitled to maternity pay |
| **Temporary**<br>Employed for a specific length of time such as the summer tourist season or the month of December. Temporary staff have the same rights as permanent staff for the duration of their contract. Temporary staff employed for longer than 2 years become permanent by law | **Casual**<br>Work for specific functions and can be employed through an agency. They do not have a contract or set hours of work. They are needed at busier times of the year e.g. At Christmas or for weddings, New years eve |

### Ratings

**Michelin guide**
Anonymous inspectors visit establishments and have a meal and write a review of the establishment can award stars for excellence.

**AA guide**
Inspectors visit restaurants or hotels and write a review of the establishment -award rosettes for restaurants, stars for hotels.

**Good food guide**
Members of the general public who have visited the establishment fill in a review which is compiled into a guide. Award points for excellence .

**Online and written reviews**
There are a number of online review sites where anyone can post their reviews of an establishment.
with a large number of reviews, a restaurant's average score is likely to be reasonably accurate

### Success Factors

**Economy**
Do people have the spare money to spend on luxuries such as eating or staying out

**Costs**
Rent, stock, gas & electricity, council tax, staff wages, new equipment

**Environment**
3 R's, packaging, food waste, global warming, carbon footprint, clean eating

**Cooking techniques**
sous vide, clean eating, steaming, new restaurants

**Competition**
Other places nearby, prices, delivery companies, new restaurants

**Technology**
Delivery and stock control – touch screen customer ordering, systems, stock management, apps for delivery services

**Political factors**
Increasing regulations – from government due to health issues, Brexit, use of migrant labour, migrants – ethnic foods

**Customer service**
If people aren't happy they won't come back. They will also spread word.

**Media**
Social media, online reviews, newspaper/TV coverage, celebrity endorsement.

**Trends**
Keeping up with what is fashionable: vegan food, whole food, healthy fast food etc.

*Key questions to check your learning for Learning Objective 1:*

1. *Recap what makes a business successful e.g. social media, prices of food, customer service and the atmosphere of the restaurant*
2. *What are the different salaries for jobs in the H&C industry?*
3. *What are the different types of service available?*
4. *What is the difference between commercial and non commercial?*

## Documentation

| | | | | | |
|---|---|---|---|---|---|
| Kitchen | Temperature charts: fridge, freezer, display, point of sale. Taken at least twice per day. | Time sheets: logging staff working hours | Accident report forms: used to report any accidents and near misses | Food safety information: blast chill records, food related incidents and cleaning rotas | Equipment fault reports: What was the issue and how was it dealt with. | Stock usage reports: order books, stock control sheets, invoice, delivery notes |
| Front of House | Bookings/ reservations: Electronic booking system, electronic reservations system, diary with bookings and reservations Feedback forms | Personnel records: Hours worked, personal details, Wages, Taxation, National insurance, Training, Accidents, Staff rotas and timetables | Financial records: Incomings and outgoings for Income tax, VAT, Wages, Insurance, Profit & loss, Staff costs, Heating, lighting | Health and safety: Fire certificate, Staff training records, Accident book, Food hygiene checks, Cleaning checks, First aid records | Purchasing: Food and drink orders Packaging orders, equipment Tables, chairs etc, Consumables and disposables, Cutlery and crockery, Staff uniforms | Stock control: Monitor stock levels for re ordering, Decide frequency of stock check, First in First out for items with a shelf life |

Documents should be:
Legible (readable)
At correct interval (daily, hourly), completed accurately.
Signed and dated.
**Remember**
Some information is confidential or sensitive i.e. staff personal information. There is a legal requirement under the data protection act to store this type of information securely

Kitchen Workflow
Workflow in the kitchen shoula follow a logical process by using different areas so that the clean stages in food production never come into contact with the "dirty" stages

1. Delivery
2. Storage
3. Food preparation
4. Cooking
5. Holding
6. Food service area
7. Wash up
8. Waste disposal


Sous Vide


Blender


Oven

## LO2 Understand how hospitality and catering provisions operate


Hot plate


Bain Marie


Fryers


Blast Chiller

Customer needs

| Local Residents | Business Customers | Leisure Customers |
|---|---|---|
| • Value for money<br>• Good standard of customer service so they return<br>• Catering for local needs (culture, religion)<br>• Consistent dishes served<br>• Loyalty schemes<br>• Recognised by staff- feel welcome<br>• Menu specials<br>• Theme nights<br>• OAP discount day<br>• Child friendly<br>• Entertainment<br>• Mailing list or email for special offers | • Dedicated corporate (business) contact at establishment<br>• Discounted rates<br>• Meeting rooms<br>• Water, juice on tables<br>• Presentation equipment, projector, tv,<br>• Office facilities- printer, phone, fax, internet,stationery<br>• Tea and coffee for breaks<br>• Lunch or other meals- buffet or restaurant<br>• Accommodation if attendees are from a long distance<br>• Quick service for lunch meetings | • Value for money<br>• Good facilities<br>• Families want child menus, play area, child friendly<br>• Tourists want local food, easy to communicate<br>• Older people may want more formal service<br>• Good customer service<br>• Varied choice of menu<br>• Dietary needs eg allergies, intolerances, vegetarian catered for without having to ask for special foods<br>• Facilities for physically impaired customers |

Customer Rights

1. The right to be protected (against hazardous goods)
2. The right to be informed (about quality, quantity, allergies etc)
3. The right to have their complaints be heard
4. The right to seek redressal (compensation.)
5. the right to receive satisfactory goods that match their product description


POS Till Point


Grill


Perculator

DRESS CODE:
White shirt
Formal trousers
Formal shoes
Apron
Tie

DRESS CODE:
Chef's jacket
Chef's pants
Hat
Neckerchief
Apron
Hand towel
Slip-resistant shoes

*Key questions to check your learning for Learning Objective 2:*

1. *What documentations are used in an establishment by law?*
2. *What is the workflow of a kitchen?*
3. *What are the different types of customers you may come across in an establishment and what do they require?*
4. *What are customer rights?*
5. *What is a correct dress code to have when working in a kitchen?*

# *Commodities* - **Fruit and Vegetables**

## Vegetables
Vegetables are classified according to which part of the plant they come from. Examples include fruit vegetables which are aubergines, tomato and cucumber or seed and pods which are peas and beans.

## Fruit
Fruits contain a variety of vitamins and minerals, they are also a good source of fibre. Fruits are classified into groups. Examples are soft fruits such as raspberries and blackberries. Citrus fruits such as orange and lemon and tree fruits such as apples and pears.

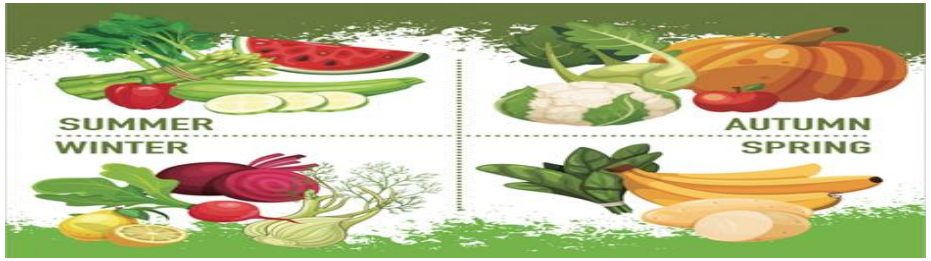
## Potatoes
Although potatoes are vegetables, a potato is actually a tuber. Tubers grow from the roots. In the Eatwell guide, potatoes are included in the starchy food section.

## Farming Fruit and Vegetables

**Intensive farming**
Increase food production.
Pesticides, fertilisers are used to grow **high-yield** crops.

**Organic farming**
Natural food production with no chemical or synthetic treatments – **low yield.**
Natural compost and manure used as fertilisers.
GM-free
No evidence that organic food is more nutritious – it is a lifestyle choice.

## Seasonal Fruit and Vegetables
Cheap
Good for the local economy reduces air miles and carbon footprint
Most nutritious




## Nutritional Value
Carbohydrates- starch/sugar
Vitamin A (retinol for your retina_ in orange/yellow
Vitamin C – most - citrus fruit
Iron – green leafy vegetables
Dietary Fibre – found in the skins

## Cooking Fruit and Vegetables

**Colour:** brightens but goes dull if overcooked

**Flavour:** flavour intensifies and sweetens as starch converts to sugar

**Texture:** softens due to starch degradation

**Nutrition:** water and fat soluble vitamins lost depending on method used so if you boil vegetables the vitamins B and C dissolve, if you fry then the vitamins A and D dissolve.

**Avoiding Vitamin loss**
Prepare close to time
Do not soak
Use as little water as possible
Cook quickly/short time
Use cooking liquid

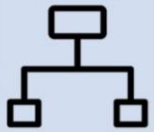
## Preserving
Freeze, dried, bottled, canned, MAP (modified atmosphere packaging)

Your Knowledge Organiser is a vital document. It contains all the key things from your lessons that you will need to work on committing to your long-term memory.

Here are some useful methods to use that will help commit the information to your long-term memory

The Trafalgar School AT DOWNTON

# How to use a knowledge organiser – step by step guide

| | Look, Cover, Write, Check | Definitions to Key Words | Flash Cards | Self Quizzing | Mind Maps | Paired Retrieval |
|---|---|---|---|---|---|---|
| **Step 1** | Look at and study a specific area of your knowledge organiser  | Write down the key words and definitions  | Use your knowledge organiser to condense and write down the facts and or information on flash cards  | Use your knowledge organiser to create a mini quiz.  | Create a mind map with all the information you can remember from your knowledge organiser.  | Ask a partner or family member to have the knowledge organiser in their hands, read out what you remember.  |
| **Step 2** | Cover or flip the knowledge organiser over and write down everything you remember.  | Try not to use your knowledge organiser to help you  | Add pictures to help support. Then quiz yourself using the flash cards. You can write questions on one side and answers on the other.  | Answer the questions and remember to use full sentences  | Check your knowledge organiser to see if there were any mistakes with the information you have made.  | They can test you by asking you questions on different sections of your knowledge organiser.  |
| **Step 3** | Check what you have written down. Correct any mistakes in green pen and add anything you missed. Repeat.  | Use a different coloured pen to check and correct your work.  | Use a parent/carer or friend to help quiz you on the knowledge.  | You can also use family to quiz you. Keep self-quizzing until you get all questions correct.  | Try to make connections that link information together.  | Write down your answers.  |