

The Trafalgar School at Downton

Knowledge Organiser

Year 10: Terms 5 and 6



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Name.....House.....

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alliteration:

You'll never put a better bit of butter on your knife



anecdote:

Talking to his children about the dangers of running in the house, a dad might include an anecdote about falling in his home as a boy and breaking his arm.



That's one small step for man, but a giant leap for mankind.

'Let us never negotiate out of fear, but let us never fear to negotiate.'

antithesis:

Think about the poor, defenceless animals that suffer due to our rubbish!

chiasmus:



'Group chat can often be a source of upset,' warned psychologist Dr Linda Pappadopolis.

emotive language:

The Road Not Taken, by Robert Frost, is one of the most famous examples of extended metaphor; in the poem, he compares life's journey to a forest path.

experts:

extended metaphor:

The witches in Macbeth are used to foreshadow that Macbeth is not innocent: 'Fair is foul and foul is fair' a line he echoes in his first appearance when he says 'so foul and fair a day I have not seen'.



foreshadowing:

Chill out! Do as I say! Don't eat the daisies! Please be quiet! Be quiet!

imperative verbs:

metaphor:



'The sun in the west was a drop of burning gold that slid near and nearer the sill of the world.'

modal verb:

You must be home by midnight. You could be tired if you're any later. E.g. mustn't, can, might, shouldn't, may, will etc.

pathetic fallacy:

In *Macbeth*, the night the King is murdered 'has been unruly ... in th' air, strange screams of death ... Some say the Earth was feverous and did shake.'



sensory description:



Wind swirled around the beach house, whistling loudly. He felt the snowflakes melting on his skin, their liquid trickling down his neck, cold, wet, seeping into his clothes.

simile:

Without warning, Lionel gave one of his tight little sneezes: it sounded like a bullet fired through a silencer.

statistics:

You only have a 20% chance of surviving a 60mph crash if you don't wear a seatbelt!

superlative:

This is the worst day of my life but at least we're in the finest café in London.

onomatopoeia:

The dog knocked over the vase with a crash!



personification:



Dancing on the water, the sun shone endlessly.

repetition:

'As my grandfather went, arm over arm, his heart making sour little shudders against his ribs, he kept listening for a sound, the sound of the tiger, the sound of anything but his own feet and lungs.'



'I' versus 'me'

Use 'I' when the people named are the subjects of the sentence:

Boris Johnson and I shook hands.

Use 'me' when the people named are the objects of a verb:

The press took pictures of Boris and me shaking hands.

Check: Will it still make sense if you remove the name/s?

~~Boris Johnson and I~~ shook hands. ✓
~~Boris Johnson and me~~ shook hands. ✗

The press took pictures of ~~Boris~~ and I shaking hands. ✗

The press took pictures of ~~Boris and me~~ shaking hands. ✓

People can't lick their elbows. **their** (shows ownership)



"Their" is like "our."

She is there already. **there** (a place)



"There" is like "here."

They're all crazy! **they're** (short for "they are")



"They're" = "they are"





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,

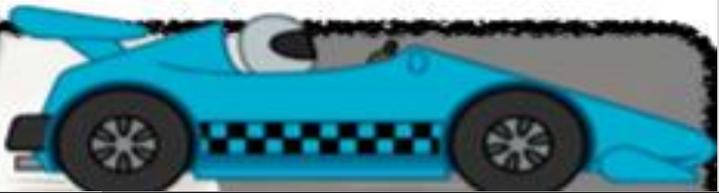
Meanwhile, Later that day, Seconds later, Subsequently, That afternoon,

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 ...

PUNCTUATION PIT STOP



Writing the text for a leaflet

Stay Safe and Sound Online

clear/apt/original title

subtitles

Manage your online reputation

Anything that you upload, email or message could stay online forever. Therefore, before you post anything online, consider whether or not you would want your parents, teacher or a future employer seeing it. If the answer is no, don't post it! Your privacy is key here.

effectively/fluently sequenced paragraphs

Privacy Matters

Make sure you set high privacy settings on social networks. Regularly you should change passwords and never share or put online any of your personal details like a phone number, address or your school details. Make sure your safety and privacy settings are activated on your mobile devices too, so you aren't sharing private information. Be aware that using public WiFi might not filter inappropriate content, so look for friendly WiFi symbols when you're out and about.

Writing Forms

bullet points

Remember:

- make sure you know how to block abusive comments and report worrying content;
- don't arrange to meet people in real life that you've only talked to online;

Text for a Speech

'Address to Nation on the Challenger' by Ronald Regan (28th January, 1986)

Ladies and Gentlemen, I'd planned to speak to you tonight to report on the state of the Union, but the events of earlier today have led me to change those plans. Today is a day for mourning and remembering. Nancy and I are pained to the core by the tragedy of the shuttle Challenger. We know we share this pain with all of the people of our country. This is truly a national loss.

a clear address to an audience

For the families of the seven, we cannot bear, as you do, the full impact of this tragedy. But we feel the loss, and we're thinking about you so very much. Your loved ones were daring and brave, and they had that special grace, that special spirit that says, 'Give me a challenge and I'll meet it with joy.' They had a hunger to explore the universe and discover its truths. They wished to serve, and they did. They served all of us.

rhetorical indicators that an audience is being addressed throughout

The crew of the space shuttle Challenger honoured us by the manner in which they lived their lives. We will never forget them, nor the last time we saw them, this morning, as they prepared for the journey and waved goodbye and 'slipped the surly bonds of earth' to 'touch the face of God.'

a clear sign off e.g. 'Thank you for listening'

Thank you.

Article

Andy Murray's Appliance of Science

clear/apt/original title

By Jim White

by-line

If the Caledonian superman wins Wimbledon this year, it will be thanks to pieces of sushi a day, a magic potion and a battalion of experts.

strapline

If you want to know what it is about Andy Murray that makes him stand out from the rest of us – apart from that fizzing backhand return and the huge-mouthed celebratory yodel – it is summed up in one word: science!

Sample Check

Today, before he even steps out on to the Centre Court for his Wimbledon semi-final, the 27-year-old, 2011 Wimbledon champion Murray will have been subject to several of these. He does a urine test every time he pops to the lavatory. The osmolarity check is conducted by one of his staff, its purpose to gauge the percentage of water and minerals in his urine, to show whether his body is correctly hydrated. The fact is, if Murray wins today, it will only be thanks to the bloke who inspects his wee.

Daily Diet

At 7.30 this morning, while many of the other players arriving at Wimbledon's press restaurant will have begun their day assaulting the glittering Himalaya of fried starch, Murray will have eaten yogurt, fruit and a bagel smeared in peanut butter ...

Writing in the Essay Form

Zoos Should be Banned

effective introduction

In America, approximately 175 million people visit a zoo each year. That's half of America's population. Clearly this suggests that zoos remain popular places for people to visit for entertainment and to learn about wild animals. However, although some people are of the opinion that zoos can provide a source of educational entertainment and a sanctuary for endangered animals, I believe that the cruelty that wild animals suffer outweighs this benefit, and that they should be shut down!

effectively/fluently linked paragraphs to sequence a range of ideas

On the surface, zoos are a huge tourist attraction because they allow families to spend a day out in the sun, looking at animals, and eating overpriced junk food. But what most people don't know is that zoos are far more sinister than selling small bottles of water for £5.00. Statistics show that in all zoos, fifteen percent of animals die every year due to living in captivity. Obviously then, zoos must be an unsuitable environment for wild animals and should, therefore, be abolished. How can zoos justify their existence by claiming animals in captivity provide people with the experience of observing wildlife they wouldn't otherwise experience, when it costs at a cost to their life?

a range of ideas (no room to reproduce the other two paragraphs here)

In conclusion, a zoos only purpose is to make as much money as possible by showing thousands of people per day to gawk at animals and spend far too much money on souvenirs and junk food. Zoos do not protect or help to repopulate animals, nor do they educate people on the specifics of these animals, and therefore should be abolished.

convincing conclusion

Writing a formal letter



writer's address

35 Hibiscus Crescent
Andover
Hants
SP10 3WE

reader's address

221B Bakers Street
London
NW1 6XE

date

20th February, 2020

Dear Sir or Madam

Formal Salutation: Sir/Madam/Mr Roderick/Mrs Roderick

I am writing because you chair a committee in charge of the compulsory wearing of school uniforms. I am a student at Brinsley High School, a friendly and successful school where uniforms are not worn.

Of course, ... that students won't spend all morning choosing what to wear or beg parents for clothes that will impress. There is another side to this case: uniforms breed uniformity. We are a culturally diverse nation and we all dress the same, this encourages us to be the same. At Brinsley High, we are encouraged to express our individuality, yet this seems to be in contradiction of the message enforced uniform sends to us.

fluently sequenced paragraphs

fluently sequenced paragraphs

Furthermore, ...

Yours faithfully
Boris Johnson

formal sign off: Yours faithfully (Sir/Madam = Faithfully) (Mr/Mrs = Sincerely)

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.

Description of Place

spatial discourse markers

adjectives

Green limbs tangled above the decaying shells of long-abandoned vehicles, forming a canopy that barely permitted the harsh rays of the sun to burn through. The stealthy fingers of squat oak trees reached out tenaciously towards them. The vehicles themselves were coated in a thick layer of rust and a patina of blue copper - and were battered and bruised through years of exposure to the elements.

Metaphor, simile, personification

Like a queue of taxi cabs, the vehicles waited patiently in the forgotten depths of the forest. Specks of light from the midday sun, which had successfully fought their way through the overhead canopy, lit up their broken bodies. Their trunks gaped open woefully and their shattered eye sockets stared blindly forward.

sensory description

sensory description

The aroma of rust and decay occupied the clearing: it was choking, corrosive. No fresh breeze could infiltrate the thick shrubbery to provide relief. The cars lay there, suffocating on their own putrid stench. It was overpowering. Meanwhile, the squawks of blackbirds echoed like sirens around the clearing. The chilling sound was relentless. It echoed through the car's hollow bodies, feeding its way through the cracks in windows and doors, striking the upholstery of the rotting seat as it passed.

spatial discourse markers

sensory description

Spread over the floor of the clearing, a thick blanket of autumn leaves hid the earth beneath. They had turned a shade of burnt red and had bleached edges that resembled torn parchment. They were brittle and cracked from heat in the clearing. Amongst them, all manner of insects scuttled- manoeuvring themselves between moments of shade, before the unforgiving rays of sun could scorch their exposed bodies.

adjectives

Journey Description

Sitting in my seat - aisle, two rows from the front - I look out. Illuminating a town engulfed in darkness, lights flash past me: shop lights, street lights, car lights, and as the clouds part just enough for the moon to penetrate through the smog, moonlight!

Inside it's silent. No one speaks. The bus windows shut, lulled by the rocking motion, side-to-side, back-and-forth, up-and-down, my eyes feel heavy. Outside, I'm mesmerised by the noise I can only see, only imagine: mouths asking, replying, laughing, traffic screeching, angry drivers honking, shop doors opening and closing.

Once more the bus door opens and, as if I've lifted my head out from underwater, I can hear the street bustle, smell the takeaways, taste the diesel fumes.

Climax (problem at its worst)

- Use exciting/dynamic verbs;
 - Quicken pace;
- Show characters feelings through action;
- Attempts to solve problem fail/intensify problem.
- Vary sentence length: short for action, longer for description.

Fail to Plan
Plan to Fail!

Rising Action (build up/conflict)

- Build on character, setting and plot;
- Introduce a problem/conflict/dilemma;
- Build tension/excitement using interesting adjectives, metaphors, similes etc.

Falling Action (fix problem)

- Character/s solving conflict/dilemma/ problem.

Resolution/Dénouement (ending)

- Link back to the start.
- What has the character learned?
- Is there an exciting twist?
- Is there a cliff-hanger ending?

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

Exposition (introduction)

- Use a story hook to grab attention e.g. atmosphere, sudden event etc.;
- Use descriptive vocabulary to set the scene and describe the main character;

Intro: My address right hand side, + date, school address left,
Dear Mr Curtis
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.

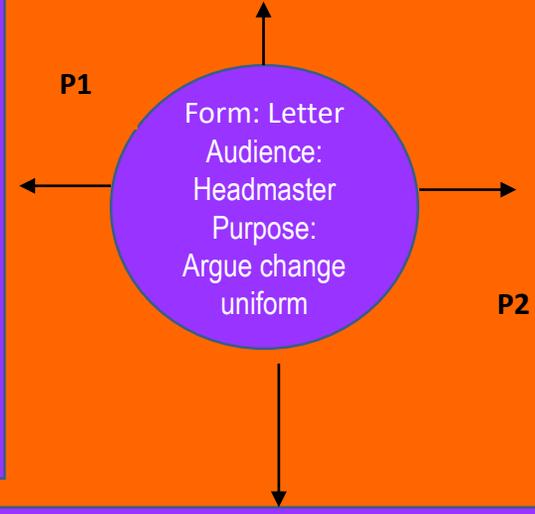
Conclusion:
To conclude,
repeat RQ,
Yes.

Yours
Sincerely

Counter: old-fashioned tradition, so easier to continue
Argument: other traditions - burnt witches, slept on straw, walked barefoot – now discontinued so ...
Reasons to: anecdote, use experts

Counter: cost cheaper as not designer or from shops making huge profit
Argument: 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,
Reasons to: emotive language: force poorer families to go without, statistics

Counter: all look same so no prejudice/bullying over clothes,
Argument: no individualism, learning who we are
Reasons to: 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?



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

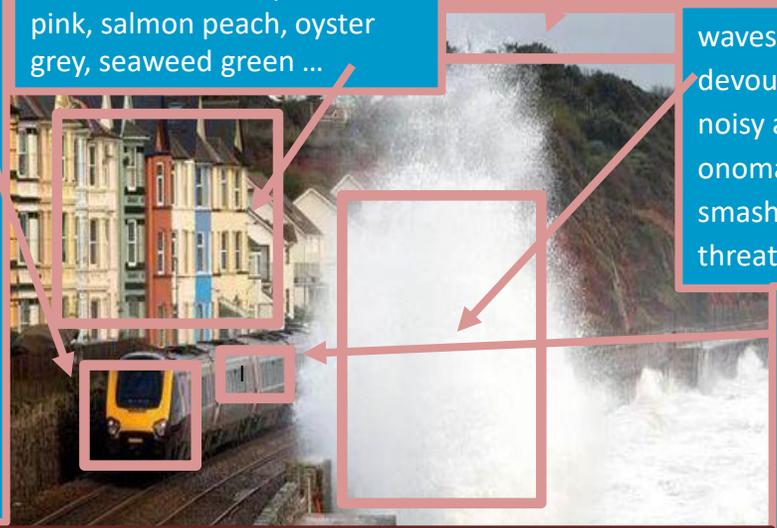
Personify train - a victim moving along railway line, past houses, towards destination - metaphor: caterpillar train sways and pitches precariously along the track to its daily destination. Snatching bites, the sea salt nips at its metal skin as it passes, gnawing at it, killing it. Rattles. Will it survive?

houses, like soldiers standing to attention - defending their inhabitants. Diff pastel colours of a seaside town: prawn pink, salmon peach, oyster grey, seaweed green ...

canopy of sky above threatening Adjectives for mood: grey sky, stuffed clouds full of cold, sharp rain, Verb: beating down, attacking!

waves engulfing and devouring the sea side town - noisy and disruptive, onomatopoeia: Crash! whip, smash personify so violent/threatening movement.

zoom in - one carriage window. Windows hit by spray that's 'like a tame cat turned savage'. Passenger pitched side-to-side: bubbling sickness, rising bile from stomach!

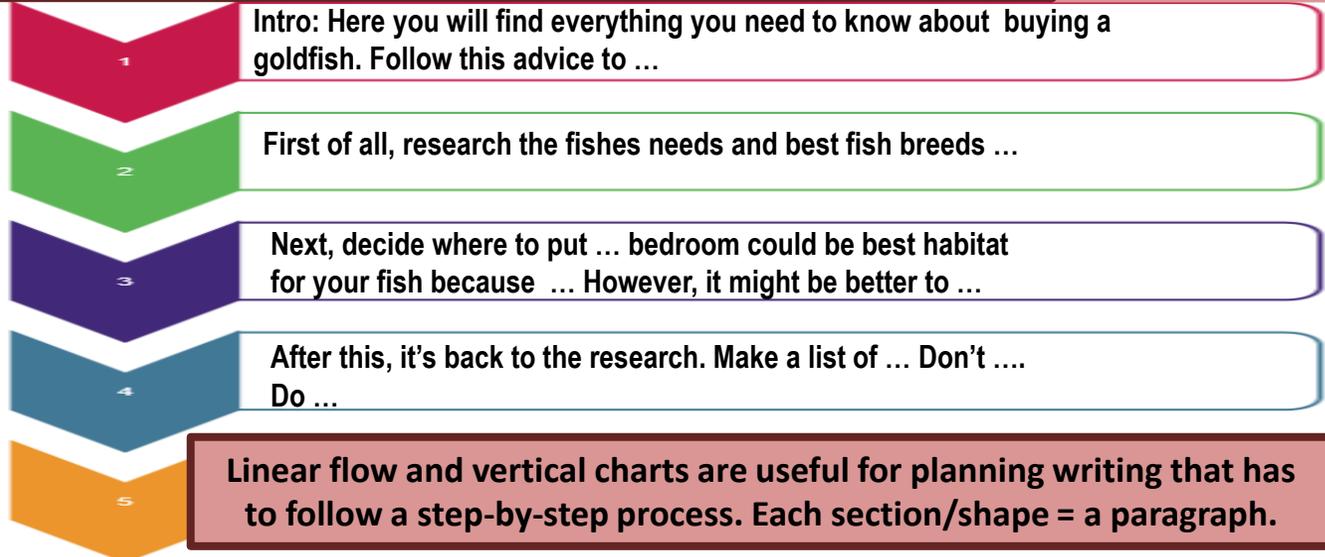


The Grid Plan is good for making sure you include lots of different methods, or to compare two/more things side-by-side. Each row/column = a paragraph.

Paragraph content/ topic	Language method/vocab	Sent structures	Punc
1: waves engulfing and devouring the sea side town - noisy and disruptive, movement	onomatopoeia crash, whip, smash personify so violent/threatening	'ing' start verbs (pres part)	! ;
2: train victim moving across railway line past houses towards destination	personify - victim, alliteration, metaphor: A caterpillar, the train sways and pitches precariously along the track to its daily destination. Snatching bites, the sea salt nips at its metal skin as it passes, eating away at it, killing it. Rattles. Will it survive?	Chain/ tricolon Question	? --
3: zoom in on one carriage window, motion sick	Windows hit by spray that 'like a tamed ca' has 'turned savage' today. Passenger pitched side-to-side; bubbling sickness rising bile from stomach!	Anadiplosis (yoked)	' ' ; !
4: houses	Like soldiers standing to attention they are defending their inhabitants. Diff pastel colours of a seaside town: prawn pink, salmon peach, oyster grey, seaweed green, cracking paintwork	Fronted spatial adverbials	() :
5: canopy of sky above threatening	Adjectives for mood: grey sky, stuffed clouds full of cold, sharp rain, Verb: beating down, attacking,	Two then three word sentences	... ;

**Fail to Plan
Plan to Fail!**

Plan describing pictures by boxing/framing parts of the image to help you to focus description on specific areas, zooming in on minute detail, and out again to another area. Each boxed area = a paragraph.



Writing Purposes

Key Language/Structural methods

Chocolate Model!



Inform: tell the reader what they want/need to know.

- Use interesting facts details;
- use brackets to explain technical terms.

Interestingly, chocolate is actually made from the seeds of a cacao tree. After fermentation, the beans are dried, cleaned, and roasted. The shell is then removed to produce cacao nibs (**unadulterated chocolate in rough form**).

Explain: tell the reader how and why.

- Use connectives: 'as a result', 'because', 'so that', when;
- use sequence discourse markers: Eventually, Another, Furthermore.

Often, when in need of comfort or reassurance, or in stressful situations, people crave chocolate. Primarily, this is **because** dopamine is released into your brain **when** you eat chocolate, and **as a result** it can lower levels of anxiety ...

Describe: help the reader to picture it and imagine the experience.

- Use similes, metaphors, personification, interesting adjectives/verbs, sensory description.

Enticingly, the dome of dark chocolate, flecked sporadically with lime slivers, remained encased in its **fluted carapace**. **Around** the outside of it **cleaved** the **diminutive remains** of its **neighbour**: a **praline** long ago eaten! **Velvety smooth**, this **solitary bead of ganache glistened, revelling** in its **escape, yet mourning its rejection**.

Narrate: tell the reader a tale that will have them hanging on your every word.

- Use the mountain/pyramid structure;
- use some description;
- use a few lines of direct speech.



Suddenly, she was aware she had arrived at her destination! On the door in front of her, a **scarlet square of shiny plastic printed** with the words 'Chocolate Laboratory' stood out on its **splintering wood**. **Why she was standing on this doorstep, though, and what, or who, had led her here in the first place?**

Persuade: try to get the reader to do as you ask/agree with you.

- Use APE FOR REST: anecdote, personal pronouns, emotive language, fact, opinion, rhetorical questions, repetition, experts, statistics, triples.

One of the world's greatest comfort foods, Chocolate, is the **unrivalled 'go-to'** when **life takes a bad turn**, an **easy gift to thrill** just about **everyone**, and a **tasty treat** that will **uplift even the most melancholy of moods**.

Argue: present two sides, but ensure your side appears strongest so reader agrees with you.

- Use sequence discourse markers;
- use 'Some believe ..', 'However, most people would agree that';
- use APE FOR REST (above).

First of all, some believe that **as chocolate** is high in calories, it is bad for you. **However, scientific experts have proven** that chocolate, as it contains high levels of antioxidants, could **lower cholesterol levels, improve mood and prevent memory decline!**

Advise: help warn and guide reader, but reassure with carefully considered advice.

- Use imperative verbs (stop, do, don't, wait etc.), and modal verbs (if, could, might, should).
- use second person (you, your).

Most importantly, if you are feeling bored and craving chocolate, **don't** give in to your yearning. Instead, **you could go** for a walk, **run** errands, **call** a friend or **read** a book. **If you** can take your mind off food for a short time, the craving **may** pass.

Most Often

Mis spelled
words

accidentally	leisure
accommodate	maintenance
allude/allusion	mischievous
believe	necessary
business	occurrence
caesura	pastime
calendar	privilege
disappoint	recommend
experience	referred
foreign	restaurant
generally	rhythm
hierarchy	separate
ignorance	tyranny
illusion	vacuum
independent	vicious

Language Methods

Alliteration: a number of words having the same first letter or sound placed close together.

Allusion: reference to a person, place thing, or idea of historical, cultural or literary significance.

Assonance: the repetition of vowel sounds.

Consonance: the repetition of consonant sounds.

Colloquial language: informal, creating a conversational tone.

Imagery: vivid and descriptive language that engages the human senses, making us imagine a sight, sound, touch, smell or taste.

Irony: language that says one thing, but implies the opposite e.g. sarcasm.

Lexical choice: the decision a writer has made about which particular word/s to use.

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.

Pathetic fallacy: the environment is described to reflect the inner experience/emotion of a narrator or character.

Personification: figure of speech in which a non human thing/idea/animal is given human attributes

Plosive:(harsh sounding) consonant which, when said in certain words, momentarily blocks the vocal tract, so released as burst of air e.g. 'c' in 'cat', but not in 'nice'.

Semantic field: group of words all related to one another through their similar meanings, theme, concept or subject.

Sibilance: words close together that contain sibilants (consonants which, as said in certain words, tongue is brought near roof of mouth so air pushed past making a hissing sound: s, z, sh, th, c).

Simile: a comparison between two unlike things which are similar in one aspect, introduced by 'like' or 'as'.

Tone: (mood) the writer's attitude to the subject they're describing.

Structural Methods

Anaphora: repeating a word/sequence of words at the beginning of neighbouring clauses.

Caesura: a rhythmical pause in a poetic line or sentence, usually signalled with punctuation, either medial (middle of line), initial (start of line), or terminal (end of line).

Cyclical structure: (circular) coming full circle by repeating something from beginning, at end.

Contrast: opposite feelings, concepts etc.

End stopped: a line of poetry ending in a piece of punctuation which results in a pause.

Enjambment: a sentence/phrase that runs on from the end of one line, into the next line/stanza without punctuation (pause).

Epistrophe: repeating a word/sequence of words at the end of neighbouring clauses.

Foreshadow: a hint of what is to come.

In medias res: begin in the middle of something.

Juxtaposition: contrasting things placed next to each other.

Quatrain: four line stanza.

Sestet: six line stanza.

Stanza: (verse) a group of lines in a poem.

Volta: turning point in the line of thought/argument in a poem.

Form

Blank verse: poem in iambic pentameter, but no rhyme.

Dramatic monologue: poem written in the form of a speech of a single individual character, in a specific situation, at a critical moment.

Free verse: non-rhyming, non-rhythmical poetry which follows the rhythms of natural speech.

Speaker: the narrator, voice, or person in the poem.

Sonnet: poem of 14 lines, typically five-foot iambics rhyming according to a prescribed scheme. The Petrarchan sonnet treats its theme in two parts: first eight lines state problem/question/emotional tension (*abbaabba*), last six lines (*cdecde* or *cdccdc* or *cdedce*) resolve it; English sonnet: three quatrains, each having an independent rhyme scheme (*abab cdcd, efef, gg*), and ended with a rhymed couplet.

Rhyming couplet: a pair of rhyming lines next to each other.

Meter: pattern of beats (stressed/unstressed syllables) in a poem used to create a poem's rhythm.

Discourse Markers to Compare

When poems have similarities:

Similarly, ... Both poems convey/address ... Both poets explore/present ... This idea is also explored in ... In a similar way, ... Likewise, ...

When poems have differences:

Although ... However, ... whereas ... Whilst ... In contrast, ... Conversely, ... On the other hand, ... Unlike...

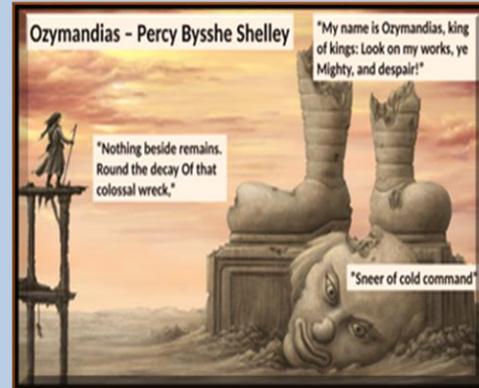
Discourse Markers to Analyse

In ... presents, In other words ... This suggests ..., This implies ..., Here ... is suggesting /implying ... It is almost as if ..., Or perhaps ... Possibly ... chose to ... because ...

'Ozymandias' by Percy Bysshe Shelley (1817)

Tone: ironic (mocking)

Summary: Narrator meets a traveller who tells him about a decayed statue he saw in a desert. Statue is of long forgotten ancient King, the arrogant **Ozymandias**. Poem is ironic and one big metaphor: Ozymandias had inscribed on his huge statue that other 'Mighty' kings would never outdo him in his work, but now lays crumbled in empty desert - so even most powerful humans can't defeat nature's power - human power is only temporary.



Context: Shelley Romantic poet (emphasis on **power** and beauty of nature). Personal contempt of monarchy/oppressive rulers. Ozymandias, Egyptian Pharaoh (aka King Ramesses II, 13BC) tyrant, thought himself indestructible, filled Egypt's Valley of Kings with monuments to himself and had one huge statue inscribed '**...king of kings: Look ...**', boasting empire he'd built would last forever. Shelley inspired by 1817 discovery and excavation of statue's remains.

Language: Alliterating with plosives - '**cold command**' = emphasises power, cruelty; '**Look on my works, ye Mighty, and despair!**': imperative and exclamation highlights commanding tone of boast; ironic he tells 'Mighty' kings to admire size of his statue and 'despair', when now it's a '**shattered**', '**trunkless**', '**decay**' - so all powerful should despair as influence and supremacy only temporary; alliteration in '**lone and levels sands stretch far away**' (sand icon of time) emphasises huge, immortal desert outlasts statue - so insignificance of human power.

Form/structure: Written in sonnet form (14 lines, iambic pentameter) - mostly used for love poetry (arrogance/ self love) but uses an irregular rhyme scheme - perhaps reflecting how, like statue, human structures (art, literature, architecture) can be destroyed, decay.

'London' by William Blake (1794)

Tone: angry, disapproving

Summary: Speaker describes walk around London offering glimpse of terrible conditions faced by inhabitants: child labour, prostitution, restrictive property laws. He's maddened by sights and sounds of poverty, misery, despair everywhere - not even hope for new-born infants. He criticises how every aspect of life in London owned/controlled, even river, implying powerful wealthy (landowners, Church, Government, monarchy) to blame for the poverty/inequality.



Context: Blake lived and worked in capital so writing from his experience of effect conditions having on people. Industrial Revolution taken its toll on citizens who now felt tired, sad and disconnected, lived in degrading conditions in London, but more than anything, poem is fierce critique of man's failure to build a society based on love, joy, freedom, communion with God.

Language: Metaphor '**mind-forged manacles**' - people trapped in poverty but 'forged' = formed/constructed, suggesting they're powerlessness a belief constructed by those in power to control them, now trapped by own perception of their limits in life; 'forged' = also means forgery, so perhaps wants London poor to see fake so could challenge and be free. Repetition '**In every..**' to emphasise amount affected and '**each chartered street/ ...chartered Thames**' to emphasise everything owned by rich, criticising the powerful; emotive language '**infant's cry of fear**'. '**Every black'ning church appals**' - church inactive, unwilling to help/corrupted.

Form and Structure: Blake divides poem into four quatrains (four line stanzas) employing a regular rhyme scheme of ABAB for each. When read makes poem sound rhythmic, and visually look regulated and controlled - might be Blake trying to reproduce sense of narrator's steady walk through London (*abab* = left, right, left, right), OR enhance feeling of restriction and control the working class of London are under: links to idea of control expressed in poem.

'Stealing the Boat' by William Wordsworth

Tone: confident -> fearful-> reflective

Summary: Written as a flashback to time Wordsworth, as young boy, found boat tied up **'One summer evening'**, stole it, rowed across lake, at first calm, confident, admires beauty. Suddenly huge mountain looms into view; size and seeming power scares him (theft guilt?), so rows quickly back to shore. Haunted by event, he reflects on how it's changed him: now aware of power nature has with its **'huge and mighty forms, that do not live like living men'**. Nature not just pretty/idyllic images, we should respect its remarkable power.



Context: Written 1799 when 29, published 1850 shortly after his death as part of 'The Prelude', a very long poem (14 books) that told story of his life. He loved nature, and was a romantic poet, so his poetry typically explores themes of nature, human emotion, and way human identity and character shaped by experience.

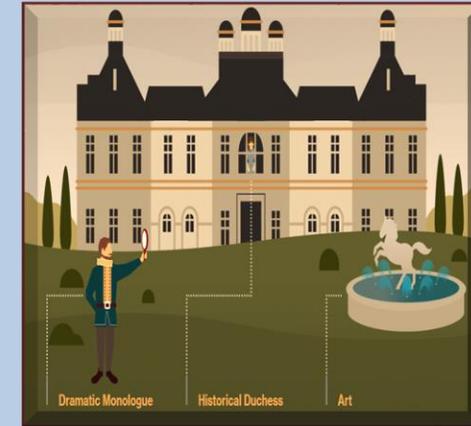
Language: Nature personified **'...(led by her)'** to show his love for it; semantic field/lexical' choices suggesting magical beauty: **'glittering', 'sparkling', 'elfin pinnacle'** = elfin/fairy boat: (metaphor) so used to juxtapose with **'huge peak, black and huge'** - repetition 'huge' emphasises size, nature's physical power, threat, all in contrast with manmade small boat; **'Upreared its head'** - personifying mountain as powerful beast with a **'measured motion like a living thing'** unrushed, purposeful, complete control, all direct contrast with speaker.

Form and Structure: Wordsworth writes extract in one stanza with three distinct sections: CONFIDENT - in first, tone light, carefree - **'I dipped my oars into the silent lake'**; FEAR - he uses a volta line 21/22 to introduce change as mountain appears, tone becomes more fearful - **'with trembling oars'**; final section REFLECTION, Line 33 onwards, tone pensive as speaker dwells on how experience has changed him - **'o'er my thoughts there hung a darkness'**.

'My Last Duchess' by Robert Browning (1842)

Tone: sinister, bitter, angry

Summary: The Duke (speaker) is showing a marriage broker (on behalf of a count) around his art collection, proudly revealing (curtained) a portrait (painted by fictional famous artist) of last wife, now dead. He reveals he was annoyed by her over-friendly, flirtatious behaviour, and put a stop to it (murder?). Taking the broker downstairs, he shows off bronze statue **'Neptune, ...Taming a sea-horse'** he'd commissioned by another (fictional) famous artist.



Context: Browning best known for dramatic monologue form, many expressing his criticisms of social norms. Possibly inspired by story of Italian Duke of Ferrara: wife died suspiciously (rumour poisoned). Neptune is Roman God of sea, controlled water.

Language: Rhetorical questions to imply the Duke is completely in control/controlling the envoy; **'I gave commands; Then all smiles stopped together'** = euphemism for his wife's murder + words with plosives help reader hear Duke's power and cruelty + 'commands' sounds military, not familial or kind + sibilants/alliterating with an 's' perhaps to help reader hear his mocking, nasty, threatening tone – like hissing snake or vicious cat. **'Notice Neptune ... Taming a sea-horse'** sculpture, symbolic/image of domination/control.

Form and Structure: Dramatic monologue ideal form to show Duke egocentric, arrogant, domineering – as complete focus on speaker! Cyclical structure brings poem full circle as at start reference to famous (imaginary) artist/artwork (showing off wealth and power), and does same at end, foreshadowing destiny of next wife OR he will never change his ways.

'Charge of the Light Brigade' by Alfred, Lord Tennyson (1854)

Tone: energetic, tragic, haunting

Summary: Tells story of when, obeying a miscommunicated command, a British light cavalry of 600+ soldiers on horseback bravely charged into long valley surrounded by enemy firing cannons from three sides (for half a league: one and a half miles).



Context: Published six weeks after the disastrous battle of Balaclava, Crimean War. Light cavalry are armed with lances and sabres, mounted, intended for reconnaissance and skirmishing only; mistakenly sent into valley, on a frontal assault, against heavy artillery! Of 670 - 673 British who started charge, two thirds killed, injured or captured. As Poet Laureate, ALT responsibility to inspire nation, portray war in positive light (propaganda). Although glorifies soldiers as heroes for willingness to sacrifice themselves without questioning orders, he also highlights fact (a commander) '**Someone had blunder'd**' - a controversial point to make in Victorian times when blind devotion to power expected.

Language: Uses biblical allusion '**Valley of Death**' ('though I walk through the valley of the shadow of death, I will fear no evil' - Psalm 23) suggests inevitability of outcome - they were doomed but patriotically/dutifully did as ordered, and portrays war as a supremely powerful, or even spiritual, experience. Personifies war '**jaws of Death**' and '**mouth of Hell**' - as an evil animal/monster that consumes its victims.

Form and Structure: Chronological order six stanzas (possibly one stanza to represent each hundred of the soldiers). Repetition of '**the six hundred**' at the end of stanzas 1-3 to remind us of number of soldiers, and greater impact and emphasis when phrase changes: 'not' in stanza 4 and 'left of' in stanza 5 focuses us on lives lost; addition of 'Noble' in last line leaves focus on the men and their bravery: emphasises huge loss.

'Exposure' by Wilfred Owen (1917)

Tone: tragic, haunting, trance-like

Summary: Speaker describes war as a battle against the weather and conditions that are as lethal as the enemy. He uses imagery reflecting the delusional mind of a man dying from hypothermia. Owen wanted to draw attention to the suffering, monotony and futility of war.



Context: Owen wrote poem from first-hand experience of extremely cold winter of 1917 in the trenches of WW1, after he and fellow soldiers had been forced to lie outside in freezing conditions for two days. There are signs the men suffering from Hypothermia: sluggish thinking, confusion, and amnesia. Image Owen painted of the horrors of war and life on the front line would have contradicted previous scenes of war glory portrayed in British press.

Language: Weather presented as enemy in '**merciless iced east winds that knife us**' - uses lots of words in line containing sibilants such as 'c', and 's', combined with plosives 'd' and 't' to create a bitter, cutting edge to the elements which '**knife**' the men, leaving us in no doubt about level of pain weather has power to inflict; personifies weather - the flakes '**with lingering stealth come feeling for our faces**', the miserable '**Dawn massing**' with '**her**' army, the gusts of wind that are '**mad**', and '**tugging on the wire**', but '**nonchalant**', suggesting, like the enemy, indifferent to the soldiers' suffering, and makes the pain and discomfort it inflicts appear intentional. Metaphor '**Our brains ache**' = mental (PTSD/shell shock/hypothermia) suffering.

Form and Structure: Owen creates sense of stasis by using a cyclical structure as ends first and last stanza with same line: '**But nothing happens**' - perhaps to reflect powerlessness to escape harsh weather OR frustrating monotony of trench life: unable to gain ground against Germans.

'Bayonet Charge' by Ted Hughes (published 1957)

Tone: bewildered, desperate, trance-like

Summary: Describes terrifying experience of 'going over the top' as soldier runs towards enemy with fixed bayonet. He becomes disorientated, pauses for a split-second, notices a hare thrashing about, dying, resumes charge. Shows how this type of warfare transforms soldier from a living, thinking person into dangerous weapon of war or machine.



Context: Set in WW1 (father served and survived the battle of Gallipoli - a doomed mission - so would have described details of trench warfare to him). Bayonet charges common part of warfare in WW1 and resulted in heavy casualties.

Language: Hughes personifies bullets, patriotism, 'rifle' - 'numb as a smashed arm', dynamite etc. linking them to body parts, humanising the weaponry, dehumanising soldier, possibly to suggest blurring of line between weapon and man in a warfare strategy such as a charge, and emphasising how, in it, soldiers are used as the weapons - not treated as human beings. 'The patriotic tear that brimmed in his eye/ Sweating like molten iron' = his sense of duty (tear) now turned into hot sweat of fear + pain. Simile comparing heat of sweat to 'molten iron' - extreme heat - suggests heroic ideals he had now replaced by extremely painful reality. Uses simile 'his foot hung like statuary in midstride' implying immobilised with fear/bewilderment.

Form and Structure: Starts in medias res, perhaps to convey shock soldier feels, sense he really has just 'Suddenly ... awoke' to reality of what he's doing OR convey the pace of charge and speed of soldier's thoughts + actions over short time it will take to reach end/enemy!

"Storm on the Island" by Seamus Heaney (1966)

Tone: dark, violent, fearful

Summary: Narrator describes how a rural island community is well-prepared for a coming storm but when it hits, they are shocked by its power: its violent sights and sounds are described using the metaphor of war. Final line of poem reveals their fear of nature's power.



Context: First eight letters of the poem's title spell 'Stormont' - name of Northern Ireland's parliament buildings, so perhaps poem metaphor for political storm that was building in the country at the time poem published (1968-98, a period of deep unrest and violence between those who wanted to remain part of UK and those who wanted to become part of Ireland).

Language: Lexical choices/semantic field of words associated with war to show mother nature's dangerous and unsentimental side - 'wind dives and strafes invisibly' (wind a fighter plane) and 'Exploding' we associate with bombs, minefields, and grenades - to suggest mother nature capable of being war-like, not gentle, sentimental or comforting. Simile 'spits like a tame cat turned savage' compares nature to an animal that has turned on its owner; lexical choices/semantic field associated with violence to show mother nature's ugly, aggressive side and her omnipotence: 'pummel' means to beat, strike, thump or bash - and what is more violent or aggressive than a beating? It shows wind's power and dominance over man and so its danger!

Form and Structure: Poem in one stanza, perhaps to represent the island itself, on its own, in the middle of the sea (space around it), with nothing to protect it, vulnerable to all that nature wishes to expose it to. Poem in the **present tense**, creating and involving the reader in the sense of drama - as if the storm is happening at the time we're reading the poem - and also reinforcing the idea that the storm is continuous and unstoppable.

'Poppies' by Jane Weir (published 2005)

Tone: tender, tragic, trance-like

Summary: Poem describes loss parent feels when son leaves home (join army/go to war, potentially killed). Explores emotional implications of last goodbye as mother feels sad, lonely, scared, so who's really the brave one? As leaves, she smartens his uniform, remembers doing same to school one. After gone (home/life) she goes to place that reminds her of him, to find trace of him. Poem about suffering of those closest to fallen soldier.



Context: Weir asked by poet laureate, CAD, to write modern war poem for 21st century war poetry collection as way of expressing suffering and grief caused by British soldiers dying in Iraq and Afghanistan, so she wrote 'Poppies' from a mother's perspective and as sons not in army, thought of Susan Owen's (mother of WW1 poet, Wilfred Owen) possible feelings.

Language: Metaphor '**blackthorns of your hair**' possibly alluding to Jesus who, according to Christian belief, wore crown of thorns when he was crucified, hinting that in order to save country, son might have to sacrifice own life! Metaphor - stomach is a piece of material being sewn together into various complicated folds of '**tucks, darts, pleats**' = the amassing pain the mother is experiencing through loss of her son as he departs for war, or as casualty of war. Metaphor '**I listened, hoping to hear your playground voice catching on the wind**' shows longing for dead son. Adjective used in line '**I was brave ...**', usually more familiar to describe soldiers so lexical choice emphasises different casualty in conflict: loved one.

Form and Structure: Cyclical structure - Weir starts and ends poem with references to a churchyard and the loss war causes opening with comment about poppies on 'individual' graves, reminding us of individual suffering, then focuses on mother's personal suffering, but ends with reference to a 'war memorial' – a monument commemorating all killed in war, making point about the scale of loss during war, and/OR cyclical – never-ending loss in war.

'Remains' by Simon Armitage (published 2008)

Tone: tragic, haunting, anecdotal

Summary: Speaker describes shooting a looter dead in Iraq and how it has affected him on his return from war, and the mental suffering that persists long after the physical conflict is over.



Context: Armitage's poems often 'dark' and focus on concerns about how people are affected by violence (used to be a probation officer); poem inspired by testimony of Guardsman Rob Tromans, who fought in Basra, Iraq, in 2003. Poem contains signs speaker may be suffering from some symptoms associated with PTSD: reliving – flashbacks/hallucinations/nightmares, anger, difficulty sleeping/concentrating, guilt.

Language: Repetition throughout mainly to reflect way memory of killing is repeated in the speaker's mind '**week after week**'. Graphic imagery: the round '**rips through his life**' and then one them '**tosses his guts back in his body**'. Metaphor '**blood-shadow**' comparing looter's left-over blood to a shadow: like a shadow, the speaker/soldier cannot remove this memory as it's always there; '**his bloody life in my bloody hands**' – alludes to 'Macbeth' – (Macbeth: warrior with PTSD, Lady Macbeth: bloody hands with guilt).

Form and Structure: Monologue told in the present tense to convey a flashback (a symptom of PTSD). Begins *in medias res*: implies one of a number of similar events and emphasises how easy for soldiers in conflict to become anaesthetised to violence they're expected to witness and perform; however, clear volta beginning of fifth stanza - soldier's tone, thoughts and emotions are changed by guilt haunting him day and night, suggesting desensitisation short-lived for soldiers, and after-pain never-ending.

'Tissue' by Imtiaz Dharker (published 2006)

Tone: thoughtful, gentle, uncertain

Summary: Speaker considers paper (holy books, maps, grocery receipts) as a metaphor of human life: like human life, paper powerful as has power to 'alter things', record/give details of things, it's important; speaker highlights paradox (conflict - contradiction), despite its power, it's fragile/vulnerable as paper documentation will not stand the test of time. In the final two stanzas, speaker links paper to human tissue: although also fragile and temporary, human tissue (person's life/reputation/significance) will outlast paper records we make of it.



Context: Koran or Qur'an - holy book for Muslims - how to live a good, rewarding life in obedience to the commandments of Allah in this life, and to gain salvation in the next.

Dharker often writes poems about the important value of things that may at first seem to be trivial, taken for granted, or easily lost or destroyed.

Language: Extended metaphor paper = life and way we live it (record); semantic field of words associated with vulnerability (lack of power): **'thinned', 'well-used', 'turned transparent', 'drift', 'fall', 'shift'** emphasising fragility of paper/life/paper records of life. Paper (life) fragile as it is at the mercy of greater forces: **simile 'might fly our lives like paper kites'** - could be lost, susceptible to elements.

Form/structure: Short stanzas build poem up in layers, reflecting idea in poem tissue (paper) and so human life, is built in layers. Very short single line stanza at end so stands out to focus reader on **'you'** (their) own **'living tissue'** - or perhaps she's addressing a child, reminding us, like paper, living tissue is transient (temporary), becomes **'transparent'** (aged) but is the family history (the skin: tissue/paper) we pass on from generation to generation so outlasts paper records of it - therefore has more of an influence on our identity.

'War Photographer' by Carol Ann Duffy (published 1985)

Tone: pained, detached, angry

Summary: A war photographer is just home in 'Rural England' developing latest photos from foreign war zone: as develops, begins to remember the brutality and horrors of war for all concerned, which leads him to consider indifference of those who might view the photos in newspapers and magazines, living in comfort, unaffected by war. At the end of the poem, he is returning to the/another warzone.



Context: reference made to 'napalm girl' picture (terrified children, including Kim Phuc, run from aerial napalm attack as South Vietnamese plane accidentally dropped its flaming napalm on South Vietnamese troops and civilians, 8th June, 1972) **an iconic Pulitzer Prize-winning war photograph taken by Nick Ut.** Ut says he knew, immediately he pressed the button, picture would stop the war (caused America to withdraw troops/funding). Duffy friends with two war photographers and seems to suggest such pictures don't affect us like this any more.

Language: Recalls sickening 'Napalm girl' image **'running children in a nightmare heat'** - to suggest danger war poses to the innocent. Metaphor **'blood stained into a foreign dust'** - lasting impact of war. Noun **'agonies'** to suggest extreme pain and suffering - and the plural form to emphasise not just one agony but a **'hundred'**, so intense pain felt by many people (photographed) suffering because of a conflict/war.

Form and Structure: Cyclical structure emphasises never-ending number of wars people are victims of across world and/OR accentuates idea reader continually sees such images so become almost immune to them.

'The Emigree' by Carol Rumens (published 1993)

Tone: mournful, defiant, nostalgic

Summary: Speaker is adult living in exile looking back at city she spent childhood in but was forced to flee due to war. Despite negative news of city now, she still sees it in positive light as she's been **'branded by an impression of sunlight'** by it/of it.



Context: Not from personal experience; speaker never specifies the city, and so she could mean it to be any one of many places throughout history where people have had to go into exile because of a change of regime or natural disaster, such as Tehran, Damascus, Beirut, Baghdad, as is exploring general emigrant experience of nostalgic longing for home.

Language: Semantic field of words associated with conflict: **'tyrants', 'war', 'tanks'** etc. perhaps to suggest city might not be as perfect as her memories of it (power of memory/ conflict between memory and reality). Personification to describe city **'sick with tyrants'** and later it **'comes to'** her and **'lies down'**, and then takes her **'dancing'**; she then protects it as it **'hides behind'** her, emphasise power of speaker's love, and later yearning, for place she remembers, or like a member of family, feels allegiance towards it. Verb **'branded'** metaphorical suggesting nothing can remove positive view of city OR like branded cattle part of identity.

Form and Structure: Repeats last line of each stanza **'sunlight'** reinforcing overriding positivity (idealised) of the city even though that is in conflict with reports (power of memory).

'Kamikaze' by Beatrice Garland (published 2003)

Tone: sorrowful, pitiful

Summary: Poem explores a kamikaze pilot's failed mission. It includes an account from perspective of pilot's daughter, speculating to own children why their grandfather, half-way there, suddenly turned back, as he **'must have seen and thought'**, things that perhaps prompted him to remember his childhood, and choose life over certain death (and patriotic duty). Poem presents us with consequences of his choice, as everyone treats him as if he no longer exists.



Context: In WW2, Japanese Kamikaze pilots were used to destroy American warships by deliberately crashing into them; in Japan, suicide had long and honourable tradition dating back many centuries, and cowardice/surrender brought shame in wartime Japan: Kamikaze pilots who failed to complete mission, for whatever reason, were ostracised, held in contempt.

Language: Metaphor **'full of powerful incarnations'** implies pilot under some form of spell/ brainwashing forcing him to complete mission, so shows his immense mental strength/power of nature to help him overpower it and turn home. Metaphor **'dark shoals of fish flashing silver'** image links to a Samurai sword/plane/battleship – conveying conflict between his love for nature/life and his sense of duty. Colours used to describe nature **'silver', 'pearl-grey'** associated with precious, highlighting beauty, suggesting positive power of nature on man as stops suicide.

Form and Structure: Writing poem from perspective of pilot's daughter, not hearing pilot's voice at all, poet emphasises idea (conflict) that pilot's been cut off from society (not allowed a voice) and accentuates distance between him and daughter (family). Very little boundary punctuation (beginning capital and end full stop) perhaps to imply decision he made as his memories flowed, was impulsive, did not stop to think of consequences of returning from 'suicide mission'.

'Checking Out Me History' by John Agard (published 2005)

Tone: defiant, angry, cynical, rebellious

Summary: Speaker represents voice of a man from Caribbean colony of British Guiana, frustrated by history curriculum he was taught at school as little attention to black history, biased towards legendary whites and nursery rhyme characters. Speaker feels history is key to understanding your identity, and if you don't know your own history it's a kind of disability.



Context: Agard was himself born in the Caribbean in 1949 and moved to UK 1970s. Toussaint l'Ouverture led slaves to victory in Haitian revolution; Nanny de Maroon is Jamaican national heroine who fought against slavery; Mary Seacole was a Jamaican nurse in the Crimean war.

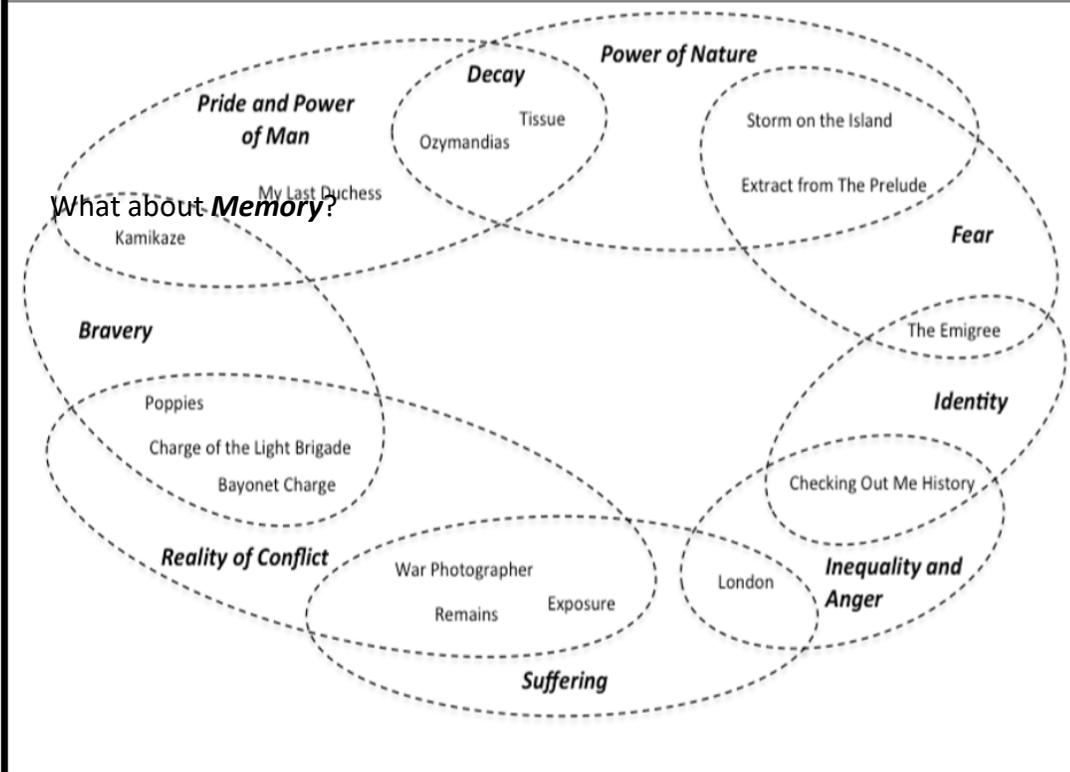
Language: Metaphors to do with deliberate removal of sight, '**Bandage up me eye with me own history**' and '**Blind me to me own identity**' to suggest purposely prevented from seeing own history/identity; verb '**Blind**' emphasises as disability, and implies longer term, so power of curriculum in his country to keep his true heritage hidden, disabled/restricted/hindered him from fully being/knowing who he really is. Contrasts simple, literal description of white legends he's been taught about, Dick had a '**cat**', Florence had a '**lamp**', with powerful imagery using light, for all three black legends he's discovered: '**beacon**', '**fire**', '**healing star**', '**yellow sunrise**', perhaps suggesting power to illuminate his identity, just as they lit up lives of others with their achievements.

Form and Structure: In dramatic monologue form, employing Creole to give floor entirely to voice of black man, angered/frustrated by a Eurocentric history syllabus. He organises parts of poem about British history in plain font, skips over them quickly, implies boring/not interesting him, but uses interesting/appealing font for black historical legends and goes into their impressive feats in detail, making them sound more exciting/appealing OR to give them more respect. Lack of punctuation could represent speaker's rejection of further rules (English punctuation) taught him!

Key Themes

Nature	<ul style="list-style-type: none"> ❖ Powerful ❖ Beautiful ❖ Sublime ❖ Dangerous 	Identity	<ul style="list-style-type: none"> ▪ Complex ▪ Established ▪ Fluid ▪ Challenging
War	<ul style="list-style-type: none"> ➤ Violent ➤ Disorientating ➤ Traumatic ➤ Glorious 	Memory	<ul style="list-style-type: none"> ✓ Changeable ✓ Unreliable ✓ Disturbing ✓ Temporary

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



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.

Calculate

A calculator and some working will be needed.



Find

Some working will be needed to get to the final answer.



Work out

Some working will be needed in order to get the answer.



Explain

Write a sentence or a mathematical statement to show how you got to your answer or reached your conclusion.



Describe

Write a sentence that gives the features of the situation.



Complete

Fill in missing values.

x	y
-1	-3
0	1
2	5

Give a reason

Must be clear and accurate reasons. If the reasons are geometrical then make sure you:

- ✓ provide a reason for each stage of working (if required)
- ✓ use correct geometric terminology.

Express

Re-write in another form, some working may be needed.



Justify

Show all working and/or give a written explanation.



Websites to help you with understanding and revision

[HegartyMaths.com](https://www.hegartymaths.com)

[CorbettMaths.com](https://www.corbettmaths.com)

[Trafalgar Maths Site](https://www.trafalgar-maths.com)

[Maths Genie](https://www.mathsgenie.co.uk)

[Maths Bot](https://www.mathsbot.com)







Simplify

Simplify the given expression.



Simplify fully

Simplify the given expression. Answer must be given in its simplest form.



Factorise

Insert brackets by taking out common factors.



Factorise fully

Insert brackets by taking out **all** the common factors.



Expand

Remove brackets.



Expand and simplify

Remove brackets and then collect like terms.



Solve

Find the solution of an equation or inequality.



Solve algebraically

Find the solution of an equation or inequality; algebraic manipulation **must** be shown.



Prove

More formal than 'show', all steps must be present. In the case of a geometrical proof, reasons must be given.



Prove algebraically

Use algebra in the proof.



Draw

Produce an accurate drawing (unless a sketch is being drawn).



Draw a sketch of... Sketch

Produce a drawing that does not have to be drawn to scale or a graph that is drawn without working out each coordinate.



Change

Usually convert from one unit to another; either using known metric unit conversions or the use of a conversion graph.



Show

All working needed to get to a given answer or complete a diagram to show given information.



Year 10 Maths Term 5/6 Quadratic Equations and Graphs

What do I need to be able to do?

(*Foundation crossover)

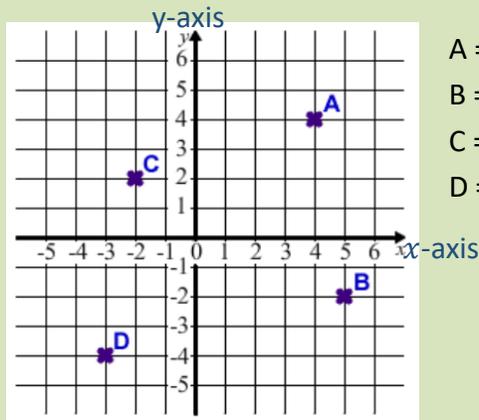
- *Plot and read Cartesian Co-ordinates
- *Recognise quadratic equations and plot quadratic functions
- *Understand properties of quadratic functions including
 - Shape (Parabola)
 - Turning points
 - Solutions and discriminant
- Solve quadratic equations by
 - *Factorisation
 - Completing the square
 - Quadratic Formula
- Using graphs to find approximate solutions
- Solve simultaneous equations involving quadratic and linear functions graphically and algebraically
- Solve quadratic inequalities and represent solutions on a numberline

Quadratic equations

A quadratic equation is any equation which contains an x^2 as the highest power.

The general format of a quadratic equation is:

$$y = ax^2 + bx + c$$



- A = (4, 4)
- B = (5, -2)
- C = (-2, 2)
- D = (-3, -4)

Coordinates are used to show a position on a graph. They are written with the notation (x, y) . The first coordinate is the horizontal position (x-axis), the second is the vertical position (y-axis).

Plotting Graphs

Hegarty : 251

- Draw a table of values
- Calculate the value of y for each value of x
- Non-calculator: break down the equation and calculate for each term before combining to total
- Calculator: remember put any negative x -value into brackets before squaring
- Draw a suitable grid
- Plot the (x,y) pairs and join with a smooth curve

Calculator Example 1:

Plot the function: $y = x^2 + x - 2$

x	-3	-2	-1	0	1	2	3
y	4	0	-2	-2	0	4	10

For $x = -3$ put into calculator:

$$(-3)^2 + (-3) - 2 (= 4) \rightarrow \text{Plot: } (-3, 4)$$

For $x = -2$ put into calculator:

$$(-2)^2 + (-2) - 2 (= 0) \rightarrow \text{Plot: } (-2, 0)$$

For $x = -1$ put into calculator:

$$(-1)^2 + (-1) - 2 (= -2) \rightarrow \text{Plot: } (-1, -2)$$

For $x = 0, y = -2$

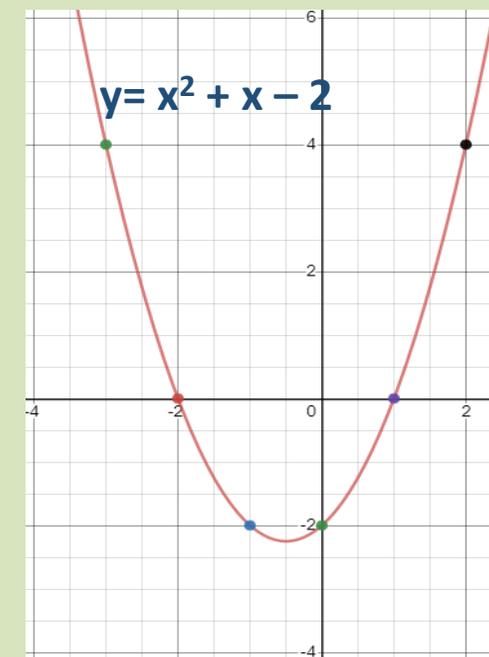
$$\rightarrow \text{Plot: } (0, -2)$$

For $x = 1$ put into calculator:

$$1^2 + 1 - 2 (= 0) \rightarrow \text{Plot: } (1, 0)$$

For $x = 2$ put into calculator:

$$2^2 + 2 - 2 (= 2) \rightarrow \text{Plot: } (2, 2)$$



Non-Calculator Example 2:

Plot $x^2 - 3x - 4$

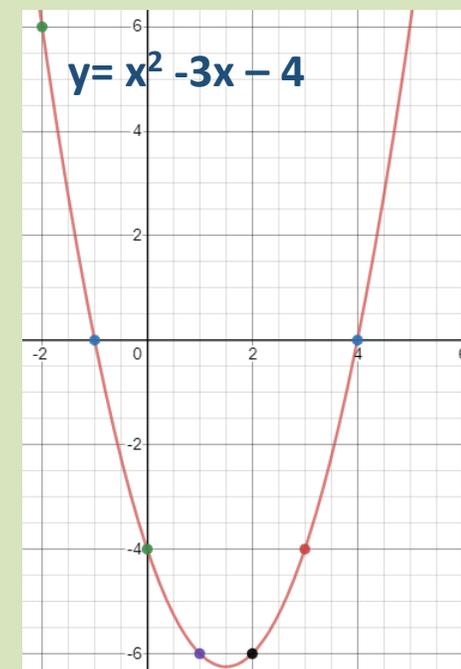
x	-3	-2	-1	0	1	2	3
x^2	9	4	1	0	1	4	9
$-3x$	9	6	3	0	-3	-6	-9
-4	-4	-4	-4	-4	-4	-4	-4
y	14	6	0	-4	-6	-6	-4

$x^2 \rightarrow$ All positive values

Sequence is square numbers

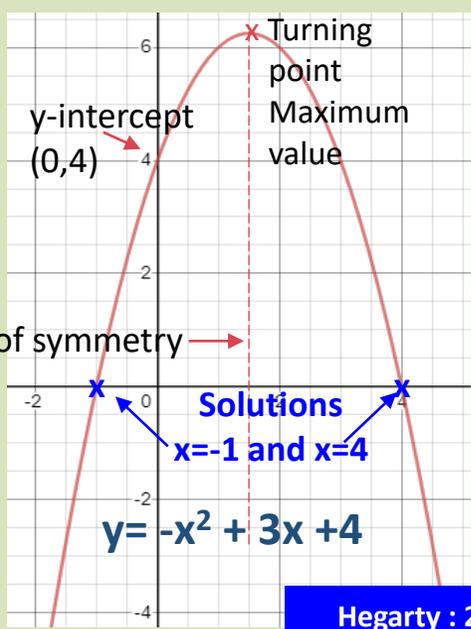
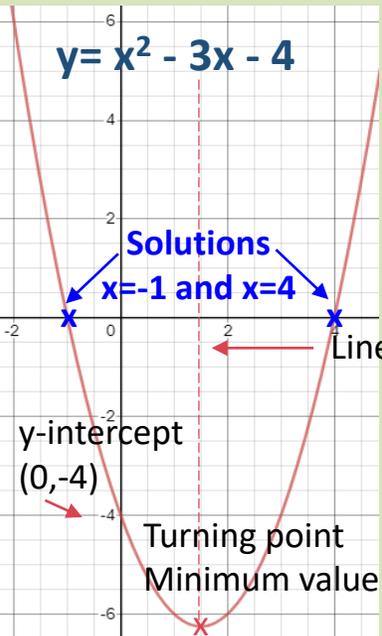
$-3x \rightarrow$ Sequence is multiples of (-3)

$-4 \rightarrow$ Is constant to be taken from sum of $x^2 + 3x$ values above



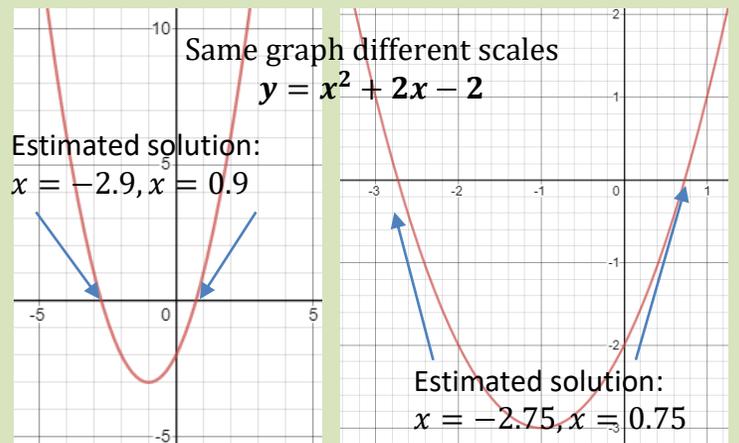
Key Properties of Quadratic graphs

- Always a **u shape smooth curve** (called a parabola). Negative ($-x^2$) functions are flipped from a u-shape to n-shape
- Always **symmetrical** about a vertical line ($x=.....$)
- Always cross the y-axis (y-intercept) at the constant value (0, c) given in the equation
- Always have a **turning point** which is the **minimum** value (of y) for a positive (x^2) function (or **maximum** value (of y) coordinate value for a negative ($-x^2$) function). The turning point is on the line of symmetry
- **The solutions – or roots - of a quadratic equation are where its graph crosses (or touches) the x-axis**



Using graphs to find approximate solutions to quadratic equations

- For any solvable quadratic equation $y = ax^2 + bx + c$, the solutions (or roots) of the equation will be where the graph crosses the x-axis i.e. where $ax^2 + bx + c = 0$
- Read off this value to get the 2 roots
- The accuracy of your reading will depend on the scale of your graph – so always try to plot using the best scale possible.



Using the general graph to find solutions to related equations

The solutions of an equation $ax^2 + bx + c = 0$ can be read from a graph at the point the graph crosses the x axis because this is where the two equations: $y = ax^2 + bx + c$ and $y = 0$ are equal.

You can use this principle to solve related equation to any given graph by drawing on additional lines:

Example 1: Using the graph $y = x^2 + 2x - 2$, find the approximate solutions to the equation

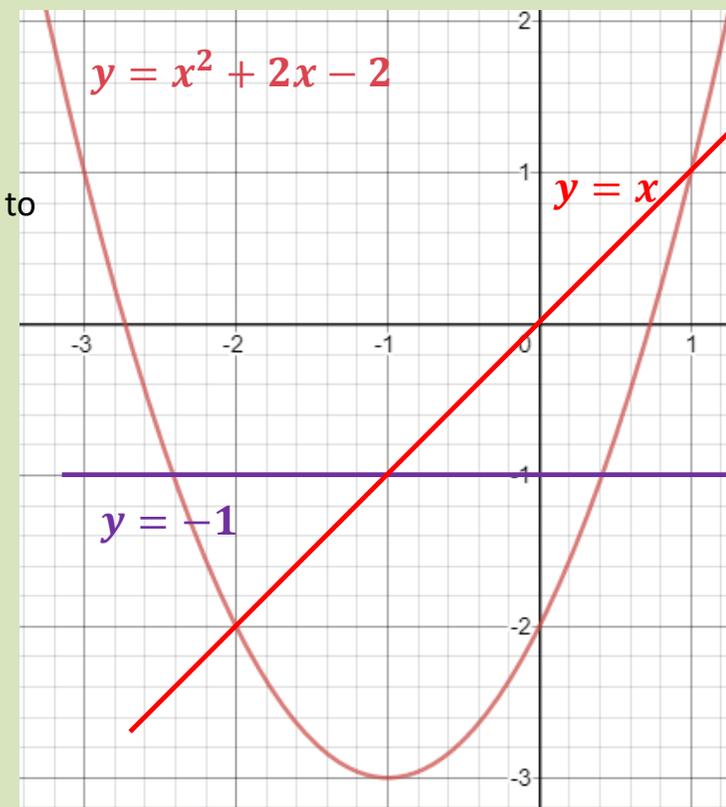
$$x^2 + 2x - 2 = -1$$

Plot the equation $y = -1$,
Where the two graphs cross is an approximate solution: $x = -2.4$ and $x = 0.4$

Example 2: Using the graph $y = x^2 + 2x - 2$, find the approximate solutions to the equation

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

Plot the equation $y = x$
Where the two graphs cross is an approximate solution: $x = -2$ and $x = 1$



Solving Quadratic equations algebraically

Quadratic equations can be solve algebraically in a number of ways

- By factorising
- By completing the square
- By using the quadratic formula
- By iteration (or trial and improvement)

If quadratic equations can be solved, there are (usually) 2 solutions

Previous learning: Year 9 KO Term 1&2 Expressions
(Hegarty maths Lesson 223-229)

Method 1: Solve by factorisation

Hegarty : 230-234

Factorising is generally the best first option to try when trying to solve a quadratic equation.

Step 1: If necessary, rearrange equation to equal zero

Step 2: Factorise to double brackets

Key principle: the double brackets represent 2 values whose product equal zero then one (or both) must be zero.

Step 3: Split into two linear equations

Step 4: Solve both linear equations

Example 1 [$ax^2 + bx + c = 0$ where $a = 1$]

Solve $x^2 - 2x = 15$

Rearrange: $x^2 - 2x - 15 = 0$

Factorise: $(x - 5)(x + 3) = 0$

Split: $(x - 5) = 0$ and $(x + 3) = 0$

Solve: $x = 5$ and $x = -3$

To factorise find two numbers whose product is -15 (possibilities: -5x3 or -3x5) and sum is -2 (so must be -5 and +3 option!)

Solving harder equations [$ax^2 + bx + c = 0$ where $a > 1$]

Example 2 [dividing through by a common factor]

Solve $3x^2 - 6x - 45 = 0$

Check if you can simplify an equation by dividing each term of the equation by a common factor. Here 3 is a common factor and dividing through means the equation being needed to solve is as Example 1!: $x^2 - 2x - 15 = 0$

Example 3 [trial and improvement]

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

Identify factor pairs of the first and last term and try different arrangements of them in the double bracket until you find an option that would expand to the original expression. Remember the signs in the bracket will be determined by the sign of the last and middle terms (Here +2 means could both be positive or both negative but +5x means both positive option is correct!)

Options: $(2x + 2)(x + 1)$ or $(2x + 1)(x + 2)$

(Expand to check: $2x + 4x + 2$ (no!) $2x + 5x + 2$ (yes!!))

Factorise: $(2x + 1)(x + 2) = 0$

Split: $(2x + 1) = 0$ and $(x + 2) = 0$

Solve: $2x = -1$ and $x = -2$
 $x = -\frac{1}{2}$

Example 3 ["ac" method]

This is useful when there are many different possibilities of first and last factors

Solve $6x^2 - 5x - 4 = 0$

Split "b" term: $6x^2 - 8x + 3x - 4 = 0$

Factorise pairs: $2x(3x - 4) + 1(3x - 4) = 0$

Create double bracket: $(2x + 1)(3x - 4) = 0$

Split and solve: $(2x + 1) = 0$ and $(3x - 4) = 0$
 $2x = -1$ and $3x = 4$
 $x = -\frac{1}{2}$ and $x = \frac{4}{3}$

Find two numbers whose product is "ac" (Here: $6 \times -4 = -24$) and sum is "b" (Here: $-8 + 3 = -5$)

The brackets from each factorised pair must be the SAME as it becomes one of double brackets

Method 2: Solve by completing the square [Higher]

Key principle: Square and square rooting are inverse function.

If one side of an equation is a square number, the square can be “unpicked” by square rooting both sides to find the solutions [Remember there are TWO values that will be the square root : a positive and a negative one]

Example 1 Solve $x^2 = 25$

Square root: $x = \pm\sqrt{25}$

Solutions: $x = 5$ and $x = -5$

Hegarty : 234-239

If a quadratic expression is more complex [$x^2 + bx + c$], it needs to be rearranged so that a square expression including all x terms is “completed”

Completing the square [$x^2 + bx + c = (x + p)^2 + q$]

Example 2

(i) Rearrange $x^2 - 12x + 20$ into the form $(x + p)^2 + q$

Step 1: Create a square bracket by halving “b”: $(x - 3)^2$

Step 2: Subtract the square of the “p” term: $(x - 3)^2 - 9$

Step 3: Include the original “c” term: $(x - 3)^2 - 9 + 20$

Step 4: Simplify $(x - 3)^2 + 11$

Note: this final expression will expand and simplify back to the original.

(ii) Hence or otherwise solve $x^2 - 12x + 20 = 0$

giving your answer as (a) an exact value and (b) to 2dp

Step 1: Complete the square: $(x - 3)^2 + 11 = 0$

Step 2: Rearrange so bracket only is on 1 side: $(x - 3)^2 = -11$

Step 3: Square root both sides: $(x - 3) = \pm\sqrt{-11}$

Step 4: Rearrange so x term only is on 1 side: $x = 3 \pm \sqrt{-11}$

Step 5: Split and solve (surd exact answer): $x = 3 + \sqrt{-11}$ and $x = 3 - \sqrt{-11}$

(rounded answer): $x = 6.32$ and $x = -0.32$

Method 3: Using the Quadratic formula

Hegarty : 240-242

Any quadratic equation in the form $ax^2 + bx + c = 0$ may be solved using

the quadratic formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Key Principle: The quadratic formula will solve any quadratic equation that can be solved. If the discriminant ($b^2 - 4ac$) is less than one and therefore cannot be square rooted, the equation cannot be solved!

Important: the quadratic formula is a key formula.

It will not be given to you – you need to learn it by heart!

Example 1

Solve $4x^2 + 3x - 2 = 0$ Give your answer to 3 sig fig

Step 1: Identify value of a, b and c : $a = 4$; $b = 3$; $c = (-2)$

These values can just be substituted into the form but better to:

Step 2: Calculate the Discriminant: $b^2 - 4ac \Rightarrow 3^2 - 4 \times 4 \times (-2)$
 $= 9 + 32 = 41$

and substitute into formula:

$$x = \frac{-3 \pm \sqrt{41}}{8}$$

Step 3: Split the “ \pm ”:

$$x = \frac{-3 + \sqrt{41}}{8} \text{ and } x = \frac{-3 - \sqrt{41}}{8}$$

Step 4: Calculate two solutions: $x = 0.4253 \dots$ and $x = -1.1753 \dots$

Step 5: Round as required: $x = 0.425$ and $x = -1.18$ (3 sf)

Example 2

Solve $10x^2 - 2x = 3$ Give your answer to 3 sig fig

Important: Rearrange to $= 0$: $10x^2 - 2x - 3 = 0$

Step 1: Identify value of a, b and c : $a = 10$; $b = (-2)$; $c = (-3)$

Step 2: Calculate discriminant: $b^2 - 4ac = (-2)^2 - 4 \times 10 \times (-3)$
 $= 4 + 120 = 124$

Step 3: Split and solve: $x = \frac{+2 + \sqrt{124}}{20} = 0.6567 \dots$ and $x = \frac{+2 - \sqrt{124}}{20} = -0.4567 \dots$

Step 4: $x = 0.657$ and $x = -0.457$ (3 sf)

This degree of accuracy is often a clue to use the quadratic formula rather than use factorisation!

Using a calculator: Enter negatives values in brackets!

Forms of Quadratic equation and graphs

• **General form:** $ax^2 + bx + c = 0$,
 Function is positive: $+ax^2 \Rightarrow$ u shaped parabola
 Function is negative: $-ax^2 \Rightarrow$ n shaped parabola
y-intercept: $(0, c) \Rightarrow$ where graph crosses y-axis

Discriminant:
 determines number of solutions Hegarty : 243
 $b^2 - 4ac > 0 \Rightarrow$ 2 solutions
 (if the discriminant is positive, the equation can be solved and the graph will cross the x-axis twice)
 $b^2 - 4ac = 0 \Rightarrow$ 1 repeated solution
 (if the discriminant is zero, there will be a repeated solution at $x = -\frac{b}{2a}$, and the graph will simply touch the x-axis)
 $b^2 - 4ac < 0 \Rightarrow$ 0 solutions
 (if the discriminant is negative it cannot be square rooted and therefore no solutions to the equation)

• **Factorised form:** $(x - m)(x - n) = 0$
 Solution of simple equations ($a = 1$): **roots are** negatives of values in brackets $\Rightarrow x = m, x = n$
Line of symmetry of graph is at midpoint between roots: $\Rightarrow x = \frac{m+n}{2}$
 • **Completed square form:** $(x - p)^2 + q = 0$
Turning point of graph : \Rightarrow at co-ordinate (p, q)
Line of symmetry of graph is negative of value in brackets: $\Rightarrow x = p$

Accurately sketching Quadratic graphs

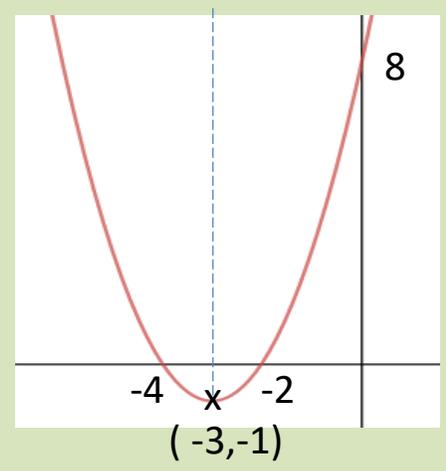
Using the different forms of equation, key coordinates can be calculated for accurate sketches of any quadratic graph.

NOT an "artistic" sketch. Use pencil and rule to create axis and show key coordinates

Example 1: Sketch the graph of

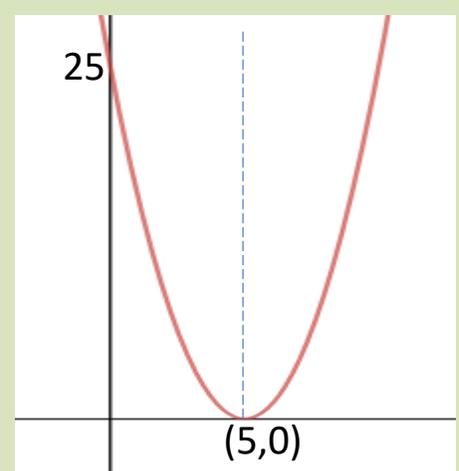
i) $x^2 + 6x + 8 = 0$

$+x^2 \Rightarrow$ u shape parabola
 y-intercept $\Rightarrow (0, 8)$
 Discriminant $\Rightarrow 36 - 32 = 4$
 \Rightarrow 2 solutions
 Factorise: $(x + 4)(x + 2)$
 Solutions $x = -2, x = -4$
 Comp. square : $(x + 3)^2 - 1$
 Turning point $\Rightarrow (-3, -1)$
 Line of symmetry $\Rightarrow x = -3$



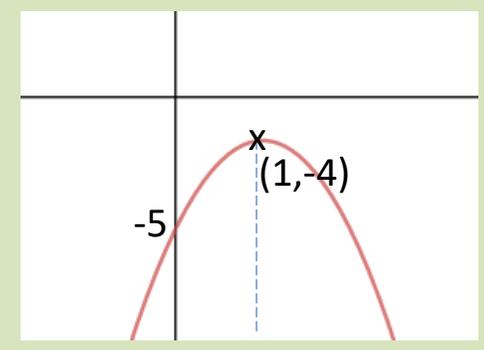
ii) $x^2 - 10x + 25 = 0$

$+x^2 \Rightarrow$ u shape parabola
 y-intercept $\Rightarrow (0, -25)$
 Discrimin $\Rightarrow 100 - 100 = 0$
 \Rightarrow 1 solution
 Factorise: $(x - 5)(x - 5)$
 Solutions $x = 5$ (repeat)
 Comp. square : $(x - 5)^2 + 0$
 Turning point $\Rightarrow (5, 0)$
 Line of symmetry $\Rightarrow x = 5$



iii) $-x^2 + 2x - 5 = 0$

$-x^2 \Rightarrow$ n shape parabola
 y-intercept $\Rightarrow (0, -5)$
 Discriminant $\Rightarrow 0$ solution
 $4 - 4 \times (-1) \times (-5) = -16$
 \Rightarrow will not cross x-axis
 Cannot be factorised
 Completed square format:
 $-[x^2 - 2x + 5] = 0$
 $-[(x - 1)^2 + 4] = 0$
 $-(x - 1)^2 - 4 = 0$
 Turning point $\Rightarrow (1, -4)$



Solving quadratic inequalities

Solve quadratic inequalities using **exactly the same methods** as solving a quadratic equation. Once the equation is solve consider which inequality is needed for each solution

Example 1 Solve $x^2 + x < 12$

Step 1: Write as equation =0:

$$x^2 + x - 12 = 0$$

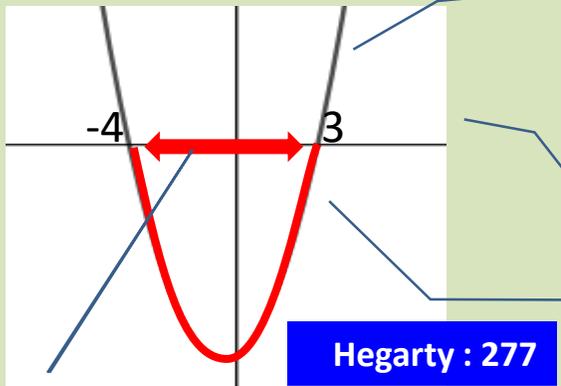
Step 2: Chose solution method and solve:

$$(x + 4)(x - 3) = 0$$

$$x = -4 \text{ and } x = 3$$

Step 3: Consider inequalities needed for the solutions

either (i) from the graph



Function value (y-coordinate) is greater than 0 above the x-axis
($x^2 + x - 12 > 0$)

Function value (y-coordinate) is equal to 0 on the x-axis
($x^2 + x - 12 = 0$)

Function value (y-coordinate) is less than 0 below the x-axis
($x^2 + x - 12 < 0$)

This is the bit we are interested in!

Hegarty : 277

x-coordinate values where the function are more than -4 and less than 3

or (ii) from substituting key values

Chose values above, between and below solutions to substitute

If $x = -5$ then $x^2 + x = 20$ [so not < 12]

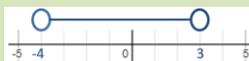
If $x = 0$ then $x^2 + x = 0$ [so < 12]

If $x = 5$ then $x^2 + x = 30$ [so not < 12]

x must be between solutions for equation

Solution for inequality: $-4 < x < 3$

Solutions to inequalities can be represented on a numberline:



Previous learning: Year 10 KO
Term 1&2 Linear equations,
inequalities & graphs
(Hegarty Maths
Lesson 265-276)

Previous learning: Year 10 KO Term 1&2
Linear equations inequalities and graphs

(Hegarty 190-195)

Solving simultaneous equations involving quadratics

Simultaneous equations involving quadratics can be solved algebraically as well as graphically. Like linear simultaneous equations, the solution to quadratic simultaneous equations will be the values where the two equations are equal (so the coordinate points where the two graphs cross). However, unlike linear simultaneous equation, we need to apply not only a different method to solve these equations (solving by substitution not elimination) but must remember that due to the shape of a quadratic graph there may be more than 1 place the graphs cross - so more than 1 solution!

Method: Solve by substitution

Example 1 Solve the simultaneous equation

$$x + y = 7 \text{ and } x^2 + y = 13$$

Hegarty : 246

Step 1: Rearrange to make 1 unknown the subject: $y = (7 - x)$

Step 2: Substitute into the other equation: $x^2 + (7 - x) = 13$

Step 3: Solve for 1 variable (as per a single quadratic equation):

Rearrange (=0): $x^2 - x - 6 = 0$

Factorise: $(x - 3)(x + 2) = 0$

Solve: $x = 3 \text{ and } x = -2$

Step 4: Substitute new known values back into either equation (it is usually easier to substitute into linear!) Make sure your keep the link between the pairs of values clear: $x = 3$ then $y = 7 - 3 \rightarrow 4$

$$x = (-2) \text{ then } y = 7 - (-2) \rightarrow 9$$

Note: the graphs will cross at (3,4) and (-2,9)

The solution to an inequality can be represented on a

Solving non-linear equations using iterative methods

Some equations don't have exact solutions and can't be solved by algebraic methods. Instead iterative methods (a form of trial and improvement) can be used which involve repeating the same instructions until you reach an adequately accurate solution.

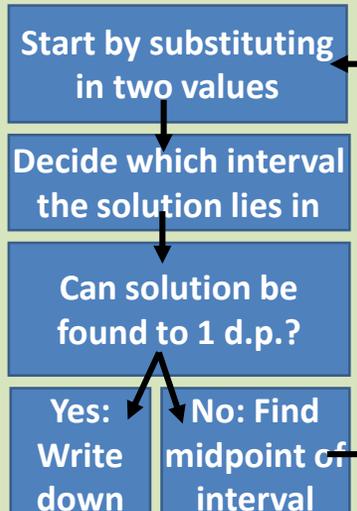
Hegarty : 321

Simple trial and improvement

this is Cubic (NOT a quadratic!) so we can't use algebraic methods

Example 1 The equation $x^3 + x = 145$ has a solution between 5 and 6. Find this solution to 1 decimal place

x	$x^3 + x$	$= 145?$
$x = 5$	$5^3 + 5$	$= 130$ (too small)
$x = 6$	$6^3 + 6$	$= 222$ (too big)
$x = 5.5$	$5.5^3 + 5.5$	$= 171.87...$ (too big)
$x = 5.25$	$5.25^3 + 5.25$	$= 149.95...$ (too big)
$= 5.125$	$5.125^3 + 5.125$	$= 139.73...$ (too small)
$= 5.1875$	$5.1875^3 + 5.1875$	$= 144.78...$ (too small)



Solution must be between $x = 5.25$ and $x = 5.1875$ as one is too big and the other too small but all values in this range would round to 5.2 to 1dp so **Approximate Solution: $x = 5.2$ (1 dp).**

Formal Iterative Methods

Hegarty : 322

Use recurrence formulas to describe the process.

e.g. $x_{n+1} = \sqrt[3]{145 - x_n}$

Previous learning: Year 10
KO Term 3&4 Sequences
(Hegarty 262)

Iteration Notation

x_0 means the starting value

x_1 means the result of the first iteration

x_n means the result of the n^{th} iteration

x_{n+1} means the result of the next iteration

Using a recurrence formula

Example 2 Using the iterative formula $x_{n+1} = \sqrt[3]{145 - x_n}$ and $x_0 = 5$ find an approximate solution to 4 sig. fig for the equation $x^3 + x = 145$

$x_0 = 5$ $\Rightarrow x_1 = \sqrt[3]{145 - 5} = 5.19249...$ Stop: both equal to 4 sf

$x_1 = 5.19249...$ $\Rightarrow x_2 = \sqrt[3]{145 - 5.19249...} = 5.19011...$

$x_2 = 5.19011...$ $\Rightarrow x_3 = \sqrt[3]{145 - 5.19011...} = 5.1901...$

Calculator TIP: "ANS" Button **Solution: $x = 5.190$ (4 sf)**

Type in the formula to find x_1 Replace the "5" with "ANS". As you now press "=", the calculator will use successive iteration values in the formula to find the next... just remember to record them accurately!

Common Questions linked to Recurrence

You may note that the recurrence formula $x_{n+1} = \sqrt[3]{145 - x_n}$ has links to cubic equation $x^3 + x = 145$.

In fact it is an rearrangement the question may include:

Example 2b: Show that the equation $x^3 + x = 145$

can be arranged to give $x_{n+1} = \sqrt[3]{145 - x_n}$

$$\begin{aligned} x^3 + x &= 145 \\ x^3 &= 145 - x \\ x &= \sqrt[3]{145 - x} \end{aligned}$$

Similarly you may need to prove that a solution is between two values:

Key principle: Roots of equations are where the graph crosses the x-axis. At one side of the root, the function (y-coordinate) < 0 , on the other > 0 .

Example 2a: Show that $y = x^3 + x - 145$ has a root between 4 and 5

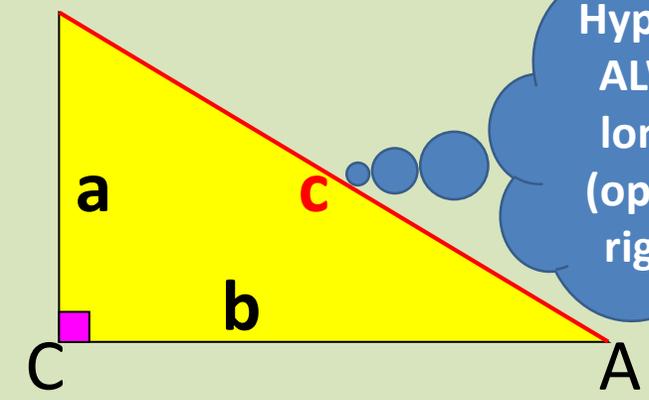
$x = 5 \rightarrow y = 5^3 + 5 - 145 = -30; x = 6 \rightarrow y = 6^3 + 6 - 145 = 77$

There is a change of sign so a root between the values

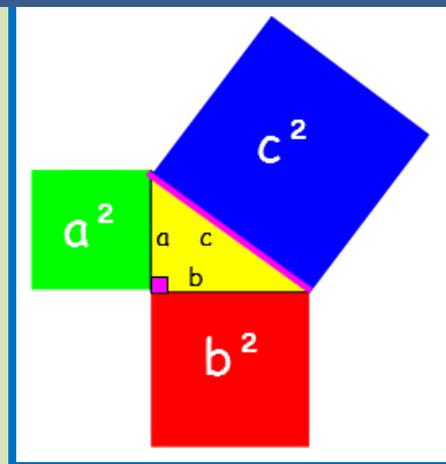
Pythagoras' Theorem states that for right angled triangles, the sum of the squares of the two shorter sides is equal to the square of the **hypotenuse**

Hegarty : 497 - 507

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



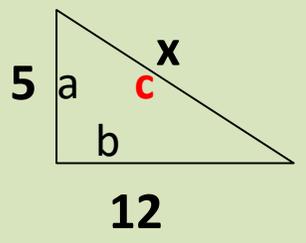
Hypotenuse is ALWAYS the longest side (opposite the right angle)



Hegarty : 501 - 507

Finding the hypotenuse

Hegarty : 498



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

$$x^2 = 5^2 + 12^2$$

$$x^2 = 25 + 144$$

$$x^2 = 169$$

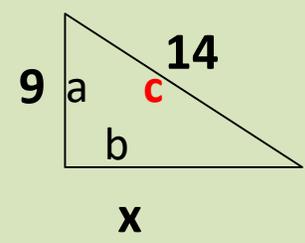
$$x = \sqrt{169}$$

$$x = 13$$

Pythagorean Triples are 3 integers that follow the Pythagorean rule e.g. **3,4,5** **5,12,13** **7,24,25** and any multiples of these triples e.g. 6,8,10 15,36,39, 14,120,125

Finding a shorter side

Hegarty : 499



Find x
All lengths in cm
 $c^2 = a^2 + b^2$
Rearrange for shorter side
 $b^2 = c^2 - a^2$

Remember to give degree of accuracy of **UNITS** of measure when needed.

$$x^2 = 14^2 - 9^2$$

$$x^2 = 196 - 81$$

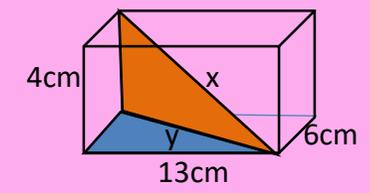
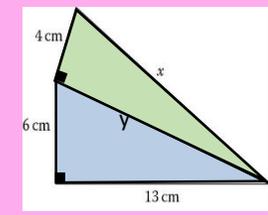
$$x^2 = 115$$

$$x = \sqrt{115}$$

$$x = 10.72380\dots$$

$$x = 10.7 \text{ cm (3 sf)}$$

Problems Solving: Pythagoras in 3D



Find the interim hypotenuse:

$$c^2 = a^2 + b^2 \rightarrow y^2 = 13^2 + 6^2$$

$$y^2 = 169 + 36 = 205$$

Find the wanted hypotenuse:

$$c^2 = a^2 + b^2 \rightarrow x^2 = y^2 + 4^2$$

$$x^2 = 205 + 16 = 221$$

$$x = \sqrt{221} = 14.866\dots$$

$$x = 14.9 \text{ cm (3 sig fig)}$$

No need to find value of y as it is y² that will be used in next calculation!

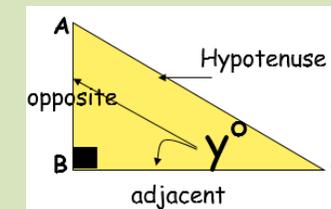
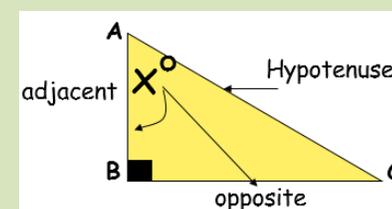
Summary 3D Formula: $d^2 = a^2 + b^2 + c^2$

Understanding Trigonometry

Trigonometry enables us to find **missing angles and sides in right angled triangles** because the ratios between different sides of a right angled triangle will be the same for all similar triangles (with the same angles).

Trigonometry Notation

For any right angled triangle ABC:
 The **HYPOTENUSE** is ALWAYS the **LONGEST SIDE**
 The **other sides** are named according to **where they are in relation to the angle**
 The **OPPOSITE** side is **OPPOSITE** the **ANGLE** known/wanted
 The **ADJACENT** side is **NEXT TO** the **ANGLE** known/wanted

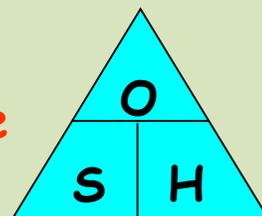


Pythagoras or Trigonometry?: Pythagoras only deals with sides; Trigonometry MUST INVOLVE AN ANGLE

A common way to remember the ratios is: “**SOH CAH TOA**”... but make up your own mnemonic to remember the order of letters e.g. from one former pupil: “**sunny on holiday, cloudy at home, today only average!**”

Sine Ratio

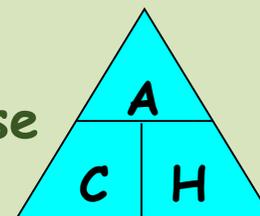
$$\sin \delta = \frac{\text{Opposite}}{\text{Hypotenuse}}$$



Finding angle $\Rightarrow \sin^{-1}\left(\frac{o}{h}\right)$

Cosine Ratio

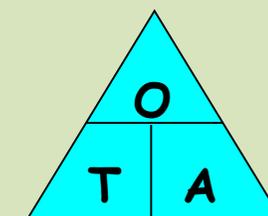
$$\cos \delta = \frac{\text{Adjacent}}{\text{Hypotenuse}}$$



Finding angle $\Rightarrow \cos^{-1}\left(\frac{a}{h}\right)$

Tangent Ratio

$$\tan \delta = \frac{\text{Opposite}}{\text{Adjacent}}$$



Finding angle $\Rightarrow \tan^{-1}\left(\frac{o}{a}\right)$

METHOD

- STEP 1:** Label the sides you **need** or **know** (only 2 out of the 3!)
Remember to label according to the known/wanted angle
- STEP 2:** Identify the trig ratio needed from the sides involved
- STEP 3:** Draw out the required calculation triangle
Cross out the item you need to find
- STEP 4:** Write down the required calculation – times or divide?

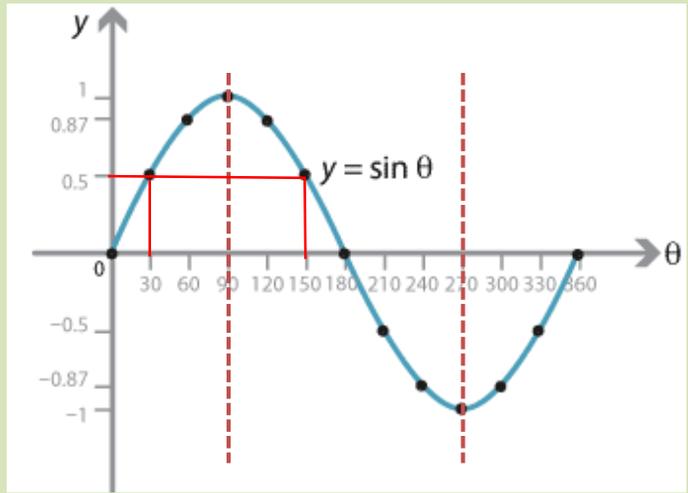
In triangle ABC find side CB

CB = $\tan(56) \times 2$
 = 2.965...
 = 2.97cm s(3sf)

In triangle ABC find angle n

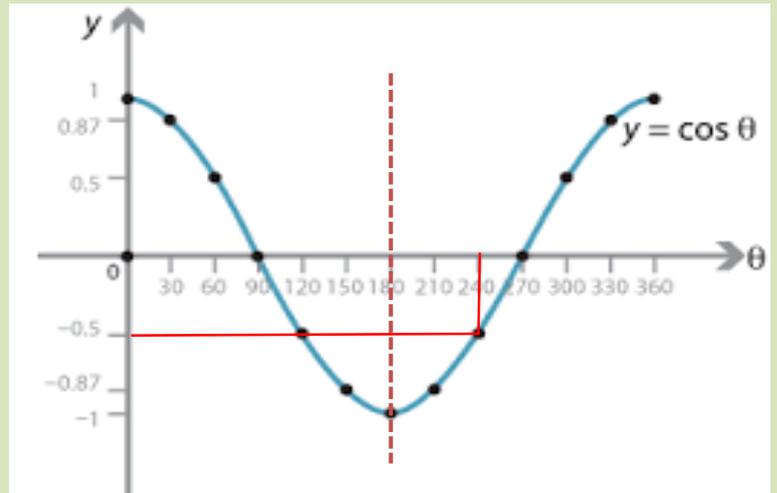
Angle n = $\sin^{-1}\left(\frac{7}{10}\right)$
 = 44.427...
 = 44° (nr°)

Sine Graph



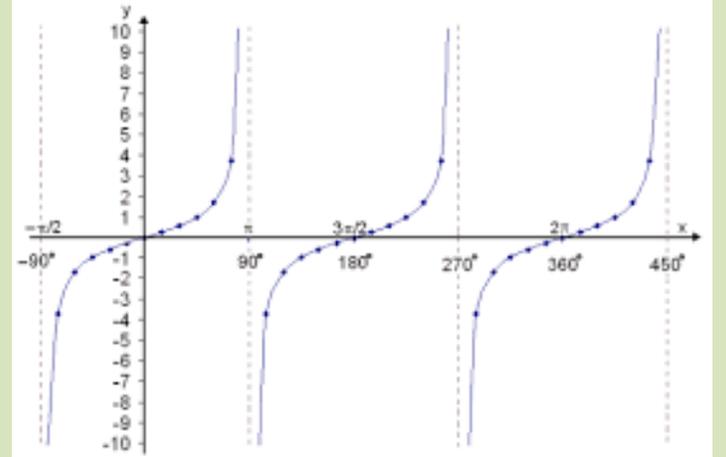
Minimum value -1 Maximum value +1
Lines of symmetry at 90° and 270°
Pattern repeats every 360° so within every 360° there are 2 angles with same sine ratio
 e.g. $\sin^{-1}(1/2) = 30^\circ$ AND 150°

Cosine Graph



Minimum value -1 Maximum value +1
Lines of symmetry at 180°
Pattern repeats every 360° so within every 360° there are 2 angles with same cos ratio
 e.g. $\cos^{-1}(-1/2) = 120^\circ$ AND 240°

Tangent Graph



Minimum value $-\infty$ Maximum value $+\infty$
Asymptotes at 90° and 270° - no tan value for these angles.
Pattern repeats every 180° so within every 360° there are 2 angles with same tan ratio
 e.g. $\tan^{-1}(1) = 45^\circ$ AND $(45+180=) 225^\circ$

Exact Values:

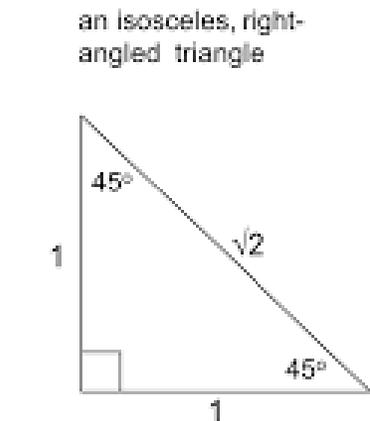
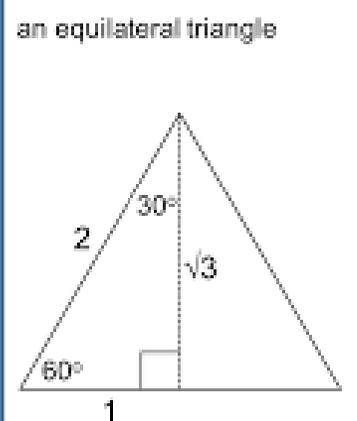
Some trigonometric values need to be learnt BY HEART

Exact Values of Trigonometric Functions

Angle (θ) Degree	0°	30°	45°	60°	90°
$\sin(\theta)$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1
$\cos(\theta)$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0
$\tan(\theta)$	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	Not Defined

Exact trig values can be calculated using properties and known angles in a "unit" equilateral triangle (60° and 30°) and a right angled isosceles triangle (45°) - Pythagoras is applied to find the 3rd side....

two famous triangles



Knowing this basic fact is key
 as correct use of formula
 requires knowing which sides
 and angles are involved

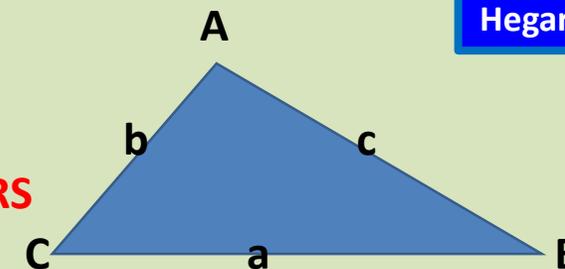
KEY LABELLING Notation

For any triangle ABC:

Angles are labelled with **CAPITAL LETTERS**

Sides are labelled with **LOWERCASE LETTERS**

Side a will be opposite **Angle A** etc.

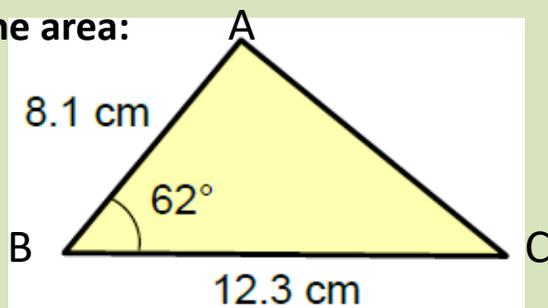


Sine Rule for AREA OF TRIANGLES

$$Area = \frac{1}{2} ab \sin(C)$$

Requires: 2 sides and INCLUDED angle

Find the area:



$$\begin{aligned} Area &= \frac{1}{2} \times 8.1 \times 12.3 \times \sin(62) \\ &= 43.984\dots \\ &= 44.0 \text{ cm}^2 \text{ (3sig fig)} \end{aligned}$$

Remember to show answer to 3 or 4 decimal places before rounding.
 Always state degree of accuracy and **units**

Sine Rule for LENGTHS and ANGLES

Finding sides:

$$\frac{a}{\sin(A)} = \frac{b}{\sin(B)} \left(= \frac{c}{\sin(C)} \right)$$

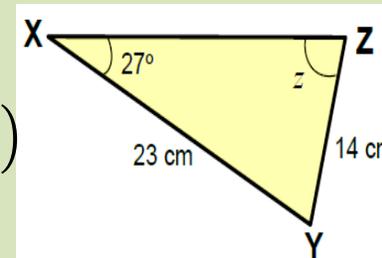
Finding angles:

$$\frac{\sin(A)}{a} = \frac{\sin(B)}{b} \left(= \frac{\sin(C)}{c} \right)$$

Requires: a known SIDE & ANGLE pair
 the opposite side/Angle of the wanted Angle/side

Find the angle Z

$$\begin{aligned} \frac{\sin(Z)}{23} &= \frac{\sin(27)}{14} \\ Z &= \sin^{-1} \left(\frac{\sin(27) \times 23}{14} \right) \\ &= 48.234\dots \\ &= 48^\circ \text{ (nr degree)} \end{aligned}$$



Cosine Rule for LENGTHS and ANGLES

Finding sides:

$$a^2 = b^2 + c^2 - 2bc \cos(A)$$

Requires: 2 sides and INCLUDED angle being the angle opposite wanted side.

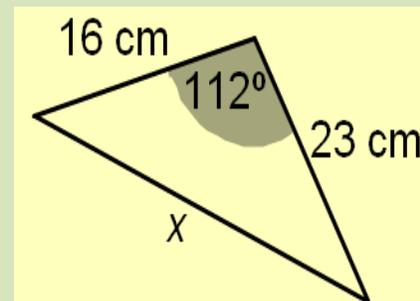
Finding angles:

$$\cos(A) = \frac{b^2 + c^2 - a^2}{2bc}$$

Requires: all 3 sides

Find the side x

$$\begin{aligned} x^2 &= 16^2 + 23^2 - 2 \times 16 \times 23 \times \cos(112) \\ x^2 &= 1060.710\dots \\ x &= 32.568\dots \\ x &= 32.6 \text{ cm (3 sf)} \end{aligned}$$

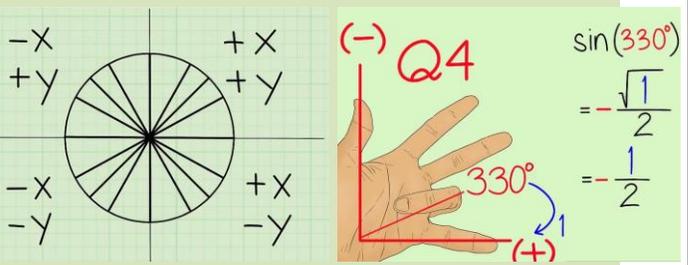
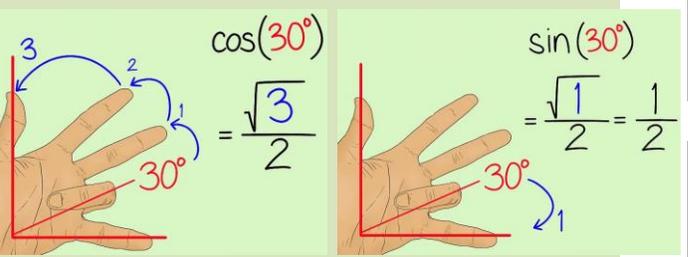
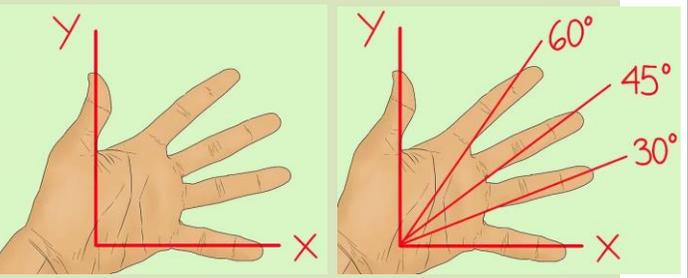


Angle	Sine	Cosine	Tangent
0	0.000	1.000	0.000
1	0.017	1.000	0.017
2	0.035	0.999	0.035
3	0.052	0.999	0.052
4	0.070	0.998	0.070
5	0.087	0.998	0.087
6	0.105	0.995	0.105
7	0.122	0.993	0.123
8	0.139	0.990	0.141
9	0.156	0.988	0.158
10	0.174	0.985	0.176
11	0.191	0.982	0.194
12	0.208	0.978	0.213
13	0.225	0.974	0.231
14	0.242	0.970	0.249
15	0.259	0.966	0.268
16	0.276	0.961	0.287
17	0.292	0.956	0.306
18	0.309	0.951	0.325
19	0.326	0.946	0.344

Angle	Sine	Cosine	Tangent
30	0.500	0.866	0.577
31	0.515	0.857	0.601
32	0.530	0.848	0.625
33	0.545	0.839	0.649
34	0.559	0.829	0.675
35	0.574	0.819	0.700
36	0.588	0.809	0.727
37	0.602	0.799	0.754
38	0.616	0.788	0.781
39	0.629	0.777	0.810
40	0.643	0.766	0.839
41	0.656	0.755	0.869
42	0.669	0.743	0.900
43	0.682	0.731	0.933
44	0.695	0.719	0.966
45	0.707	0.707	1.000
46	0.719	0.695	1.036
47	0.731	0.682	1.072
48	0.743	0.669	1.111
49	0.755	0.656	1.150

Angle	Sine	Cosine	Tangent
60	0.866	0.500	1.732
61	0.875	0.485	1.804
62	0.883	0.469	1.881
63	0.891	0.454	1.963
64	0.899	0.438	2.050
65	0.908	0.423	2.145
66	0.914	0.407	2.246
67	0.921	0.391	2.356
68	0.927	0.375	2.475
69	0.934	0.358	2.605
70	0.940	0.342	2.747
71	0.946	0.326	2.904
72	0.951	0.309	3.078
73	0.956	0.292	3.271
74	0.961	0.276	3.487
75	0.966	0.259	3.732
76	0.970	0.242	4.011
77	0.974	0.225	4.331
78	0.978	0.208	4.705
79	0.982	0.191	5.145
80	0.985	0.174	5.671
81	0.988	0.156	6.314
82	0.990	0.139	7.115
83	0.993	0.122	8.144
84	0.995	0.105	9.514
85	0.996	0.087	11.430
86	0.998	0.070	14.301
87	0.999	0.052	19.081
88	0.999	0.035	28.636
89	1.000	0.017	57.290
90	1.000	0.000	Undef.

The left hand trick for Sine and Cosine



- Your pinky is the x-axis, your thumb is the y-axis
- Each finger represents an angle
- Find Cosine coordinate of an angle by counting fingers to the left
- Find Sine coordinate of an angle by counting fingers to the right
- Switch the charge to represent the coordinates
- Fill in your circle using your hand trick

What do I need to be able to do?

- Know the vocabulary and definitions of features of a circle
- Understand properties of congruent and similar shapes
- Understand the properties needed to construct unique triangles : SSS, SAS, ASA RHS
- Construct standard ruler and compass constructions including:
- Perpendicular bisector
- Perpendicular from and to a point on a line
- Angle bisector
- Use constructions % properties of triangles to construct key angles: 30, 60 45 and 90
- Understand and solve loci problems
- Prove and apply circle theorems

Features of a Circle

Hegarty : 592

Circumference – outer edge (perimeter) of circle	Centre of the circle – usually labelled “O”	Arc – part of the circumference of the circle
Semi-circle – half a circle. Area bounded by diameter and arc		Chord – line crossing the circle from one part of the circumference to another
Diameter – a chord that passes through the centre		Segment – Area bounded by a chord and an arc
Tangent – Line touching circle that is 90° to the radius at that point (perpendicular to radius)		Radius – line connecting the centre to the circumference 2 radii = 1 diameter
Sector – Area bounded by two radii and an arc (looks like a slice of pizza!)		Quadrant – sector that is a quarter of a circle (radii are at 90°)

key circle formulae:
 Circumference = $\pi \times \text{diameter}$
 Area = $\pi \times \text{radius}^2$

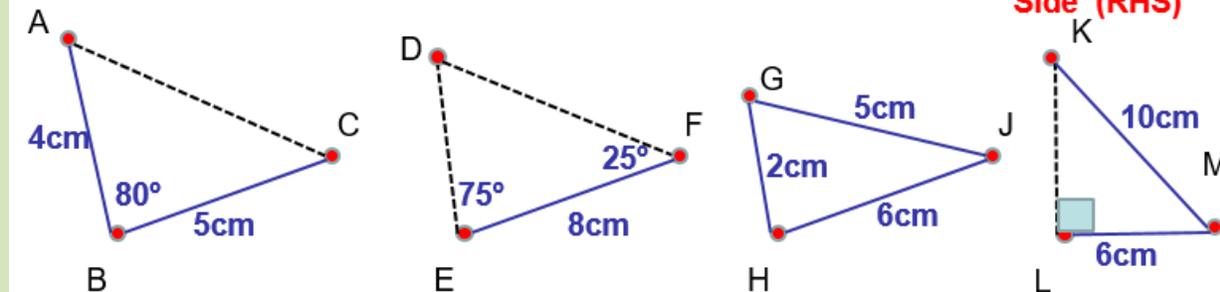
Previous learning: Year 10 KO Term 1&2 Working in 2D (Hegarty 549-562)

Constructing Unique Triangles

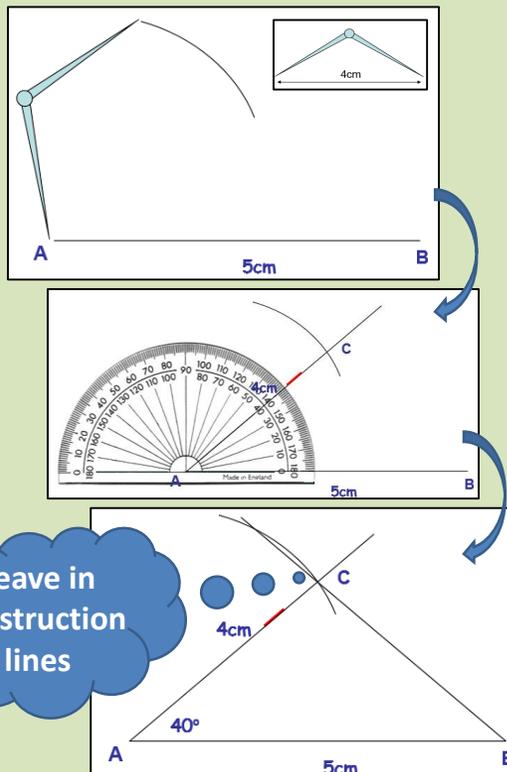
Hegarty : 683

We can always construct the same unique version of a triangle if we know....

- 1) **Side Angle Side (SAS)** or **Angle Side Angle (ASA)** or **Side Side Side (SSS)** or **Right angle Hypotenuse Side (RHS)**



We are given: the length of two sides and the angle between We are given: the size of two angles and the side between We are given: the length of all three sides (Pythagoras' Theorem means all 3 sides are known RHS → SSS)



Leave in construction lines

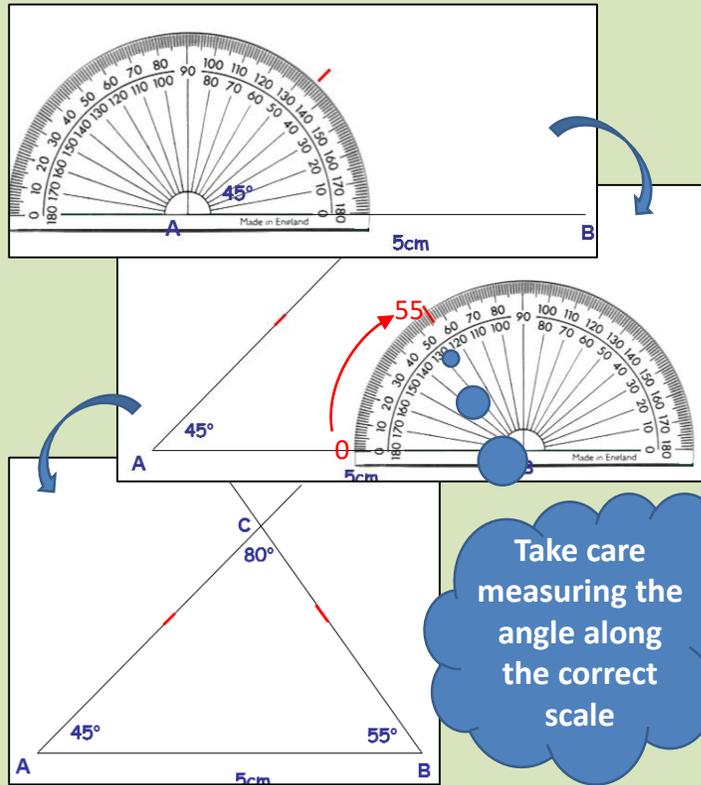
Side, Angle, Side (SAS)

- Example 1: Construct triangle ABC with AB = 5cm, angle A=40° and AC = 4cm**
1. Draw a line 5cm long. Label it AB
 2. Stretch your compass out to 4cm
 3. Place the point on A and make a long arc above the line AB
 4. Measure an angle of 40° at A
 5. Draw a long line out from A
Remember to write in the angle
 6. Join the crossing point to B.
 7. Label the point C
Remember to mark the length of side AC

Angle Side Angle (ASA)

Example 2: Construct triangle ABC with AB side 5cm and angles A=45°, B=55°

1. Draw a line 5cm long. Label it AB
2. Measure an angle of 45° at A
3. Draw a long line out from A
Remember to write in the angle.
4. Measure an angle of 55° at B
5. Draw a long line out from B
Remember to write in the angle
6. Label the crossing point C

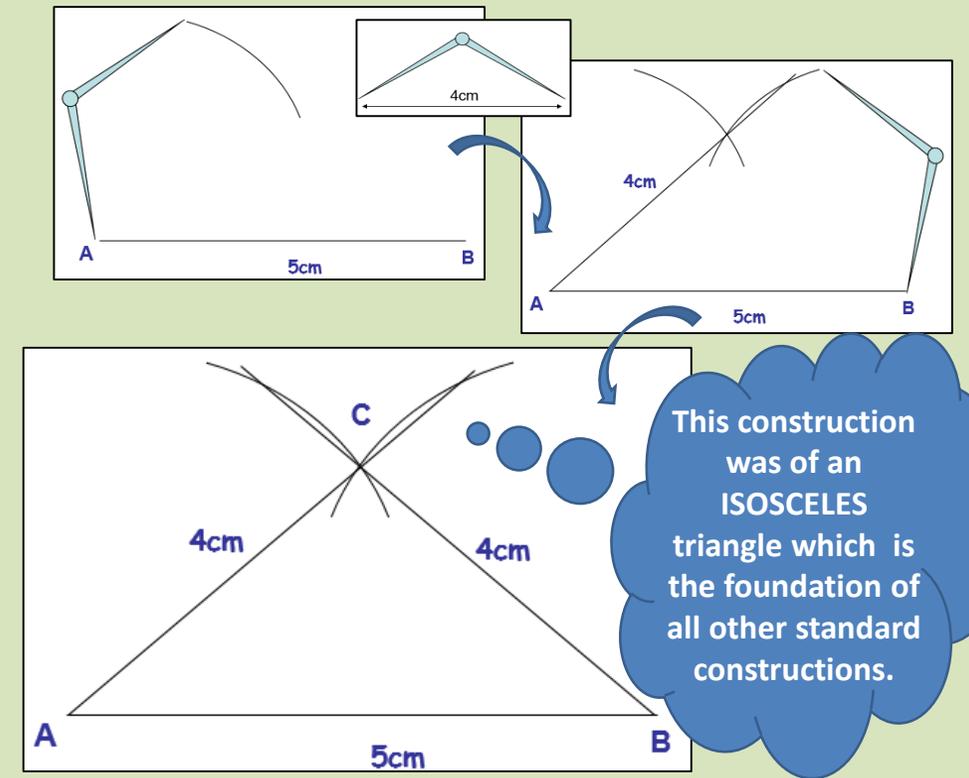


Take care measuring the angle along the correct scale

Side, Side, Side (SSS)

Example 3: Construct triangle ABC with AB = 5cm, AC = 4cm and BC = 4cm

1. Draw a line 5cm long. Label it AB
2. Stretch your compass out to 4cm
3. Place the point on A and make a long arc above the line AB
4. Check that your compass is (still) stretched to 4cm
5. Place the point on B and make a long arc above the line AB
6. Join the crossing point to A and B.
7. Label the point C. Remember to mark the length of sides AC and BC



This construction was of an ISOSCELES triangle which is the foundation of all other standard constructions.

Isosceles Triangles

Being able to construct an isosceles triangle is really important for more advanced constructions...

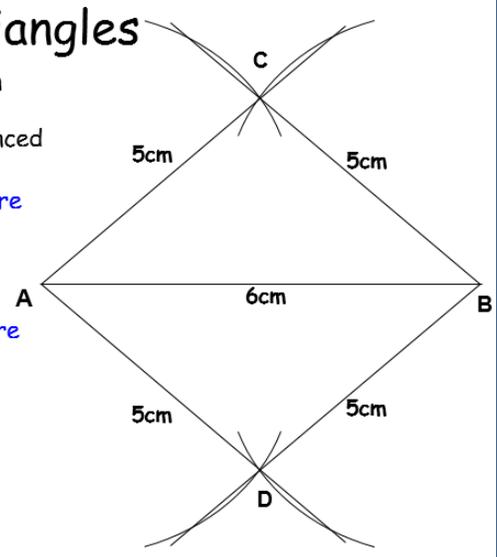
Q1: Construct ΔABC where

- AB = 6cm
- AC = BC = 5cm

Q2: Construct ΔABD - a reflection of ΔABC - where

- AB is common; and
- AD = BD = 5cm

What shape is ACBD?
Rhombus



Importance of a Rhombus

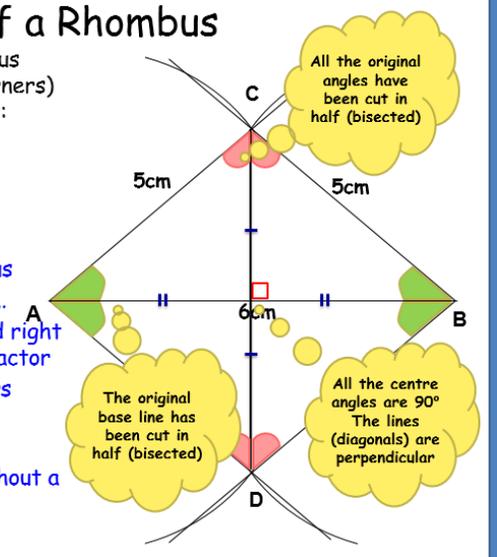
The diagonals of a rhombus (lines joining opposite corners) have some key properties:

They are

- perpendicular
- bisect each other
- bisect each angle

So constructing a rhombus Means you can construct...

- Perpendicular lines and right angles without a protractor
- Perpendicular bisectors of a line
- Angle bisectors
- 45° and 30° angles without a protractor.



All the original angles have been cut in half (bisected)

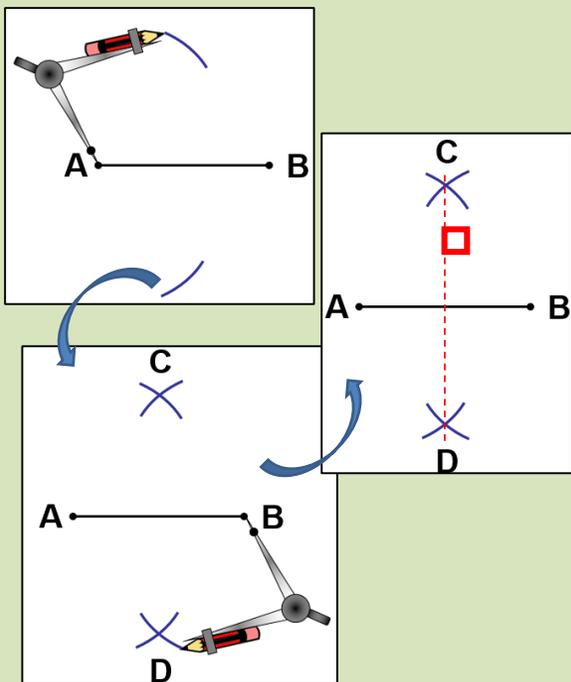
The original base line has been cut in half (bisected)

All the centre angles are 90°
The lines (diagonals) are perpendicular

Perpendicular Bisector

Example 1: Construct a perpendicular bisector of line AB

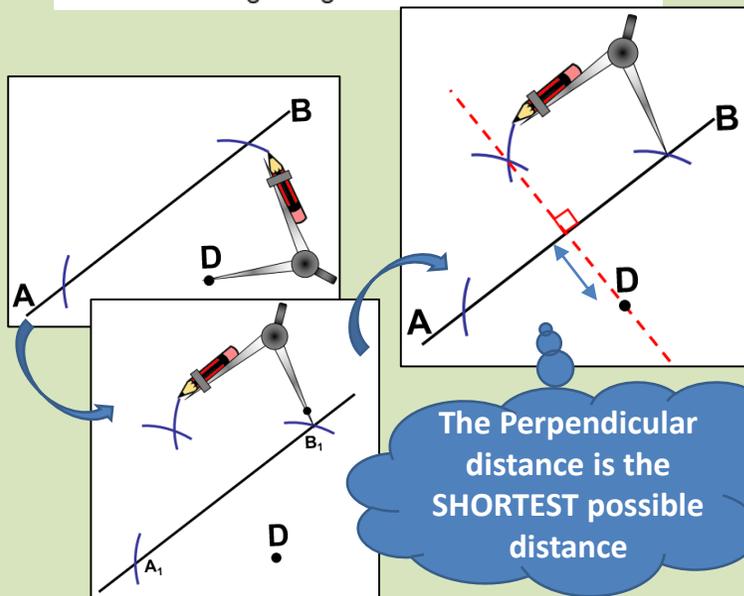
1. Stretch your compass out more than half the distance of AB
(it is a good idea to measure what distance you use to ensure that you can keep it the same throughout)
2. Place the point on A and make a long arc above and below the line AB
3. Without changing the stretch of your compass, place the point on B and make a long arc above and below the line AB
4. Join the crossing points with a line crossing AB.
5. Label the right angle and equal lengths.



Perpendicular from a point to a line

Example 2: Construct a line from D that is perpendicular to line AB

1. Stretch your compass out more than the distance from D to AB
(it is a good idea to measure what distance you use to ensure that you keep it the same throughout)
2. Place the point on D and make two arcs each cutting the line AB (or one long arc cutting the line AB twice) one nearer A (A_1) and the other nearer B (B_1)
3. Without changing the stretch of your compass, place the point A_1 make a long arc above AB
4. Repeat by making a long arc from point B_1
5. Join the point where these two arcs cross to D with a line crossing AB.
6. Label the right angle

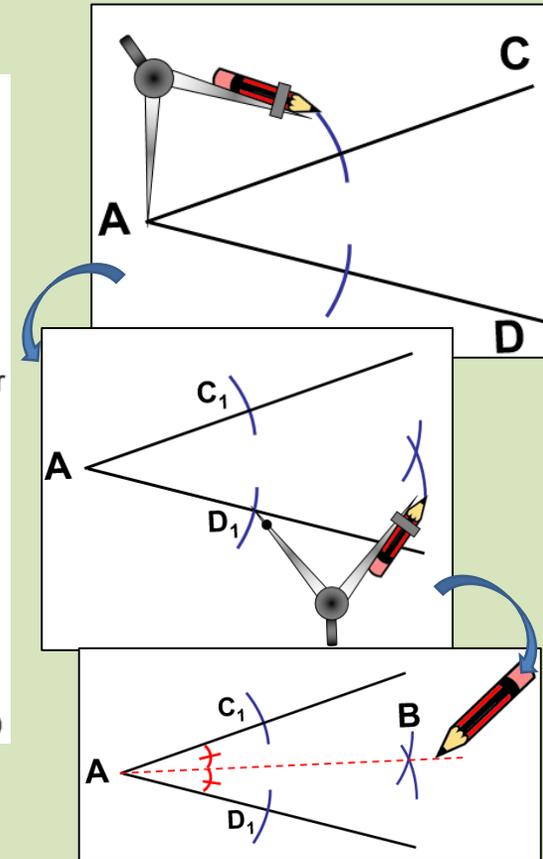


The Perpendicular distance is the **SHORTEST** possible distance

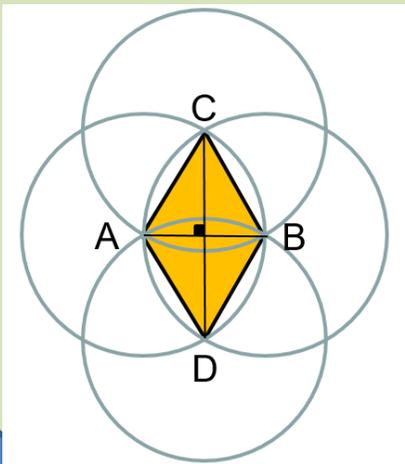
Angle Bisector

Example 3: Construct an angle bisector of the angle CAD

1. Stretch your compass out to a known distance (so you can keep the same distance throughout)
2. Place the point on A and make a long arc (or two short ones) one cutting the line AC (at C_1) and the other cutting the line AD (at D_1)
3. Without changing the stretch of your compass, place the point C_1 make an arc in the space between the lines AC and CD
4. Repeat by making an arc from point D_1
5. Join the point (A) where these two arcs cross to B
6. Label the two equal angles created at $\angle CAD$



Note: all the arcs drawn in these standard constructions are from of 4 overlapping circles which create a rhombus



Combining different constructions can create:
 60° and 30° angle (construction of equilateral triangle and angle bisector)
 90° and 45° angle (construction of perpendicular lines and angle bisector)
 Parallel lines (combine perpendiculars from 2 points on a line) leading to rectangles

“Locus” is Latin for “place” or “position”
Its plural is “LOCI”

In maths, LOCI problems involve rules determining the position or movement of points. LOCI scenarios which can be solved using **standard constructions**

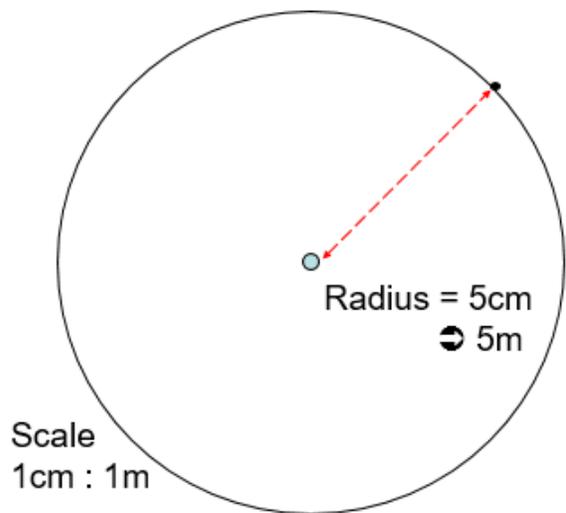
Hegarty : 674- 679

Example 1:

A goat is tethered by a 5m long rope. Show the area in which the goat can move.

Construction Solution :

Construct a circle of given radius



Example 2:

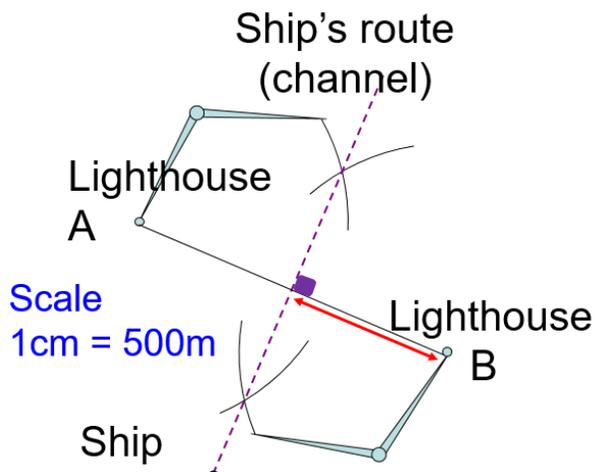
A and B are two lighthouses. Ships must pass an equal distance from both to have safe passage through the channel.

- (a) Show the channel.
- b) What is the closest that the Ship will be to the Lighthouse?



Construction Solution :

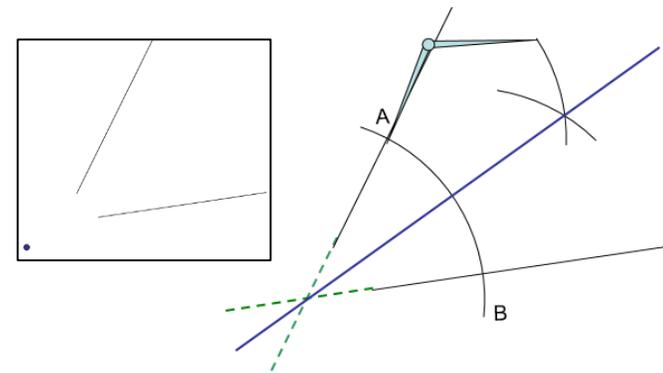
- a) Perpendicular Bisector of a line between two points
- b) Perpendicular distance from a point to a line



Example 4:

A Movie star doesn't want to disappoint his fans waiting at two barricades so decides he must walk an equal distance from each. Show the path he must follow.

**Construction Solution :
Angle bisector**

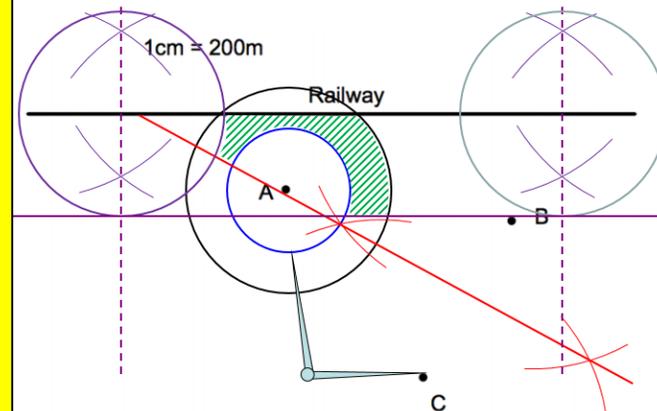


Example 5:

A phone box is located near 3 houses, A B and C.
i) The phone box is less than 500m from the railway track
ii) The phone box is between 300m and 500m from House A
iii) The phone box is closer to house C than house B
Shade the region on the map where the phone box could be.

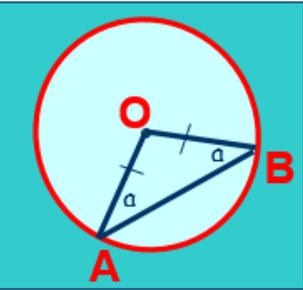
Construction Solution

- i) 2 perpendiculars and circles of given radius (5cm) to create parallel line
- ii) Circles of given radius (3cm & 5cm)
- iii) Perpendicular bisector between 2 points



Year 10 Angle & Circle facts

Previous learning: Year 9
KO Term 3&4 Angles and Polygons



If a triangle is drawn from a chord and 2 radii it must be an **isosceles**

Hegarty : 593

Example 1: OA and OB are radii of the circle. Angle AOB = 134°
Find angle OAB

$\triangle AOB$ is isosceles therefore $\angle OAB = \angle OBA$
(base angles of an isosceles triangle are equal)
 $\angle AOB = (180 - 134) \div 2 = 23^\circ$
(Sum of angles in a $\triangle = 180^\circ$)

Geometric Reasoning Problems

Always: Show your workings

- State the "angle fact" that you are relying on to make a calculation
- Check the question for additional information – if a shape is named you can rely on its properties
- Try to use the diagram effectively – draw in given lengths and angles to help you work out other angles

Never: make assumptions about a shape on what it looks like – rely on given or proven facts only!

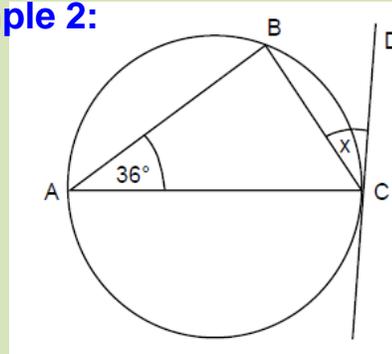
Circles Theorems

Higher Tier

Hegarty : 594-606

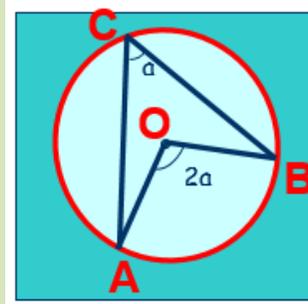
Circle theorems are just circle "angle facts"
Whenever they are applied to solve a problem you **MUST** state the circle theorem using key words:

Example 2:

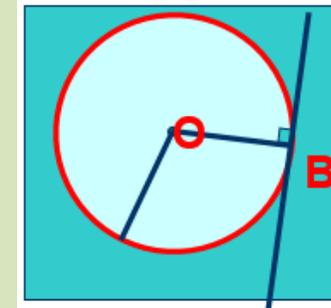


The diagram shows a circle. AC is a diameter of the circle and CD is a tangent. Work out the size of x.

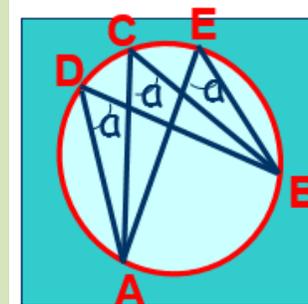
$\angle ABC = 90^\circ$ (the angle created in a semi circle is a right angle)
 $\angle BCA = 180 - (90 + 36) = 54^\circ$
(angles in a \triangle sum to 180°)
 $\angle ACD = 90^\circ$ (a radius is 90° to a tangent at that point)
Therefore $X = 90 - 54 = 36^\circ$



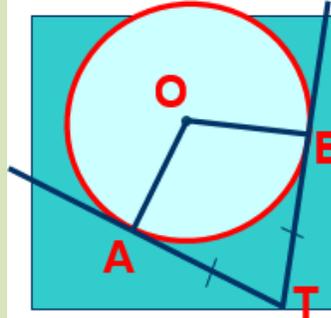
The angle at the centre is double that at the circumference drawn from the same arc



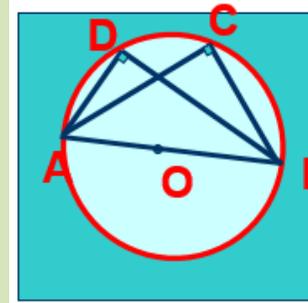
The radius and a tangent at that point are perpendicular (at 90°)



The angles drawn in the same segment from the same arc are equal

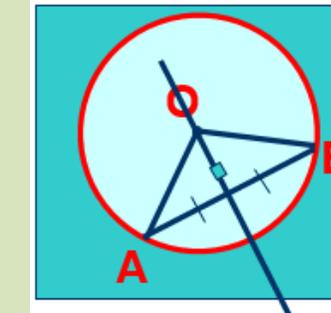


Tangents drawn from the same point are equal

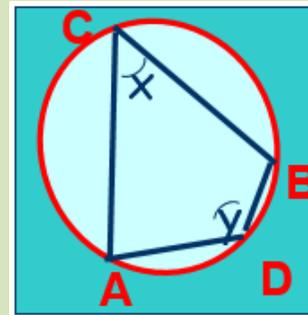


The angle in a semi-circle is a right angle

Reverse logic can also be applied: If "C" is not 90° then AB is not a diameter

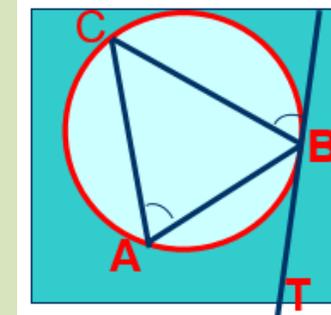


The perpendicular bisector of a chord passes through the origin



Opposite angles of cyclic quadrilaterals add up to 180

Cyclic Quadrilaterals MUST have all 4 vertices on the circumference



Alternate Angle theorem

Angle between a chord and tangent is equal to the angle drawn in the alternate segment from the same points

Reverse logic can be applied: If not equal then then TB not a tangent

Circle Theorem Proof

Example 1

Example 2

A **geometry proof** — like any mathematical **proof** — is an argument that begins with known facts, goes through a series of logical deductions, and ends with the thing you're trying to prove.

You can draw in additional lines – for instance Example 1 started by drawing in a diameter - but only “honest” ones (here point O was clearly the centre of the circle).

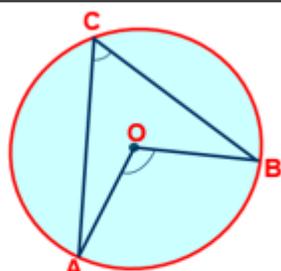
You cannot make just assumptions about lines, angles or shapes ... and you can't use the angle fact you are trying to prove in your proof of that angle fact!

Many geometric proofs are based on the properties of unique congruent triangles: SSS, SAS, ASA RHA

Most circle theorems can be proven from first principles. It is really important to state your reasoning (the “angle facts” you are relying on) at every stage.

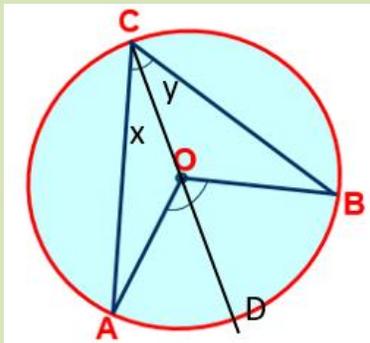
Note: These examples are not the only ways to prove these circle theorems, nor are they the only circle theorems that can be proved:

Prove that...



Angle at the centre is double that at the circumference drawn from the same arc

First step: draw in diameter, COD

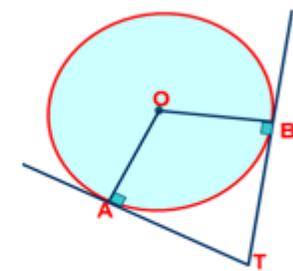


Proof: Let $\angle ACO = x$ and $\angle BCO = y$ so $\angle ACB = (x+y)$
 As $OA=OB=OC$ (radii of circle) Δs AOC and BOC are isosceles
 Therefore: $\angle ACO = \angle OAC$ and $\angle OCB = \angle OBC$
 (base angles of isosceles triangles are equal)
 $\angle AOC = 180 - 2x$ and $\angle BOC = 180 - 2y$
 (angles in a triangle sum to 180)
 $\angle AOC + \angle BOC = 180 - 2x + 180 - 2y = 360 - (2x + 2y)$
 Angles at a point sum to 360 therefore in minor sector:
 $\angle AOB = 360 - [\angle AOC + \angle BOC] = 360 - [360 - (2x + 2y)]$
 $= 2x + 2y = 2(x+y)$
 Therefore angle at the centre ($\angle AOB$) is double that at the circumference ($\angle ACB$) drawn from the same arc AB

This proof can be used at the basis to prove

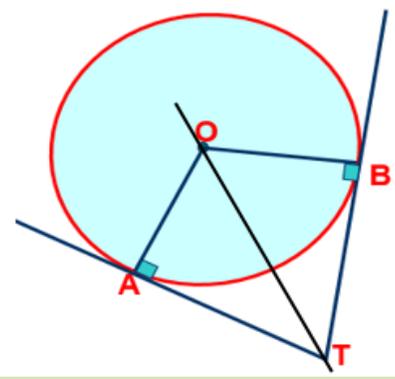
- **Angle in a semi circle is 90°**
 (because if $\angle AOB = 180$ then $\angle ACB$ must be 90)
- **Angles in the same segment are equal**
 (because centre angle will remain the same and the proof can apply to any angle drawn to the circumference in the major sector from AB)

Prove that...



Tangents drawn from the same point to a circle are equal.

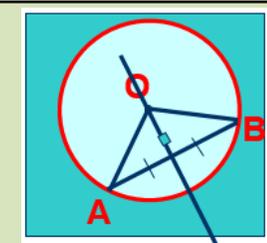
First step: draw in diagonal OT



Proof:
 $OA = OB$ (radii of a circle)
 TA and TB are tangents to a circle (given)
 Therefore: $\angle TAO = 90^\circ$ and $\angle TBO = 90^\circ$
 (radius and a tangent at that point are perpendicular)
 Therefore: $\Delta OAT = \Delta OBT$ - congruency by reason RHS
 (Right angle: $\angle TAO = 90^\circ$ and $\angle TBO = 90^\circ$)
 (Hypotenuse: OT is common)
 (Side: $OA = OB$)
 As ΔOAT and ΔOBT are congruent all corresponding sides are equal therefore $TA = TB$ and thus, tangents drawn from the same point (T) to a circle are equal

This proof can be used at the basis to prove

- **Perpendicular bisector of a chord passes through the origin**
 (because if tangents are drawn from T to A and B, this proves OATB is a kite and the properties of a kite include diagonals are perpendicular and one is bisected by the other)



KS4 Biology: B10
Homeostasis, The Nervous
System, The Brain,
The Eye

Homeostasis

- Is the regulation of the internal conditions of a cell or organism to maintain optimum conditions for function, in response to internal and external changes.
- Important for maintaining optimal conditions for enzyme action and all cell functions.
- In the human body homeostasis includes control of blood glucose concentration, body temperature and water levels.
- The automatic control systems may involve nervous or chemical responses.
- All control systems include receptors coordination centres and effectors.

Keyword	Definition
Central Nervous System (CNS)	The brain and spinal cord, it is where reflexes and actions are coordinated.
Coordination Centre	An organ that processes information from receptors and organises a response from the effectors.
Effectors	Either a muscle or gland that responds to nervous impulses.
Enzymes	A protein that acts as a biological catalyst. E.g.) Protease, lipase, amylase
Eukaryote Cell	Complex cell such as a plant or animal cell.
Glycogen	A molecule that acts as a store of glucose in liver and muscle cells.
Homeostasis	Regulation of a constant internal environment
Negative Feedback	A mechanism that restores a level back to optimum in a system.
Optimum Level	A level of something that enables the body to work at its best.
Peripheral Nervous System	The neurones that link the senses to the CNS

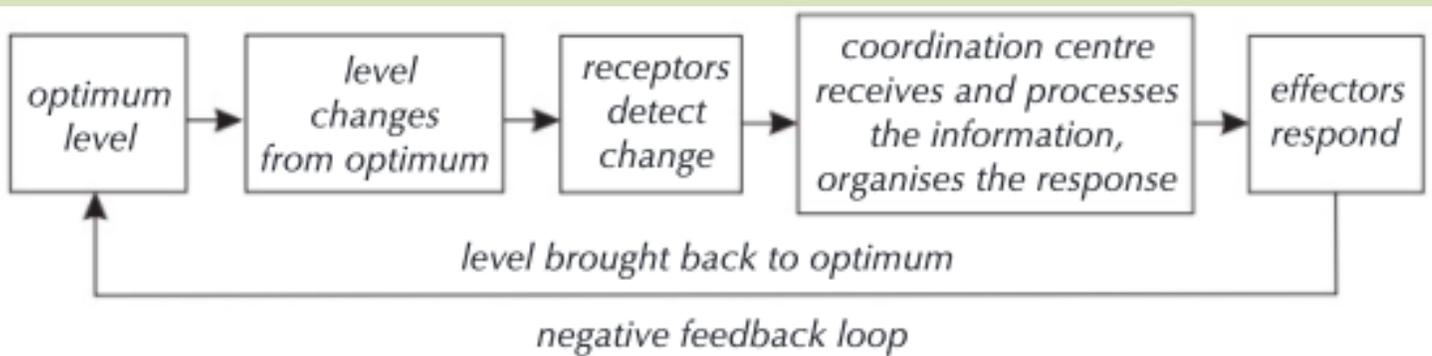


Figure 1: A negative feedback mechanism.

Example

Body temperature is usually kept within 0.5 °C above or below 37 °C.

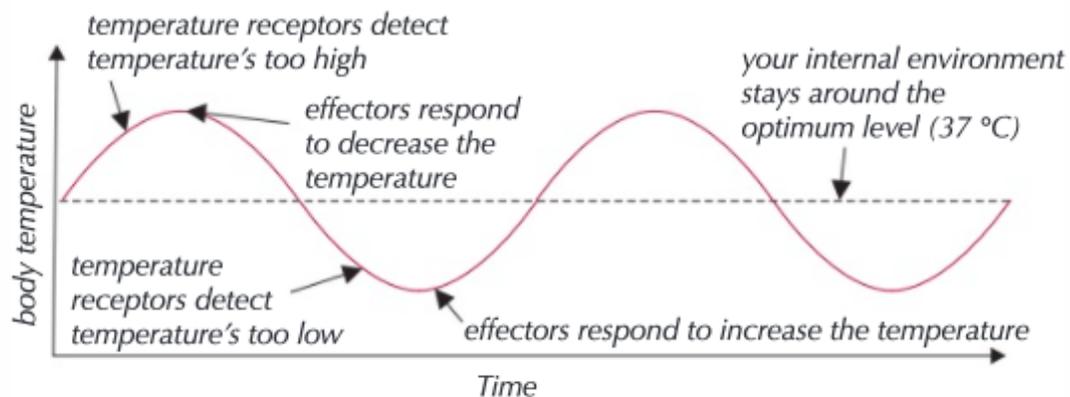
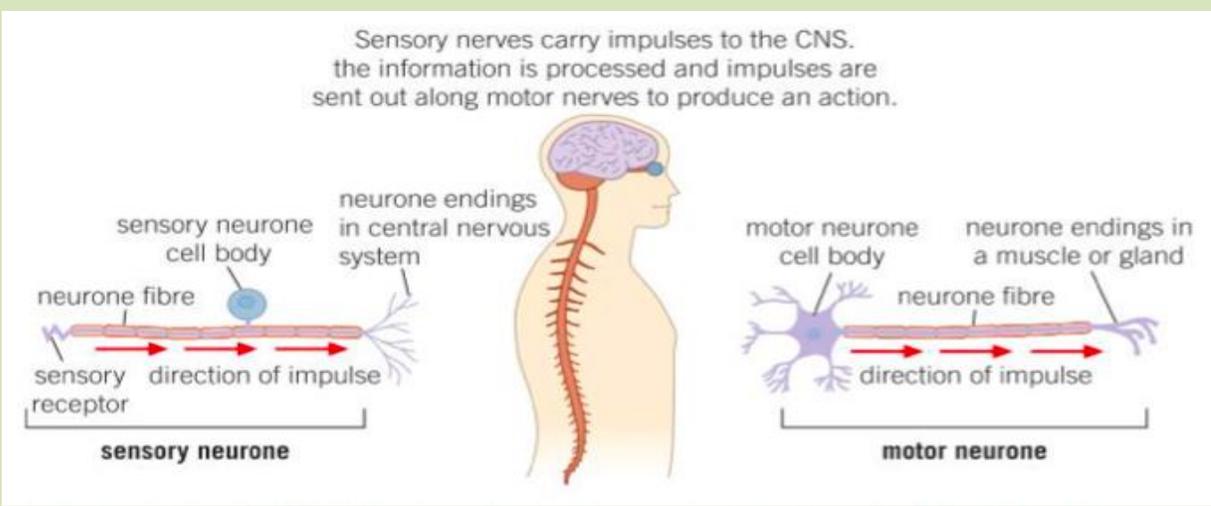


Figure 2: Control of body temperature via negative feedback.

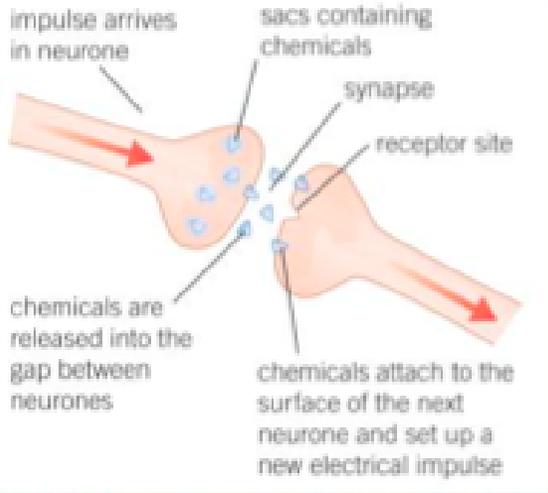
Tip: A negative feedback system responds when a level changes from its optimum point, in order to bring the level back to optimum. It's a continuous, looping process.

Keyword	Definition
Motor Neurones	A nerve cell that carries electrical impulses from the CNS to effectors.
Sensory Neurones	A nerve cell that carries electrical impulses from the receptors in the sense organs to the CNS.
Stimulus	A change in the environment.



The Nervous System

- The nervous system uses electrical impulses to enable you to react quickly to your surroundings and coordinate your behaviour.
- Cells called receptors detect stimuli.
- Impulses from receptors pass along sensory neurones to the CNS. The brain coordinates the response, and impulses are sent along motor neurones from the brain to the effector organs.

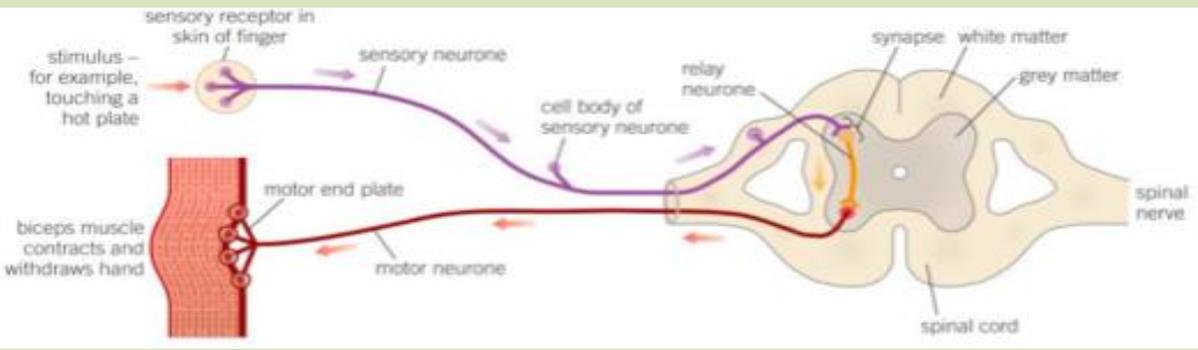


Reflexes

- Reflex actions are automatic and rapid and do not involve the conscious parts of the brain.
- Reflexes involve sensory, relay and motor neurones.
- Reflex actions control everyday bodily functions, such as breathing and digestion and help avoid danger.

KS4 Biology separate science only

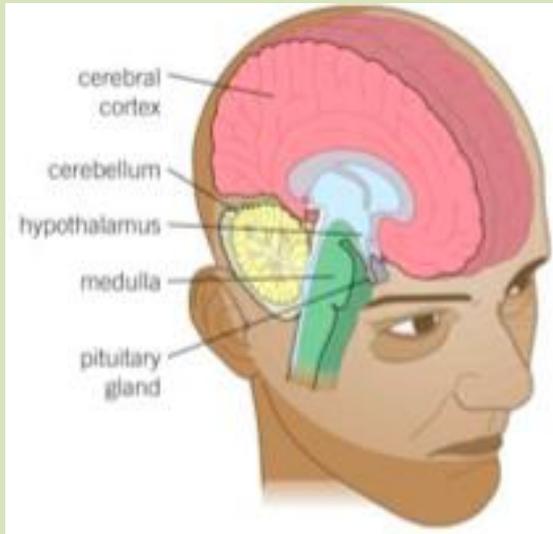
Keyword	Definition
Accommodation	The ability of focusing on near or distant objects by changing the shape of the lens in the eye.
Cerebral Cortex	Part of the brain concerned with consciousness, intelligence, memory and language.
Cerebellum	Part of the brain concerned mainly with coordinating muscular activity and balance.
Medulla	Part of the brain concerned with unconscious activities, such as controlling the heartbeat, the movements of the gut and breathing.
MRI	A tube like machine that can be used to produce a very detailed picture of the brain's structures.
Magnetic Resonance Imaging	



KS4 Biology separate science only

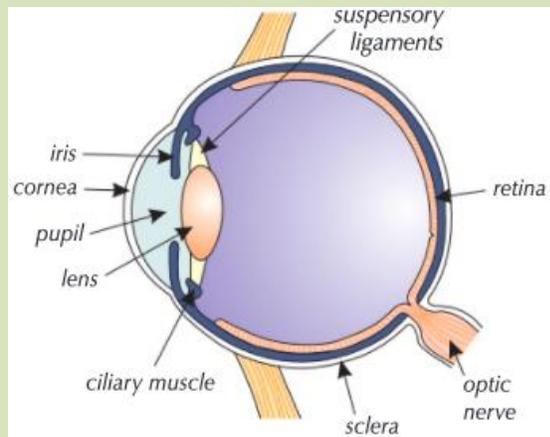
The Brain

- The brain is made up of billions of interconnected neurons that control complex behaviour.
- It has different regions with important functions.
- Scientists map regions of the brain to their functions by studying patients with brain damage, by electrically stimulating different areas of the brain and using MRI scanning techniques.



The Eye

- A sense organ containing receptors in the retina that are sensitive to light intensity and colour.

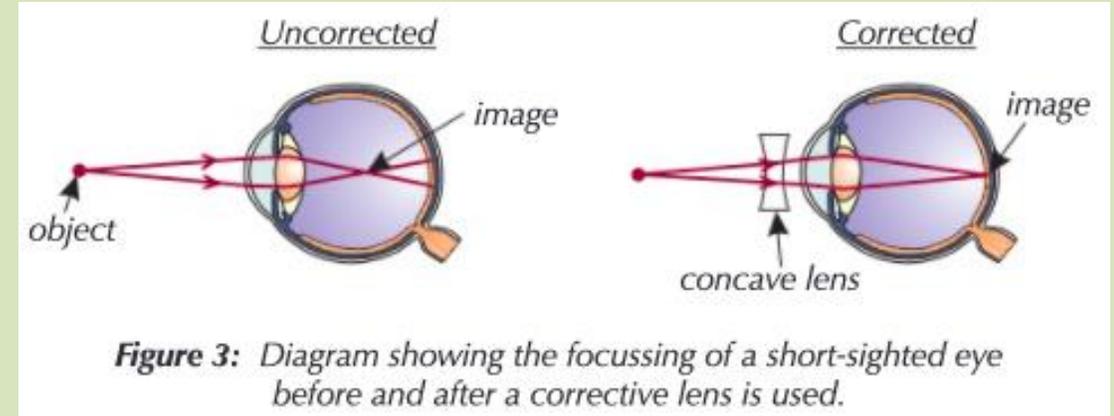


Common defects of the eye

- To focus on close objects the ciliary muscles contract, the suspensory ligaments loosen and the lens becomes thicker so it can refract light rays strongly.
- To focus on distant objects the ciliary muscles relax, the suspensory ligaments are pulled tight and the lens is pulled thin so it only refracts the light rays slightly.
- Sight defects can be treated using spectacle lenses, hard and soft contact lenses, laser surgery and replacement lenses in the eye.

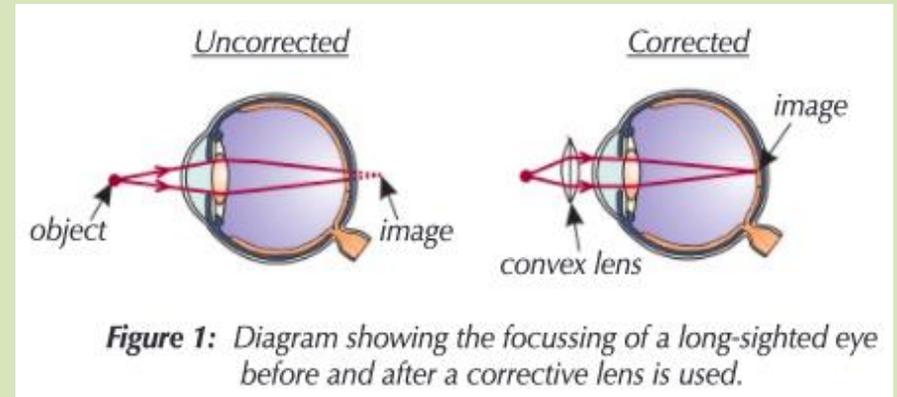
Myopia

- Short-sightedness, unable to focus on distant objects.
- The lens is the wrong shape and refracts the light too much or the eyeball is too long.



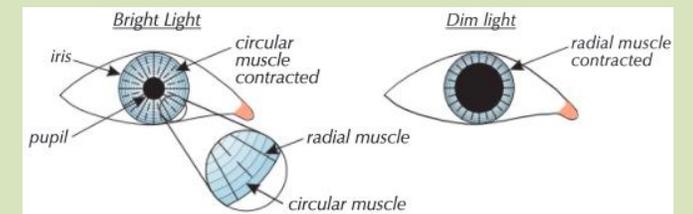
Hyperopia

- Long-sightedness, unable to focus on near objects.
- Lens is the wrong shape and doesn't refract the light enough, the objects are brought into focus behind the retina.



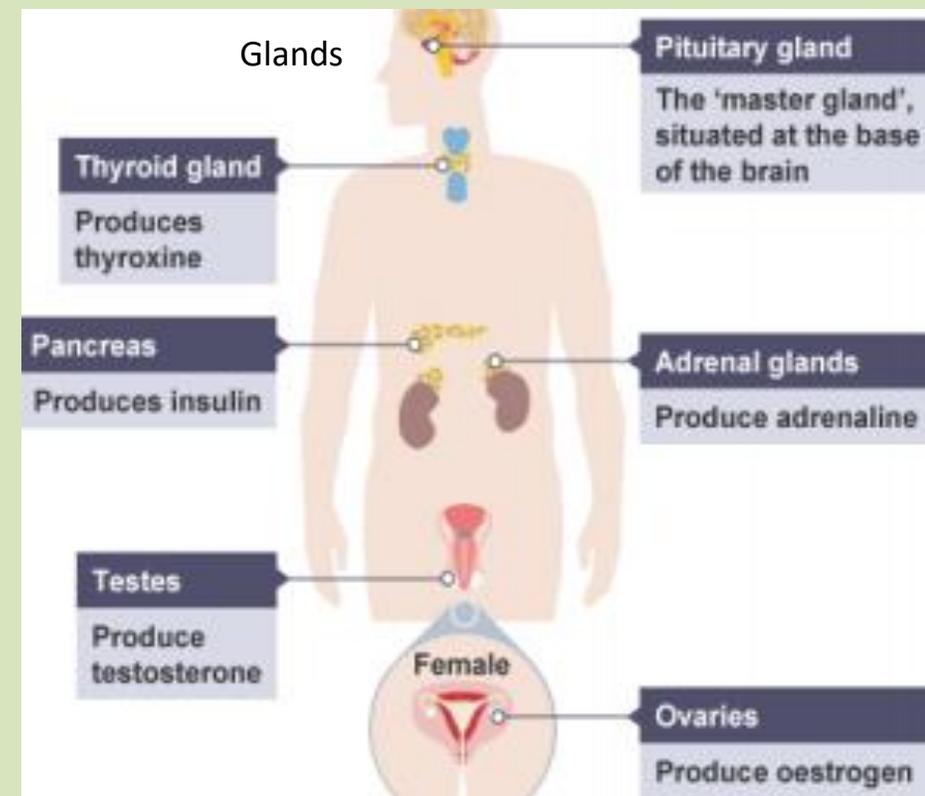
The Iris Reflex

This process avoids damage to the eye

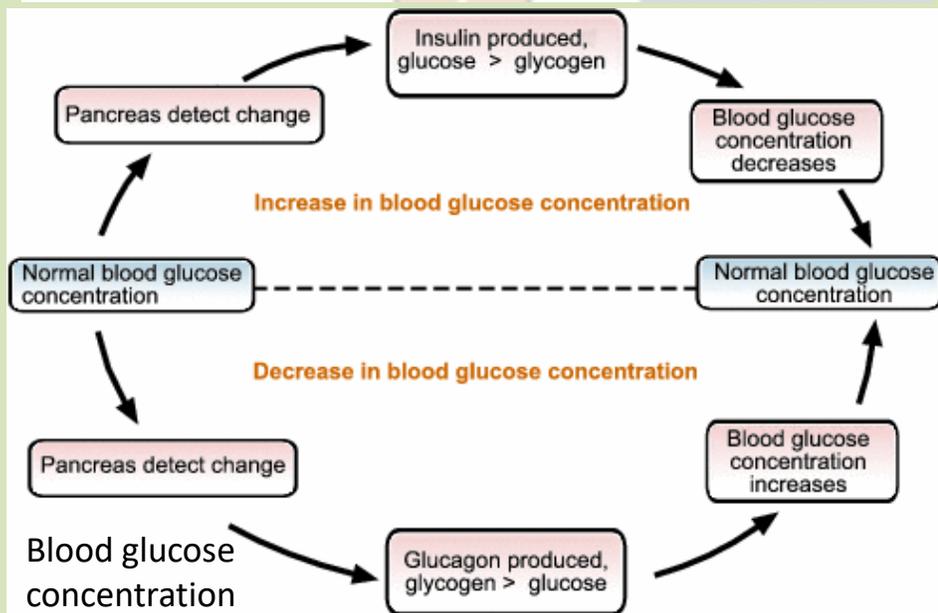


KS4 Biology: B11 Hormonal Coordination

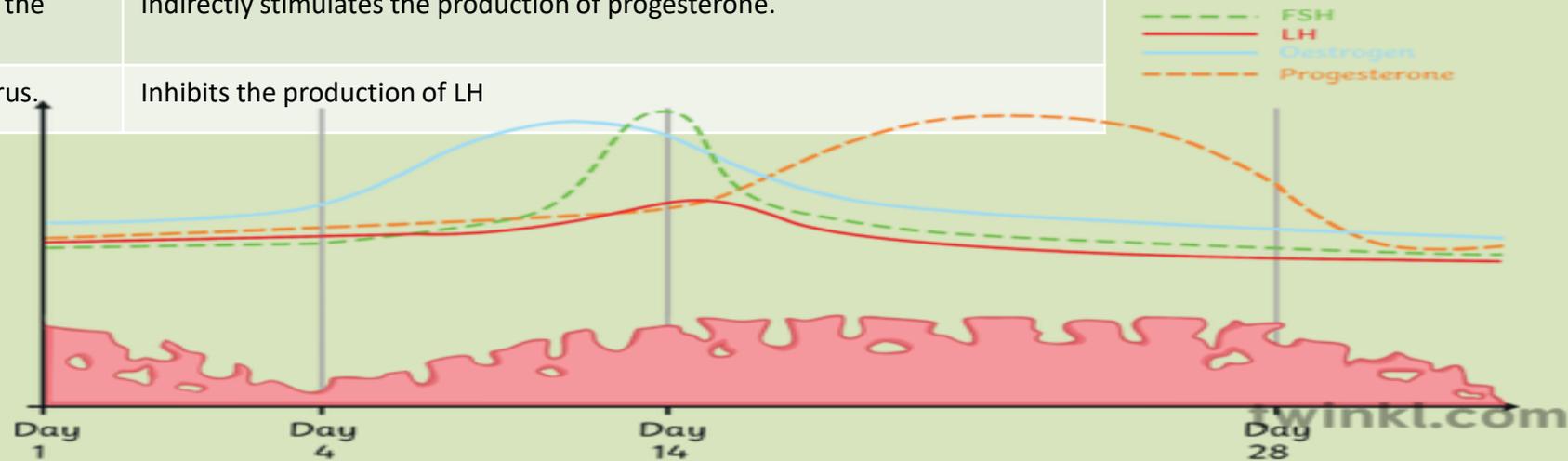
Key word	Definition
Homeostasis	Maintaining the body's conditions within narrow physical and chemical limits so enzymes and cell functions can work. E.g. blood glucose levels, temperature, water levels.
Endocrine system	The glands that produce hormones.
Hormones	Chemicals made in glands that travel through the blood to effect the function of another part of the body.
Stimulus	Change in the environment eg sound, heat, light.
Receptors	Detect stimuli.
Coordination centre	Eg 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).



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	Reduces blood glucose by causing cells to absorb glucose for use in respiration and for storage as glycogen.
Glucagon	Increases blood glucose by releasing glucose from glucagon storage.
Glycogen	Human storage polymer for glucose.



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. 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



Method	How it works	Pros/Cons
The pill (hormone oral)	Oestrogen/progesterone in the pill inhibits FSH so no eggs mature.	☺ Easy to take, can be easily reversed. ☹ Mild side effects, can lead to pregnancy if not taken. No STI protection.
Injection, implant, skin patch	Contains progesterone to inhibit LH release so no ovulation.	☺ Given by GP, reliable. ☹ Can take time to reverse the effects. No STI protection.
Condoms	Physical barrier to prevent sperm reaching the egg.	☺ Easy to use, reliable, protects against most STIs. ☹ Can fail.
Intrauterine device (coil)	Inserted into uterus by GP/nurse. Can release hormones, prevents implantation of the embryo in the uterus.	☺ Requires little or not aftercare, very reliable. ☺ No STI protection.
Spermicide	Kill or immobilise sperm.	☺ Easy to use. ☹ Less effective when used alone. No STI protection.
Abstaining from sex	No sex near time of ovulation, reduce likelihood of fertilisation	☺ Inexpensive ☹ not always reliable.
Surgery	Males – tie tubes delivering sperm. Females – block oviducts.	☺ Risks from surgery. ☺ Difficult/impossible to reverse.

Higher Tier Only

Infertility

FSH and LH given to stimulate normal ovulation.

IVF: FSH and LH stimulate eggs to mature. They are collected before ovulation.

Fertilised using sperm in a lab.

Embryos inserted into woman's uterus for implantation.

If successful it's a normal pregnancy!

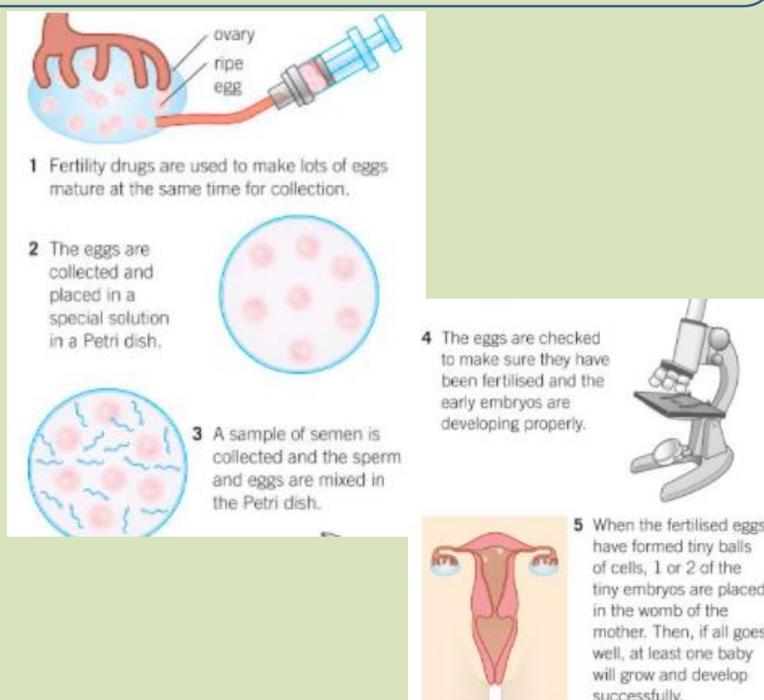
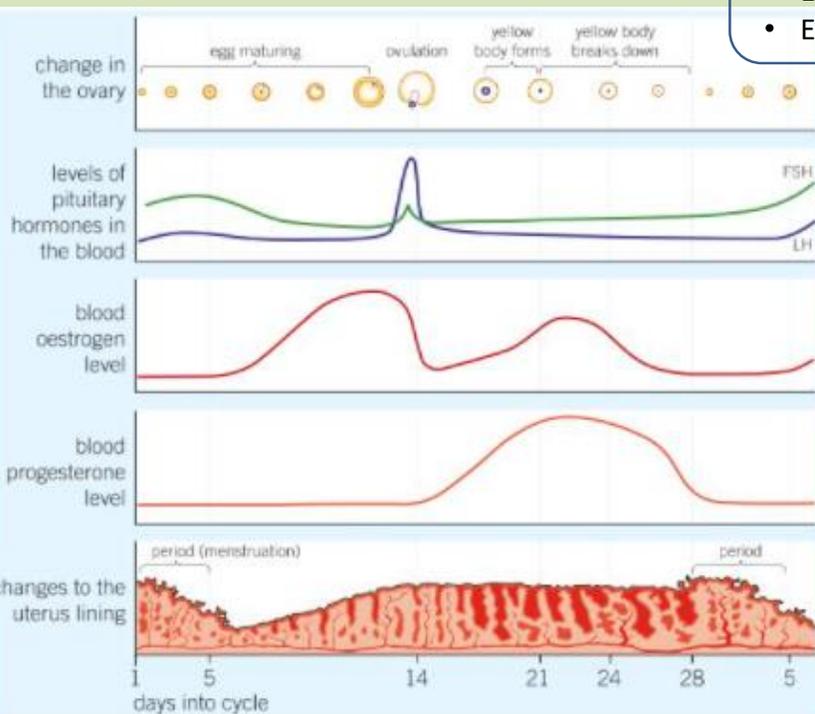
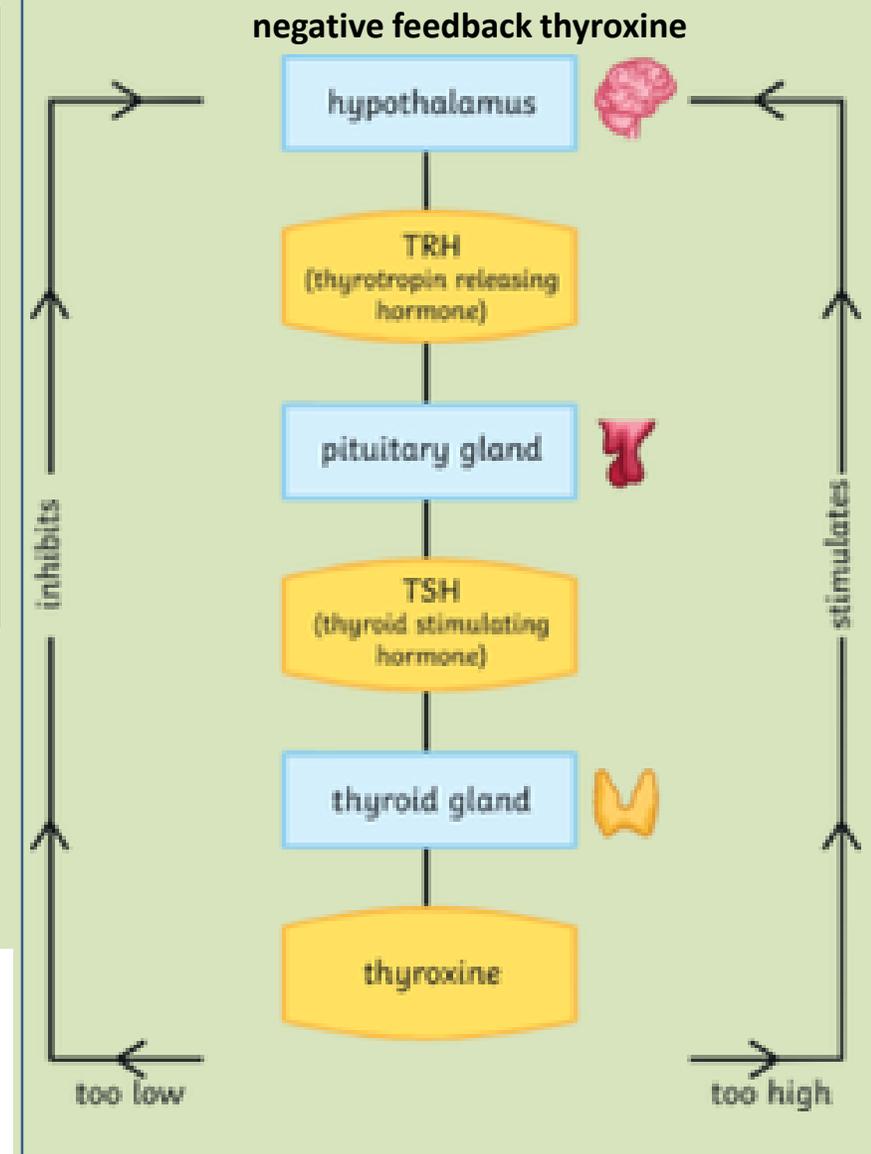
IVF:

Advantages

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

Disadvantages

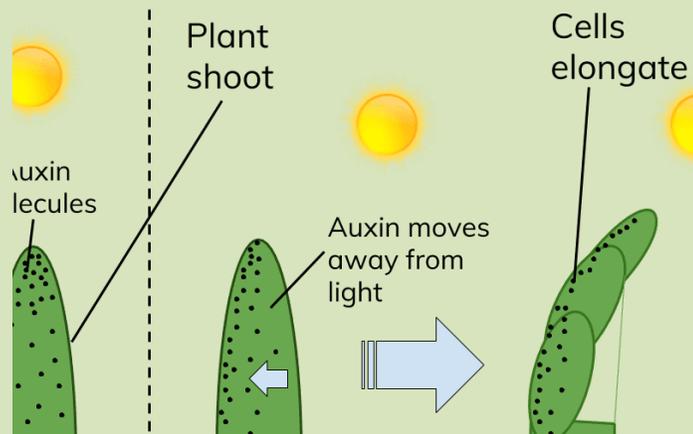
- Expensive
- Not always successful
- The older the parents, the less likely it is that they will have a baby
- Use of fertility drugs can have health risks for mother
- Increases the chances of multiple pregnancy which increases risks to both mothers and babies, which can lead to premature births and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



Adrenaline is a hormone produced by the adrenal gland, released in response to stress or fear. Acts on lungs and heart and vasodilation to increase oxygen supply for respiration in muscles – fight or run away.

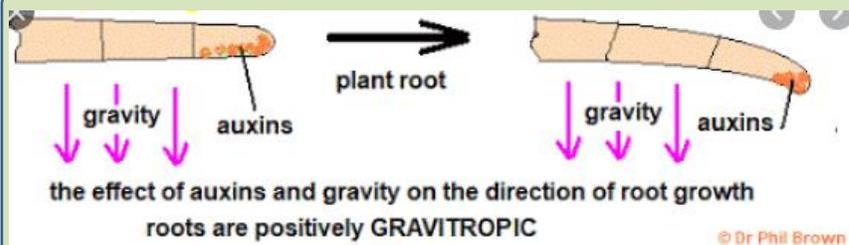
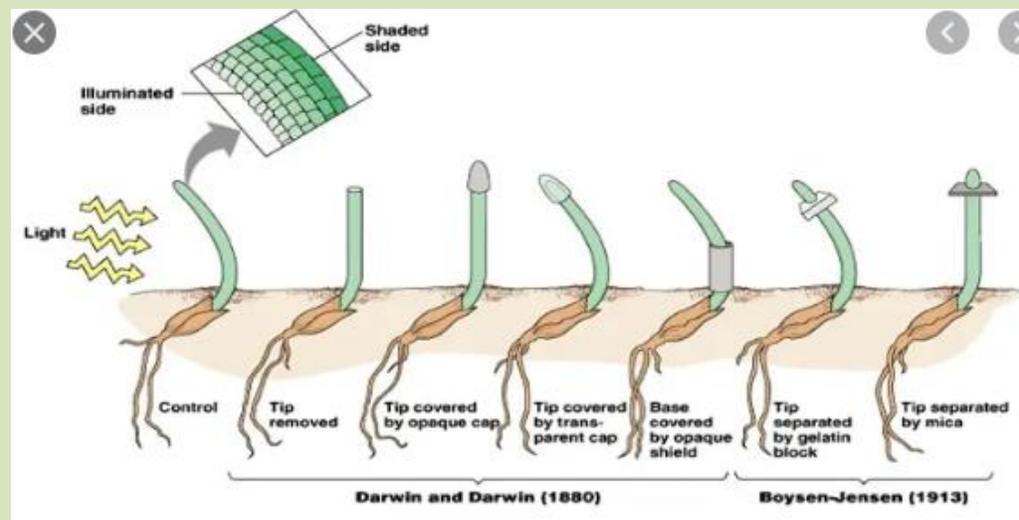
Figure 3 The main events of the menstrual cycle

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 plant'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 plant'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).

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

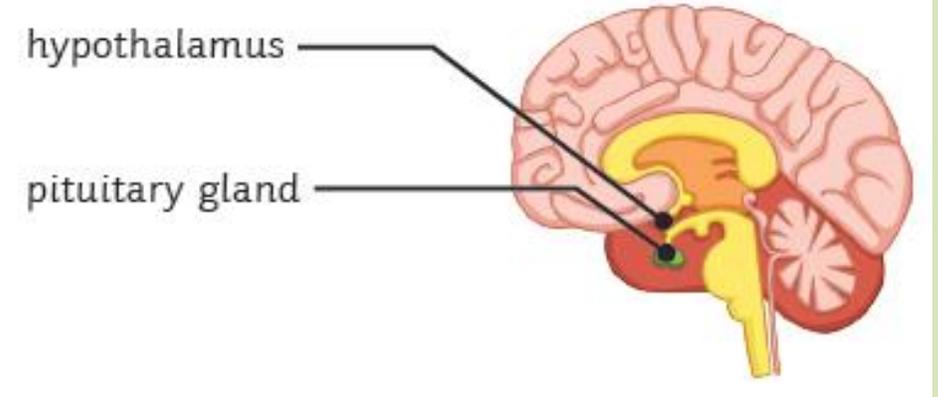
Method – growth of seedling

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.

Hormone	Uses	Commercial uses
Auxins	Controlling plant growth	Kill broad leaved plants eg weeds in lawn but not kill grass. Growing plants from cuttings using auxin rooting powder. 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.

KS4 Biology: B12 Homeostasis in action
Separate Science

Controlling body temperature – 37°C



Key word	Definition
Thermoregulatory centre	The area of the brain that is sensitive to the temperature of the blood.
Receptor	Cells that detect stimuli .
Stimuli	Changes in the internal or external environment.
Vasodilation	The dilation or opening up of the blood vessels.
Vasoconstriction	The constriction or narrowing of the blood vessels.
Exothermic	Reactions that transfer energy to the surroundings and the temperature of the surroundings increases.
Urea	The nitrogenous waste produced by the breakdown of excess amino acids in your liver .
Urine	Excess mineral ions, water and urea are removed from the body in urine.
Selective reabsorption	The process in the kidney where the materials needed in the body such as glucose, some mineral ions and water are reabsorbed back into the blood from the filtrate.
ADH	Anti-diuretic hormone helps control the water balance of the body and affects the amount of urine produced by the kidney.
Dialysis	The process of cleansing the blood through a dialysis machine when the kidneys fail.
Osmosis	Movement of water from a dilute to a concentrated solution.

Body temperature is monitored and controlled by the **thermoregulatory** centre in the brain.

The skin contains temperature **receptors** and sends nervous impulses to the **thermoregulatory** centre.

If the body **temperature is too high**:

- blood vessels dilate (**vasodilation**)
- sweat is produced from the sweat glands
- Both these mechanisms cause a transfer of energy from the skin to the environment.

If the body **temperature is too low**:

- blood vessels constrict (**vasoconstriction**)
- sweating stops
- skeletal muscles contract (shiver) (more respiration which is **exothermic**).

HINT: never say that capillaries dilate or constrict – they can't as they have no muscle layer. The blood vessels that supply capillaries dilate and constrict (arterioles).

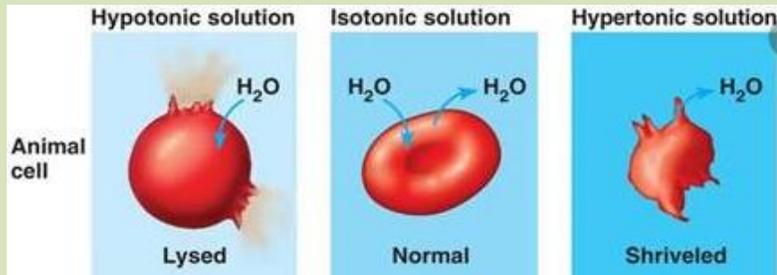
Homeostasis of water:

Water leaves the body via the lungs during exhalation (breathing out).

Water, ions and urea are lost from the skin in sweat. There is no control over water, ion or urea loss by the lungs or skin.

Excess water, ions and urea are removed via the kidneys in the urine.

If body cells lose or gain too much water by osmosis they do not function efficiently.



Higher Tier Only

The water level in the body is controlled by the hormone ADH which acts on the kidney tubules.

ADH is released by the pituitary gland when the blood is too concentrated and it causes more water to be reabsorbed back into the blood from the kidney tubules.

This is controlled by negative feedback.

Further Reading

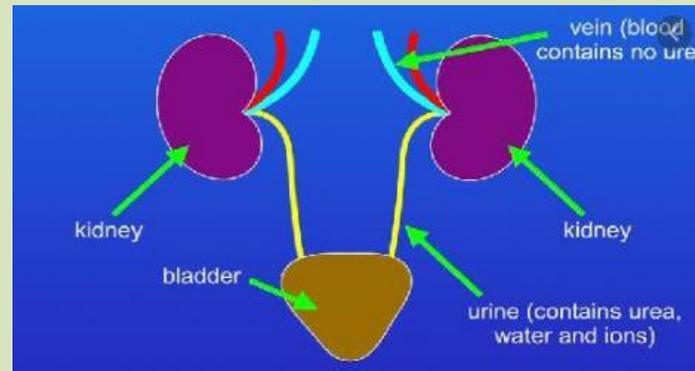
<https://www.bbc.co.uk/bitesize/articles/zngv382>

Higher Tier Only

The digestion of proteins from the diet results in excess amino acids which need to be excreted safely.

In the liver these amino acids are **deaminated to form ammonia**.

Ammonia is toxic and so it is immediately converted to **urea** for safe excretion.



Filtration of the blood

1. As the blood passes through the kidney, the small molecules are filtered out and pass into the kidney.

- The small molecules filtered out include: glucose, urea, ions and water.
- Large molecules such as protein are too big so stay in the blood.

2. Selective reabsorption – useful substances are reabsorbed back into the blood.

- All of the glucose by diffusion and active transport.
- Some of the water as needed by the body by osmosis.
- Some of the ions as needed by the body by active transport.

If both kidneys fail, **dialysis** or a **kidney transplant** is needed. Dialysis is time consuming and is used while a kidney donor can be found – but no rejection problems or operation like transplants – transplants are cheaper overall.

Unfiltered blood is taken from the patient and is **pumped into the dialysis machine** – it is kept separate from the dialysis fluid by a **partially permeable membrane**.

The blood flows in the opposite direction to the dialysis fluid to maintain the concentration gradient.

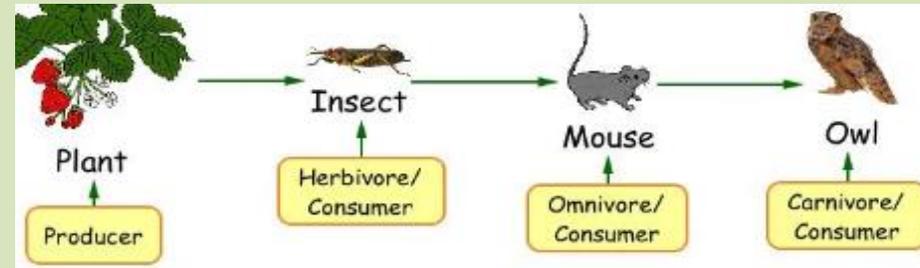
The dialysis fluid contains glucose, ions and no urea.

Urea moves across the membrane by diffusion. The glucose and ion concentration are similar to required concentrations so only excess ions leave the blood and no glucose.

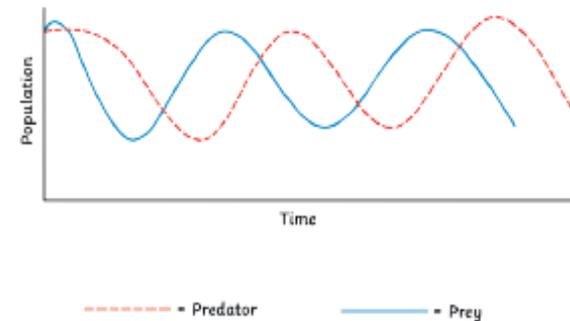
KS4 Biology: B17 Organising an Ecosystem

Keyword	Definition
Biodiversity	The variety of living organisms in an ecosystem.
Community	Made up of populations of different species living in a habitat.
Consumers	Feed on other organisms for their energy. Can be primary, secondary or tertiary.
Decomposers	Organisms which feed on dead or decaying organisms. They break down biomass and release nutrients into the soil.
Ecosystem	The interaction between the living organisms (biotic) different factors of the environment.
Habitat	Where a living organism lives.
Interdependence	The interaction between two or more organisms, where it is beneficial for both species.
Population	The number of individual organisms of a single species living in a habitat.
Predator	Organisms which kill for food. Apex predators are at the top of the food chain and not prey for any organism.
Prey	The animals which are eaten by the predators.
Producers	Convert the sun's energy into useful compounds through photosynthesis. They are green plants or algae.
Species	Organisms with similar characteristics that are able to breed to produce fertile offspring.

Food chain – simple model of the feeding relationships in an ecosystem. The arrows show the direction the energy flows in.



Populations of predators and prey increase and decrease in cycles. The size of the predator population depends on the size of the prey population and vice versa. Overall, there is a stable community.



The decay cycle

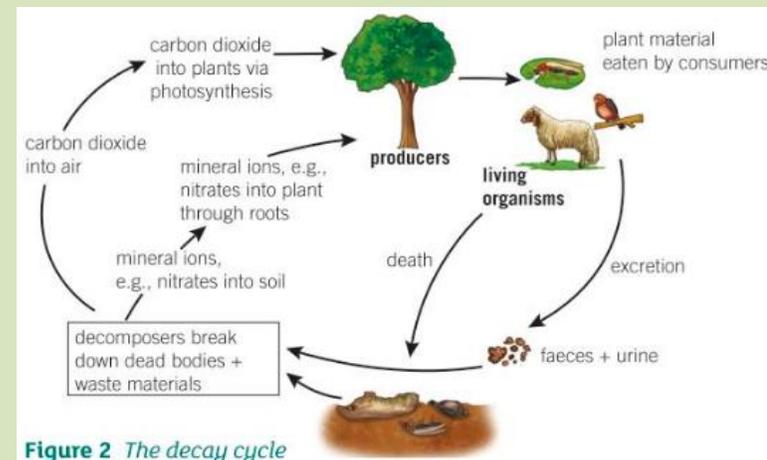
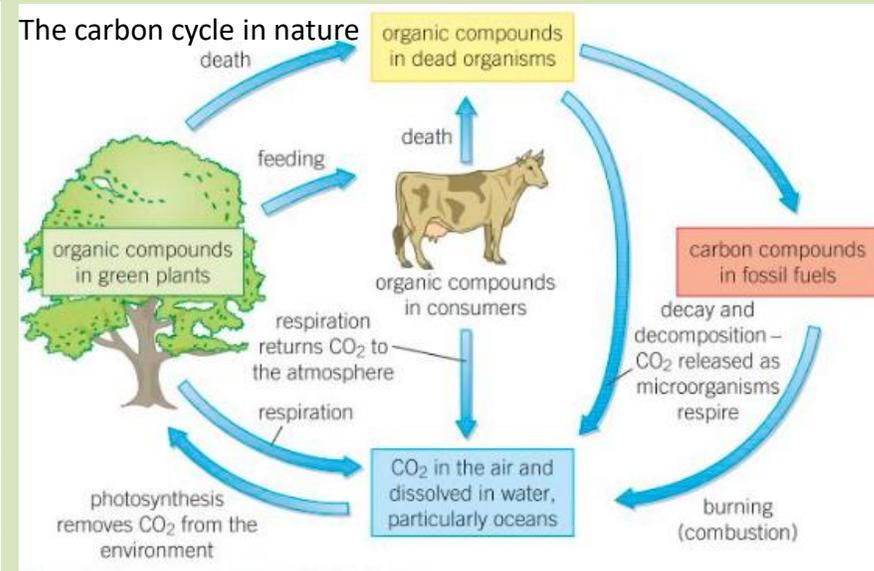


Figure 2 The decay cycle

Keyword	Definition
Condensation	Water cooling from a gas to a liquid.
Precipitation	Water droplets big enough to fall as rain, sleet, hail, snow etc.
Evaporation	Water heating to go from a liquid to a gas.
Transpiration	Loss of water vapour from plants (link to xylem and stomata).
Aerobic respiration	Glucose + oxygen → water + carbon dioxide
Percolation	Movement of water through the gaps in soil and rocks.
Photosynthesis	Water + carbon dioxide → glucose + oxygen
Combustion	Fuel + oxygen → water + carbon dioxide



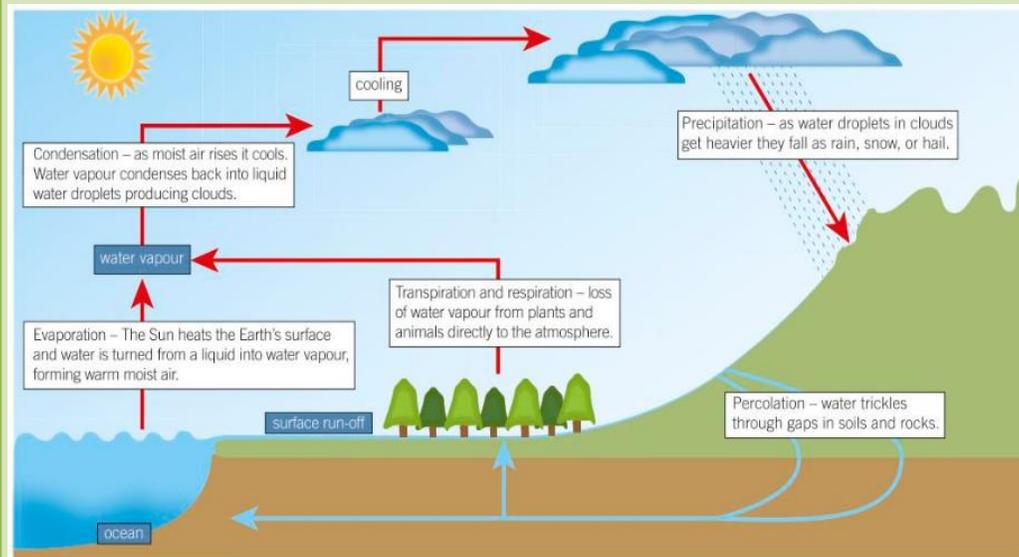
Separate science - Biology only Rates of decomposition

Conditions for decay (decay needs microorganisms to do aerobic respiration): Warm, moist, oxygen.
Gardeners and farmers try to optimise conditions for decay of waste to make compost.

REQUIRED PRACTICAL

The effect of temperature on the rate of decay on fresh milk by measuring pH change.
As milk decays it becomes more acidic – if milk is in a warmer location it will decay faster.

The water cycle



Further resources

<https://www.bbc.co.uk/bitesize/guides/zwt482p/revision/3>
<https://www.savemyexams.co.uk/revision/gcse-biology-aqa-new/ecology/organisation-of-an-ecosystem/>

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.

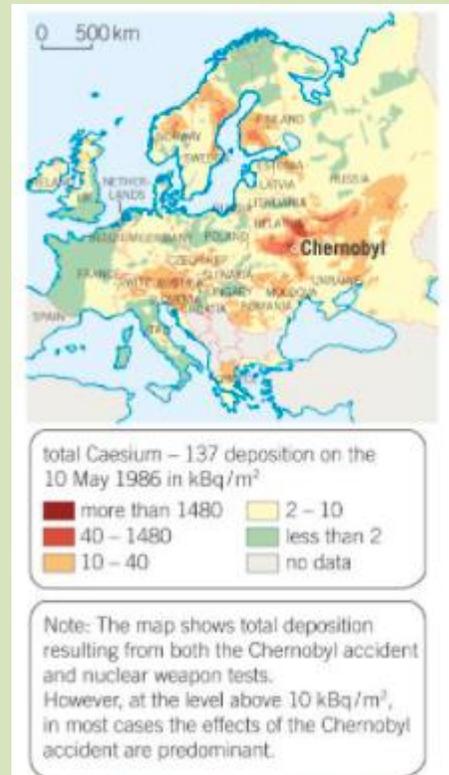
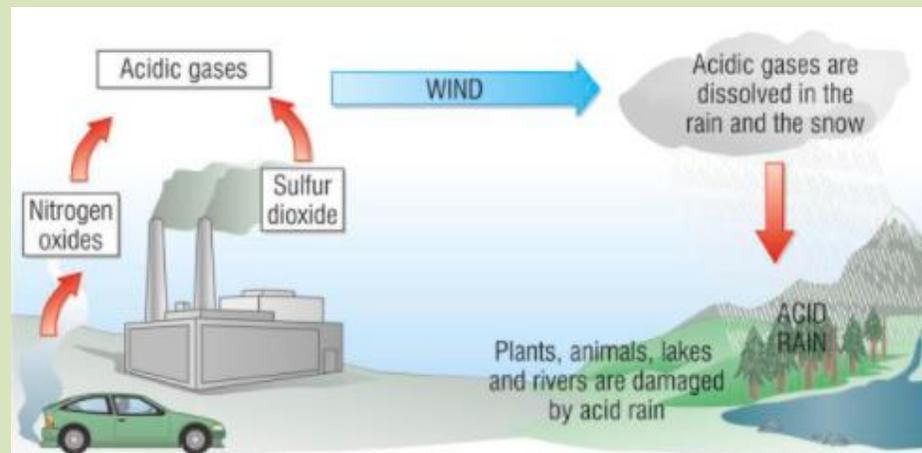


Figure 1 The accident at Chernobyl nuclear power plant polluted the land a long way away – including areas of the UK



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 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.

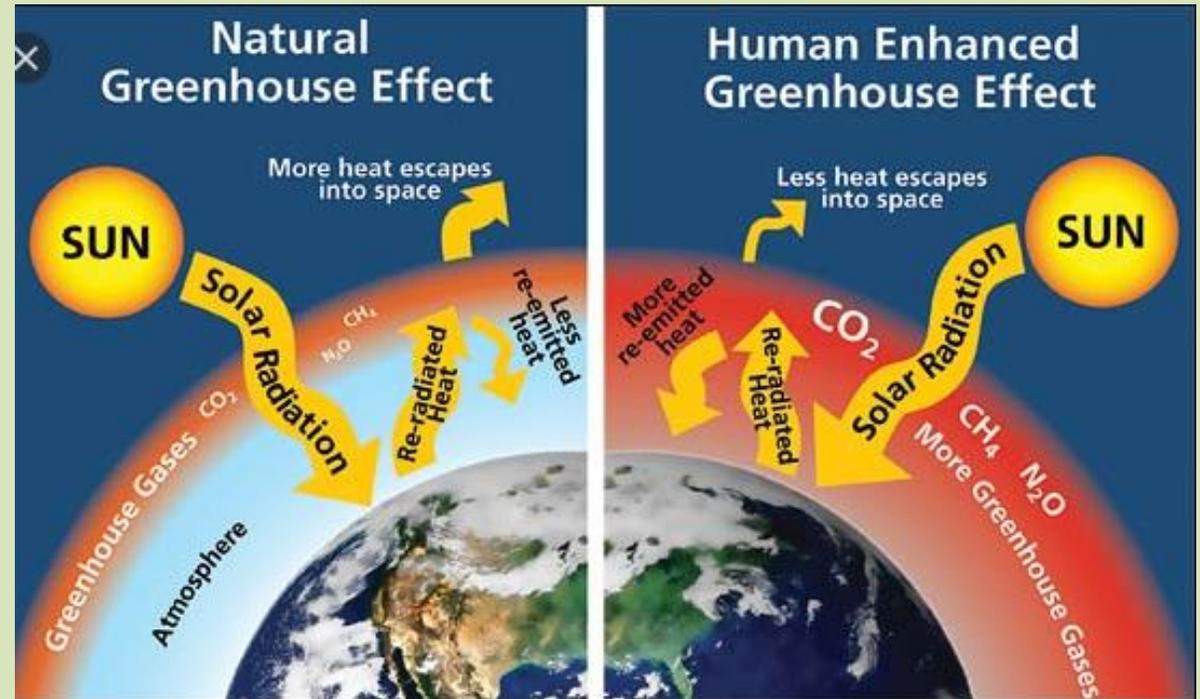
Greenhouse effect is a natural process where some of the Sun's radiation is trapped within the insulating layer of **carbon dioxide** in the atmosphere. Most of the radiation from the Sun is absorbed by the Earth, the rest is reflected into the atmosphere and re-emitted in all directions.

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).

Trophic levels

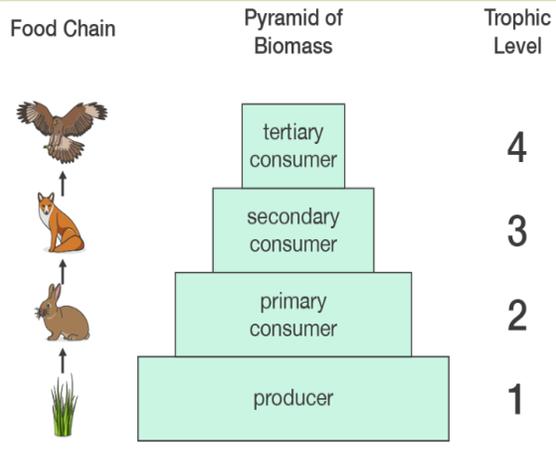
- **Level 1: Plants** and **algae** make their own food (by photosynthesis) and are called **producers**.
- **Level 2: Herbivores** eat plants/algae and are called **primary consumers**.
- **Level 3: Carnivores** that eat herbivores and are called **secondary consumers**.
- **Level 4: Carnivores** that 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

Producers 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

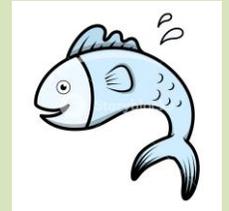
Biological factors affecting food security:

- Increased birth rate
- Changing diet in developed world -> scarce 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 Chemistry: C12 Chemical analysis

Pure substances

The word **pure** is used in chemistry in a different way from its everyday meaning.

For example, cartons are often labelled as 'pure' orange juice. The label means that the contents are just orange juice, with no other substances added.

However, the juice is not pure in the chemical sense, because it contains different substances mixed together

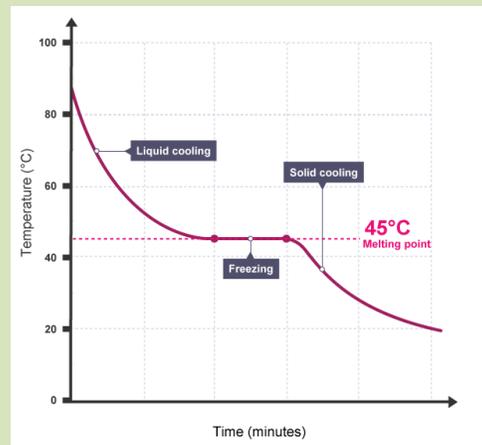
Examples of pure and impure substances:

Description	Example	Diagram
Pure element	Oxygen	
Pure compound	Carbon dioxide	
Mixture of elements	Oxygen and helium	
Mixture of compounds	Alcohol and water	
Mixture of elements and compounds	Air	

Distinguishing between pure substances and mixtures;

Pure substances have a clear melting point, where as mixtures melt over a range of temperatures – this is clearly seen on a graph showing a cooling curve;

The horizontal part of the graph shows that the salol has a sharp melting point, so it is pure.

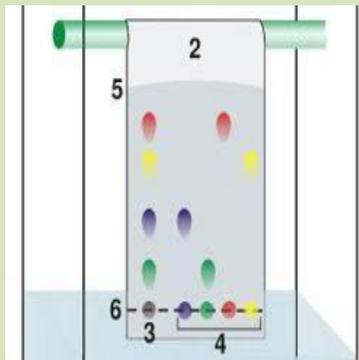


Formulations: Many consumer products are made up of complex mixtures, paints (contain pigment, binder and solvent), and cleaning agents (surfactant, water and colouring).

Paper chromatography

Technique used to separate mixtures of soluble substances and to provide information on the possible identity of the substances present in the mixture.

These are often coloured substances such as food colourings, inks, dyes or plant pigments.



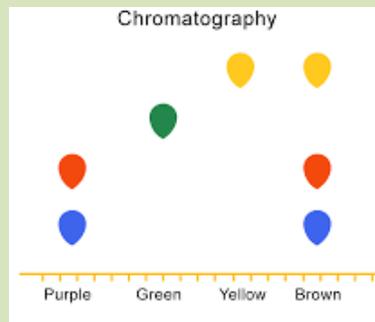
Keyword	Definition
Pure substance	Consists of only one element or one compound
Mixture	Consists of two or more different substances, not chemically joined together
Formulation	Is a mixture which has been designed as a useful product, e.g. medicines, fuels and foods
Soluble	A substance able to dissolve in a solvent
Solvent	A liquid that dissolves a solute to form a solution
Solute	The substance that dissolves to make a solution
Solution	Mixture formed by a solute and a solvent.
R_f (retention factor)	A measurement from chromatography: it is the distance a spot of substance has been carried above the baseline divided by the distance of the solvent front
Mobile phase	Phase in chromatography that moves, usually a solvent or mixture of solvents.
Stationary phase	Phase in chromatography that does not move, for instance, the paper.

Interpreting a chromatogram

You might be asked to determine the number of substances contained in a pigment or ink.

A chromatogram can be used to distinguish between **pure** and **impure** substances

- Pure substances will produce one spot on a chromatogram
- Impure substances will produce more than one spot on a chromatogram



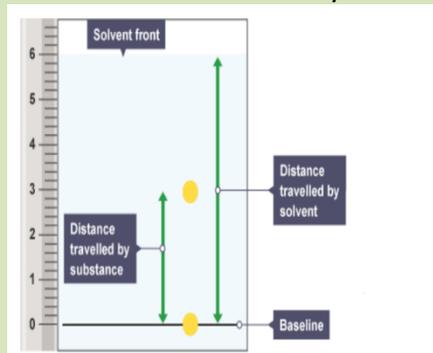
R_f values

R_f values can be used to identify unknown chemicals if they can be compared to a range of reference substances.

The R_f value is always the same for a particular substance if run in the same solvent system.

The R_f value of a spot is calculated using:

$$R_f = \frac{\text{distance travelled by substance}}{\text{distance travelled by solvent}}$$



Testing for Gases:

Hydrogen:

Collect a test tube of the product; place a lit splint in the gas and if positive a squeaky pop goes off.

Safety: wear eye protection

Oxygen:

Collect a test tube of the product; place a glowing splint in the gas and if positive it will relight.

Safety: wear eye protection

Required practical – investigating the composition of inks

Aim

To investigate how paper **chromatography** can be used to separate and tell the difference between coloured substances.

Method

1. Draw a pencil line across the chromatography paper, 1 - 2 cm from the bottom of the chromatography paper – **Use pencil as this will not run and blend with the ink samples**
2. Use a pipette or capillary tube to add small spots of each ink to the line on the paper
3. Place the paper into a container with a suitable solvent in the bottom allow the solvent to move through the paper, **make sure the solvent does not start above the pencil line**, remove the **chromatogram** before the solvent reaches the top
4. Allow the chromatogram to dry, then measure the distance travelled by each spot of pigment and by the solvent, **use mm not cm as this gives you a more precise measurement**
5. Calculate the R_f value for each spot

Risks, Hazards and precautions

As with all practicals in science it is important that you use correct apparatus and methods and can talk about why these were used and how you carried out the experiment safely.

Example risk assessment;

Hazard	Possible harm	Possible precaution
Harmful solvent	Skin irritation	Avoid skin contact, eg wear gloves
Harmful solvent	Breathing difficulties	Ensure adequate ventilation or use a fume cupboard

Testing for Gases:

Carbon dioxide:

Bubble the product through limewater; if positive the lime water turns cloudy.

Safety: wear eye protection

Chlorine:

Collect the product; if positive blue litmus paper turns white (it is bleached)

Safety: chlorine gas is toxic gas must be collected in a fume cupboard

Separate Science Only:

Test for Negative Ions (Anions)

Carbonates:

Add dilute acid to a carbonate, it fizzes producing carbon dioxide gas.

Most carbonates do not dissolve in water, but Group 1 are soluble in water.

Halides:

Add dilute nitric acid and then silver nitrate solution.

If a precipitate forms there are halides present.

Iodide ions I^- = yellow precipitate

Bromide ions Br^- = cream precipitate

Chloride ions Cl^- = white precipitate

Sulfates:

Add dilute hydrochloric acid followed by barium chloride solution.

A white precipitate tells you sulfate ions are present.

Instrumental Analysis

Important in the work of environmental agencies fighting pollution.

Advantages:

Highly accurate and sensitive

Quicker

Enable small samples to be analysed

Disadvantages:

Very expensive

Special training

Results need comparing

Test for Positive Ions (Cations)

Some metal ions, produce flames with characteristics colour:

Method:

1. Nichrome wire loop should be dipped in concentrated hydrochloric acid and then heated (clean it)
2. Dip in acid again before dipping into metal compound to be tested
3. Hold the loop in the roaring blue flame
4. The Bunsen flame will change colour depending on the metal ion compound
5. If there is a mixture of metal ions, then some flame colours can be masked.

Results:

Metal Ion	Flame Colour
Lithium, Li^+	Crimson
Sodium, Na^+	Yellow
Potassium, K^+	Lilac
Calcium, Ca^{2+}	Orange-red
Copper, Cu^{2+}	Green

Flame emission spectroscopy

Used for analysing samples of metal ions, the sample is heated in a flame. The energy provided excites electrons in the metal ions, making them jump into a higher energy levels, when they fall back, the energy is released as light energy.

In the spectrometer, the wavelength of the light can be analysed.

Provide an accurate way to monitor water for metal ions.

KS4 Chemistry: C13 The Earth's Atmosphere

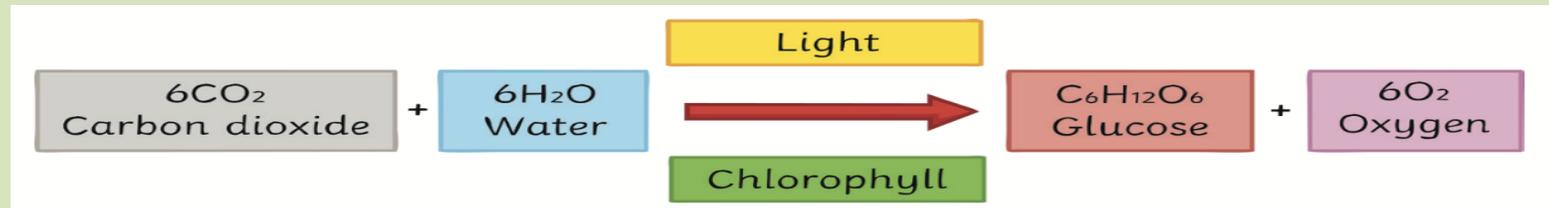
Keyword	Definition
Atmosphere	The relatively thin layer of gases that surround planet Earth
Carbon capture and storage	A technique that involves capturing carbon dioxide produced by burning fossil fuels and pumping it underground to be absorbed by porous rocks so that it is not released into the atmosphere
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

The Earth's Early Atmosphere. Theories about the composition of the earth's early atmosphere and how it's formed has changed over time. Evidence is limited since it is thought this occurred 4.6 billion years ago. One theory suggests that intense volcanic activity first released the gases that formed the Earth's early atmosphere. At that time, the Earth's atmosphere resembled that of Mars and Venus today, consisting 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.

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 (coal, oil, natural gas) that contain carbon.

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. This was followed by animals as the levels of oxygen increased to a level that would sustain more complex life. Oxygen is produced by plants in the process of photosynthesis.

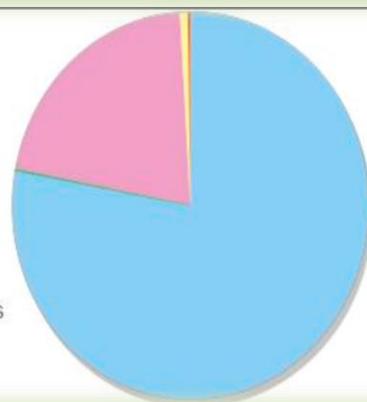
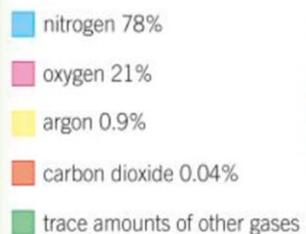
The carbon footprint is the **total amount of carbon dioxide and other greenhouse gases emitted over the full life cycle** of a product, service or event. The carbon footprint can be reduced by **reducing emissions of carbon dioxide and methane.**



The Atmosphere

By 200 million years ago the proportions of gasses had stabilised. These remain the same as they are today:

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



(The atmosphere also contains trace proportions of other gases.)

Human activities can increase the amounts of greenhouse gases in the atmosphere.

- More farming: Increased farming of crops (rice, for example) 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 (and some carbon dioxide).
- 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

The greenhouse effect

1. The earth and its atmosphere are very similar to that of a greenhouse. The greenhouse gases (CO₂, 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.

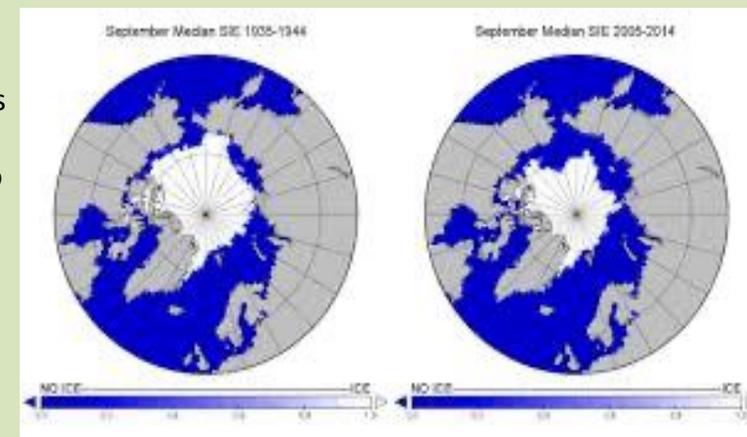
4. The atmosphere warms up



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.

Arctic sea ice levels



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**.

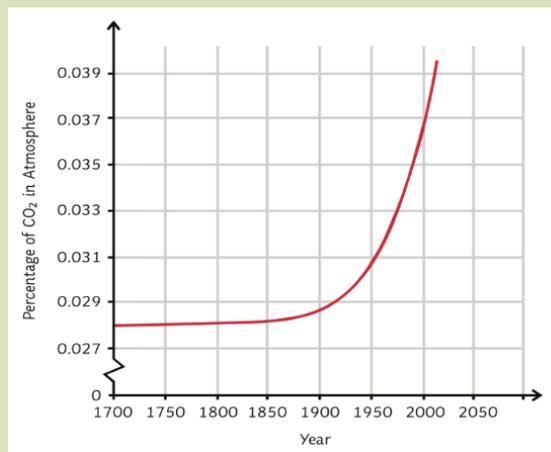
Scientists believe that human activities have resulted in the increased amount of greenhouse gases in the atmosphere. Activities such as farming cattle and farming rice release huge amounts of methane into the atmosphere. Burning fossil fuels in cars and power stations releases large amounts of carbon dioxide. With large areas of the rainforest being cut down through deforestation, the excess carbon dioxide is not being absorbed by photosynthesis.

However, not everyone believes that humans are causing the rise in greenhouse gases. Some believe that the rise in global temperatures is associated with cycles of climate change and natural factors.

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. The impact of which is already being felt around the globe. The consequences of human activity will affect us all.



Sulphur dioxide

Sulphur dioxide is an atmospheric pollutant. It is a gas that is produced from the burning of fossil fuels. Sulphur dioxide is able to dissolve 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 NO_x. Nitrogen compounds, along with sulphur dioxide, are also responsible for acid rain.

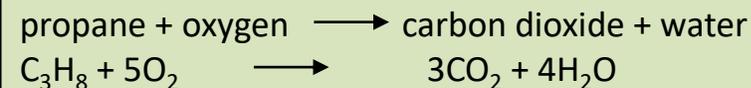
Compounds of nitrogen oxides react in the atmosphere with ultraviolet light from the sun to produce photochemical smog. The smog is most noticeable during the morning and afternoon and occurs mainly in densely populated cities.

Combustion

The **combustion (burning)** of fuels, including coal, contain carbon and/or hydrogen and may also contain some sulphur. When burnt, these fuels release gases (carbon dioxide, water vapour, carbon monoxide, sulphur dioxide and oxides of nitrogen) into the atmosphere.

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

A hydrocarbon will react with oxygen to produce carbon dioxide and water.



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.



Carbon monoxide is a poisonous gas. It is often called the silent killer due to it being 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 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.

Further reading

<https://www.bbc.co.uk/bitesize/guides/zg4qfcw/revision/1>

<https://www.bbc.co.uk/bitesize/guides/zxy4xfr/revision/1>

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

Filter

Screening and grit removal

Why? To remove insoluble solids

Sedimentation

Sterilise – chlorine, ozone, or UV light

Anaerobic digestion of sludge

Aerobic treatment of effluent

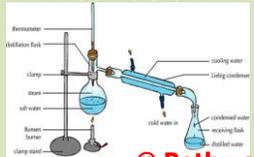
Why? To kill microbes

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

Salt water

Desalination

Distillation



Using membranes e.g. Reverse osmosis

⊗ Both use a lot of energy

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

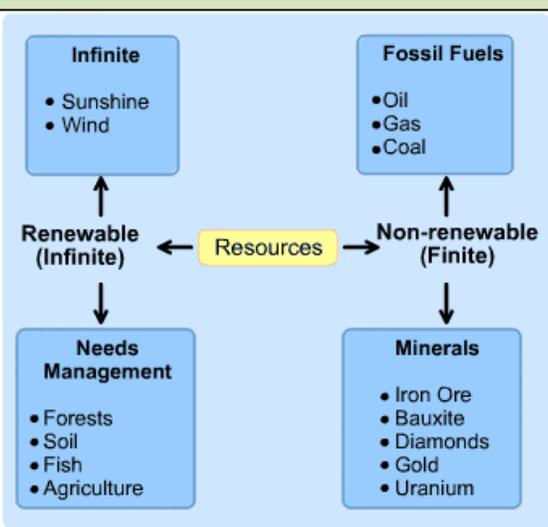


e.g. Coal, oil and gas are used for energy.
e.g. metal ores are mined to get metals.

'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

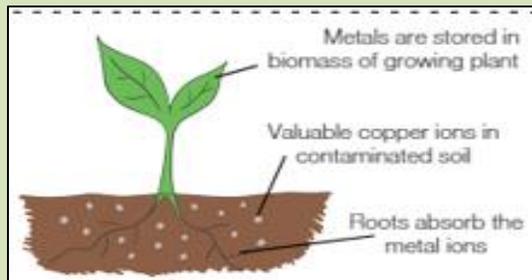
Finite	Will run out eventually
Renewable	We can replace them as we use them
Sustainable	meets the needs of the current generation without compromising the ability of future generations to meet their needs.
Potable	Safe to drink, Drinkable
Pure	a pure substance consists of only one element or one compound
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



Bacteria feed on metal ore → '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



Links to Further Reading:

<https://www.bbc.co.uk/bitesize/guides/zg6cfcw/revision/3>

<https://www.bbc.co.uk/bitesize/guides/zgqhcj6/revision/2>

<https://www.youtube.com/watch?v=KyVf2bVLI08&safe=active>

HOW IS ALUMINIUM RECYCLED?



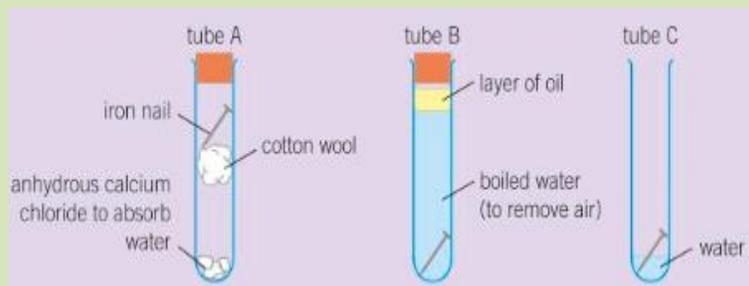
KS4 Chemistry: C15 using our resources

Key word	Definition
Rusting	the corrosion of iron.
Alloy	a mixture of two or more elements one of which is a metal.
Polymer	a (plastic) substance made from lots of small monomers
Sacrificial protection	a more reactive metal is coated onto an object to prevent rusting
Neutralisation	a chemical reaction involving an acid and a base where a salt and water is formed.
Galvanising	Where iron is protected by being coated in a protective later of zinc
Carbon steels	Iron that has either a high or low carbon content. Low carbon steel is soft and malleable whereas high carbon steel is hard and brittle
Stainless steel	A steel nickel alloy that is resistant to rusting
Ceramic	Materials that are made from clay and fired in a furnace to increase the bonding/strength of the clay
Composite	When two or more materials with different properties are combined to produce a different material with different properties

Rusting

Rusting is an **oxidation** process (addition of oxygen)
Rust is hydrated **iron oxide, Fe₂O₃**.
Water is loosely bonded to the iron.

The reaction can be summarised as:



The rusting reaction has ideal conditions to take place- both oxygen (found in the air) and water are needed to completely rust the iron nail.

To protect iron from rusting- it can be coated in :

- Paint (to prevent oxygen reaching the iron)
- Oil and grease
- Plastic

Iron can also be galvanized in zinc (a more reactive metal) so that the zinc is oxidised instead and acts as a sacrificial coating.

Polymers

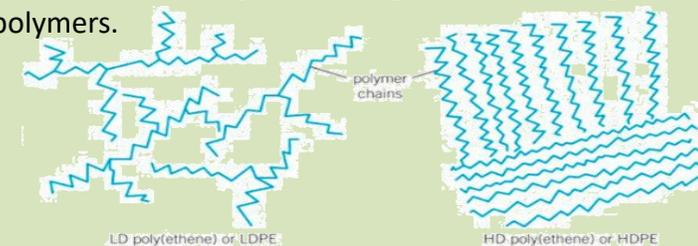
Polymers are derived from crude oil. The properties of polymers depend on:

- The monomers used to make it
- The conditions chosen to carry out the reaction.

Poly means more than one and the suffix is the name of the monomer, so poly(ethene) is more than one ethene monomer covalently bonded together.

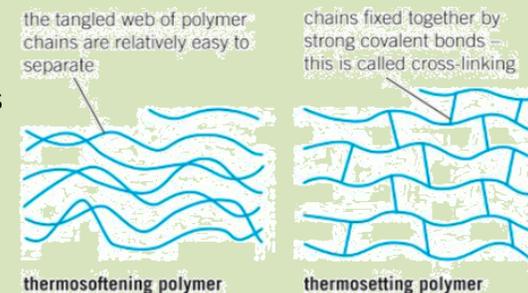
There are 2 types of polyethene: high density (HD) and low density (LD) as they are formed under different conditions.
LD – made under very high pressure with O₂ = randomly branched → low density

HD – made with a catalyst and slight pressure = straight-chain → pack close together → high density. Stronger than LD polymers.



You can also sort polymers based on what happens to them when heated. Polymers that melt easily and set when cool are called **Thermosoftening polymers**.

Whereas polymers that have strong covalent cross links do not melt when heated and are called **thermosetting polymers**

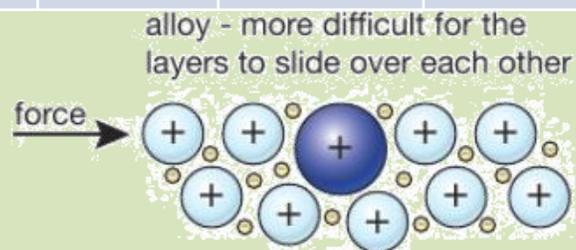


Alloys

Whilst pure metals are valuable, mixing them with other metals to make alloys can give them more useful properties, the main examples and uses are shown below.

	Copper alloys	Aluminium alloys	Gold alloys	Carbon steels	Alloy steels
Made from...	Brass = 70% copper 30% zinc Bronze = 88% copper 12% tin	Aluminium and a variety of other metals (up to 300)	Gold and copper	Iron + 0.03-4% of carbon	Iron + 1-5% of other metals Such as nickel and tungsten
Properties	Harder than copper but malleable too Tough and corrosion resistant	Lightweight and stronger than Aluminium alone.	Produces different shades, hard-wearing, lasts longer than pure gold	Low carbon steel: softer and easily shaped High carbon steel: very hard, but brittle	Resistant to corrosion, high strength and hardness
Uses	Musical instruments Ships, statues	Aircraft machinery and military vehicles	Jewellery	Car bodies, ships, machinery	Cooking utensils, cutlery, drill bits

Alloys are often harder than pure metals as the mixture of different sized atoms distorts the usually regular layers in metal- making them harder to move over each other

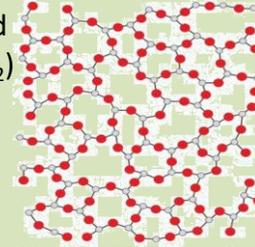


Glass, ceramics and composites

Different materials have different properties, this determines what we use them for, for real world applications. You need to be able to compare the properties of glass, metals, composites and ceramics

Glass

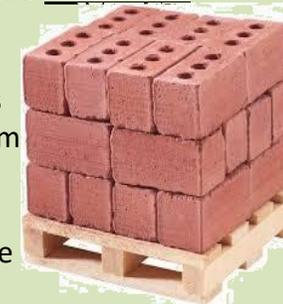
Glass is typically made up of sand that contains silicon dioxide (SiO_2) in combination with materials such as limestone (CaCO_3) and soda (Na_2CO_3). When heated together to about 1500°C the mixture will melt and form glass when it cools down. Its solid structure at the atomic level gives an irregular pattern, giving it a smoother surface and contributing to its transparency. You can also add Boron trioxide to get borosilicate glass that has high melting points (used for test tubes).



Ceramics

Ceramics are typically made with clay and baked at high temperatures in a kiln to strengthen them. Examples are bricks, tiles, sinks and crockery. The properties of ceramics are that they are brittle will break with a hard sharp blow, they are also good electrical insulators and are resistant to chemicals (inert).

Ceramics have a mixture of ionic and covalent compounds in its structure. These help form layers when it is wet. When fired in the furnace- the water is driven out, strengthening the bonds between layers. Sharp blows distort these layers so ions of the same charge begin to repel each other- breaking the ceramic

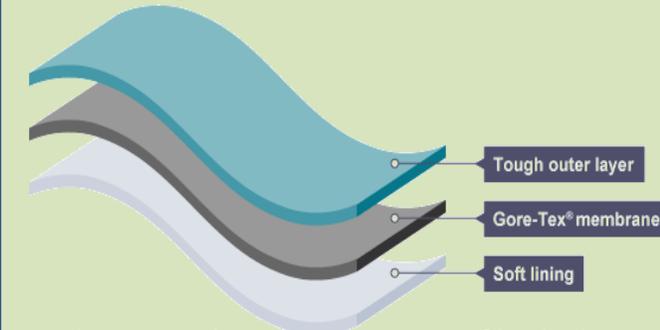


Composites

Composites use multiple materials and combines their properties to make a product with improved properties for a specific use. Typically a binding material (also called a matrix) that binds fragments/fibres of another material.

For example waterproof jackets combine a tough outer layer, with a Gore-Tex membrane and a soft lining.

Combining these materials makes the jacket rip resistant, waterproof/breathable as well as soft to wear- it would not have these properties without using all three materials



Another example is the composite of both glass and ceramics. Both are brittle and will shatter when struck but when they are heated together to get a ceramic-glass composite. The glass melts between the layers of the ceramic to prevent cracks from spreading. Ceramic-glass is no longer brittle and can even be used for false teeth in dentistry!



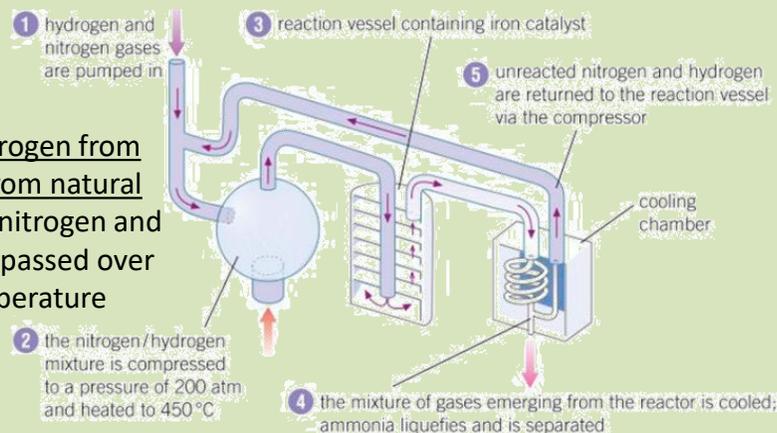
Making ammonia-the Haber process

To help grow plants to meet an increased demand, farmers have to use fertilisers to help plant growth. Natural fertiliser such as manure can be used, however most opt for reliable chemical fertilisers that are made from ammonia, such as ammonium nitrate (NH_4NO_3).

Ammonia contains nitrogen and hydrogen (NH_3), the nitrogen is used by plants for growth as it is used to make amino acids (the building blocks of proteins). The atmosphere is ~78% nitrogen but only a select few plants can make use of this by a process call nitrogen fixation. To overcome this the artificial fertilisers allow nitrogen to be taken in as soluble NO_3^- ions in the soil.

The Haber process

The Haber process takes nitrogen from the air and uses hydrogen from natural gas (such as methane). The nitrogen and hydrogen are purified, then passed over an **iron catalyst** at high temperature (~450°C) and high pressure (~200 atmospheres).



The high temperature and pressure enable a good yield from the reaction as it is a reversible reaction (ammonia can decompose to form its constituent gases). Once the ammonia is formed it is quickly cooled so that the ammonia condenses (separating it from the hydrogen/nitrogen which are reused)



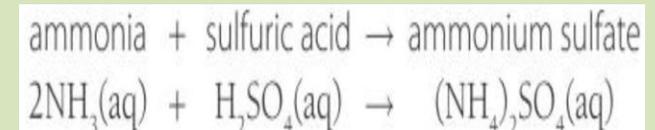
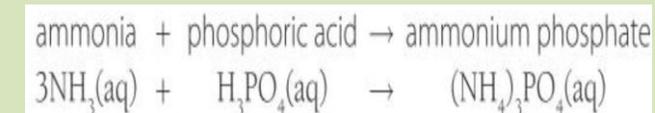
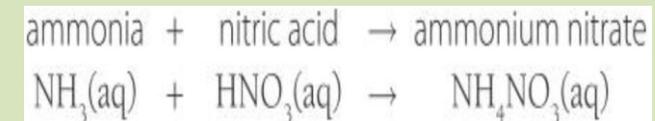
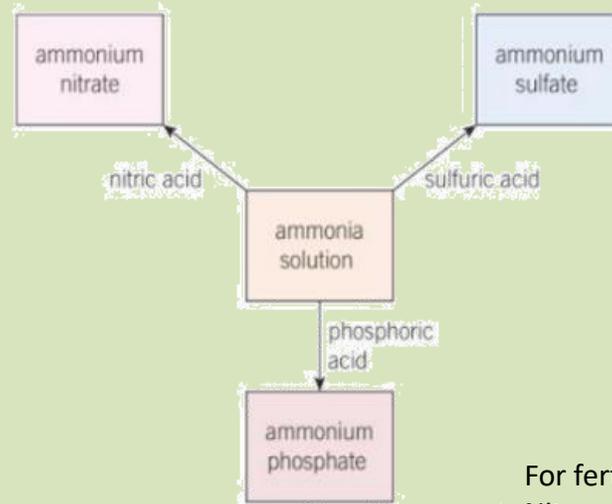
The conditions needed for the Haber process are a compromise, a higher yield could be achieved but increasing the pressure (as there are more gas molecules on the reactants than products- think Le chatelier's principle) but this is too costly to do.

The forward reaction is exothermic so decreasing the temperature would increase yield **however** the rate at which the reaction would happen would decrease the rate at which ammonia is formed- so a higher temperature of ~450°C is chosen.

Making fertilisers

Fertilisers contain nitrogen, potassium and phosphorus needed for healthy growth, we call fertilisers that are made with compounds containing the 3 elements NPK fertilisers.

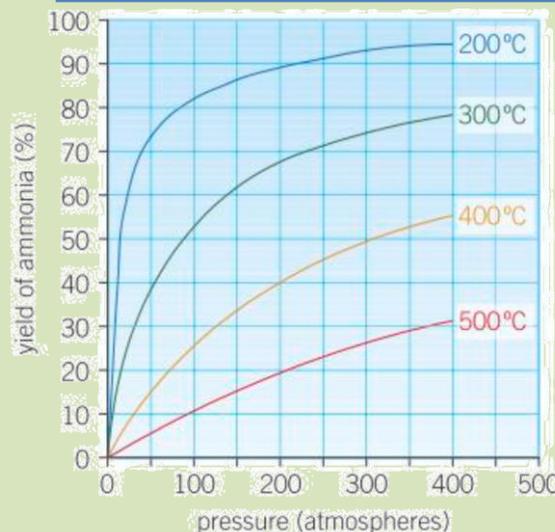
Most of the ammonia is reacted with an acid to make an ammonium salt fertilizer (in a neutralisation reaction)



For fertilisers the NPK components are obtained as follows
Nitrogen, (N) comes from the ammonia and is reacted with acids to form ammonium containing compounds

Phosphorus, (P) is mined from phosphate rock and treated with acids to form fertilisers (such as calcium phosphate)

Potassium, (K) comes from potassium salts mined from the ground and is also treated with acids to form fertilisers such as potassium chloride/sulfate.



Further reading

<https://www.bbc.co.uk/bitesize/topics/z9wqk2p>
<https://www.youtube.com/watch?v=HAKaD6-7fgQ>
<https://www.expertguidance.co.uk/new9-1-aqa-gcse-chemistry-c15-using-our-resources-kerboodle-answers/>

KS4 Physics: P7 Radioactivity

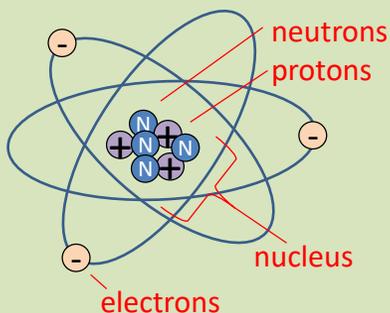
Atomic structure

Subatomic particle	Mass	Charge
Neutron	1	0
Proton	1	+1
electron	Very small $\frac{1}{2000}^{\text{th}}$	-1

Relative atomic mass = number of protons and neutrons in the nucleus



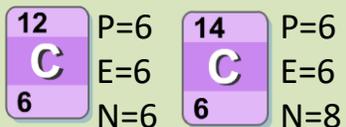
Atomic number = number of protons (number of electrons also)



P = 3
E = 3
N = 4 (7-3)

To work out the **number of neutrons** = **atomic mass – atomic number**

Isotope: an element containing the same number of protons but a different number of neutrons



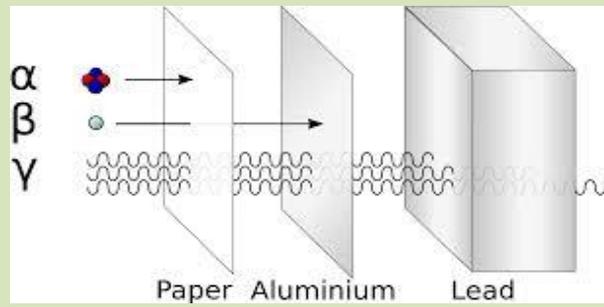
Some isotopes are more stable than others. Some isotopes are unstable and undergo radioactive decay.

The history of the atom

Name	Date	Discovery	Diagram	Explanation
J J Thomson	1897	The electron – Plum pudding Model		Discovered the electron, proposed the plum pudding model that there were negatively charged electrons embedded in a sphere of positive charge
Rutherford Geiger and Marsden	1911	The Nucleus Nuclear model of the atom – gold leaf exp.		Positively charged alpha particles were fired at very thin gold foil, with Thomson's model they would have passed through but some were deflected and some reflected back. This could only be explained by a concentrated mass and charge at the centre of the atom. The charge must have been positive to deflect the alpha particles. Most of the atom must be empty space for the majority to pass straight through.
Niels Bohr	1922	Electron shells		He discovered that elements emitted light of only specific wavelengths leading to the idea that electrons exist in specific energy levels or shells. Electrons move closer to the nucleus when they emit EM radiation and further from the nucleus when they absorb EM radiation.
James Chadwick	1932	The neutron		Noticed that the mass of protons in an atom did not add up to the total mass of the atom, he later experimentally discovered the charge-less neutron.

Some isotopes **decay**, radioactive substances give out nuclear radiation in the form of **alpha particles (α)**, **beta particles (β)**, and **gamma rays (γ)**.

When this nuclear radiation interacts with other atoms or molecules, they may break them up into **ions**. This is known as **ionization**.



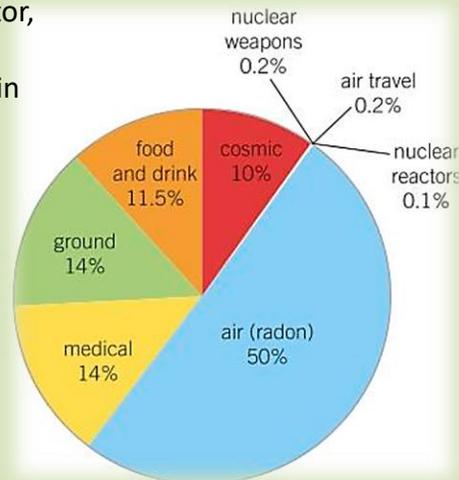
Radiation	Symbol	What is it?	Ionisation strength	Penetrating power	Range in air
Alpha α	${}^4_2\text{He}$ ${}^4_2\alpha$	A Helium nucleus	Strongly ionising	Stopped by paper	A few cm (~10cm)
Beta β	${}^{-1}_0\text{e}$ ${}^{-1}_0\beta$	An electron	Moderately ionising	Stopped by aluminium	Several metres
Gamma γ	${}^0_0\gamma$	An electro magnetic wave	Very weakly ionising	Stopped by thick lead	Many, many meters

Measuring radiation:

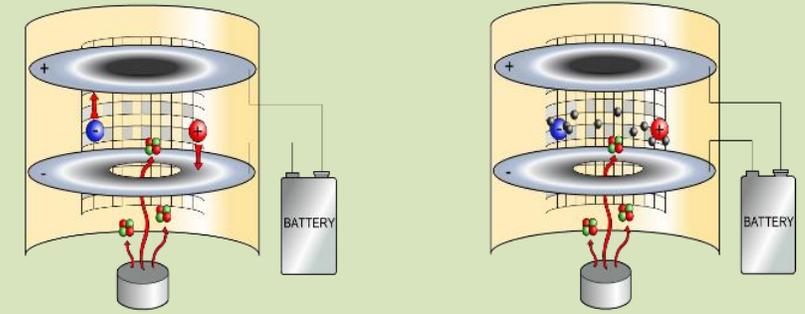
- **Count-rate** is the number of decays recorded each second by a detector, such as the Geiger-Muller tube.
- **Activity:** the number of decays per second from a sample (measured in Becquerel's Bq).
- Sieverts: this is a unit for dose (Sv) usually given in milli Sieverts, mSv

We are exposed to **background radiation** every day and it poses an extremely low risk. Most of this occurs naturally.

People who work with ionising radiation have to monitor their exposure time to ensure they do not go above the safe limits of exposure.

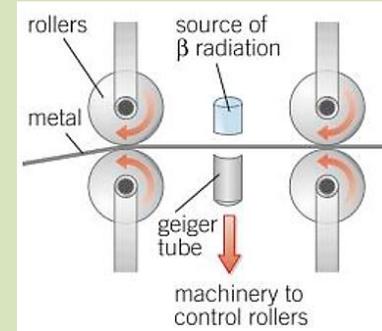


Uses of radioactive decay



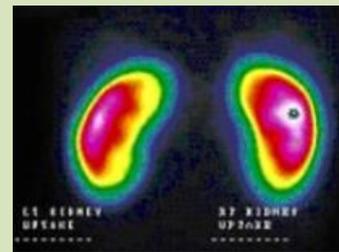
Alpha particles are used in smoke detectors. The alpha particles ionise air between two plates in a circuit. This allows a current to flow. If smoke is present, this interacts with the alpha particles resulting in a drop in the current and the alarm sounds.

Beta particles are used to detect the thickness of paper. If the detector detects too much beta radiation the paper has become too thin and the rollers are adjusted. If too little radiation passes through it means the paper is too thick.



Gamma Radiation has many uses. It can be used to sterilise medical equipment. It can be fired in narrow beams at cancerous cells as it can pass through the skin and body tissue.

It is used for radioactive tracers, for example to check for blockages in the kidneys. A solution containing a gamma source is ingested and gamma radiation will be emitted more strongly from an area that may be blocked as there will be a greater concentration of the gamma source. The source must have a long enough half-life to get readings but short enough not to cause harm to the body.



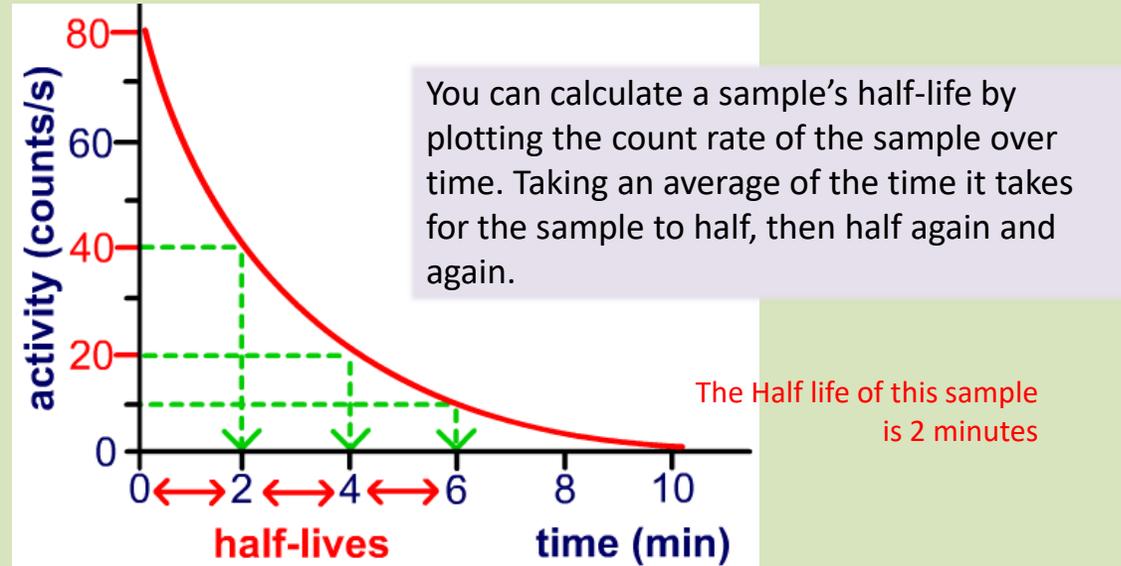
Half-life The half-life of a radioactive isotope is the average time that it takes for **half** the nuclei in a sample to decay.

There are three ways to consider half-life:

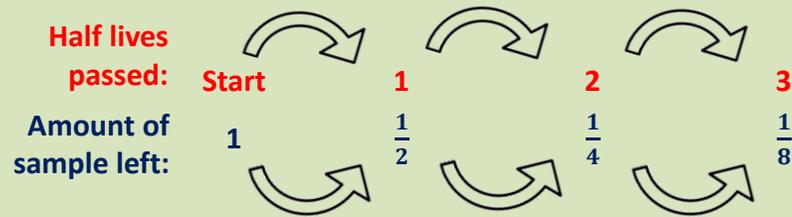
Half-life is the time it takes for half of nuclei in a sample to decay

Half-life is the time taken for the activity of the sample to halve

Half-life is the time taken for the count rate to halve



You may be asked to work out how much of a sample is remaining after a particular time. To do this work out how many **Half-lives** have passed. If 3 half-lives have passed you will have $\frac{1}{8}^{th}$ the original sample left.



Example. A sample of 12g of iodine has a half-life of 8 days. How much of the sample will remain after 24 days?

Answer: 24 days = 3 x half-lives. So the sample will have halved 3 times. There will be $\frac{1}{8}^{th}$ remaining so $\frac{1}{8}^{th}$ of 12g = 1.5g remaining

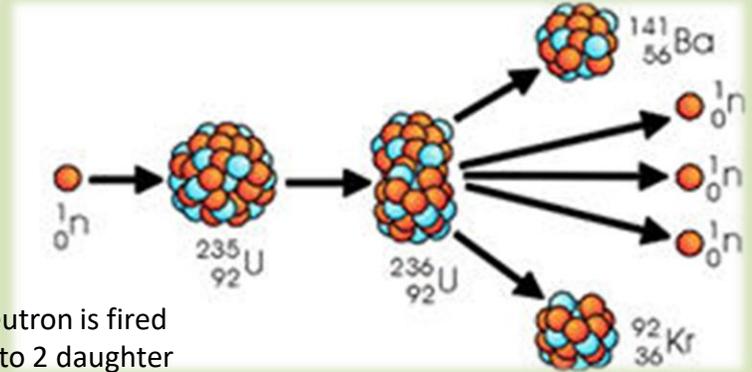
Physics Separates Science only

Fission and fusion

Fission : splitting atoms

Fusion : joining atoms

Nuclear fission occurs when a stable isotope is struck by a **neutron**. The isotope absorbs the neutron, becomes unstable and then **splits** apart, releasing large amounts of energy.



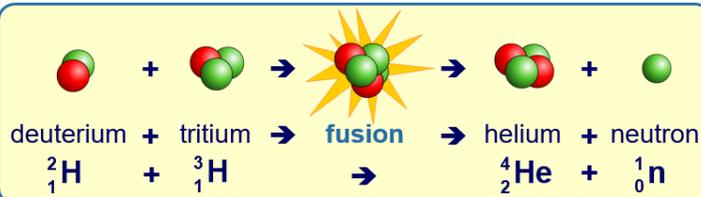
In a fission chain reaction a neutron is fired at a ^{235}U nucleus. This splits into 2 daughter nuclei and releases 3 more neutrons. These in turn collide with other ^{235}U nuclei and the process repeats. Lots of energy is released in the form of kinetic energy and gamma rays.

Nuclear Power stations control the chain reaction to harness the energy and heat water (creating steam to spin a turbine and generator)

Benefits: The fission of 1 kilogram of **uranium-235** releases more energy than burning 2 million kilograms of coal and there is no CO_2 output from Nuclear fission.

Drawbacks: Nuclear power stations produce nuclear waste that remains radioactive for 1000s of years. Accidents at nuclear power plants can result in harmful substances entering the environment.

Nuclear fusion occurs in under extremely high temperatures and pressures like that found in the sun and other stars. Small Nuclei are fused together to form larger atoms and energy is released.

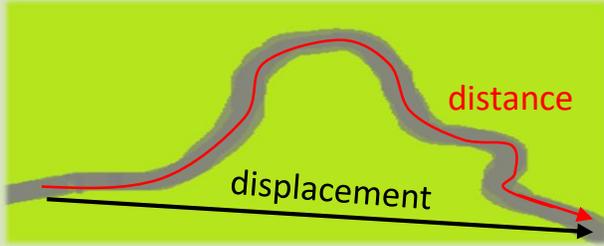


The Torus fusion reactor can achieve this on earth but at the moment we put in more energy in than we get out so can not use it to generate electricity

Nuclear weapons involve uncontrolled fission chain reactions that trigger further fusion reactions releasing extraordinary amounts of energy.



KS4 Physics: P8 Forces in balance



Distance is a scalar quantity, and is a measure of the total distance travelled e.g. along this path.

Displacement is a distance in a particular direction and is a vector quantity

scalar	A physical quantity, such as mass, speed or energy, that has magnitude only (unlike a vector which has magnitude and direction)
vector	A vector is a physical quantity, such as displacement or velocity, that has a magnitude and a direction (unlike a scalar which has magnitude only)
contact force	A force that only acts on an object when in contact with it
non-contact force	A force that can act on an object without making contact, for example the force due to gravity (weight), electrostatic forces or magnetic forces
resultant force	A single force that has the same effect as all the forces acting on the object
magnitude	the size or amount of a physical quantity

Calculating resultant force

To work out the resultant force, if two forces are acting in opposite directions, subtract them from each other. If they act in the same direction add them together.

Newton's Laws

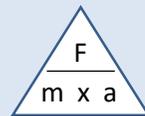
Newton's first law of motion

If the resultant force on an object is zero, the object stays at rest if it is stationary, or it keeps moving with the same speed in the same direction

Newton's second law of motion

The acceleration of an object depends on the force applied to the object and mass of the object.

(Force (N) = Mass (Kg) x acceleration (m/s^2))



Newton's third law of motion

When two objects interact with each other, they exert equal and opposite forces on each other

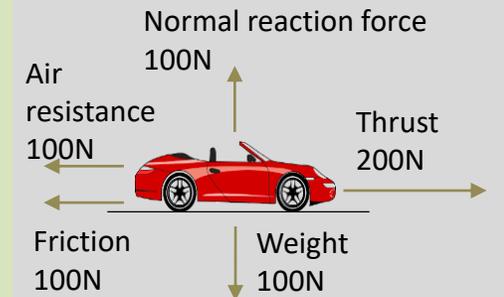
The resultant force on the red ball is **400N downwards** ($500N - 100N$)

The resultant force on the red car below is $50N \leftarrow$
 $(\leftarrow 100N + 150N = 250N \leftarrow) \quad 250N - 200N = 50N \leftarrow$



HT: Free body force diagrams

A free body force diagram is a diagram drawn with vector arrows drawn to represent the size and direction of each force acting on an object. The **length** of the arrow represents the magnitude of a force. You always need a scale on your diagrams e.g. $100N = 1cm$

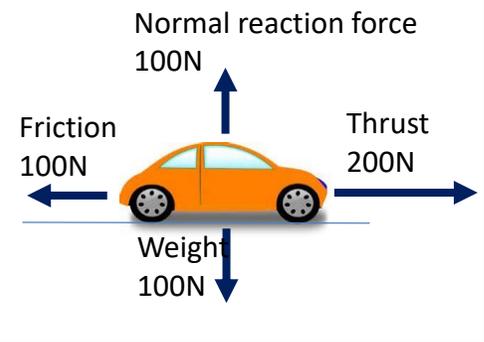


Scale: $100N = 1cm$

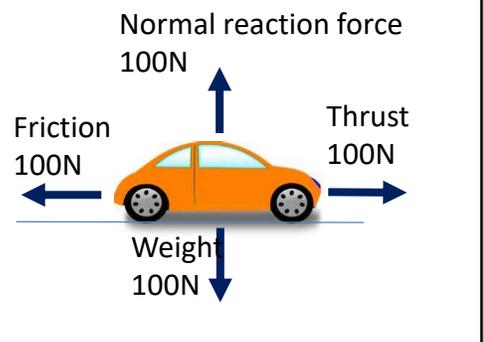
Rules for forces and motion

Balanced forces = The object is stationary or object moving at a constant speed
 Unbalanced forces = The object is changing speed or changing direction or changing shape
 (Accelerating or decelerating)

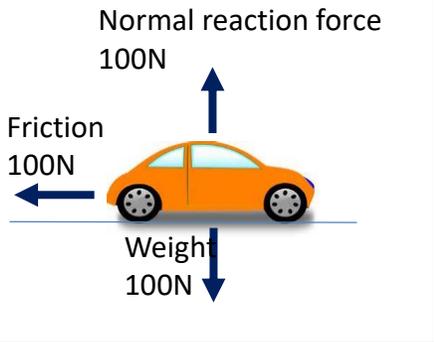
Drag	Drag forces oppose the motion of an object. They include air resistance and friction
Normal reaction force	Normal reaction force is the force exerted by a surface on an object, it acts at right angles to the surface



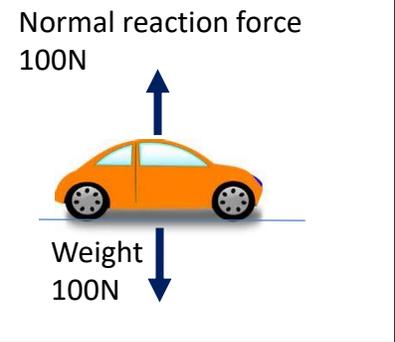
This car is accelerating as it has a larger thrust force than friction force (The resultant force is 100N →)



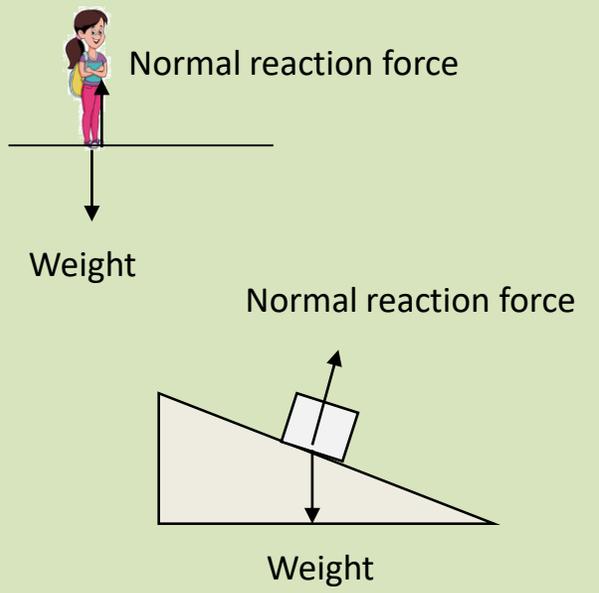
This car is travelling at a constant speed as it has an equal thrust force and friction force (The resultant force is zero)



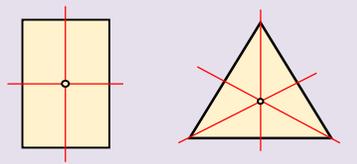
This car is decelerating as it has a larger friction force than thrust force (The resultant force is 100N ←)



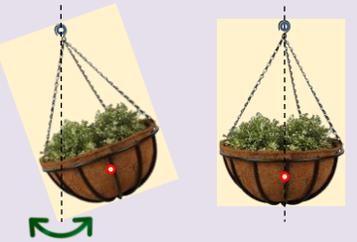
This car is stationary as there is no friction or thrust forces (the resultant force is zero)



Centre of mass
 For a symmetrical flat shape, the centre of mass will always be along its line of symmetry.

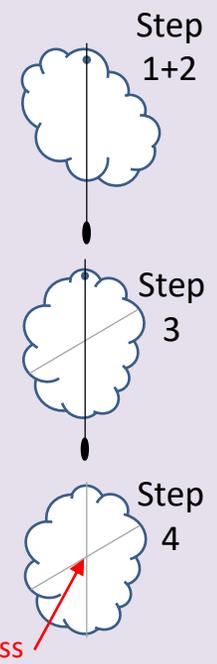


A swinging object will always come to rest with its centre of mass below the pivot.



This idea can be used to find the centre of mass of an irregular flat shape.

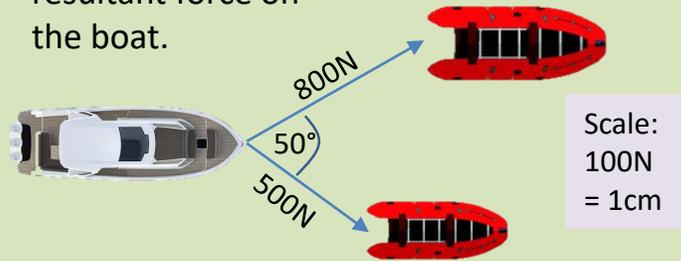
1. Suspend your irregular flat shape from a pin.
2. Use a plumb line (string with a mass on the end) to draw a vertical line on the shape.
3. Repeat putting the pin in a different location.
4. The point at which the two lines meet is the centre of mass.



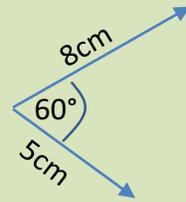
Centre of mass

HT: Parallelogram of forces: [working out the resultant force from two forces at an angle](#)

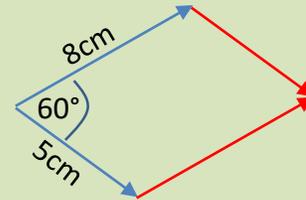
1. Look at the problem.
Calculate the resultant force on the boat.



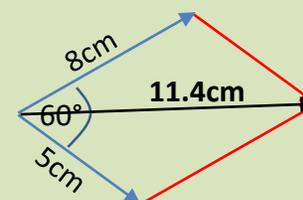
2. Draw a vector for each force at the correct angles



3. Turn into a parallelogram



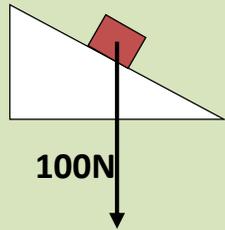
4. Draw a line across the parallelogram and measure its length



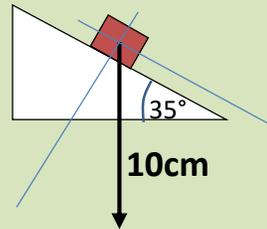
5. Use the scale to turn the length back into a force.
You may need to give the angle of the resultant force relative to one of the other force vectors.

Resultant force = 1140N at an angle of **23°** to the **800N** force.

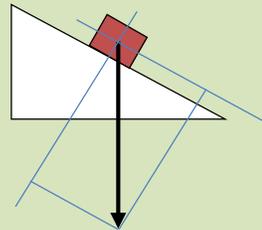
HT: Resolving forces: [working out the 2 components of a force](#)



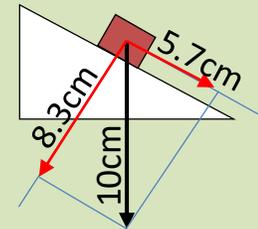
1. A 100N weight is stationary on a 35° slope. What is the friction force?



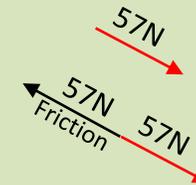
2. Draw the problem as a vector diagram. E.g. 1cm = 10N. Add faint lines perpendicular and parallel to the slope.



3. Draw faint lines at 90° connecting the lines to the vector arrow head.



4. Draw vector arrows to the correct length. The length of each arrow represents the components of the force.



5. The force down the slope is 57N, because the block is stationary the forces are balanced so the force down the slope = the friction force acting up the slope. So the friction force is 57N

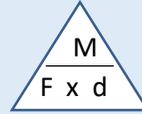
Physics: Separate science only

Moments: The moment is the turning effect of a force. You know from experience it is easier to undo a bolt with a long spanner than with your hands. The longer the spanner the greater the turning effect of the force.

Calculating moments

Moment (Nm) = Force (N) x perpendicular distance from pivot (m)

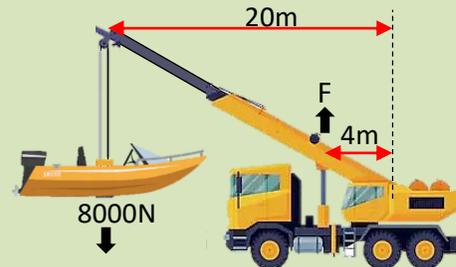
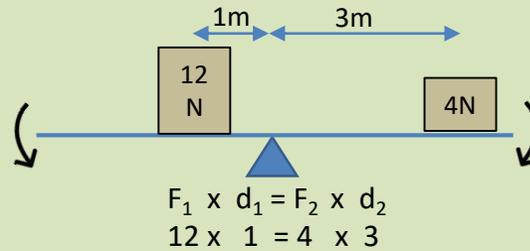
$$M = F \times d$$



Levers are force multipliers because they can multiply the effect of the force. When looking at levers there is always a pivot, effort and load. Levers reduce the force required to lift or move objects

Balancing moments – equilibrium

If a lever is in balance the clockwise moment must equal the anticlockwise moment.



(Anticlockwise moment = Clockwise moment)

$$F_1 \times d_1 = F_2 \times d_2$$

$$8000 \times 20 = F \times 4$$

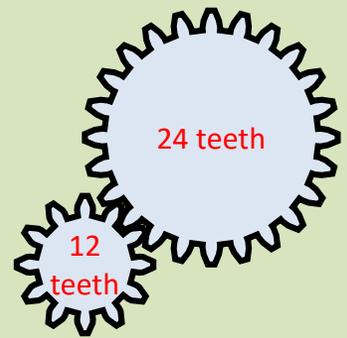
$$\frac{(8000 \times 20)}{4} = F = 40000\text{N}$$

Gears

Gears are force multipliers

A wheel with more teeth turns slower. Here, the bigger wheel turns at *half* the speed

But the *moment of the turning force* will be *twice* as big (since the radius is twice the size)

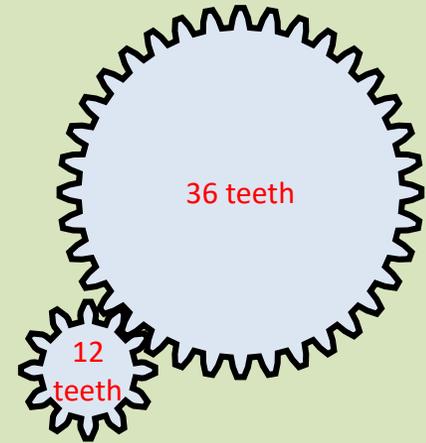


Ratio of moments

= ratio of teeth

= ratio of radii

In this example, the bigger wheel will turn a third of the speed of the smaller but the moment of the turning force will be three times the size of the smaller wheel



- The larger wheel has a radius of 30cm, and has a moment of 120Nm applied

- What's the moment about the 20cm wheel?

- (Remember ratio of moments = ratio of radii)

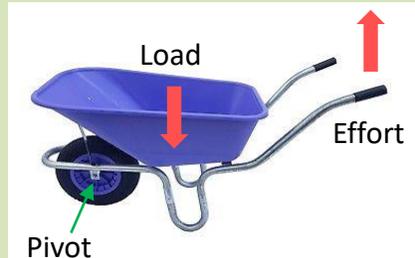
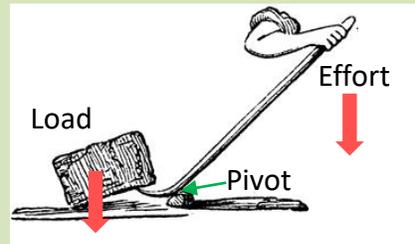
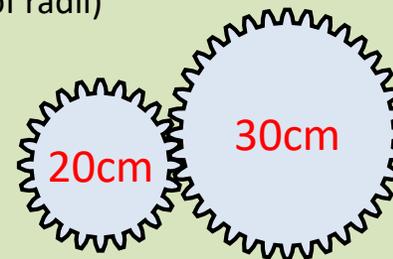
$$20 : 30 = M : 120$$

$$\text{or, } \frac{20}{30} = \frac{M}{120}$$

$$\therefore \frac{20 \times 120}{30} = M$$

$$\therefore M = 80\text{Nm}$$

The same calculation can be performed if you were given the number of teeth instead of the gear radii



Equations

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

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

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

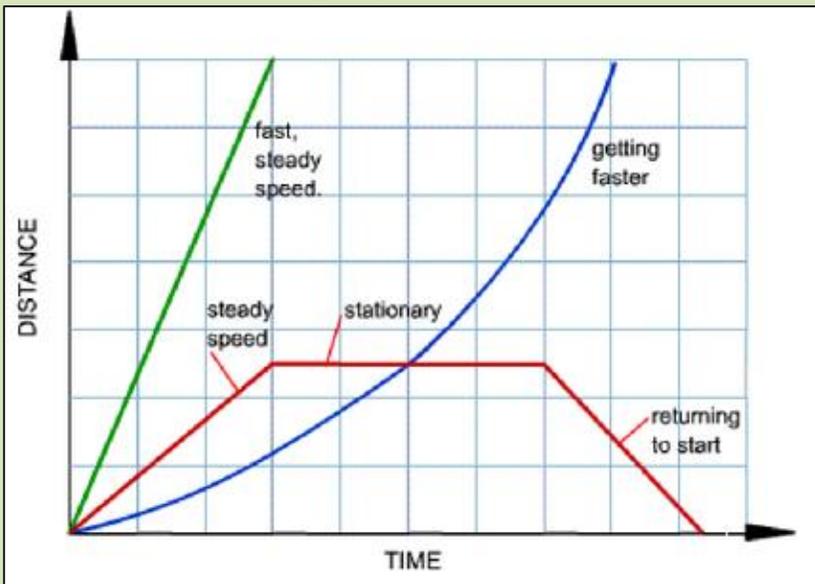
$$s = \frac{d}{t}$$

a = acceleration (m/s² or ms⁻²)
 v = final velocity (m/s)
 u = initial velocity (m/s)
 t = time (s)
 s = displacement (m)
 Δ = change in

$$\text{final velocity} - \text{initial velocity} = 2 \times \text{acceleration} \times \text{displacement}$$

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

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.

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)

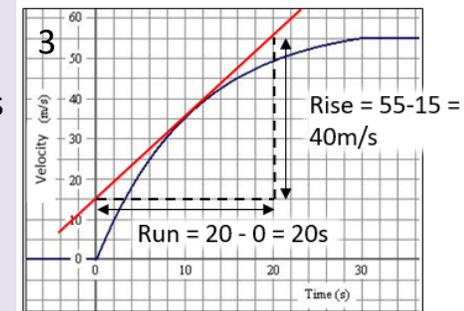
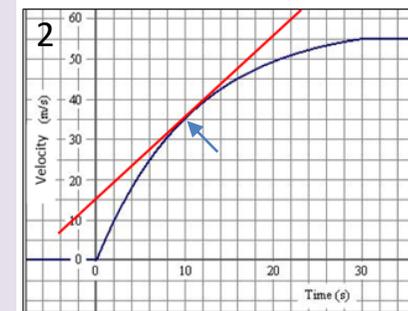
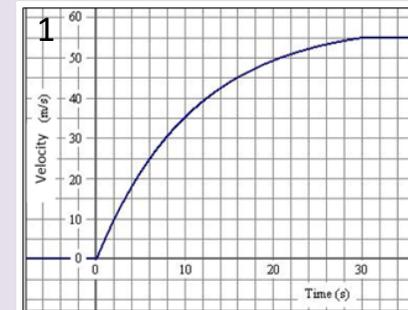
$$\text{gradient} = \frac{\text{change in } y}{\text{change in } x}$$

or

$$\text{gradient} = \frac{\text{rise}}{\text{run}}$$

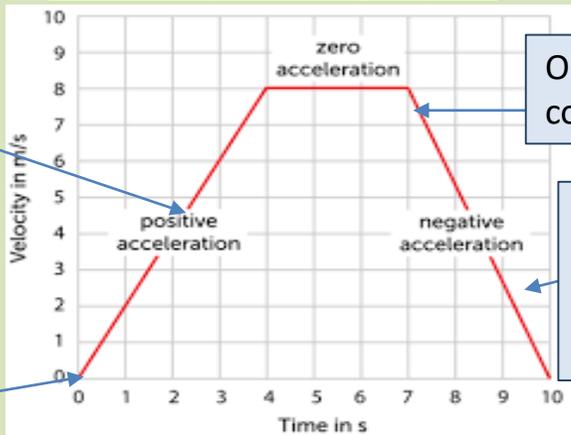
Calculate the gradient of the tangent, draw vertical and horizontal lines to the tangent. Measure rise and run.

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



Velocity time graphs

constant acceleration / speeding up

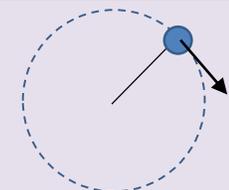


Object at a constant velocity

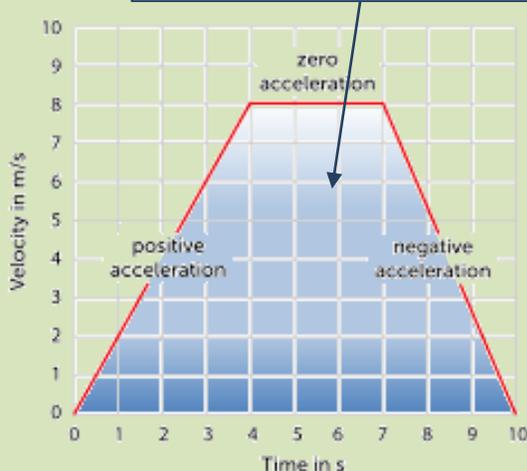
Constant deceleration / slowing down

Object stationary

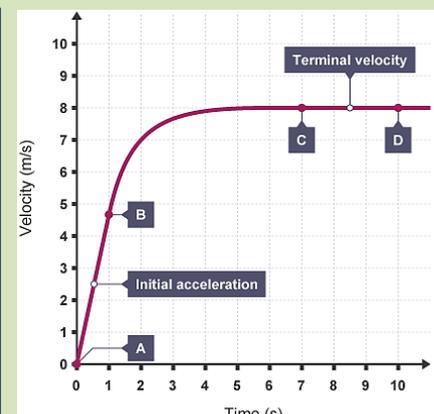
HT: Circular motion – an object moving in a circular motion can have a constant speed but its velocity is constantly changing as it changes direction (remember velocity is a vector quantity with a magnitude and direction)



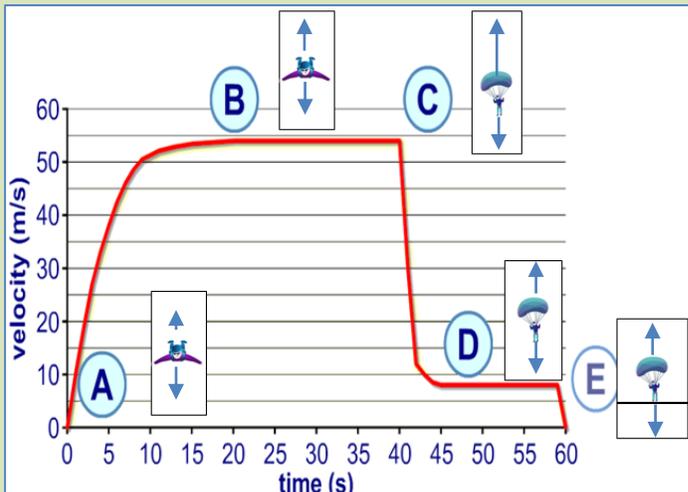
HT: The area under a velocity time graph = displacement



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



Shape	description
—	Constant speed
/	acceleration
\	deceleration
⤵	Increasing deceleration
⤴	Decreasing acceleration
gradient	Acceleration or deceleration



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

Computational Thinking – Searching Algorithms – Term 5

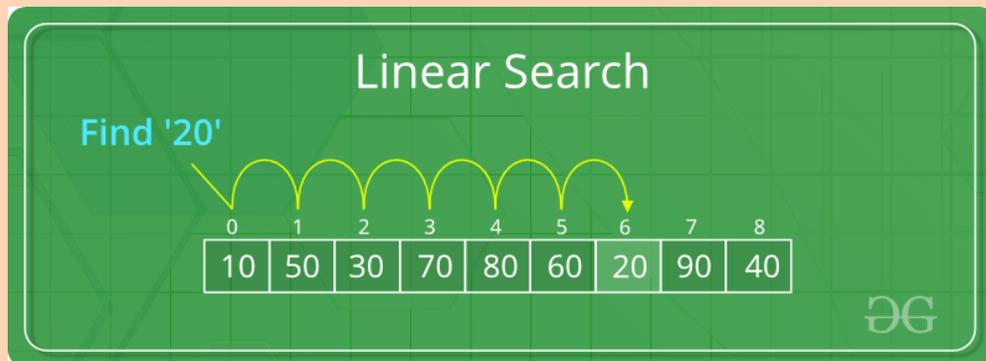
Linear Search

A linear search is the simplest method of searching a data set.

Starting at the beginning of the data set, each item of data is examined until a match is made. Once the item is found, the search ends. If there is no match, the algorithm must deal with this.

A written description algorithm for a linear search might be:

1. Find out the length of the data set.
2. Set counter to 0.
3. Examine value held in the list at the counter position.
4. Check to see if the value at that position matches the value searched for.
5. If it matches, the value is found. Send a message and end the search.
6. If not, increment the counter by 1 and go back to step 3 until there are no more items to search.
7. If all the items have been checked and no match is found, send a message.



Binary Search

A binary search is an efficient method of searching an ordered list. It will not work on a list that has not been sorted first.

A written description of a binary search algorithm is:

1. Start by setting the counter to the middle position in the list.
2. If the value held there is a match, the search ends and a message is sent.
3. If the value at the midpoint is less than the value to be found, the list is divided in half, the lower half of the list is ignored and the search keeps to the upper half of the list.
4. Otherwise, if the value at the midpoint is greater than the value to be found, the upper half of the list is ignored and the search keeps to the lower half of the list.
5. The search moves to the midpoint of the remaining items. Steps two to four continue until a match is made or there are no more items to be found and a message is sent.



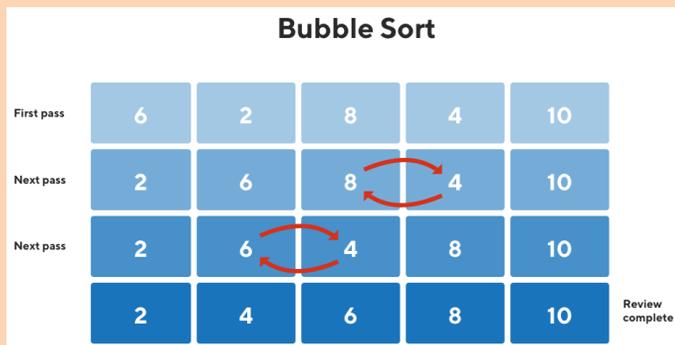
Computational Thinking – Sorting Algorithms – Term 5

Bubble Sort

A bubble sort is the simplest of the sorting algorithms. However, it is an inefficient sort for anything but a small list because of the number of comparisons required.

A written description algorithm of a bubble sort is:

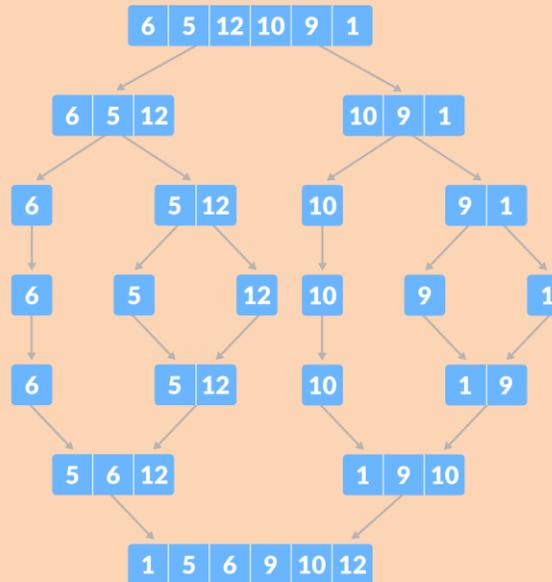
1. **Start at the beginning of the list.**
2. **Compare the first value in the list with the next one up. If the first value is bigger, swap the positions of the two values.**
3. **Move to the second value in the list. Again, compare this value with the next and swap if the value is bigger.**
4. **Keep going until there are no more items to compare. Note - the last item checked in the list is now sorted, so ignore this next time.**
5. **Go back to the start of the list.**
6. **Each run through the list, from start to finish, is known as a pass. The bubble sort continues until a pass is made where no values have been swapped. At this point, the list is sorted.**



Merge Sort

A merge sort is a more complex sort, but also a highly efficient one.

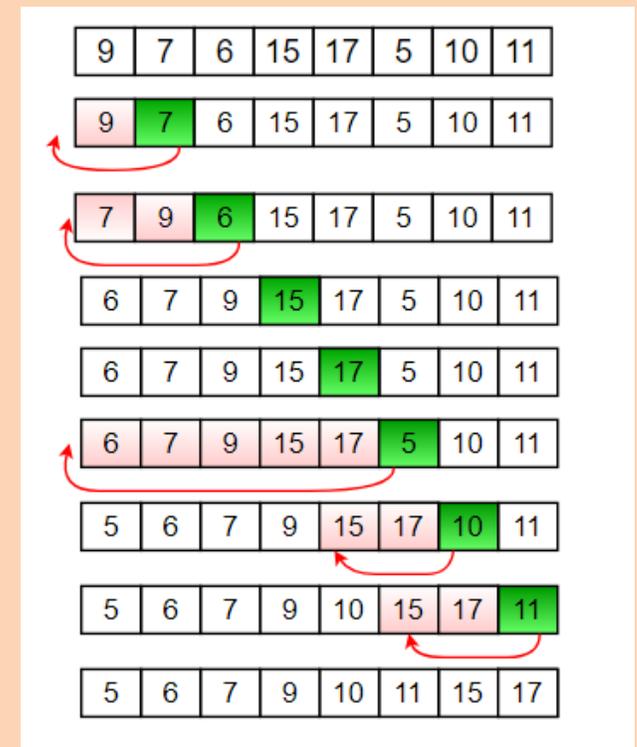
A merge sort uses a technique called divide and conquer. The list is repeatedly divided into two until all the elements are separated individually. Pairs of elements are then compared, placed into order and combined. The process is then repeated until the list is recompiled as a whole.



Insertion Sort

An insertion sort is less complex and efficient than a merge sort, but more efficient than a bubble sort.

An insertion sort compares values in turn, starting with the second value in the list. If this value is greater than the value to the left of it, no changes are made. Otherwise this value is repeatedly moved left until it meets a value that is less than it. The sort process then starts again with the next value. This continues until the end of the list is reached.



Computational Thinking – Programming Fundamentals – Term 5

Programming Languages

Algorithms are designed to solve problems. Programming languages are used to implement algorithms. They create the programs (software) that communicate instructions to a computer.

There are many different types of programming languages. But they all have the ability to:

- **Input data from a device such as a keyboard**
- **Output data to a device such as a screen**
- **Process calculations like addition and subtraction**
- **Process decisions based on certain conditions being met**
- **Process repetition for a certain number of times, or while a condition is met, or until a condition is met**

Sequence

Sequence is the order in which programming statements are executed. Programming statements usually run one after another in order, unless one of the other programming constructs is used.

The sequence of a program is extremely important as once these are translated, carrying out instructions in the wrong order leads to a program performing incorrectly.

Having statements in the wrong order is one of the simplest, yet most common, logical programming errors. The error occurs no matter which programming language is used.

Programming Languages

Programs are designed using common building blocks. These building blocks, known as programming constructs (or programming concepts), form the basis for all programs.

There are three basic building blocks to consider:

- **Sequence is the order in which instructions occur and are processed**
- **Selection determines which path a program takes when it is running**
- **Iteration is the repeated execution of a section of code when a program is running**

There are two types of iteration:

- **Definite iteration (also known as count-controlled iteration)**
- **Indefinite iteration (also known as condition-controlled iteration)**

All programs use one or more of these constructs. The longer and more complex the program, the more these constructs will be used repeatedly.

Selection

Selection is a programming construct where a section of code is run only if a condition is met. In programming, there are occasions when a decision needs to be made. Selection is the process of making a decision. The result of the decision determines which path the program will take next.

For example, a program could tell a user whether they are old enough to learn how to drive a car. If the user's age meets the required driving age, the program would follow one path and execute one set of statements. Otherwise, it would follow a different path and execute a different set of statements.

Definite Iteration

Indefinite iteration repeatedly executes a section of code until a condition is met - or no longer met.

There are two types of indefinite iteration:

- **WHILE loops - uses the statements WHILE and ENDWHILE**
- **REPEAT UNTIL loops - uses the statements REPEAT and UNTIL**

Definite Iteration

There are times when a program needs to repeat certain steps until told otherwise, or until a condition has been met. This process is known as iteration.

Iteration is often referred to as looping, since the program 'loops' back to an earlier line of code. Iteration is also known as repetition.

Iteration allows programmers to simplify a program and make it more efficient. Instead of writing out the same lines of code again and again, a programmer can write a section of code once, and ask the program to execute the same line repeatedly until no longer needed.

Computational Thinking – Data Types – Term 5

Data Types

Each variable has a data type. The data type determines what type of value the variable will hold.

Data type	Purpose	Example
Integer	Whole numbers	27
Real	Decimal numbers	27.5
Character	A single alphanumeric character	A
String	One or more alphanumeric characters	ABC
Boolean	TRUE/FALSE	TRUE

Different data types have limitations:

- Integers and real numbers cannot be concatenated, e.g. joined together.
- Numbers held in strings cannot be subject to mathematical operations.

Casting

Sometimes a programmer needs to change the data type of the contents of a variable. For example, an integer may need to be converted to a string in order to be displayed as part of a message.

This process is known as casting. The following examples in Python convert a string to an integer and an integer to a string:

```
str(68) returns "68"  
int("54") returns 54
```

Operators

An operator is a character, or characters that determine what action is to be performed or considered.

There are three types of operator that programmers use:

- **Arithmetic operators**
- **Relational operators**
- **Boolean operators**

These operators are common to most high-level programming languages.

Variables

A variable is a named piece of memory that holds a value. The value held in a variable can - and usually does - change as the program is running.

A variable's name is known as an identifier. The identifier given to a variable usually follows certain rules known as a naming convention:

- It can contain letters and numbers but must start with a letter.
- It must contain at least one letter - at the start of the name.
- It must not contain special characters such as !@£\$%&* or punctuation characters. However, an underscore can be used. Spaces are not allowed.
- It should contain lowercase letters. However, uppercase letters can be used if a variable name comprises more than one word joined together.
- The name should be meaningful - it should represent the value it is holding.

Arithmetic operation	Operator	Example
Addition	+	$x = x + 5$
Subtraction	-	$x = x - 5$
Multiplication	*	$x = x * 5$
Real division	/	$x = x / 5$
Integer division	DIV	$x = x \text{ DIV } 5$
Remainder	MOD	$x = x \text{ MOD } 5$

Relational operation	Operator	Example
Assignment	=	$x = 5$
Equivalence	= or ==	if $x = 5$ or if $x == 5$
Less than	<	if $x < 5$
Less than or equal to	<=	if $x <= 5$
Greater than	>	if $x > 5$
Greater than or equal to	>=	if $x >= 5$
Does not equal	<> or !=	if $x <> 5$ or if $x != 5$

Boolean operation	Operator	Example
And	AND	IF $x > 0$ AND $x < 10$
Or	OR	IF topic = "Computing" OR topic = "Computer Science"
Not	NOT	WHILE NOT x

Computational Thinking – Additional Programming Techniques – Term 6

Basic file handling operations

Programs process and use data. When the program finishes, or is closed, any data it held is lost. To prevent loss, data can be stored in a file so that it can be accessed again at a later date.

Files have two modes of operation:

- **Read from - the file is opened so that data can be read from it**
- **Write to - the file is opened so that data can be written to it**

Each item of data written to or from a file is called a record.

Databases, records and attributes

Data is often stored in a database. A database is a persistent store of related data. Data in a database is stored as records, which in turn is stored in files.

An attribute is one item of data. Records usually consist of one or more attributes. For example, a record holding data about a person might have these attributes:

- Title
- Forename
- Surname
- Email address

Structured query language (SQL)

Databases use their own type of programming language. This language is known as structured query language, or SQL.

Consider this simple personnel table with four records:

Person ID	Title	Forename	Surname	Email address
1001	Mr	Alan	Turing	aturing@bitesize.com
1002	Mrs	Ada	Lovelace	alovelace@gcsecompsci.com
1003	Miss	Grace	Hopper	ghopper@bitesizemail.co.uk
1004	Mr	George	Boole	gboole@bbcbitesize.com

Retrieving data

Data can be retrieved using the commands SELECT, FROM and WHERE, for example:

```
SELECT * FROM "personnel" WHERE "Title" = "Mr"
```

Note - * stands for **wildcard**, which means all records. This would retrieve the following data:

```
1001 Mr Alan Turing aturing@bitesize.com
1004 Mr George Boole gboole@bbcbitesize.com
```

The LIKE command can be used to find matches for an incomplete word, for example:

```
SELECT * FROM "personnel" WHERE "email address" LIKE "%com"
```

This would retrieve:

```
1001 Mr Alan Turing aturing@bitesize.com
1002 Mrs Ada Lovelace alovelace@gcsecompsci.com
1004 Mr George Boole gboole@bbcbitesize.com
```

Note - %com is also a wildcard which will return any value that contains "com".

```
Console Search Profiler Grok Debugger
1 POST _sql?format=txt
2- {
3  "query": "SELECT OriginCityName, DestCityName FROM Flights WHERE
4    FlightTimeHour > 5 AND OriginCountry='US' ORDER BY FlightTimeHour
5    DESC LIMIT 20"
6- }
6 POST _sql?format=txt
7- {
8  "query": "SELECT COUNT(*), MONTH_OF_YEAR(timestamp) AS month_of_year,
9    AVG(FlightTimeHour) AS Avg_Flight_Time FROM Flights GROUP BY
10   month_of_year"
11- }
12
```

Retrieving data

Boolean operators AND and OR can also be used to retrieve data.

```
SELECT * FROM "personnel" WHERE "Surname" = "Turing" OR "Hopper"
```

This would retrieve:

```
1001 Mr Alan Turing aturing@bitesize.com
1003 Miss Grace Hopper
ghopper@bitesizemail.co.uk
```



Computational Thinking – Defensive Design – Term 6

Using subprograms to produce structured code

Subprograms are small programs that are written within a larger, main program. The purpose of a subprogram is to perform a specific task. This task may need to be done more than once at various points in the main program.

There are two types of subprogram:

- **Procedures**
- **Functions**

Procedures

A procedure is a subprogram that performs a specific task. When the task is complete, the subprogram ends and the main program continues from where it left off.

For example, a procedure may be written to reset all the values of an array to zero, or to clear a screen.

Functions

A function works in the same way as a procedure, except that it manipulates data and returns a result back to the main program.

For example, a function might be written to turn Fahrenheit into Celsius:

```
function f_to_c(temperature_in_f)
    temperature_in_c= (temperature_in_f -32) * 5/9
    return temperature_in_c
endfunction
```

Defensive design considerations

The purpose of defensive design is to ensure that a program runs correctly and continues to run no matter what actions a user takes.

This is done through planning for all possibilities (contingencies) and thinking about what a user may do that the program does not expect.

Defensive design encompasses three areas:

- **Protection against unexpected user inputs or actions, such as a user entering a letter where a number was expected**
- **Maintainability - ensuring code is readable and understandable**
- **Minimising/removing bugs**

This anticipation and protection is done through:

- **Validation**
- **Sanitisation**
- **Authentication**
- **Maintenance**
- **Testing**

Validation

A programmer should consider that any inputs a user makes may be incorrect and should plan arrangements for such unexpected actions. Using validation helps a programmer to ensure that any data input is possible and sensible.

Validation applies rules to inputted data. If the data does not follow the rules, it is rejected, reducing the risk that incorrectly input data may crash a program.

Data sanitisation

Validation is used to ensure that data entered is both possible and sensible. The purpose of data sanitisation is to hide or protect data so it can't be seen or disclosed.

Data can be sanitised in several ways. One example of data sanitisation is known as masking. Masking hides visible data by replacing it with something else.

A good example of this is when a person enters a password. On many systems, as the user types in their password, all that can be seen of the password is a series of asterisks or dots, one for each character typed in.

Here, masking protects the user as the actual password is not visible to anyone who might be looking at the screen.

Username

Password

Sign in Need Help?

Computational Thinking – Defensive Design – Term 6

Authentication

Authentication is the process of a user confirming that they are who they say they are on a computer system. In a network, this is often done through inputting a username and password.

For networks that require high levels of security, authentication may include other methods.

Maintainability

The purpose of maintainability is to ensure that, over time, a program can be easily maintained.

A programmer may decide to return to a program they wrote some time before in order to add an extra feature. Additionally, another programmer may wish to modify the program in order to improve it or debug an error.

In both situations, the understanding of the program, how it works and the purpose of the code will be made easier if the program is written in a maintainable style.

Testing

When first written, many programs contain bugs (errors). Syntax errors are usually quickly removed, but it can take a long time to deduce where a logic error is occurring and why. The purpose of testing is to help the programmer remove such bugs and to ensure that the program functions as intended.

Testing is carried out in various ways:

- Iterative testing is carried out while a program is being developed. The programmer writes a section of code (module) then tests it. The module may work fine, but more likely the programmer will amend or fix the code, and test it again. The process repeats (iterates) until the module works as intended.
- Final (terminal) testing is carried out when all modules are complete and the program is tested as a whole to ensure that it functions as it should.

Ideally, a programmer should run as many tests as is sensible. Many large programs, especially games, contain bugs simply because it may not be possible to test every possible input or action.

Syntax and Logic Errors

Syntax errors

A syntax error occurs when code written does not follow the rules of the programming language. Examples include:

- misspelling a statement, e.g. writing pint instead of print
- using a variable before it has been declared
- missing brackets, e.g. opening a bracket but not closing it

A program will not run if it has syntax errors. Any such errors must be fixed first. A good integrated development environment (IDE) will usually point out any syntax errors to the programmer.

Logic errors

A logic error is an error in the way a program works. The program simply does not do what it is expected to do.

Logic errors can have many causes, such as:

- incorrectly using logical operators, e.g. expecting a program to stop when the value of a variable reaches 5, but using <5 instead of <=5
- incorrectly using Boolean operators
- unintentionally creating a situation where an infinite loop may occur
- incorrectly using brackets in calculations
- unintentionally using the same variable name at different points in the program for different purposes
- referring to an element in an array that falls outside of the scope of the array

Unlike a syntax error, a logic error will not usually stop a program from running. Instead the program will run but not function as expected.

Computational Thinking – Languages – Term 6

High level languages

The instructions that tell a computer what to do are written in machine code. Machine code is a series of numbers, written in either binary or hexadecimal. Each number represents a different instruction.

High level programming languages are languages that are close to the spoken and written language of the programmer.

Programmers write in high level languages because they are easier to understand and are less complex than machine code. They allow the programmer to focus on what needs to be done, rather than on how the computer actually works.

For example, in many high level languages, to place a message on the screen, a programmer would use the statement 'print'. The programmer might not know how the computer actually generates the message. They just need to know how to use the 'print' statement.

High level languages have a disadvantage - they are restricted to the number of statements built into them. If the programmer wants a program to do something, but a statement does not exist to do so, the task cannot be done.

Commonly used high level languages

Many types of high level language exist and are in common use today, including:

- Python
- Java
- C++
- C#
- Visual Basic
- JavaScript

Source code

Any program written in a high level language is known as source code. Source code must be translated into machine code before the computer can understand and execute it.

High level languages are known as one-to-many languages as each high level instruction is translated into many machine code instructions.

Low Level Languages

Low level languages are languages that sit close to the computer's instruction set. An instruction set is the set of instructions that the processor understands.

Two types of low level language are:

- Machine Code
- Assembly Language.

Machine Code

High level languages contain commands that programmers use to instruct the computer what to do. However, they are restricted by the limited number of commands implemented within them. In fact, high level commands are nothing more than a series of machine code instructions.

Machine code is the instructions that a processor understands and can act upon.

Assembly Language

Assembly language sits between machine code and high level language. While high level languages use statements to form instructions, assembly language uses mnemonics (short abbreviations).

Each mnemonic directly corresponds with a machine code instruction. As a result, assembly language is known as a one-to-one language. Here are some examples of mnemonics below

Mnemonic	Action
LDA	Loads a value from a memory address
STA	Stores a value in a memory address
ADD	Adds the value held in a memory address to the value held in the accumulator
SUB	Subtracts from the accumulator the value held in a memory address
MOV	Moves the contents of one memory address to another

In assembly language, programmers write programs as a series of mnemonics. Mnemonics are much easier to understand and debug than machine code, giving programmers a simpler way of directly controlling a computer.

Writing in mnemonics is easier for programmers because they are usually brief representations of the actual commands. They are quicker to write than binary or hexadecimal, and it is easier to spot mistakes.

Computational Thinking – Translators and IDE – Term 6

Translators

Any program written in a high level language is known as source code. However, computers cannot understand source code. Before it can be run, source code must first be translated into a form which a computer understands - this form is called object code.

A translator is a program that converts source code into object code. Generally, there are three types of translator:

- **Compilers**
- **Interpreters**
- **Assemblers**

Compilers

A compiler takes the source code as a whole and translates it into object code all in one go.

Once converted, the object code can be run unassisted at any time. This process is called compilation.

Interpreters

An interpreter translates source code into object code one instruction at a time.

It is similar to a human translator translating what a person says into another language, sentence by sentence, as they speak.

The resulting object code is then executed immediately. The process is called interpretation.

Assemblers

Assemblers are a third type of translator. The purpose of an assembler is to translate assembly language into object code.

Whereas compilers and interpreters generate many machine code instructions for each high level instruction, assemblers create one machine code instruction for each assembly instruction.

Integrated Development Environments

Writing large programs can be a complex task. To help the programmer write clear, maintainable code, various tools exist:

- **editors**
- **run-time environments**
- **automatic line numbering**
- **error trapping**
- **colour coding**
- **breakpoints**
- **variable tracing**
- **auto-correct**
- **auto-suggestion**
- **auto-indent**
- **Interpreters**

Some (or all) of these tools are often gathered together in software known as an integrated development environment (IDE).

Many brands of IDE exist:

- **Python comes with a simple IDE called IDLE.**
- **Eclipse and NetBeans are two fully featured IDEs often used for programming in Java, JavaScript and HTML.**
- **Visual Studio is an IDE largely designed to help programmers in Visual Basic and C#.**

The choice of IDE is down to the personal preference of the programmer. Some programmers enjoy the variety of tools offered by some IDEs, while others prefer a simpler, bare-bones approach.

Computational Thinking – IDE – Term 6

Editors

Editors are software which allow programmers to write and edit code. Editors are often fairly simple, but usually offer facilities such as:

- automatic line numbering
- colour coding
- auto-correct
- auto-suggestion
- auto-indent

These tools help to improve the readability of code. However, they do not usually help to identify errors.

Debugging tools

Debugging tools help programmers to locate and fix errors:

- Breakpoints enable a program to be paused or stopped at predetermined points. The programmer can then examine different parts of the running program, such as the values held in variables or the status of conditions. This information tells the programmer whether or not the program is working as expected.
- Variable tracing lets the programmer see the changing values of variables as the program runs. Again, this enables the programmer to check if the program is functioning as expected.
- Some IDEs pinpoint exactly where a syntax error occurs, or at which line in a program an error is generated. This is known as error trapping.

Runtime environments

A **runtime environment (RTE)** is special software that allows a program to run on a computer, even if it is not designed to run on it. It works on different platforms, meaning a program can be developed on different systems and still work.

An RTE creates a virtual machine in order to run a program. A virtual machine is an emulation of a computer system that can be made to run on a different computer. This means a programmer can concentrate on program development rather than understanding how different computer systems actually work.

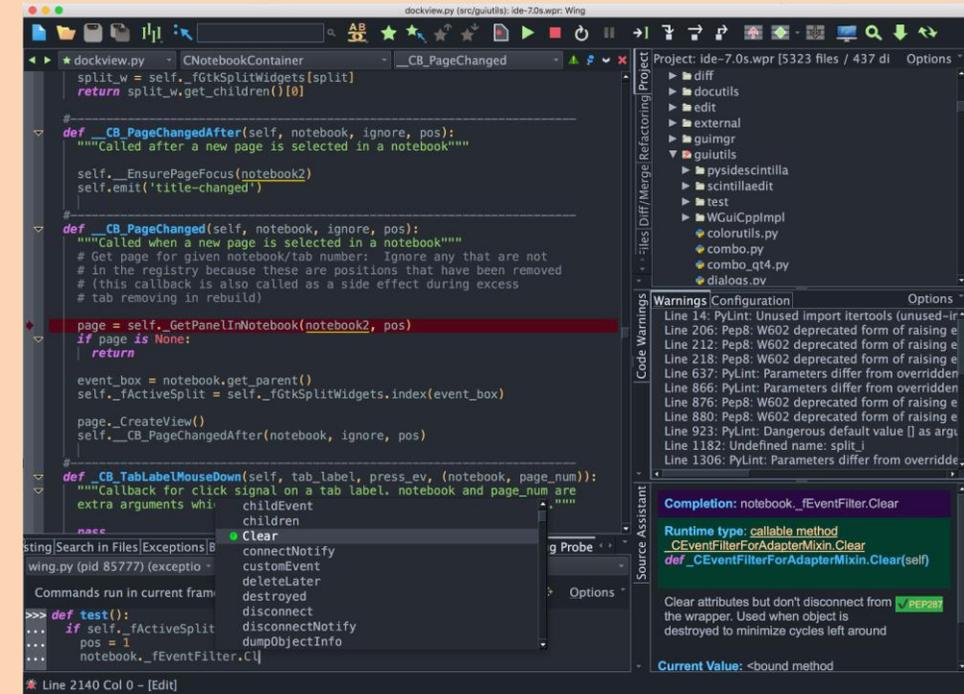
A common RTE is the Java Runtime Environment. This RTE allows Java programmers to design programs on one platform, but to be able to run them on many.

Error Diagnostics

Information that is presented following the detection of some error condition and is mainly intended to assist in identifying the cause of the error.

Questions to consider?

1. What is the benefit of writing code in a low level language?
2. Name a type of Translator that can be used to translate High-Level Language into Machine Code?
3. What are the differences between a compiler and an interpreter?
4. What is meant by the term High level Language and Low Level Language?



An Example of a Python IDE with a large python program running in it.

iMedia - Digital Graphics – Key Terms

Key Term	Explanation
Assets	These are the component parts that are used in the creation of the digital graphic. Examples would be photographs, images, graphics, text, logos.
Design and layout of graphics	This refers to the use of colour, composition, white space and styles in the digital graphic in the context of a given target audience . For example, choices of colour can be very different depending on the age group of the target audience . The colours should also contrast and complement each other. Composition refers to the layout of the different elements on the overall graphic, using suitable sizes and positions of different images and assets. White space is not necessarily a white colour – it is any blank space and can be used effectively to emphasise key parts of the graphic. The styles are associated with different genres of graphic products. Examples would include themed magazine covers, gaming covers, film posters, advertisements. These concepts of design and layout can be applied in the development of the visualisation diagram .
File formats	This refers to the type of image file and file extension that is being used or considered. Typical examples of file formats are .tif, .jpg, .png, .bmp, .gif and .pdf .
Image editing software	This is the type of software required for the unit. It is not the same as desktop publishing software, which does not have the required range of image editing tools and techniques.
Legislation	In the context of digital graphics , this refers to the differences between copyright protected, copyright free, royalty free and use of trademarks. For example, a final graphic may be considered as an orphan work but the copyright on component images and assets remains with the original author/owner. Google images should not be accepted as a copyright free source.

Key Term	Explanation
Properties	The properties of digital graphics refer primarily to the pixel dimensions and dpi resolution. Final work that is 595 x 842 pixels will be the correct aspect ratio for an A4 page but since this would only be at 72dpi it is not suitable for print purposes. Furthermore, a graphic that is saved using pixel dimensions of 2480 x 3508 (i.e. A4 at 300dpi) using jpeg low quality settings might reduce the file size but that does not mean it is suitable for web use. The fitness for purpose of the final graphics is fundamental to the unit. This means it must have an appropriate number of pixels – whether for print or web use
Resources	This refers to the hardware and software used to create the graphics. Examples would include both the computer equipment, image capture hardware and the image editing software application
Technical compatibility of assets	Component images that are to be used in a digital graphic should be technically compatible with each other. This primarily refers to the pixel dimensions and dpi resolution. For example, a 300 x 200 pixel image at 72 dpi would be unsuitable for use as the background image to a full size A4 print poster. If for print, this should be converted for typically 300dpi and the pixel dimensions taken into consideration for the print size of this component image rather than the overall finished product. Alternatively, high resolution photographs may not be suitable as a component part of a web graphic. The file formats would also be part of the technical compatibility consideration
Visualisation diagram	This is a preconceived sketch or diagram of what is to be created as the digital graphic. It can be hand drawn or produced using a software application. The intention is such that any other person or the client can get an idea of what the final product will look like. It can include annotations in addition to a draft layout of the content.

iMedia - Digital Graphics Term 5

Image Editing

Image editing software is used to create and edit images. Often images can be edited or combined to create a new composition. They can also be created from scratch to create logos or illustrations.



Photoshop

Available for both Windows and Mac, Adobe Photoshop is an extremely powerful application that's used by many professional photographers and designers. You can use Photoshop for almost any type of image editing, from touching up photos to creating high-quality graphics.



Technical Compatibility

Compatibility is the capacity for two systems to work together without having to be altered to do so. Compatible software applications use the same data formats. For example, if word processor applications are compatible, the user should be able to open their document files in either product.

DPI Resolution

DPI, or dots per inch, is a measure of the resolution of a printed document or digital scan. The higher the dot density, the higher the resolution of the print or scan. Typically, DPI is the measure of the number of dots that can be placed in a line across one inch, or 2.54 centimetres.

Pixel

The term "pixel" is actually short for "Picture Element." These small little dots are what make up the images on computer displays, whether they are flat-screen (LCD) or tube (CRT) monitors.

Key Words

Image Editing Photoshop Technical Compatibility DPI Resolution Pixel Pixel Dimensions Use of Layers

Pixel Dimensions

The total pixel dimensions of an image will tell you how many total pixels (dots) the image is made up of. For example, let's say we have a digital image that is 1200x1800 pixels (dots). That means our digital image is 1200 dots high by 1800 dots wide.

Use of Layers

Transparent areas on a layer let you see layers below. You use layers to perform tasks such as compositing multiple images, adding text to an image, or adding vector graphic shapes. You can apply a layer style to add a special effect such as a drop shadow or a glow. A new image has a single layer.

Editing Techniques

Cropping	Cropping is the removal of unwanted outer areas from a photographic or illustrated image.
Rotating	Rotating the view of an image can make it easier to edit or retouch certain areas.
Brightness/ Contrast	<ul style="list-style-type: none">- Brightness refers to the absolute value of colours (tones) lightness/darkness.- Contrast is the distinction between lighter and darker areas of an image, and it refers to making more obvious the objects or details within an image.
Levels	Levels is a tool in Photoshop and other image editing programs which can move and stretch the brightness levels of an image
Colour Adjustment	In graphics and image-editing programs, colour adjustment(s) can be used to change the overall tone of your image and also to remove unwanted colours from your image.
Cloning	To copy pixels to new locations in an image. To paint with the Clone Stamp tool.
Retouching	Basic retouching means up to 10 minutes of work on an image – removing blemishes, brightening teeth, smoothing skin, or even removing an unsightly wire.
Selections	With selections, define an area that you can further edit to enhance your images and composites.

iMedia - Digital Graphics Term 6

Version Control

The naming conventions of files should include the use of relevant words and phrases that describe the content of the digital graphic file. The renaming of a photograph from a digital camera would be a good starting point e.g. 'DSCN1056.jpg' being renamed to 'school_entrance.jpg'

File Types and Formats

Depending on the pre-production document that you are creating, the content of it, and the software you are using, a digital file will be created when a project is saved or exported. It is important that the file type and format used is compatible with the document type otherwise it may be unreadable or inaccessible. Some file types are designed to only be used by specific software packages e.g. Photoshop .psd whereas others are designed to be widely compatible and accessible.

Examples of File Formats

Image	.jpg	.png	.tiff	.psd	.bmp
	.pdf				
Video	.wmv	.mp4	.mov	.fiv	
	.avi				
Audio	.mp3	.wav	.ogg	.aac	
	.m4a				
Document	.doc	.pdf	.ppt	.pub	.html
Animation	.gif	.swf			

Key Words

Version Control
File Types
Formats
File Compression
Lossy
Lossless
Asset Table
Master File
Review

File Compression

This is how files are made smaller so that they take up less storage space or can be easily transferred, transmitted or downloaded. There are two types:

- Lossy – Discards some of the original information to reduce file size. Quality is usually reduced. Useful for use on the web.
- Lossless – No information is discarded, file size is usually greater but so is the quality.

Asset Tables

An Asset table is a table where images and items are kept that will be used within the project.

They require information on the potential use of the image and the location the image has been found (website) as well as any alterations that have been made to it.

Master File

Master files are the original file which are used to store all the original data as you make changes.

These files can be used in the case you lost your current work or if you have made irreversible changes and need to back track.

These are always useful for your projects.

Reviewing a Digital Graphic

There are a number of steps that need to be taken when reviewing a Digital Graphic:

- Make sure both of the final digital graphic formats are fit for purpose.
- Check that the digital graphic meets the client requirements initially specified.
- Review the final digital graphic in terms of composition, colours and overall quality.

Reviewing a Digital Graphic – Positives and Negatives

When reviewing Digital Graphics both the positives and the negatives need to be taken into account:

- Positives: Looking at what was done well in the project will allow you to identify those techniques which can be used again in the future.
- Negatives: Understanding what went wrong within the project helps you avoid techniques when looking at certain projects.

These help you create your “toolkit” which you will rely on for your future projects.

iMedia - Digital Graphics Legislation

Legislation

Legislation are laws passed by government to control, restrict, protect and prevent various aspects of media production.

There are three main pieces of legislation that affect media production:

- Data Protection Act 1998
- Health and Safety Act 1990
- Copyright, Designs and Patents Act 1988

Health and Safety Act 1990

The Health and Safety Act is the main law that deals with the health and safety of employees.

The law ensures that employers look after the rights of their workers by keeping the conditions to an acceptable and legal standard.

Two areas covered by H&S are:

1. General Working Conditions
2. Employer Regulations

Data protection Act 1998

The Data Protection Act 1998 (DPA) is a law designed to protect personal and sensitive data that has been collected about people from being misused. There are 8 Principles:

1. Data is processed fairly and lawfully.
2. Data is used for specified legal purposes.
3. Data stored is adequate, relevant and not excessive.
4. Data is accurate and up to date.
5. Data is not kept longer than necessary.
6. Data is processed in accordance with data subjects' rights.
7. Data is kept safe from accidental damage and secure from unauthorised access.
8. Data is not transferred to another country outside the EU.

Copyright

Copy right is a law designed to help protect peoples work and ideas.

If you:

- **Take peoples work (download films /music)**
- **Use people's work (copy text/ images from the internet**
- **Steal people's ideas (create a new product using someone else's technology)**

Without permission and without acknowledging them, then you are breaking copyright law. Typical punishments range from 6 months to 10 years imprisonment and also £5000 fine.



Location Recce

Location Recce is a production term used in the UK, Europe, India, Australia, New Zealand, South Africa, and Malaysia which refers to a pre-filming visit to a location to determine its suitability for shooting (commonly carried out by the Director of Photography), including access to necessary facilities and assessment of any potential lighting or sound issues, and is closely related to location scouting. In the US, the term "site survey" or "tech scout" is commonly used with the same meaning.

Trademark

A Trademark is a type of intellectual property consisting of a recognizable sign, design, or expression which identifies products or services of a particular source from those of others, although trademarks used to identify services are usually called service marks. The trademark owner can be an individual, business organization, or any legal entity. A trademark may be located on a package, a label, a voucher, or on the product itself. For the sake of corporate identity, trademarks are often displayed on company buildings. It is legally recognized as a type of intellectual property.

Key Words

Legislation Data Protection Health & Safety
Copyright Location Recce Trademark
Intellectual Property Royalty Free

Intellectual Property

This is a piece of work, idea or an invention which may then be protected by copyright, patent or trademark. The concept of copyrighting an idea is increasingly becoming a bigger issue with the development of the internet and the ease of access to people's intellectual property.

Royalty Free

Normally, copyrighted material is protected and cannot be used without permission and payment of royalties. Royalties are usually a percentage of earnings or recurring payment made to a creator or intellectual property owner.

Royalty free is a term that is used to describe certain types of intellectual property that you're allowed to use without having to pay royalties. The intellectual property owner must specifically put this label on their content in order for anyone to use it in this way.

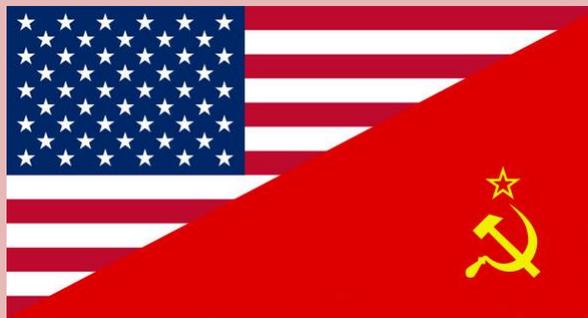
History Terms 3 & 4: The Cold War

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

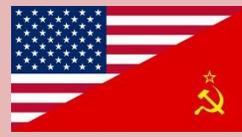
<https://tinyurl.com/ColdWarVids>

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.

Potsdam Conference 1945	Iron Curtain divides East and West 1945	Truman Doctrine 1947	Berlin Blockade 1948	USSR tests nuclear bomb 1949	Korean War 1950-53	Space Race 1955-75	U-2 Plane Incident 1960	Berlin Wall erected 1961	Bay of Pigs botched invasion 1961	Cuban Missile Crisis - brink of WW3 1961	Strategic Arms Limitation Talks 1969	Soviets invade Afghanistan 1979	Fall of the Berlin Wall 1989	Fall of the USSR End of Cold War 1991
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Key Topic 1: Origins of the Cold War



Capitalism

Politics: Favours democracy – people choose their leaders from several different parties.

Economy: Businesses are privately owned, and there are opportunities to become very wealthy for some people. If you work hard and are good at your job, you will be promoted and earn more money – this gives people an incentive to work.

Beliefs: Freedom is good and is necessary for a successful society. Some people will be wealthier than others but mostly this should reflect their ability, ingenuity and hard work. It would be unfair for everyone to be equal if some work harder than others. Capitalism should be the system used by the rest of the world because it encourages prosperity and development.

Problems: Capitalism leads to inequality – some people become very rich, but others become very poor. Power is concentrated in the hands of a minority of rich and powerful individuals, whilst the poor are vulnerable to being exploited.

Communism



Politics: Only one party allowed, the Communist Party, which represents the people. There are no elections and you cannot change your government.

Businesses are all owned publicly – by the government. All profits and products are shared amongst the people. Nobody becomes hugely wealthy, but nobody is much poorer than anyone else.

Beliefs: Freedoms such as a free media and freedom to hold different political views is harmful to the unity and success of the country. Everyone should be equal, and it is the government's job to ensure that this happens, as capitalism will exploit the poor and the workers to benefit the elite. Communism should be the system used by the rest of the world, and the USSR should encourage revolutions in other countries to ensure this happens.

Problems: Communism leads to a lack of productivity – why work hard with no opportunity for financial reward? It also stifles creativity – people are less likely to have the freedom and incentive to develop ideas if they won't personally benefit from them. Lack of democracy leads to the suppression of other basic rights.

The Conferences

Grand Alliance | Wartime alliance between USA, Britain and USSR

Sphere of Influence | The region over which a country has influence/control

Demilitarisation | The removal of army and other military from a region

Soviet Expansion

Satellite states | Countries controlled by a larger, more powerful nation

Containment | The US plan to prevent the spread of Communism

Iron Curtain | The name given to the 'border' of Western/Eastern Europe

US Actions – The Truman Doctrine and Marshall Plan

Doctrine | A key message that you are committed to enforcing

Soviet Actions – The Berlin Blockade

Comecon | Organisation to increase Soviet economic control in Europe

Cominform | Organisation encouraging cooperation between communist countries

Blockade | Preventing access to a location or region

Bizonia | The merging of the German regions controlled by the US and Britain

Airlift | Bringing needed goods into a region by air

NATO | Military alliance of America and its allies

Warsaw Pact | Military alliance of the USSR and its allies

The Arms Race

Arms race | Competitive military spending between countries

ICBM | Missiles than can be fired huge distances – across continents

H-Bomb | Hydrogen bomb – a very powerful and destructive weapon

B-52 | The type of bomber aircraft used by the USA

Sputnik | A Soviet satellite, the first man made satellite in space

Hungarian Uprising

De-stalinisation | Khrushchev's policy of moving away from Stalin's methods

Secret Police | Organisations that enforce the law but are not accountable or public

Guerrilla | A type of fighting that relies on ambushes or unconventional warfare

Key Topic 1: Origins of the Cold War



The Three Conferences 1943-45

The Tehran Conference, November 1943

Representatives:

Franklin D. Roosevelt (USA)
Joseph Stalin (USSR)
Winston Churchill (UK)

Focus: Develop relationship between three powers in the Grand Alliance; strategy to win the war.

Level of cooperation: High, Roosevelt and Stalin agreed on most major issues.

Agreements:

Britain and US would open up a second front in WWII by invading France in 1944.
The Soviet Union would join the US in declaring war on Japan after Germany's defeat.
The United Nations would be set up after the war to resolve disputes and guarantee international security.
An area of Poland would become part of the USSR.

The Yalta Conference, February 1945

Representatives:

Franklin D. Roosevelt (USA)
Joseph Stalin (USSR)
Winston Churchill (UK)

Focus: What to do with Europe after Allied victory in WWII.

Level of cooperation: Medium, Stalin had started to push his luck on some issues and the other leaders put their foot down.

Agreements:

Both Germany and its capital Berlin would be divided into four zones administered by the US, USSR, Britain and France.
To give liberated countries formerly occupied by the Nazis full freedom to choose their own governments without pressure or interference.
That each of the three powers would join the new United Nations
That Eastern Europe was in the Soviet 'sphere of influence' and this would be respected by the US and Britain.

Disagreements:

How much in reparations Germany should pay (Stalin wanted more)
Where Germany's eastern border should be (Stalin wanted Germany to be as small as possible)
What kind of government Poland should have (Stalin wanted a 'friendly' Polish government to act as a buffer against Germany).

The Potsdam Conference, July 1945

Representatives:

Harry S. Truman (USA)
Joseph Stalin (USSR)
Winston Churchill then Clement Attlee (UK)

Focus: Resolving issues left incomplete at Yalta; dealing with changing situation after Germany's surrender.

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.

Agreements:

Established borders of the zones of Germany and Berlin
Germany demilitarised
Democracy, freedom of speech and a free press would be established in Germany
Most of Germany's reparations would go to the USSR as they had suffered most.
The Nazi party was banned.

Disagreements:

Stalin wanted to disable Germany with huge reparations but Truman saw a strong Germany as a useful ally against the threat of the USSR
Truman wanted free elections across Eastern Europe but Stalin argued that as this was the Soviet sphere of influence this shouldn't happen.



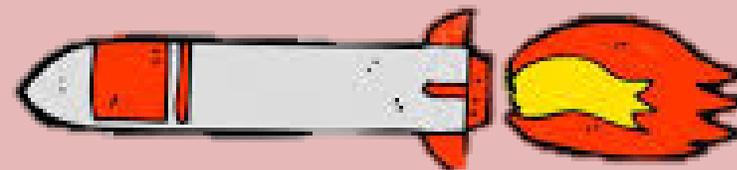
THE COLD WAR



Key Topic 1: Origins of the Cold War

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.



Roosevelt
1933-1945

1943 Tehran Conference
1944
1945 Yalta Conference / Potsdam Conference / A-Bomb



Truman
1945-1953

1946 1945-47 Soviet Expansion
1947 Truman Doctrine / Marshall Plan / Cominform
1948 Berlin Crisis / Airlift
1949 Comecon / NATO / USSR tests A-Bomb



Eisenhower
1953-1961

1950
1951
1952
1953 Successful H-Bomb tests / Khrushchev new leader
1954
1955 Warsaw Pact
1956 Hungarian Uprising
1957 Launch of Sputnik – first key moment of space race



Kennedy
1961-1963

1958
1959
1960 U-2 spy plane crisis
1961 Second Berlin Crisis
1962 Cuban Missile Crisis

Key Topic 2: Cold War Crises



Key Terms

Two crises in Berlin – not the same thing!

Berlin Crisis of 1948

The Berlin crisis of 1948 was caused by Stalin, who was resentful of the US and Britain having free access through East Germany to get to their sectors of Berlin. He thought they were spying on the Communist country and were spreading pro-capitalist messages. He closed off all the roads and railways, and attempted to force the US and Britain to give up their claim to West Berlin. Instead, the US organised airlifts of food and fuel to defeat the blockade and save the people of West Berlin. Stalin eventually had to back down. This crisis was significant in the wider Cold War because it showed that the USA was prepared to back up its words in the Truman Doctrine with actions. It was also significant because it led to the creation of NATO.

Berlin Crisis of 1961

The Berlin Crisis of 1961 was caused by Khrushchev, who was resentful of highly qualified professionals leaving East Berlin and East Germany. There was no border between the East and West zones, meaning that people frequently travelled to the West and then on to capitalist countries that they otherwise were not allowed to go to. Highly qualified people knew they could earn lots more money in the capitalist West, so the 'brain drain' was a big concern for Khrushchev. He attempted to force the US to prevent this migration, but the US refused, so Khrushchev authorised the East Germans to build a wall around the entirety of West Berlin. This meant no East Germans could enter or they would be shot. Migration stopped, but the city was cut in two. The wall stood for 28 years.

The Berlin Crisis, 1961

Defection	Leaving one country to go to its enemy
Refugee	A person fleeing crisis in their home country
Ultimatum	A final choice with two serious options
The Construction of the Berlin Wall	
Checkpoint	A guarded border post on the Berlin Wall
The Cuban Revolution	
Dictator	A leader with total power over the country
Diplomat	A representative from one country in another
Exile	A person forced to leave a country to live in another
CIA	The Central Intelligence Agency – US spy network
Bay of Pigs	A bay in Cuba that was the focus of a failed invasion
The Cuban Missile Crisis	
U-2	US spy plane which captured images of the missiles

Hawks and Doves

People who favoured aggressive or diplomatic US response

Brinkmanship

Going right to the edge to get what you want

Consequences of the Cuban Missile Crisis

Hotline

A telephone connection to allow instant communication

Treaty

An agreement between countries

Detente

The thaw in relations that led to progress between US/USSR

The Prague Spring

Reforms

Changes to the way the country is run

Censorship

Limiting the information that people have access to

The Soviet Invasion of Czechoslovakia

Resistance

Refusal to cooperate

Propaganda

Materials which are designed to push a particular message

Brezhnev Doctrine

USSR plan to invade countries which threatened E. Europe

Vietnam War

A disastrous conflict the US was involved in in the 1960s/70s

Key Topic 2: Cold War Crises



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



Eisenhower
1953-1961

1958 Berlin Ultimatum

1959 Khrushchev visits USA / Cuban revolution

1960 Planned Paris Summit / U-2 spy plane crisis

1961 Vienna Summit / Berlin Wall built / Bay of Pigs



Kennedy
1961-1963

1962 Cuban Missile Crisis

1963 Kennedy visits Berlin



Johnson
1963-1969

1964 Brezhnev replaces Khrushchev as Soviet leader

1968 Prague Spring / Soviet invasion / Brezhnev

Doctrine



Nixon
1969-1974

1969 Czech Anti-Soviet demonstrations continue

Key Topic 3: End of the Cold War



Ronald Reagan



Mikhail Gorbachev



Ronald Reagan was a former Hollywood actor who was elected US President in 1980. He took a tougher line with the USSR, and his SDI 'Star Wars' initiative led to massive military spending. His description of the USSR as the 'Evil Empire' in 1982 deteriorated relations, but his policies forced the USSR to accept that they couldn't keep up with US progress and that reform was necessary.

Mikhail Gorbachev came to power in 1985 with the USSR in crisis. He was their fourth leader in the last three years and their political and economic situation looked bleak. Gorbachev announced a series of reforms called 'New Thinking' including 'glasnost' and 'perestroika'. His willingness to reform the USSR and improve relations with the West made him incredibly popular in the USA. His reforms brought about the end of the Soviet Union.

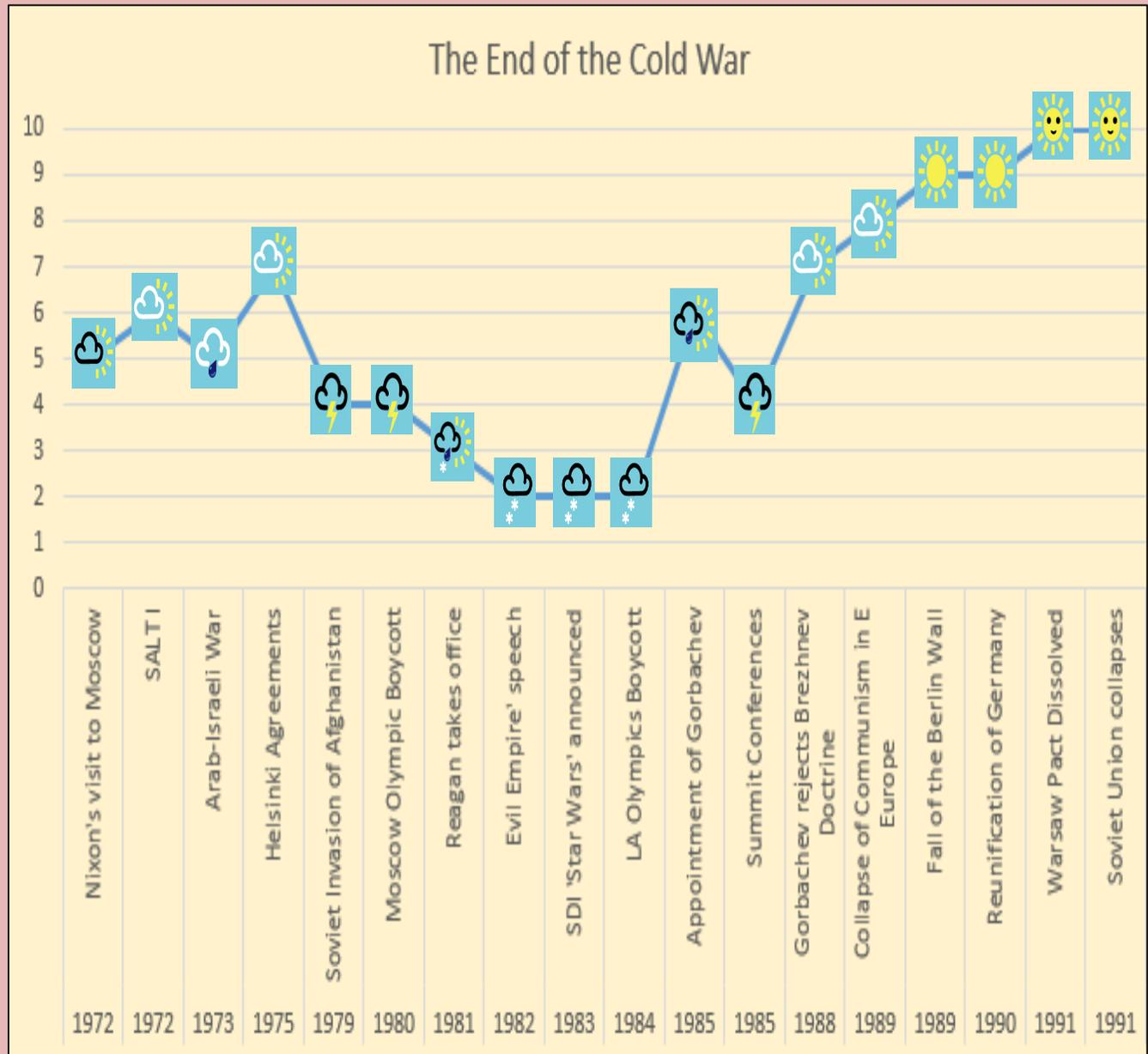
Key Terms

Reasons for Detente		Carter Doctrine	A US vow to go to war if their interests in Middle East threatened
Detente	An period of improved relations between US and USSR	Boycott	A refusal to use certain services or to attend an event
Linkage	Nixon's plan to 'link' benefits to positive Soviet actions	Reagan and the Second Cold War	
Bilateral	Agreements that involve cooperation between two parties	Second Cold War	Reagan's escalation of the Cold War after the failure of detente
Detente		NUTS	Targeting nuclear weapons at USSR warheads, not cities
SALT I	A plan to limit production of new nuclear weapons	START	Talks focused on reducing total nuclear weapons on both sides
ABM	Anti-Ballistic Missiles – reduced by the SALT Treaty	SDI	'Star Wars' – high tech laser guided missile protection system
MIRV	Weapons that contained several targetable warheads	Gorbachev's 'New Thinking'	
Disarmament	Reducing or completely destroying supplies of weapons	New Thinking	A series of reforms proposed by Gorbachev to modernise USSR
Apollo-Soyuz	A US-Soviet meeting in space to show their cooperation	Perestroika	'Restructuring' – economic changes to the USSR and communism
Helsinki Agreements	Agreements over issues like security and human rights	Glasnost	'Openness' – greater freedoms within the USSR and E Europe
Human Rights	Basic freedoms that are not respected in some countries	Dissidents	Political opponents to a regime that often experience persecution
Afghanistan and End of Detente		Uskoreniye	Acceleration – a Soviet plan to boost and modernise the economy
Mujahideen	An Afghan resistance force that was armed by the US	INF Treaty	First successful agreement to reduce nuclear weapons
Jihad	A Muslim 'holy war' that was declared against the USSR	Sinatra Doctrine	Nickname of plan for E European countries to do things 'their way'
Fundamentalism	An extreme and dangerous version of a religion	The Fall of the Berlin Wall and the End of the Cold War	
Embassy	A building that represents one country's people in another.	Reunification	Germany being reunited into a single country after being divided

Key Topic 3: End of the Cold War



The End of the Cold War



Nixon
1969-1974

- 1970
- 1971
- 1972 SALT I signed / Nixon visits Moscow
- 1973 USSR brokers peace deal to end Vietnam War
- 1974 Nixon visits Moscow for second time



Ford
1974-77

- 1975 Apollo-Soyuz link up / Helsinki agreements
- 1976
- 1977



Carter
1977-1981

- 1978 Communist revolution in Afghanistan
- 1979 SALT II discussions end / Soviets invade Afghanistan
- 1980 US boycott of Moscow Olympics
- 1981



Reagan
1981-1989

- 1982 Death of Brezhnev / Andropov new leader
- 1983 SDI announced 'Star Wars'
- 1984 Soviets boycott LA Olympics / Chernenko new leader
- 1985 Gorbachev new leader / Reagan + Gorbachev meet
- 1986 Reykjavik Summit collapses
- 1987 INF Treaty



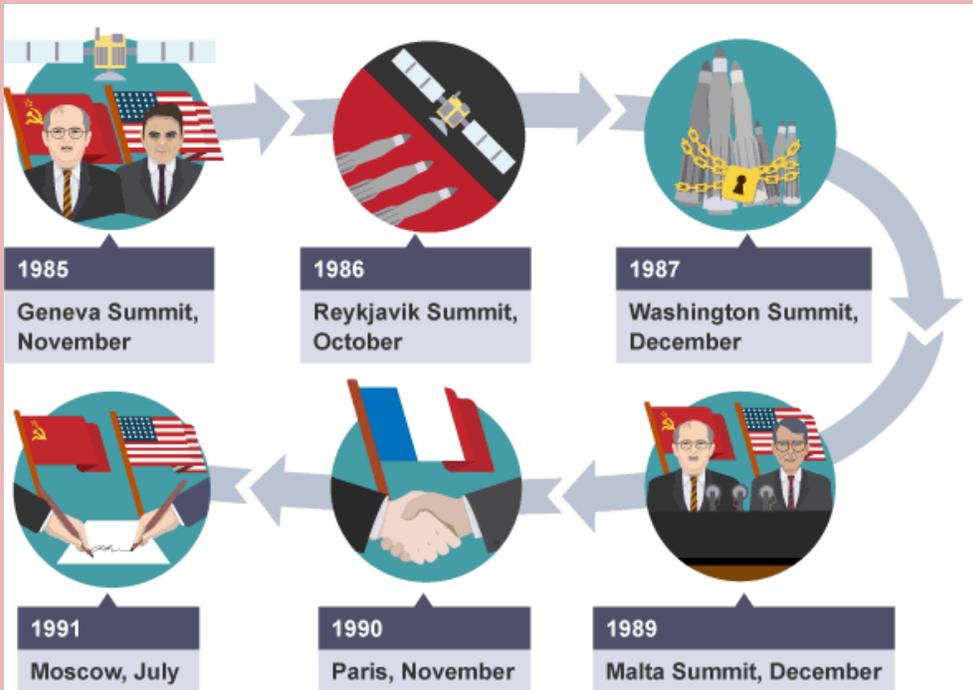
Bush Sr.
1989-1993

- 1988
- 1989 Iron Curtain ends / Berlin Wall pulled down
- 1990 Collapse of Soviet Union / Germany reunited
- 1991 START I / Gorbachev resigns / Warsaw Pact ends

Key Topic 3: End of 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



Cold War Video Library
<https://tinyurl.com/ColdWarVids>

East Germany

Oct-Nov 1989: Millions protest on the streets of major cities
 Nov 1989: Berlin Wall is opened
 Oct 1990: German reunification

Czechoslovakia

Nov 1989: Mass protests against Communism lead to resignation of government
 Dec 1989: Non-communist president appointed
 1990: Elections won by non-Communist alliance

Poland

1988: Mass strikes across country
 1989: *Solidarity* party wins elections and first non-Communist leader in E Europe is elected.

Romania

25 Dec 1989: Communist dictator Ceausescu executed
 1990: Democratic elections held, won by party dominated by ex-communists

Hungary

1988: Becomes multi-party state
 1989: Border opens with democratic Austria
 1990: anti-Communist alliance wins elections

Bulgaria

1990: Democratic elections held, won by renamed Communist Party



YALTA CONFERENCE 1945

BERLIN BLOCKADE 1948

WARSAW PACT 1955

BERLIN WALL 1961

TEHRAN CONFERENCE 1943

TELEGRAM LONG 1946
NOVIKOV

NATO 1949

HUNGARIAN UPRISING 1956

GENEVA SUMMIT 1959

BAY OF PIGS 1961

CUBAN MISSILE CRISIS 1962

GRAND ALLIANCE 1941

POTSDAM CONFERENCE 1945

TRUMAN DOCTRINE 1947

COMECON 1949

CAMP DAVID SUMMIT 1959

CUBA 1959 REVOLUTION

VIENNA SUMMIT 1961

KENNEDY'S BERLIN SPEECH 1963

1940s > > > > > 1950s > > > > > 1960s

Superpower Relations & Cold War

WASHINGTON-MOSCOW HOTLINE 1963

LIMITED TEST BAN TREATY 1963

1990s < < < < < 1980s < < < < < 1970s

OUTER SPACE TREATY 1967

PRAGUE SPRING 1968
INVASION OF CZECHOSLOVAKIA

INF TREATY 1987

SDI "STAR WARS" 1983

REAGAN'S "EVIL EMPIRE" SPEECH 1983

CARTER DOCTRINE 1980

HELSEINKI AGREEMENTS 1975

1972 SALT 1 AGREEMENT

BREZHNEV DOCTRINE 1968

FALL OF THE BERLIN WALL 1989

REYKJAVIK SUMMIT 1986

LOS ANGELES OLYMPICS 1984

MOSCOW OLYMPICS 1980

1979 SOVIET INVASION OF AFGHANISTAN

NUCLEAR NON-PROLIFERATION TREATY 1968

WARSAW PACT DISSOLVED 1991

CHERNOBYL 1986

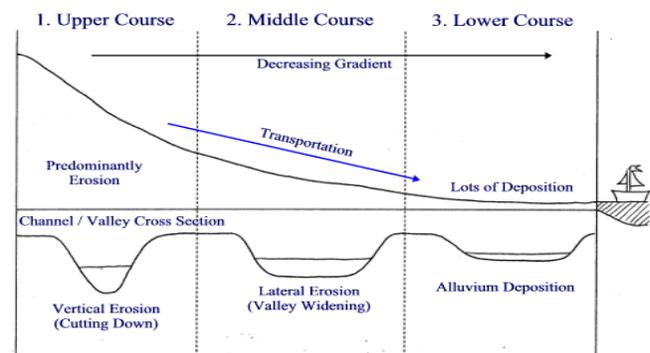
GENEVA SUMMIT 1985

SALT 2 ABANDONED 1979

RESIGNATION OF GORBACHEV & END OF USSR 1991

GORBACHEV BECOMES SOVIET LEADER 1985

The long profile of a river



Upper course-

- Steep gradient, v-shaped valley cut by erosion
- Small, shallow river due to low water volume
- Low water velocity as friction removes energy

Middle course-

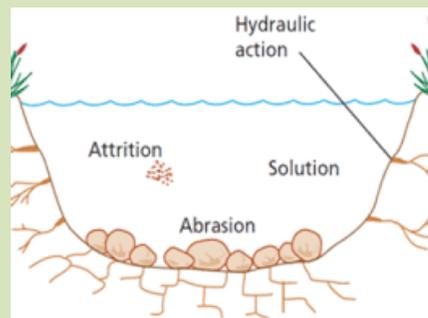
- Gently sloping, fairly flat land either side
- Meandering river of greater volume
- Eroding laterally, so river changes course
- Losing velocity so deposition occurs

Lower course-

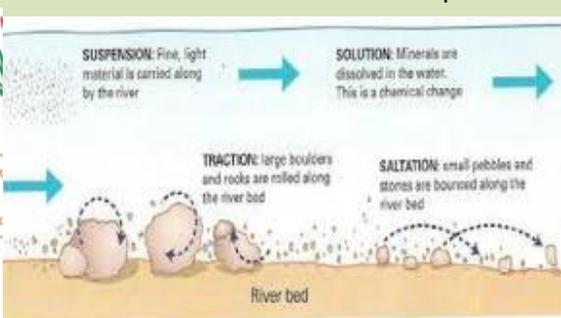
- Very flat land either side, prone to flooding
- Wide river – river is many times larger
- Fast flowing water – reduced friction
- Levees created by deposition during floods

Fluvial processes

Erosion



Transportation



Upper course- mostly erosion – leads to waterfalls and gorges

Middle course- erosion and deposition- creating oxbow lakes and meanders

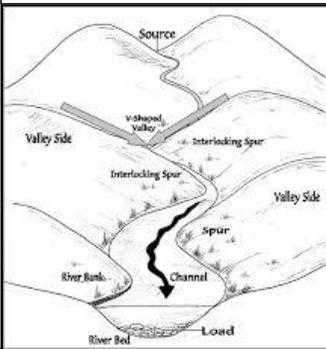
Lower course- mostly deposition- resulting in the formation of levees

Interlocking spurs

In the upper course river discharge and volume is low and most of the energy is used to overcome friction and eroding vertically.

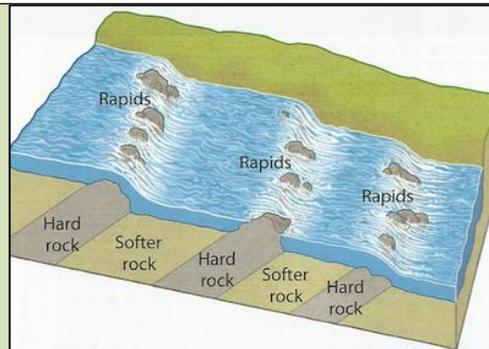
The river erodes by hydraulic action and freeze-thaw weathering giving the valley the V-shape and causing weak rock to fall.

The winding path is due to obstacles of hard rock and the river likes to take the easiest path to the sea, therefore this results in projections of hard land of the valley from alternate sides called interlocking spurs.



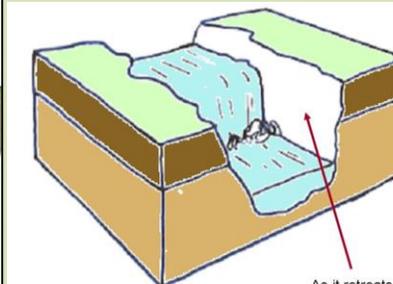
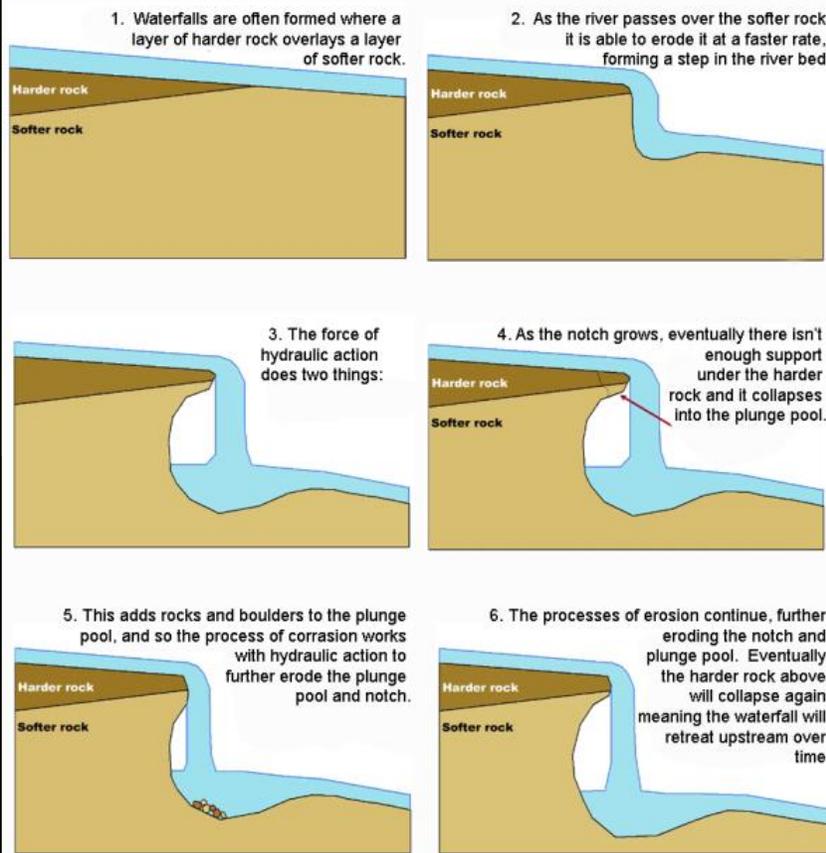
Rapids

Are formed by different rates of erosion of vertical layers of soft and hard rock >>>



Waterfalls and gorges

Waterfalls often form in the upper stages of a river where it flows over different bands of horizontal rock.



As it retreats, it leaves behind a steep sided gorge.

Over time, this process is **repeated** and the waterfall moves upstream. A steep-sided **gorge** is formed as the waterfall retreats.

Meanders and Oxbow Lakes

In the middle course the river has more energy and a high volume of water. The gradient here is gentle and lateral (sideways) erosion has widened the river channel. The river channel has also deepened. A larger river channel means there is less friction, so the water flows faster:

- As the river erodes laterally, to the right side then the left side, it forms large bends, and then horseshoe-like loops called meanders.
- The formation of meanders is due to both deposition and erosion and meanders gradually migrate downstream.
- The force of the water erodes and undercuts the river bank on the outside of the bend where water flow has most energy due to decreased friction.
- On the inside of the bend, where the river flow is slower, material is deposited, as there is more friction.
- Over time the horseshoe become tighter, until the ends become very close together. As the river breaks through, e.g. during a flood when the river has a higher discharge and more energy, and the ends join, the loop is cut-off from the main channel. The cut-off loop is called an oxbow lake. The blockage between channel and loop colonises with marsh plants and the water in the lake become stagnant, with a slip-off slope in the middle and a steep drop around the curve- this is where the deepest water is.

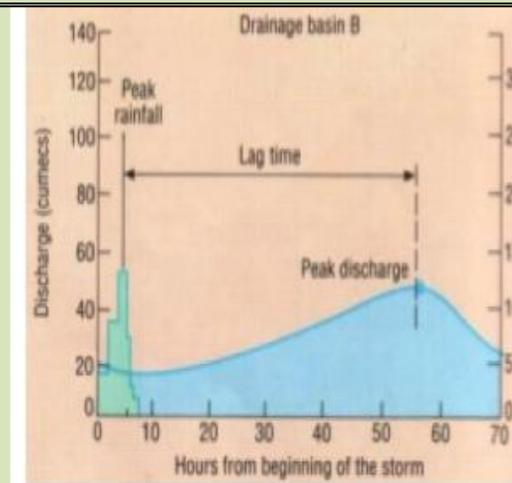
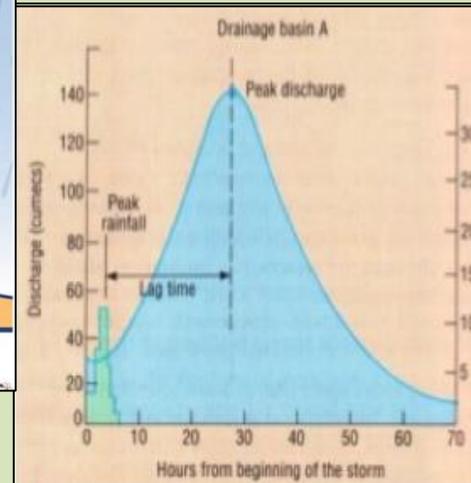
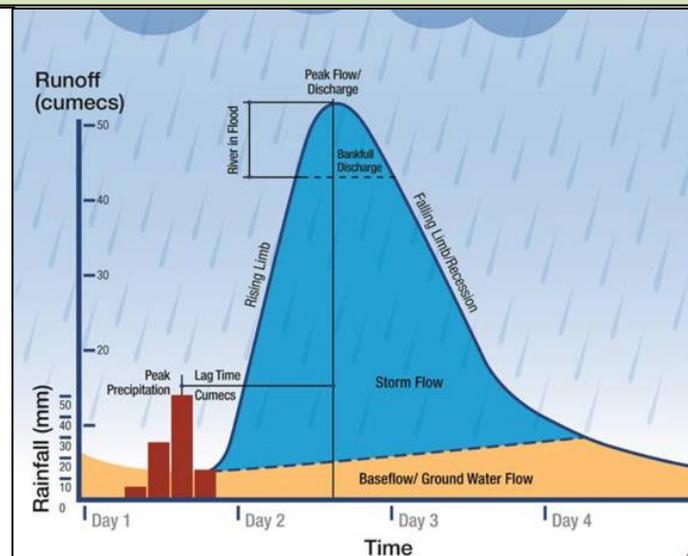
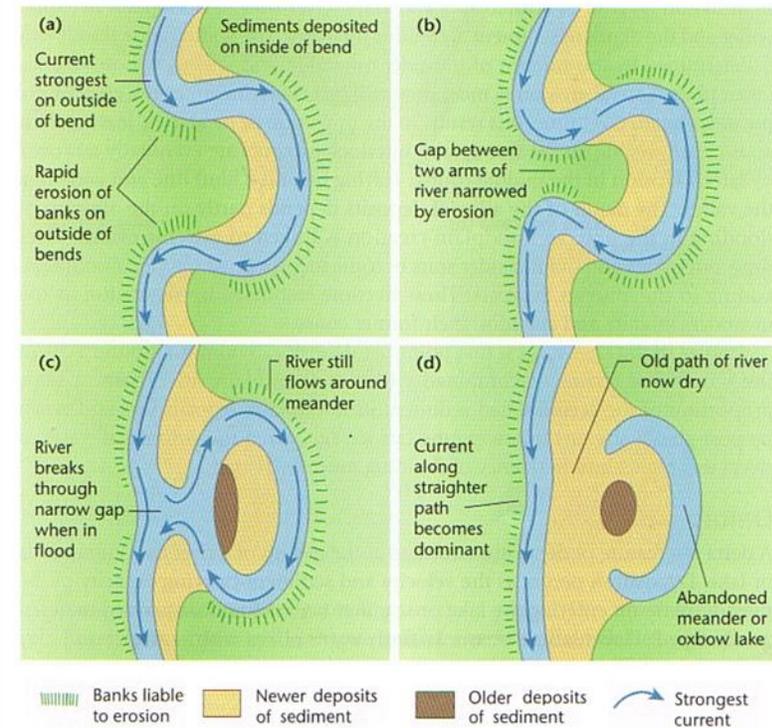
Storm Hydrographs are graphs that show how a drainage basin responds to a period of rainfall. They are useful in planning for flood situations as they show the discharge (amount of water reaching channel via surface run-off (storm flow), through flow, and base/groundwater flow) that originated as precipitation and whether this will exceed the amount the river can cope with before bursting it's banks (bankfull discharge).

A Flashy response hydrograph shows a river which is more likely to flood (drainage basin A). This may be as a result of factors such as:

- Impermeable rock and a steep-sided valley
- Prolonged rainfall leading to saturation of the ground
- Urbanisation and increased use of drains, concrete and tarmac
- Little vegetation / deforestation

A Slow response hydrograph (B) illustrates a river less likely to flood, because:

- Forests slow down transfer through interception
- Permeable rocks and gently sloping valleys
- Less human interference – fewer buildings, roads and drainage systems
- Large river basin means it will take longer for water to reach the river



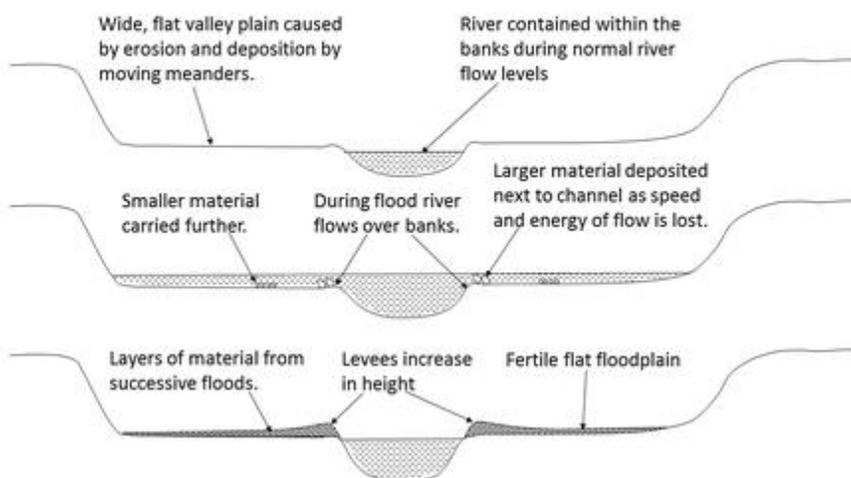
Levels

1. When a river floods, friction reduces the velocity of the river and deposition occurs.
2. Heavy sediment is deposited closest to the river and the size becomes smaller the further away.
3. With each flood, the banks are built up higher and over time the river bed also develops sediment which raises the river channel.

Flood plains

1. The width of a flood plain is due to how far a meander has migrated previously, as when a river erodes laterally it carves out a wider valley floor.
2. When a river floods then recedes the floodplain is fertile due to a build-up of deposition of silt and alluvium. It is built up over the years with each flood adding more material.

The Formation of a Floodplain



Hard engineering

- Dams & reservoirs- controls flow of water; reduces risk of flooding downstream
- Channel straightening- speeds up rate of flow, water can be moved away faster, less friction
- Embankments- increased capacity of river, can hold more water
- Flood-relief channels – redirects water to reduce pressure on main river, increases capacity.

Strategies to reduce flooding

Soft engineering

- River restoration- promoting natural flow of the river
- Flood plain zoning- allows us to use land appropriately
- Afforestation & wetlands- increasing water storage and interception, decreases speed of water getting to river
- Flood warnings- to allow preparation to occur.

Estuaries

1. Mud flats and saltmarshes in an estuary are formed when alluvium is transported by the river to the sea and the incoming waves transport sand and silt up the estuary.
2. Deposition occurs because the fresh water river mixes with the sea water (creating 'brackish' water) and where they meet, the velocity is reduced and so deposition occurs.
3. These are valuable habitats, eventually becoming salt marsh – home to a variety of wildlife that is well adapted to it's conditions.



Jubilee flood-relief river

The Jubilee River scheme was built by the Environment Agency and it opened in 2002. The scheme reduces the risk of flooding to over 3,000 properties in Maidenhead, Windsor, Eton and Cookham.

The Jubilee River diverts river water from the River Thames upstream of Maidenhead, running parallel and to the north of the river, and rejoins the Thames downstream of Windsor.

Under normal conditions, the Jubilee River provides a local recreational and wildlife amenity. In flood conditions, further water is diverted from the Thames and into the Jubilee River. This reduces flood levels in the River Thames running through Maidenhead, Windsor, Eton and Cookham.

Along the length of the Jubilee River are several weirs that keep water at levels similar to those experienced in the River Thames. The scheme also incorporates flood embankments to the north of Maidenhead and the west and north of Cookham.

The Jubilee River reduces flood risk to properties by increasing the total flood capacity of the channels flowing through the area.

While it does not protect communities downstream of the scheme, it operates so that flood levels downstream are not adversely affected.

- Cost £110 million to construct
- 11,7km long
- Average width of 50m



Key terms and definitions for this topic

Watershed – the edge of a drainage basin

Tributary – a river or stream joining into a larger river

Estuary – the tidal region of a river (the part of the river which is affected by tides)

Source – The point at which the river begins

Drainage basin – an area of land drained by one river system and its tributaries

Confluence – the junction of two rivers

Mouth – the end of a river where it enters the sea

V-shaped valley - a valley formed by flowing water cutting down into the rock beneath

Interlocking spurs – harder areas of rock the river has to flow between, alternating from opposite sides of the valley

Fluvial processes – water related processes in a river

Hydraulic action – Water hits the river banks and is forced into cracks under pressure, causing the channel to weaken.

Abrasion – rocks scratch and scrape their way down the bank/bed and wear the bank and the stones down

Attrition – when stones collide with each other, chipping off the jagged edges

Solution – refers to the dissolving of rocks: Minerals are dissolved in water and travel in the water column.

Traction – large boulders rolled down the river bed

Saltation – small pebbles and stones bounced along the river bed

Suspension – fine, light material held up and carried within the river's water column.

Thalweg – line of fastest flow through a meander

Brackish – a mixture of fresh and salt water

Tide - the rise and fall of sea levels twice daily caused by the combined effects of the gravitational forces exerted by the Moon and the Sun, and the rotation of the Earth

Peak discharge – the highest recorded discharge following a rainfall event

Peak rainfall – the highest amount of rainfall per time unit

Lag time – the time delay between peak rainfall and peak discharge

Rising limb – shows how quickly the discharge rate rises after a rain storm on a hydrograph

Falling limb – shows reduced rate of discharge once the main effect of run off has passed

Precipitation - moisture reaching the ground, often in the form of rain

Interception – water being prevented from reaching the surface by trees or grass

Infiltration – water seeping into the soil from the surface

Percolation – water seeping deeper below the surface into and through the rock

Transpiration – water lost through pores in vegetation

Ground water flow – water flowing through the rock layer parallel to surface

Surface run off – water flowing on top of ground

Through flow – water flowing through the soil layer parallel to the surface

River discharge – volume of water moving through a river at any given moment, measured in cubic metres per second and usually expressed as “cumecs”

Hard engineering – use of technology and man-made structures to try to control rivers

Soft engineering – utilise and enhance the natural river system as a flood defence

Sustainable – actions and forms of progression that meets the need of the present without reducing the ability of further generations to meet their needs

River bed – the area immediately below the water column in a river

River bank – material holding the water in the river at either side

Bed load – the size of material carried by a river and later deposited as it loses energy

Key questions for this topic. Use the command word to help answer them appropriately when instructed to do so.

This could also be used as a revision activity, getting someone else to ask you the question and confirm the answer against your 'master' answer.

1. How does the long- and cross- profile of a river and its valley change downstream? **(describe-3)**

As a river makes its way downstream,...

2. What are the 4 types of erosion? What is meant by vertical and lateral erosion? **(describe-4)**

Abrasion is where...

While attrition happens when...

Whereas Hydraulic action occurs when...

Finally, some rock types can be...

While vertical erosion will tend to happen in the _____ course, lateral erosion is generally seen...

3. What are the 4 types of transportation? **(outline-3)**

Rocks can be transported in 4 different ways depending upon...

4. Why is material deposited and where will this happen in a river? **(explain-4)**

Deposition occurs when...

5. What landforms of erosion are created in rivers and how are they formed? **(discuss-6)**

In the upper course of a river,...

Meanwhile, further downstream as the valley opens out...

Key questions for this topic. Use the command word to help answer them appropriately when instructed to do so.

This could also be used as a revision activity, getting someone else to ask you the question and confirm the answer against your 'master' answer.

6. What landforms of deposition are created in/near rivers and how are they formed? **(explain-4)**

Depositional landforms happen when...

...so are often found in...

7. To what extent are human activities the cause of increased flood risk? **(to what extent - 6)**

8. What relationship does a hydrograph show? **(describe – 2)**

A storm hydrograph shows the relationship between r_____ and d_____ in a river over a period of t_____.

9. What are the positives and negatives of different soft engineering strategies? **(discuss-6)**

One example of a soft engineering strategy is _____. While it has benefits, such as...

10. "Hard engineering strategies are often controversial projects". Using an example, to what extent do you agree with this statement? **(to what extent - 6)**

The Jubilee Flood Relief Channel, which runs through...

...has been hugely beneficial because...

...but...

...overall...

What is a resource?

A resource is a stock or supply of something that has a value or a purpose. The three most important resources are food, energy and water. **Adequate supplies** of these resources are essential for countries to develop and for personal well-being.

Energy is required for **economic development**. It powers factories and machinery and provides fuel for transport. In the past, countries depended on their own resources for energy. Today the situation is more complex. As the world develops the **demand** for energy is increasing.

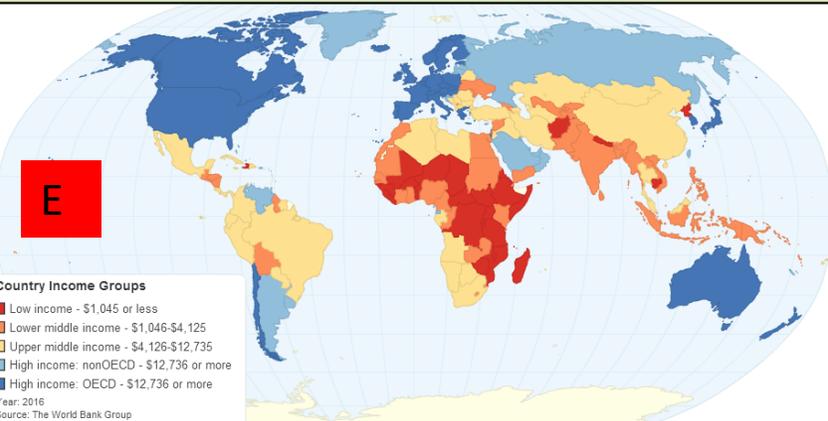
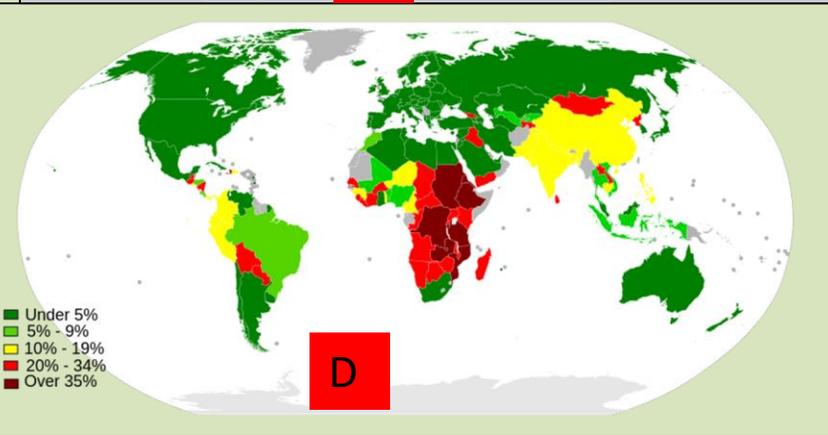
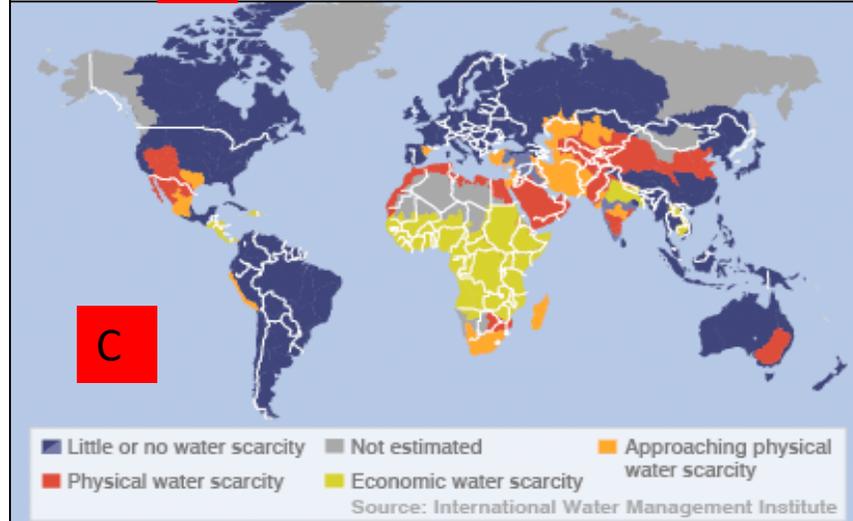
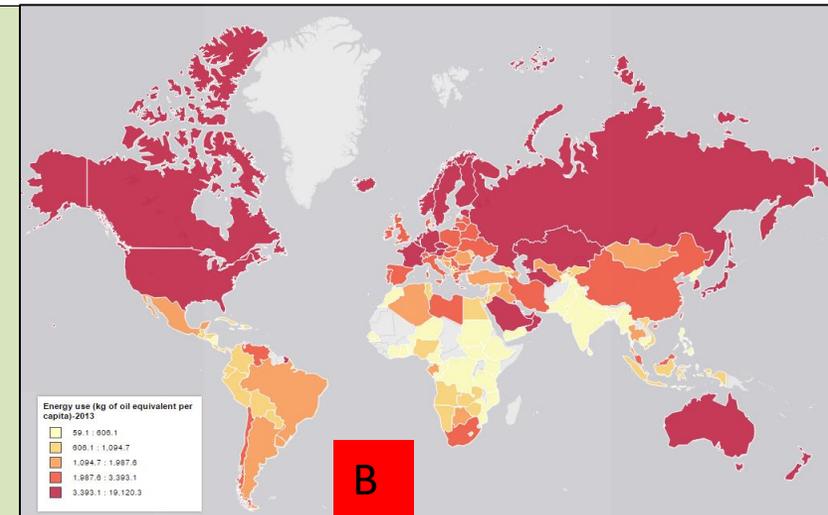
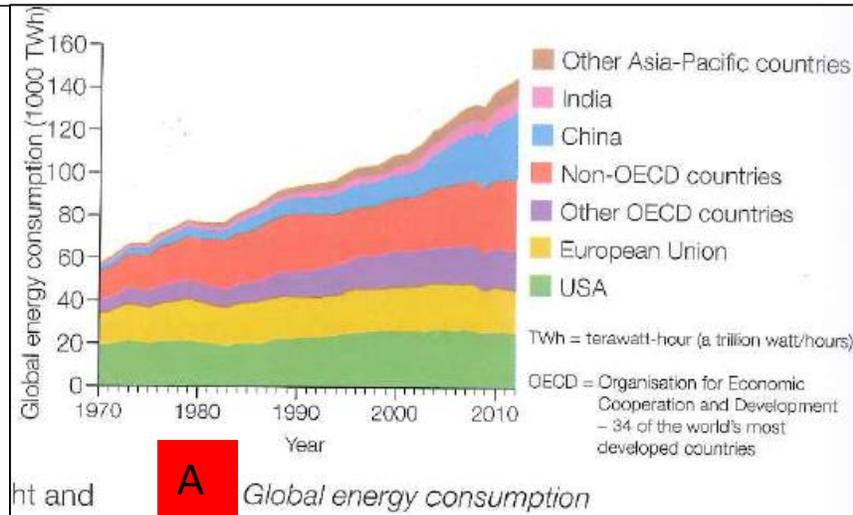
Water is essential for people and animals to drink and is vital for crops and food supply. It is also important as a source of power for producing energy. As the global population grows, more people are faced with the shortage of water. The **imbalance** in water supply is due to mainly variations in climate and rainfall. Many of the poorest countries in the world, particularly in Africa, have a shortage.

Food: The World Health Organisation suggests we need 2000-2400 calories a day. Over one billion people in the world fall below this level and are described as **malnourished**. A further two billion suffer from **malnutrition**, which can result in a range of illnesses, diseases and obesity.

Link between wealth and resources

Graph A and map B show global consumption of energy. You will see that these countries tend to be High Income Countries on map E and that those countries which generally consume less per person are those in Central Africa and Southern Asia. On map C, we again see that in most parts of HICs, there is little water **scarcity**, while in LICs and particularly Africa, there is often either a physical lack of water, or insufficient money to obtain it – known as economic scarcity. Where there is a physical lack of water in some parts of HICs, such as the Nevada Desert in the USA, they have enough money to obtain water from elsewhere.

Map D shows us the percentage of the population in each country who are malnourished. Again – an obvious pattern emerges.



<p>How has demand for food in the UK changed?</p> <p>Seasonal food refers to the times of year when the harvest or the flavour of a given type food is at its peak. This is usually the time when the item is harvested. Before supermarkets, most food eaten in the UK was sourced in the UK and seasonal. Fruit and vegetables were available according to the season. For example, during the summer months, lettuce and strawberries were widely available, whereas during the winter parsnips and cabbage were sold. Food was also preserved by being bottled, frozen and pickled. Today, we are used to enjoying seasonal fruit and vegetables throughout the year. However, because some food cannot be grown throughout the year in the UK, it has to be imported from other countries, along with food that is not native to the UK such as avocado and mango. Therefore, there has been an increase in food being imported into the UK.</p> <p>Even seasonal fruits and vegetables which can be grown here, are imported from other countries. It can be cheaper for food to be grown in low income countries and transported to the UK, despite the increased food miles. 47 percent of the UK's food was imported in 2013.</p>	<p>What are food miles and carbon footprints?</p> <p>The distance that food travels from producer to consumer is called food miles. Food in the UK travels over 30 billion kilometres each year by air, ship, train and road. A carbon footprint is the amount of CO₂ and other greenhouse gases released into the atmosphere as a result of the activities of humans.</p> <p>How does importing food increase the UK's carbon footprint?</p> <p>19 million tonnes of carbon dioxide are released each year into the atmosphere by transport used to import food, increasing the UK's carbon footprint. The further food travels the greater the food miles and carbon footprint. However, the food production techniques used also affect these, for example, the use of heated greenhouses increases carbon emissions. 17% of carbon dioxide emissions in the UK are linked to food.</p> <p>What are the alternatives to importing food?</p> <p>In order to reduce emissions, the volume of food products flown into the UK needs to be reduced. This can be achieved by:</p> <ul style="list-style-type: none"> • Consuming seasonal produce from the UK. • Only allowing imported foods that cannot be grown in the UK and limiting which can be transported by aeroplane. • Label the origin of food on restaurant menus so customers can make an informed choice as to what they eat. • Consuming food that has been produced locally e.g. from farm shops. • Growing your own food in your garden or on an allotment 	<p>Why is there a trend towards agribusiness?</p> <p>When a farm is run like a large industrial business they are known as an agribusiness. They are large-scale, money-intensive commercial activities. This has led to the size of farms increasing significantly by increasing field sizes, removing hedgerows, increased mechanisation (more machinery), combining small family farms, using hi-tech solutions, improved seeds (genetically modified) and greater use of pesticides and fertilisers. Crop Irrigation using large scale technology also helps to improve yields. Many large agribusinesses now own processing factories, transport and shops where the produce is sold. This is known as 'farm to fork'. Supermarkets and food-processing companies buy crops before they are even planted.</p> <p>Agribusiness has had a negative impact on the environment through the increased used of chemical fertilisers and pesticides. Also, as farms have become more mechanised there has been a decline in agricultural employment as fewer people are needed to work on farms. Also, smaller family farms struggle to compete with large farms. Agribusiness faces risks every growing season. From the weather to insect infestations to unexpected livestock death from disease, there are numerous influences that can shape profits. Even simple climate changes, like having a little too much rain, can create risk.</p> <p>The positives of agribusiness include more food security and cheaper prices for consumers as overheads are lower. Research and development in modern agricultural practices, including the use of technology, is providing jobs to skilled workers.</p>
	<p>Reducing our carbon footprint</p> <p>Seasonal food consumption</p> <p>In the past, people ate food that was in season, eg cabbages during the winter and salad crops during the summer. Food is now available out of season thanks to heated greenhouses to produce it in the UK and cold storage to transport it to the UK. Seasonal food consumption reduces food miles and electricity use.</p> <p>Reduction of food waste</p> <p>Developed nations waste a lot of food. Buying only the food that is needed is more sustainable as there is more food left to feed others.</p>	<p>Organic farming</p> <p>Organic farming uses natural methods to grow foods. This means using organic fertilisers and pesticides, such as animal slurry and natural predators and no artificial fertilisers or pesticides. Yields from organic crops are initially low, but they increase over time until they are in line with inorganic crops. Organic farming is environmentally sustainable because it doesn't pollute the environment.</p>
		<p>UK - food</p>

What are the demands for water in the UK?

Think about all the ways you use water, for washing, drinking, flushing the toilet, cleaning and cooking. Almost 50 per cent of the UK's water supply is used domestically. But 21 per cent is wasted through leakage (graph A)!

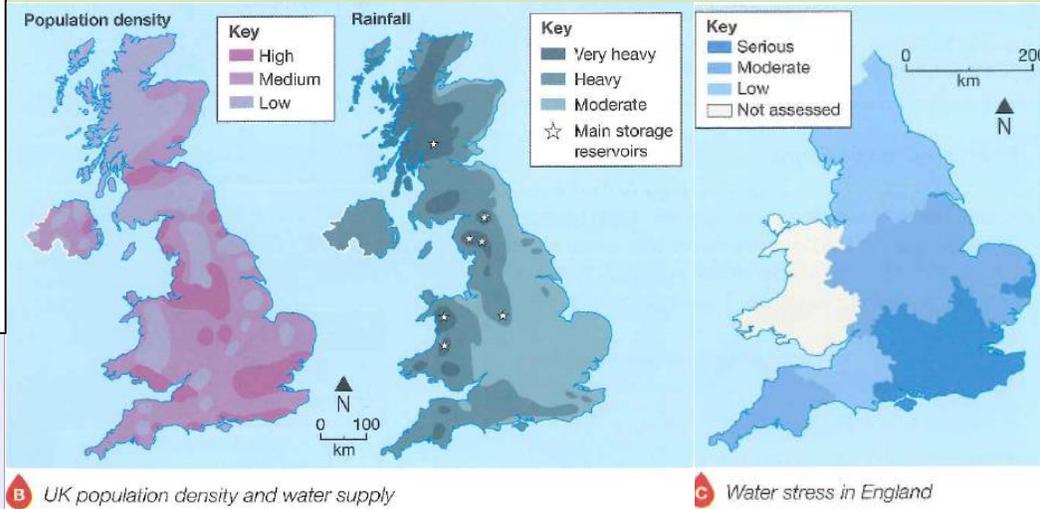
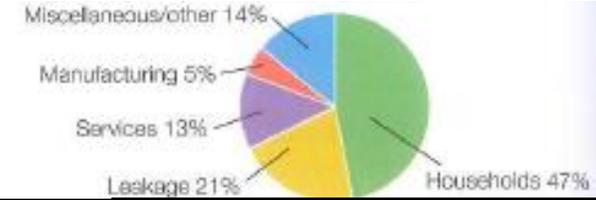
The Environment Agency estimates that the demand for water in the UK will rise by 5 per cent by 2020 because of:

- the growing population
- more houses being built
- an increase in the use of water-intensive domestic appliances.

Saving water can help to manage water supplies. Savings can be made by:

- the use of domestic water meters
- increasing the use of recycled water
- more efficient domestic appliances.

Waste water (**grey water**) from people's homes can be recycled and put to good use. It can be used to irrigate both food and non-food plants. The phosphorus and nitrogen in the water are an excellent source of nutrients.

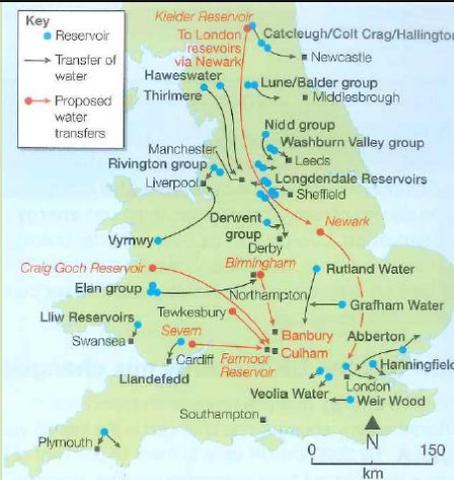


Water use in the UK has increased significantly over time. For example, the amount of water used by the average household in the UK has increased by 70% since 1985. Almost 50% of the UK's water is used in the home. The average person in the UK uses 149 litres of water per day. This compares to 575 litres in the USA and just 4 litres in Mozambique.

The reasons for the increased demands for water are:

- The increase in households having appliances such as dishwashers and washing machines, which use a large amount of water;
- Improvements in personal hygiene, so people now take showers more often. In the past, people were more likely to have a weekly bath and share the water with their family!
- More food is now grown in greenhouses to meet the demand for out of season food. This requires watering throughout the year;
- Industrial production has increased leading to a greater demand for water;
- People have more leisure time now than in the past. This has led to an increased demand for water for leisure facilities such as golf courses;
- Car ownership has increased leading to more people cleaning cars;
- The population of the UK has increased which has led to a greater demand for water.

Water deficit and surplus in the UK – there are areas of water surplus and deficit in the UK. Population distribution in the UK is uneven. The most densely populated areas are often located in areas that are the driest. As you can see from the map below population density in the UK is highest in the south-east. One-third of the population of the UK live in this area. However, the south-east is also one of the driest areas in the UK. The map below shows average yearly rainfall rates in the UK between 1981 to 2010. From the rainfall map, it is clear that some areas experience high levels of rainfall but have a low population density. An example of this is North Wales. This suggests the area has a water **surplus**. However, the south-east of England has low levels of rainfall, however, population density it high. The area experiences a water **deficit**. Which means it does not have enough water to meet the needs of the population. This leads to increased water stress.



Water Transfer schemes

One way to deal with the water supply and demand problem in the UK is to transfer water from areas of surplus to areas of deficit. There are a number of smaller scale water transfer solutions in place in the UK. This includes water being transferred from reservoirs in North Wales and the Lake District to cities such as Manchester and Liverpool in the densely populated north-west of England. About 5% of water supplied to homes and businesses in the UK comes from water piped in from outside the immediate area, but such schemes have fallen out of favour in the last decades as concerns have risen about the environmental impact on the areas donating the water, the cost and energy use.

How is the UK's energy demand changing?

Despite increasing demand for electricity in the UK, energy consumption has fallen in recent years. This is due mainly to the decline of heavy industry and improved **energy conservation**. Low-energy appliances, better building insulation and more fuel-efficient cars have resulted in a 60 per cent fall in energy use by industry and a 12 per cent fall in domestic energy use.

How and why has the UK's energy mix changed?

The UK is no longer self-sufficient in energy. About 75 per cent of the UK's known oil and natural gas reserves have been exhausted. By 2020 the UK is likely to be importing 75 per cent of its energy. The UK's **energy security** is affected as it becomes increasingly dependent on imported energy.

Two-thirds of UK gas reserves remain, with oil remaining in less accessible oilfields. The remote Mariner oilfield (150km east of the Shetland Isles) will start producing in 2017, but UK oil production overall has declined by 6 per cent each year during the last decade.

The major change in the UK energy mix has been the decline of coal. Between 1990 and 2007 there was a steady decline because of concerns about greenhouse gas emissions and ageing coal-fired power stations.

However, fossil fuels are likely to remain important in the future because:

- ◆ the UK's remaining reserves of fossil fuels will provide energy for several decades
- ◆ coal imports are cheap – over three-quarters of the UK's coal now comes from abroad, mainly from Russia, Colombia and the USA
- ◆ existing UK power stations use fossil fuels – all coal-fueled power stations to be closed by 2025
- ◆ shale gas deposits will be exploited in the future.

UK - energy

Extracting natural gas

Advantages

Cleanest of the fossil fuels with 45% less CO₂ emissions than other non-renewable sources and less toxic chemicals like NO and SO₂.

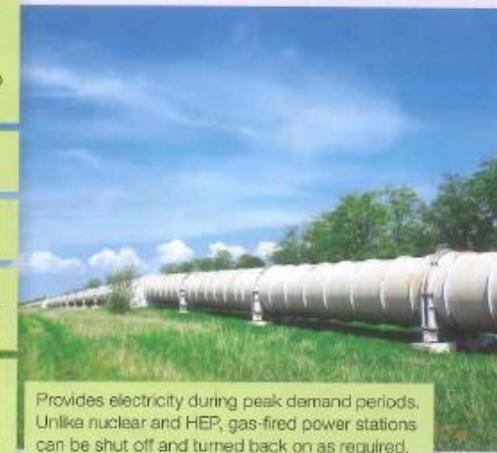
Less risk of environmental accidents than oil.

Provides employment for 1.2 million people.

Can be transported in a variety of ways, i.e. through pipelines or by tankers over land and sea.

Relatively abundant compared to other fuels. This is increasing as technology makes exploitation of shale gas more economic.

A gas pipeline



Provides electricity during peak demand periods. Unlike nuclear and HEP, gas-fired power stations can be shut off and turned back on as required.

Disadvantages

Dangerous if handled or transported carelessly.

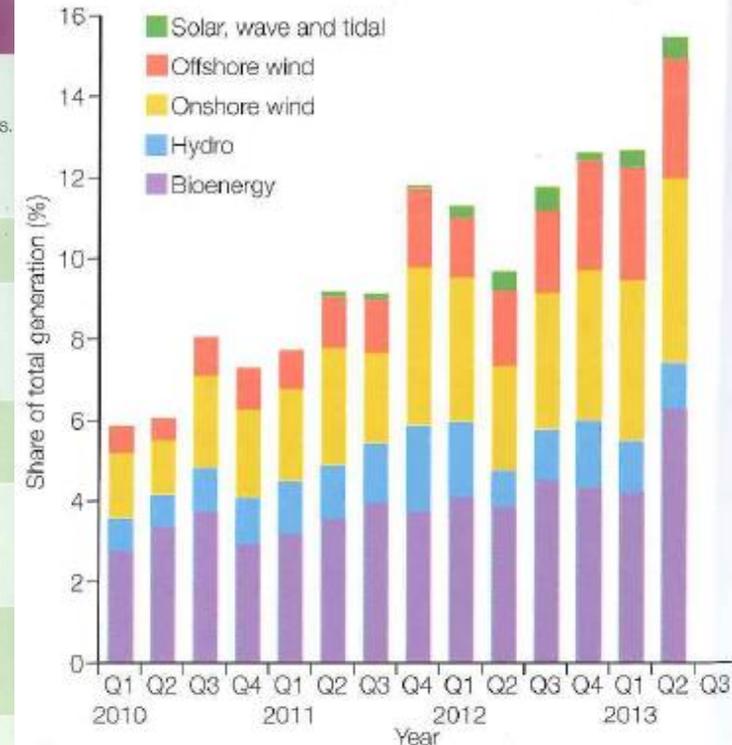
Some gas reserves are in countries that are politically unstable or prepared to use gas supply as a political weapon.

Contributes to global warming by producing CO₂ and methane emissions.

Fracking is controversial. Lots of water is needed. Wastewater and chemicals could contaminate groundwater and minor earthquakes are possible.

Pipelines are expensive to build and maintain.

Renewable energy source	How does it work?	Can it increase energy supplies?
Biomass	Energy produced from organic matter includes: <ul style="list-style-type: none"> • burning dung or plant matter • the production of biofuels, by processing specially grown plants such as sugar cane. 	<ul style="list-style-type: none"> • Using land to grow biofuels rather than food crops is very controversial. • Burning organic matter can create smoky unhealthy conditions. • Fuelwood supplies are limited.
Wind	Turbines on land or at sea are turned by the wind to generate electricity.	<ul style="list-style-type: none"> • In 2014, wind power met 10% of the UK's electricity demand. • Unpopular, but considerable potential.
Hydro (HEP)	Large-scale dams and smaller micro-dams create enough water to turn turbines and generate electricity.	<ul style="list-style-type: none"> • Large dams are expensive and controversial. • Micro-dams are becoming popular options at the local level. • An important energy source in several countries. It currently contributes 85% of global renewable electricity.
Tidal	Turbines within barrages (dams) built across river estuaries use rising and falling tides to generate electricity.	There are few tidal barrages (the largest is the Rance in France) due to high costs and environmental concerns.
Geothermal	Water heated underground in contact with hot rocks creates steam that drives turbines to generate electricity.	Limited to tectonically active countries: <ul style="list-style-type: none"> • the USA (has the most geothermal plants – 77) • Iceland (provides 30% of the country's energy) • the Philippines and New Zealand.
Wave	Waves force air into a chamber where it turns a turbine linked to a generator.	<ul style="list-style-type: none"> • Portugal has built the world's first wave farm, which started generating electricity in 2008. • There are many experimental wave farms but costs are high and there are environmental concerns.
Solar	Photovoltaic cells mounted on solar panels convert sunlight into electricity.	<ul style="list-style-type: none"> • Energy production is seasonal. • Solar panel 'farms' need a lot of space. • Great potential in some LICs with high levels of sunshine.



B The renewable share of total electricity generation

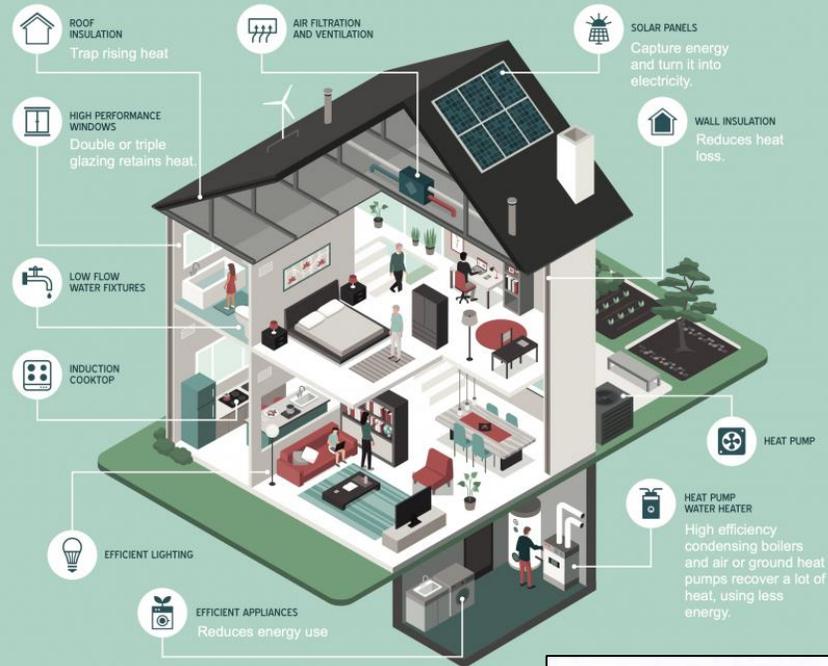
Why is energy consumption increasing?

Energy consumption has rapidly increased since the 1950s. This is because:

- Economic development leads to higher demand for energy. Currently, the most significant need for energy comes from HICs such as the USA and Australia, and rapidly developing NEEs such as Brazil, China and Nigeria. In the future, energy demand is likely to develop in LICs, especially in Africa.
- As a country becomes more developed, there is a higher demand for food, leading to more intensive farming techniques. These techniques require additional energy to power machinery, provide lighting and heating. The processing, manufacturing and transport of food also lead to increased energy demands. As agriculture shifts from subsistence to commercial farming as a country develops the demand for energy also increases.
- Rapid industrialisation leads to the development of processing and manufacturing industries. Global demands for energy are increasing, fuelled by industrialisation in NEEs. Future demands are likely to come from current LICs as they develop.
- As improvements in living standards continue across the world, car ownership has continued to grow. Despite advances in the efficiency of engines, car manufacturing places considerable demands on energy.
- Demand for energy increases with urbanisation. As more people live in urban areas, the demand for energy for lighting, cooking, domestic appliances and heating also increases. In the future, urbanisation is going to place demands on energy in regions such as Africa and parts of Asia.
- As people become wealthier, their demand for energy grows with increased purchases of domestic appliances, leisure and recreation activities. Global energy supplies will increase significantly in highly populated NEEs such as India, China and Brazil.
- Population growth creates an increased demand for energy. Since 1950 the world's population has increased dramatically, leading to the growth in demand for energy. The overwhelming majority of this growth has been in LICs and NEEs, where there are already energy deficits.

ENERGY EFFICIENT HOUSE

ZERO NET BUILDING FOR GREEN TECHNOLOGY



Energy security

Energy security is largely determined by energy supply and demand. Most of the world experiences energy insecurity. Research shows that despite having a high reliance on imports, North America and Europe are largely energy secure. However, large areas of central and southern Africa, Asia and South America experience energy insecurity.

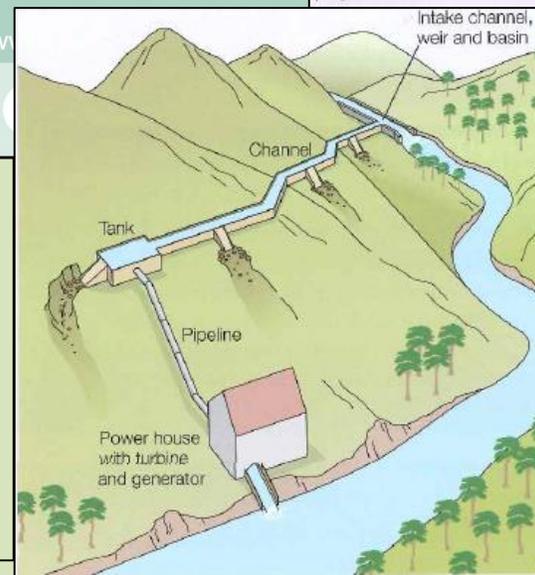
Chambamontera, Peru – an example of a micro HEP scheme to improve people's lives

Most people in the area are dependent on subsistence farming with some small-scale coffee growing and rearing of livestock (photo B). Development has been severely restricted by a lack of electricity for heat, light and power. Despite farming being efficient, nearly half the population survive on just US\$2 a day.

The steep slopes rise to 1700m and the rough roads are impassable in winter. This makes Chambamontera a very isolated community. Due to the low population density it was uneconomic to build an electricity grid to serve the area.

The solution to Chambamontera's energy deficit involved the construction of a micro-hydro scheme supported by the charity Practical Action. The high rainfall, steep slopes and fast flowing rivers make this area ideal for exploiting water power as a renewable source of energy (diagram C).

The total cost of the micro-hydro scheme was US\$51 000. There was some government money and investment from Japan, but the community had to pay part of the cost. The average cost per family was US\$750. Credit facilities were made available to pay for this.



The scheme has had many positive outcomes: Regulating the flow of water in rivers has reduced the danger of flooding. Less need to burn wood as a source of heat has reduced deforestation and reduced soil erosion. Electricity is available in the winter when heating demands are high. Healthcare has improved as fridges allow the storage of medicines. Improved school facilities and the possibility of doing school work after dark. Reduced fire risk because paraffin lamps are no longer needed in homes.

Key questions for this topic. Use the command word to help answer them appropriately when instructed to do so.

This could also be used as a revision activity, getting someone else to ask you the question and confirm the answer against your 'master' answer.

Why are food, water and energy important for our economic and social well-being? **(Suggest)**

Food, water and energy are important for our economic and social well-being because...

Explain why an increasing amount of food in the UK is imported, and why this might be an issue **(Explain)**

Imports of food are increasing in the UK because....

This may cause issues such as....

Discuss why our demand for water is increasing and the problems this creates **(Discuss)**

In the UK, demand for water is increasing because....

This could lead to problems such as...

Outline the way in which the UK energy mix is changing **(Outline)**

Over the last 20-30 years there has been a shift away from.... to....

Reasons for this include....

Outline the economic and environmental issues associated with exploitation of fossil fuels **(Outline)**

The exploitation of fossil fuels causes a wealth of issues. On an economic side these include...

Environmentally...

Key questions for this topic. Use the command word to help answer them appropriately when instructed to do so.

This could also be used as a revision activity, getting someone else to ask you the question and confirm the answer against your 'master' answer.

Compare energy consumption and supply in different continents and give reasons for these trends **(Compare)**

In Europe and North America....

Whereas, in Asia....

In Africa...

Define energy insecurity **(Define)**

Energy insecurity is...

Evaluate the usefulness of renewable energy sources in the UK **(Evaluate)**

Wind energy is valuable resource in the UK when...

But...

Solar power...

Hydroelectricity...

Discuss the advantages of using natural gas in the UK **(Discuss)**

There are many advantages of using natural gas in the UK...

However...

Explain how micro-HEP in Chambamontera, Peru has improved the lives of local people in the region **(Explain)**

The use of micro-hydroelectric power in Chambamontera has proved beneficial for local people because....

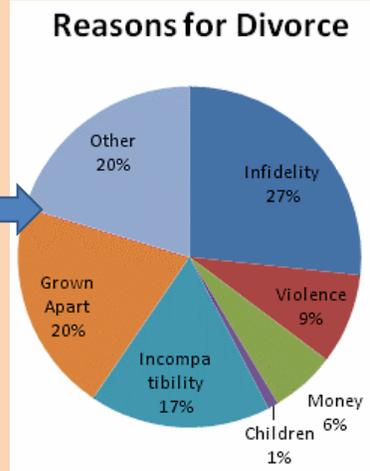
Adultery, Divorce and re-marriage

UK Laws regarding divorce

- Divorce laws have not changed since **1967** and there is a call for modernising them
- At present you can only divorce straight away if there has been **poor behaviour or adultery**
- Couples that both wish to divorce under different reasons have to have **5 years** separation first.
- There are calls for reform because life expectancy are rising, couples are e often together for many years.

"Thou shall not commit adultery" 10 Commandments

Why do marriages break down?



	Catholics	Muslims
Adultery	<ul style="list-style-type: none"> • Adultery is a sin and breaks wedding vows e.g. To love and cherish • In the 10 commandments it says <i>"Thou shall not commit adultery"</i> 	<ul style="list-style-type: none"> • The Qur'an says <i>"Do not commit adultery. It is shameful and an evil way to act"</i> • Adultery can be punishable by execution in some Islamic countries
	<ul style="list-style-type: none"> • Divorce is always wrong as marriage is a sacrament (sacred) • Divorce breaks wedding vows made to God so cannot be broken – Until death do us part: <i>"What therefore God has joined together, let not man separate."</i> Bible • Jesus said <i>"Whoever divorces... then marries another; it is as if he committed adultery"</i> • An annulment (making the marriage invalid) can be given in exceptional circumstances • There is no remarriage as divorce is not recognised by God 	<ul style="list-style-type: none"> • Divorce is available to Muslims however it is seen as a last resort. • Couples facing problems have mediation – someone to try and help resolve the problems. • The couple must wait 3 months through counselling before a divorced can be given. • If after counselling divorce is still wanted, then the man states "I divorce you 3 times", whereas a woman must seek approval at a Islamic council / Imam at their mosque • Half the dowry must be returned by the wife to husband
Divorce and re-marriage		

Divorce is becoming more common over the last 50 years. If divorce laws are relaxed, what would be the impacts?

Against relaxing divorce laws:

- For religious believers marriage is a **sacrament about God too**.
- Marriage will be taken into lightly – with no serious thought to "death do us part"
- It could have negative effects on children
- People will give up and not try to work through their difficulties

For relaxed divorce laws:

- Allowing people to move on to another relationship, where they are in love
- Love does not always last forever
- To end the relationship is often healthier if there are problems (even when children are involved)

Gender Equality

Christianity	Islam
<i>"Neither Jew nor Greek, slave nor free, male nor female, for you are all one in Jesus Christ"</i> Bible	Muhammad said <i>"I command you to be kind to women"</i>
God created mankind in his own image therefore they are equal	<i>"Men and women have equal rewards for their deeds"</i> Qur'an
In the Anglican church the first bishop was appointed in 2015	Benazir Bhutto was elected PM in Pakistan - a Muslim country
However, men and women can have different ROLES in Religion.	
However, In Catholic church women are not allowed to become priests	However all Islamic leaders are men. Women are not allowed to pray at the front of the mosque
	A man can get a divorce by just declaring it 3 times, women must seek approval from a council at a mosque

Women in the Bible



Eve shows by giving into evil, she reminds the world that while God is good, Satan's temptations are not. Eve has also been shown to lead man (Adam) astray.

Mary Magdalene is an oft-misunderstood Biblical figure, but she was certainly a faithful follower of Jesus. After being healed by Him, she travelled with Him and witnessed his crucifixion, burial, and resurrection.

Abraham's wife Sarah is an example of how God keeps his promises: After telling Abraham she would bear a son, despite being barren, Sarah gave birth to Isaac at 90 years old. She always show loyalty staying with Abraham by his side, even when he married a second time.

Inequality impacts....

- Aspirations
- Jealousy and tension
- Government laws to restrict or promote women
- Inclusion / exclusion
- Prejudice and attitudes
- Self worth and confidence
- opportunities



Gender has been in the news recently, expressing problems and inequality for women



Only **35%** of senior management roles were female in UK 2012

9.7% is the average full time pay gap between men and women. For every £1 earned by a man a woman earns **81p**



1 in 10 women have faced sexual harassment at work

Types of Worship

At church:

Liturgical worship is worship at church which follows a set pattern or order. This is very traditional and is used for formal and routine services, for example the Eucharist or Advent service. This means they are the same each time. This can give familiarity and comfort for Christians. They have set prayers and passages from the bible that reflect that service, with set hymns too. This worship is also very formal and would be the same whoever lead the worship.

Non-Liturgical worship is more informal. This is where the preacher (vicar, priest etc) will create his own service. He would speak from the heart for prayer and would choose a theme for his service e.g. forgiveness or sin etc. This way he could choose relevant bible passages or parables to use. This service is more personal to the preacher and his community. The worship could also focus on something important in the community or world for example if there has been a disaster to focus on. Services can also have modern music and songs. This clip (below the photo opposite) is from London Holy Trinity Church, a more modern church and service.

Charismatic worship is very free flowing and informal. This would be a church where the service is filled with music and movement. The congregation would often sing out and throw their hands up in praise of God, they may even call out, as if the Holy Spirit is within them. This allows the congregation to express themselves and their devotion to God and be free with their feelings.

At Home:

Private worship can be done wherever and when ever a Christian wants. This may be more formal like a set Grace (prayer) before dinner or the Lord's prayer before bed. Or this can be informal such as choosing to pray when they like, speaking from the heart. A Christian may also use things to worship such as lighting a candle (Jesus represents the light of the world). Catholics use Rosary beads to prayer. Other Christians may meditate or read a parable or bible passage.

Christian Practices



<https://www.youtube.com/watch?v=Jacv52sRyEA>



Key vocabulary

Liturgical
Non-Liturgical
Charismatic
Congregation
Rosary beads
Lord's prayer

Why do Christians worship?

- Connection to God to develop a relationship
- Show praise and devotion
- Show deep love and respect
- To join a religious community



Prayer

There are 5 general reasons for a Christian to pray these are illustrated on the **prayer hand** (see below. There are lots of these you could also search too).

The parable of the persistent widow, talks about how a widow continued to pray and ask for help from God, each time nothing changed. Then after some number of prayers God answers her prayers and helps her. This teaches Christians that continue to pray, and your prayers will be answered.

The **bible** also teaches this using the quote *"Ask and it will be given to you"* (Bible: Matthew)

Some Christians use **set prayers** (those already written), the most common of these is the **Lord's Prayer** (below)



THE LORD'S PRAYER

**Our Father, who art in heaven,
hallowed be Thy name.
Thy kingdom come.
Thy will be done on earth as it is in
heaven.
Give us this day our daily bread and
forgive us our trespasses as we
forgive those who trespass against us.
And lead us not into temptation, but
deliver us from evil.
Amen.**

Key vocabulary

Sacraments
 Conformation
 Baptism
 Believers Baptism
 Testimony
 Declaration of
 Penitence



Christian Practices



Baptism – origins and reasons for

This is one of the most common sacraments taken by Christians. It originates back to when Jesus was baptized by John the Baptist in the River Jordan, when he was an adult. The baptism signifies **washing away of sin and being re-born into the Christian faith**. Jesus wanted all his followers to be baptised, as it also embraces the Holy spirit and God’s love into a Christian. Jesus said *“Go make disciples of all Nations, baptising them in the name of the Father, the Son and the Holy Spirit”*.



Sacraments

A sacrament is a **special event** in a Christians life. These events could be taken once or on a regular basis. A sacrament means an **outward action that has an inner meaning**.

Here are 2 examples: Baptism outward action is to pour water over a person, the inward meaning is that this washing away sin. Marriage: the Outward action is placing the rings on finger; the inward message is eternal love.

Catholics beliefs of Sacraments:

- See the sacraments as God’s gift and follow all of them (x7)
- They are special events that are regular or at different times of a person's life e.g. baptism, confirmation
- They connect closer with God’s love by taking part in them

Quakers beliefs about Sacraments:

- They reject the sacraments, saying many are not mentioned in the bible
- They believe Jesus did not intend for baptism and Eucharist to become a ritual
- They believe Christians speak directly to God – there is no need for sacraments to connect with God

	Infant Baptism	Believers baptism (adult)
Why choose this baptism?	<ul style="list-style-type: none"> • Traditional to English Christianity • Bring up their children as Christian • Children can then take part in other sacraments as they grow • If the baby is ill and may die 	<ul style="list-style-type: none"> • It is the adults choice – they understand that they are becoming a Christian and joining the church • Jesus was baptised as an adult • As a baby you would not have sins, therefore it has more meaning as an adult
What happens?	<ul style="list-style-type: none"> • Baby wears white • Oils are given as a sign of strength and to fight off evil and acceptance into Heaven (Salvation) • Holy water is placed in the sign of a cross over the baby’s head, showing their faith to Jesus • Godparents make promises to protect the child growing up • A candle is lite, signifying receiving the light of Christ (Jesus) 	<ul style="list-style-type: none"> • White clothes are often worn • A testimony is given by the person, to show why they wanted to be baptised. • A Declaration of Penitence (sins) is given to show they are truly sorry for their sins, dedicating themselves to Christ • The person is dropped backwards into the pool of water, then risen. This also represents re-birth, much like Jesus’ resurrection.

Eucharist

Christian Practices

Why do Christians go on pilgrimage?

The Eucharist is another name for Holy mass or communion. All Christians take the Eucharist, however this may vary in how and how often.

The Eucharist sacrament comes from the instruction of Jesus at the **Last Supper**. The night before he would be crucified, Jesus knew of his death so told his disciples to remember him and the **atonement** (sacrifice) for mankind by representing wine and bread as his body and bread. By taking part in the Eucharist Christians are showing **faith and obedience to Christ**, they are receiving **God's Grace and salvation**.

Catholic Eucharist: What happens and why?

- Often called Holy Communion. Happens quite regular as seen as important.
- The service starts with the confession of peoples sins and God's forgiveness.
- The Eucharist prayer is read at the beginning and end of service.
- Bread and wine are consecrated (blessed) at the altar.
- The priest places the consecrated bread on the worshippers tongue or in their hands, wine is drunk, often from a chalice.
- Catholics believe in **transubstantiation**. This is a belief that the wine and bread become the blood and body of Christ. Therefore the Eucharist is more about a **spiritual connection with Christ**, embracing the Holy Spirit.

Protestant Eucharist: What happens and why?

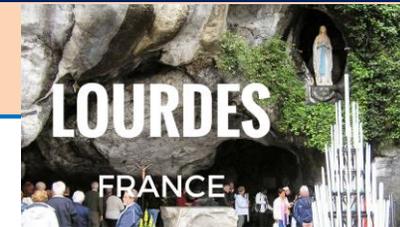
- It is often called the Lord's Supper
- The Minister reads the Gospel (Bible) story of The Last Supper.
- Worshippers stand at the front of the church, bread is given and wine (usually non-alcoholic) is in separate glasses.
- The Lord's Prayer is read at the end.
- Therefore the Eucharist for Protestants is more about the **remembrance of Jesus' sacrifice**.



Key vocabulary

Eucharist
Atonement
Grace of God
Salvation
Holy Communion
Lord's Supper
Transubstantiation
Pilgrimage
 Lourdes

- To follow the footsteps of Jesus e.g. to Jerusalem
- To visit a sacred place e.g. place of Jesus or a disciple / saint
- For healing – physical or spiritual
- To break from normal life and focus on God
- To reflect on their life
- To connect with God
- For forgiveness of sins
- To meet other Christians
- To connect with Christian communities around the world



Pilgrimage places

Lourdes:

Lourdes is a pilgrimage site because of Saint Bernadette. Bernadette was illiterate, poor and suffered with health problems. Bernadette had 8 religious visions, the last from the Virgin Mary. On one vision, Bernadette had injured her arm, Mary had told her to dig out a spring water in a nearby cave to heal her dislocated arm. Her arm was healed by being placed in the water in the cave. Others after her had shown that the spring in the cave had healing powers.

Today many people come to the caves to touch the walls and bath / drink the spring water. There are processions at different times of year to celebrate the religious site. The Catholic church arrange for pilgrimages for the sick and there is a special children's pilgrimage there every Easter, where 1,000 sick or special needs children come.

Santiago de Compostela.

Santiago is the local Spanish name for Saint James. James was one of the 12 disciples of Jesus. According to legend, the remains of St James were carried by boat from Jerusalem to northern Spain where he was buried on what is now the city of Santiago de Compostela.

Today, thousands of Christian pilgrims travel a pilgrimage route to Santiago de Compostela. Most travel by foot, some by bicycle and a few travel, as some of their medieval forbears did, on horseback or by donkey. It takes 35 days to walk the 500 miles. Many of the pilgrims wear cockle-shell badges and this is the emblem of pilgrims to Santiago.

Christmas

Matthews Gospel:

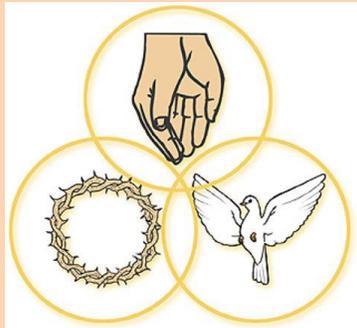
Matthew mainly talks about how Mary found out she was with child from the **Angel Gabriel**. This talks about Joseph's reaction. It talks of how she will give birth a virgin to a **Messiah**. Matthew also talks about the **Magi** (wise men) who were instructed by Herod to visit the Messiah and inform him. The Magi worshiped the Messiah and presented him with gifts.

Luke's Gospel:

Luke mainly talks about how and why Joseph and Mary travel from Nazareth to Bethlehem. He talks about how the **Shepard's** find out and find their route to visit Jesus.

Why is the birth of Jesus important?

- It was foreseen in a **prophecy** that the **Messiah** would be born in Bethlehem to lead the people of Israel
- The virgin Mary showed that Jesus was the Son of God; this in turn showed the **Trinity**: God, his power of the Holy Spirit living through his Son
- The birth of Jesus showed the **incarnation** of God and **God's grace** (love) for mankind to send his son down.



"The word became flesh and lived among us for a while"

Christian Festivals

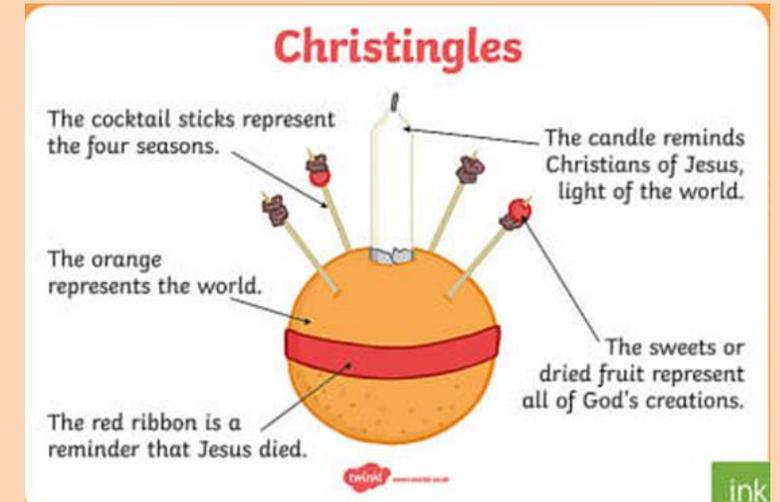
Key vocabulary

Gospel	Messiah
Incarnation	Trinity
Atonement	Christingle
Grace of God	Magi
Prophecy	Midnight mass



How do Christians celebrate Christmas?

- Attending **Midnight mass** on Christmas Eve, where the Eucharist is practiced. This begins in darkness and when the Gospel story is read, a candle is lit to signify the light as Jesus' birth.
- **Christingle service**; Carols and readings from the Gospels about the nativity story. A Christingle is given, often to children.
- Churches are decorated and nativity scenes are put up
- Exchanging of gifts and presents to show love for family and friends; like those of the Magi.
- Some Christians invite someone into their house or go and help serve meals for the homeless



Christmas
Begins with Christ



Easter

Christian Festivals

Why is Holy Week important to Christians?

- Shows the **Prophecy** of the **Messiah**
- Show Jesus' **Atonement** for mankind
- Establishes the **Eucharist**
- Shows **God's Grave** (love) *"God loved the world so much he gave his only son"*
- Enables **salvation** for Christians
- **Resurrection** shows Jesus is the Son of God (**Incarnation**)

Key vocabulary

Palm Sunday
Maundy Thursday
Good Friday
Atonement
Grace of God
Salvation
Prophecy
Eucharist
Resurrection

How do Christians celebrate over Easter?

 <p>Palm crosses are given out at church</p>	 <p>Christians often eat fish as opposed to red meat.</p>	 <p>Christians may walk behind a procession of someone carrying a Cross</p>
 <p>The church may be stripped of its decorations to show God's House.</p>	 <p>The Queen often gives out money (coins) to the elderly.</p>	 <p>A light is lit at the start of the church service to represent Jesus.</p>
 <p>Easter eggs are given and broken</p>	 <p>In Rome the Pope reads out Mass on Sunday</p>	 <p>Christians take part in the Eucharist</p>

Events in Holy Week

- **Palm Sunday** - Jesus rides into Jerusalem over palm branches to celebrate Passover (Jewish festival to remember Moses) on a donkey as stated in the **prophecy** from the Old testament saying a **Messiah** would save them.
- **Monday** - Jesus went to the **temple** and spoke about how God did not need followers to pay riches to the church and use the sacred house for trading.
- **Tuesday** - Jesus went back to the **temple** to challenge the authority of the high priests called the Sanhedrin.
- **Wednesday** - On the Wednesday it is said that **Judas** agreed to betray Jesus. He was paid **30 pieces of silver**. Judas was fed up with Roman oppression and believed Jesus was one to start a rebellion, he was disappointed to learn that this was not so.
- **Maundy Thursday** - **The last Supper** - including the wine and bread. Jesus challenges Judas on his betrayal and is later arrested and brought before the high priests.
- **Good Friday** - The trial of **Pontius Pilate**, Jesus is **crucified**. Jesus atones for the sins of mankind to reconcile the relationship between God and his believers, so they can have salvation. The temple curtain ripped showing all had access to God.
- **Saturday** - The **disciples** hide, fearing they will be arrested. Losing Jesus had challenged their faith in God.
- **Easter Sunday** - 2 women arrive at the tomb, the stone covering the tomb entrance is gone. Jesus has **resurrected** from the dead.



GCSE FRENCH YEAR 10: WHERE I LIVE

Où habites-tu? (Where do you live?)

J'habite / nous habitons en ville / dans un village... (I / we live in town / in a village...)

Qui est situé(e) / qui se trouve (Which is situated / which is to be found)

Dans le sud / l'ouest / le nord / l'est de l'Angleterre (In the south / west / north / east of England)

À la campagne / Au bord de la mer (In the country / by the sea)

Près de / pas loin de (near to / not far from)

J'y habite / nous y habitons **depuis**... ans (I have lived / we have lived **there for** ... years)

C'est une ville calme / touristique / historique (it's a quiet town / touristy / historic)

Il y a / nous avons / il n'y a pas de / nous n'avons pas de (there is, are ; we have ; there isn't, we don't have)

En été / hiver / automne / au printemps (In the summer / winter / autumn / spring)

On peut (you / one can)

Faire des promenades / faire des magasins / visiter des monuments / aller au cinéma (go for walks / shops / see the sights / go to the cinema)

Avant / il y a ans (previously / ... years ago)

Il y avait / c'était (there was, were ; it was)

Dans le futur je voudrais habiter / vivre... (in the future I'd like to live)

Ma ville idéale serait / aurait (my ideal town would be / would have)

Les avantages / les inconvénients de ma ville (The advantages / disadvantages of my town)

Il n'y a jamais (there is / are never)

Il n'y a rien (there is nothing)

Il n'y a plus de (there isn't ... any more)

Il n'y a ni...ni... (there are neither ... nor)

Trop de / beaucoup de / plein de / assez de (too much, many / lots of / full of / enough)

La criminalité / la circulation / la pollution / le bruit (criminality / traffic / pollution / noise)

Ce qui est bon / mauvais (what's good / bad)

Ce qui me concerne (what concerns me)

Ce que m'embête (what annoys me)

Ce qui me plaît (what I like, what pleases me)

Parce que / car / étant donné que / puisque (because, as, given that, since)

C'est facile / difficile de... (it's easy / difficult to...)

Se déplacer (get around)

Trouver un bon emploi (find a good job)

Comment est ta maison? (What's your house like?)

C'est une maison individuelle / jumelée (it's a detached / semi)

C'est un appartement (it's a flat)

Au premier / deuxième étage (on the first / second floor)

Au sous-sol / au rez-de-chaussée (In the basement / on the ground floor)

La chambre / la salle de séjour / la salle de bains (the bedroom / living room / bathroom)

Le jardin / le grenier (the garden / the attic)

Les meubles (furniture)

La table / la chaise / la lampe / la télévision (table / chair / lamp / TV)

Au coin de / au milieu de / à côté de / sur / sous / à droite de / à gauche de (in the corner / in the middle / next to / on / under / to the right / to the left)



R – range

O –

opinions

T – tenses

A –

adjectives

T – tie

together

E – extend

Comment passes-tu tes vacances? (How do you spend your holidays?)

Normalement / d'habitude / dans le mois de juillet (*normally / usually / in the month of July*)

Je passe / on passe / nous passons (*I spend / one / we spend*)

Une quinzaine / quelques jours / un mois (*a fortnight / some days / a month*)

En France / en Espagne (*in France / Spain*)

Nous y allons en voiture / avion (*we go there by car / plane*)

Nous louons (*we rent*)

Une gîte / une voiture / des vélos (*a holiday cottage / a car / some bikes*)

Nous restons (*we stay*)

Dans un camping (*on a campsite*)

Dans le sud / le nord... (*in the south / north*)

Pendant la journée (*during the day*)

Le matin / l'après-midi / le soir (*in the mornings / afternoons / evenings*)

Tous les jours / soirs (*every morning / evening*)

Si / quand (*if / when*)

Il fait beau / mauvais / chaud / froid (*it's / the weather is nice / bad hot / cold*)

J'aime / on aime / nous aimons (*I / we like*)

Je préfère / on préfère / nous préférons (*I / we prefer*)

Faire des promenades / aller en ville / visiter les monuments (*doing walks / going to town / seeing the sights*)

Ce que j'aime, c'est... (*what I like is...*)

plus / moins ... que (*more / less than*)



L'année dernière / en juillet (*last year / in July*)

Je suis allé / on est allés / nous sommes allés (*I / we went*)

J'ai passé / on a passé / nous avons passé (*I / we spent*)

J'y suis allé en avion (*I went there by plane*)

Pendant le voyage (*during the journey, trip*)

J'ai dormi / j'ai lu / j'ai regardé / j'ai fait / j'ai mangé (*I slept / I read / I watched / I did / I ate*)

C'était barbant / super / génial (*it was boring / super / great*)

L'hôtel était situé (*the hotel was situated / located*)

Près de la plage / en centre ville / dans une forêt (*near the beach / in the town centre / in a forest*)

Je me suis bien amusé / on s'est bien amusés / nous nous sommes bien amusés (*I / we had a good time*)

Il a fait froid / chaud (*the weather was cold / hot*)

Il y avait du soleil / des orages (*it was sunny / stormy*)

L'année prochaine / septembre prochain (*next year / September*)

Je veux / voudrais / vais (*I want / would like / am going*)

Aller / visiter / voir (*to go / to visit / to see*)

J'espère que (*I hope that*)

Il va faire beau (*the weather will be nice*)

J'ai l'intention de (*I intend*)

Essayer / faire / acheter / apprendre / louer (*to try / do / buy / learn / rent*)



Les vacances de mes rêves

Si j'avais beaucoup d'argent / si j'étais riche (*if I had lots of money / if I were rich*)

J'irais / je passerais / je resterais / je visiterais (*I would go / spend / stay / visit*)

Les vacances de mes rêves seraient en Italie (*my dream holiday would be in Italy*)

J'aurais / je serais / je ferais / je mangerais (*I would have / be / do / eat*)



R – range

O – opinions

T – tenses

A – adjectives

T – tie together

E – extend



Les avantages et les inconvénients de voyager

A mon avis / je pense que / je crois que (*in my opinion / I think that / I believe that*)

Un avantage / un inconvénient (*one advantage / disadvantage*)

C'est important de (*it's important*)

voyager / apprendre / voir / visiter / faire la connaissance de / se faire des amis (*to travel / learn / see / visit / get to know / make friends*)

D'un côté ... de l'autre côté (*on the one hand ... on the other hand*)

Ça peut être (*it can be*)

Cher / dangereux (*expensive / dangerous*)

Il y a le risque de (*there's the risk of*)

Il a des problèmes (*there are problems*)

La pollution / l'environnement (*pollution / the environment*)

C'est mieux de voyager (*it's better to travel*)

C'est pire (*it's worse*)

KEY GRAMMAR

Conditional mood

Saying what you 'would' do, eg I would go, I would stay, I would live etc

Use the 'simple future' stem, but this time put on the endings from the imperfect tense.

je serais = I would be
j'aurais = I would have
je ferais = I would do
j'irais = I would go



je voyagerais = I would travel

nous resterions (we would stay)
nous louerions (we would rent)

so:

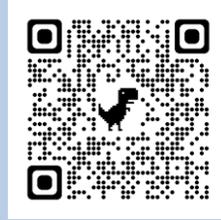
Je –ais
tu – ais
il – ait

nous – ions
vous – iez
ils - aient

Perfect tense - reminder!

Most verbs take '**avoir**' as *auxiliary verb*

j'ai mangé = I ate (I have eaten)
j'ai lu = I read
j'ai choisi = I chose



A *small* number of verbs use '**être**' as *auxiliary verb*

je suis allé(e) = I went
je suis resté (e) = I stayed

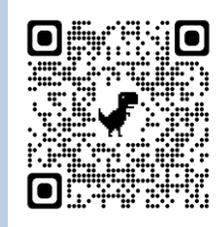
je me suis levé(e) = I got up
je me suis couché(e) = I went to bed

A useful acronym to remember the verbs using **être** is:

DR & MRS VANDERTRAMP

descendre	entrer
revenir	retourner
monter	tomber
rentrer	rester
sortir	arriver
venir	mourir
aller	partir
naître	
devenir	

+ ALL REFLEXIVE VERBS



Near future – reminder!

aller + infinitive (just like in English...!)

je vais faire = I'm going to do
on va manger = we're going to eat
nous allons jouer = we're going to play

Simple future – reminder!

This is when we want to say 'I **will** do x, y, z'

Most of the time put these endings on to the **INFINITIVE**

je –ai (je mangerai)
tu – as (tu mangeras)
il –a (il mangera)

nous –ons (nous mangerons)
vous –ez (vous mangerez)
ils –ont (ils mangeront)

Note: j'irai = I will go / je serai = I will be
je ferai = I will do / j'aurai = I will have

GCSE SPANISH YEAR 10: WHERE I LIVE

¿Dónde vives? (Where do you live?)

yo vivo / vivimos en la ciudad / en un pueblo ... (i / we live in the city / in a town ...)

que se encuentra / (which is located)

en el sur / oeste / norte / este de Inglaterra (in the south/west/north/east of England)

en el campo / junto al mar (in the countryside/ on the coast)

cerca / no lejos de (close to/ not far from)

he vivido allí / hemos vivido allí durante ... años (i / we have lived there for years)

es una ciudad tranquila / turística / histórica (it is a quiet/tourist/historic city)

hay / tenemos / no hay / no tenemos (there is/we have/there isn't/ we don't have)

en verano / invierno / otoño / primavera (in summer / winter/ autumn / spring)

se puede (you can)

dar un paseo / ir de compras / visitar monumentos / ir al cine (go for a walk / go shopping/ see the sights/ go to the cinema)

antes / hace.... años (before/ years ago)

había / fue (there was/ it was)

en el futuro me gustaría vivir ... (in the future, i would like to live)

mi ciudad ideal sería / tendría (my ideal town would be/ would have)



Las ventajas / desventajas de mi ciudad (The advantages and disadvantages of my town)

hay / no hay nunca (there is/ is never)

no hay nada (there is nothing)

no hay ... más (there is no longer)

no hay ni ... ni (there is neither...nor)

demasiado / muchos / muchas / lleno de / suficiente (too much/ lots of/ full of/ enough)

crimen / tráfico / contaminación / ruido (crime / traffic / pollution / noise)

qué es bueno / malo (which is good/bad)

lo que me preocupa (what worries me)

lo que me molesta (what annoys me)

lo que me gusta (what i like)

porque / ya que / dado que (because/ given that)

es fácil / difícil de ... (it's easy/ difficult to...)

displazarse (to get around)

encontrar un buen trabajo (find a good job)

R – range

O – pinions

T – tenses

A – adjectives

T – tie together

E – extend



¿Cómo es tu casa? (What's your house like?)

vivo en una casa en... – i live in a house in...

vivo en un piso – i live in a flat

moderno/a – modern

anticuado/a – old fashioned

grande – big

pequeño/a – small

espacioso/a – spacious

elegante – elegant

bonito/a – pretty

feo/a – ugly

acogedor(a) – warm/welcoming

Hay - There is / There are
Tenemos – We have

un dormitorio – a bedroom

una cocina – a kitchen

un salón – a living room

un cuarto de baño – a bathroom

un comedor – a dining room

un sótano – a basement

un ático – an attic

un jardín – a garden

un garaje – a garage

un pasillo – a hallway

un lavadero – a utility room

un aseo – a toilet

una sala de juegos- a games room

¿ Que haces normalmente en las vacaciones? (*What do you do in your holidays?*)

normalmente / usualmente / en julio (*normally / usually / in the month of july*)

paso/ pasamos (*i spend / one / we spend*)

una quincena / unos cuantos días/ un mes (*a fortnight / some days / a month*)

en francia / en españa (*in france / spain*)

vamos / viajamos allí en coche / avión (*we go / travel there by car / plane*)

alquilamos (*we rent*)

una casa de vacaciones/ un coche/ bicis (*a holiday cottage / a car / some bikes*)

nos quedamos (*we stay*)

en un camping (*on a campsite*)

en el sur / norte de ... (*in the south / north of*)

durante el día (*during the day*)

por la mañana / la tarde / la noche (*in the mornings/ afternoons / evenings*)

cada día / noche (*every morning / evening*)

si / cuando (*if / when*)

hace buen tiempo/ mal tiempo / calor / frío (*it's / the weather is nice / bad hot / cold*)

me gusta / nos gusta (*i / we like*)

prefiero / preferimos (*i / we prefer*)

dar un paseo/ ir al centro / visitar los monumentos (*doing walks / going to town / seeing the sights*)

lo que me gusta es... (*what i like is...*)

más / menos ... que (*more / less than*)

el año pasado / en julio (*last year / in july*)

fui / fuimos(*i / we went*)

pasé / pasamos (*i / we spent*)

fui en avión (*i went there by plane*)

durante el viaje (*during the journey, trip*)

dormí/ leí / veí/ comí / hice/ (*i slept / i read / i watched / i ate/ i did*)

fue aburrido / fantástico / genial (*it was boring / fantastic / great*)

el hotel estaba (situado) (*the hotel was (situated)*)

cerca de la playa / en el centro / en un bosque (*near the beach / in the town centre / in a forest*)

lo pasé bien / lo pasamos bien(*i / we had a good time*)

hizo frío / calor (*the weather was cold / hot*)

hizo sol (*it was sunny*)

nadé / caminé / compré / jugué / comí / bebí /

fui / (*i swam / i walked / i bought / i played / i ate / i drank / i went*)

el año próximo / el septiembre que viene(*next year / september*)

quiero / quisiera / voy a (*i want / would like / am going*)

ir / visitar / ver (*to go / to visit / to see*)

espero que (*i hope that*)

hará buen tiempo (*the weather will be nice*)

tengo la intención de (*i intend*)

intentar / hacer / comprar / aprender / alquilar (*to try / do / buy / learn / rent*)

Las vacaciones de mis sueños

Si tuviera mucho dinero / si fuera rico (*if I had lots of money / If I were rich*)

iría / pasaría/ me quedaría / visitaría (*I would go / spend / stay / visit*)

Las vacaciones de mis sueños serían en Italia (*my dream holiday would be in Italy*)

tendría / sería/ haría/ comería (*I would have / be / do / eat*)

Iría al sur de Francia y alquilaría una casa de vacaciones enorme en el campo (*I would go to*

Pasaría todo mi tiempo al lado de la piscina (*I'd spend all my time by the pool*)

Compraría muchos regalos caros para mis amigos (*I'd buy lots of expensive presents for my friends*)



Las ventajas y desventajas de viajar

En mi opinión / pienso que/ creo que (*in my opinion / I think that / I believe that*)

Una ventaja / una desventaja (*one advantage /disadvantage*)

Es importante de (*it's important*)

viajar / aprender / ver / visitar / conocer / hacer amigos (*to travel / learn / see / visit / get to know / make friends*)

Por un lado... por otro lado (*on the one hand ... on the other hand*)

Puede ser (*it can be*)

caro / peligroso (*expensive / dangerous*)

Hay un riesgo (*there's the risk of*)

Hay problemas (*there are problems*)

La polución /el medioambiente (*pollution / the environment*)

Es mejor viajar (*it's better to travel*)

Es peor (*it's worse*)

R – range

O – opinions

T – tenses

A – adjectives

T – tie together

E - extend



KEY GRAMMAR

Conditional mood

Saying what you 'would' do, eg I would go, I would stay, I would live etc

Use the 'simple future' stem, but this time put on the endings from the imperfect tense.

sería = I would be
tendría = I would have
haría = I would do
iría = I would go

viajaría = I would travel

Nos quedaríamos (we would stay)
alquilaríamos (we would rent)

so:

Yo --ía
tú - ías
Él/ella - ía

nosotros - íamos
vosotros - íais
Ellos/ellas - ían

Preterite tense

The preterite tense is used for single events that happened in the past **at a definite time**. To form the preterite, you have to take the ending (ar, er or ir) off the infinitive and add the following endings:

-ar verbs	-er and -ir verbs
hablé	comí
hablas	comiste
habló	comió
hablamos	comimos
hablasteis	comisteis
hablaron	comieron

Imperfect tense

The preterite tense is used for events that happened in the past (used to/was) **over a period of time**. To form the imperfect, you have to take the ending (ar, er or ir) off the infinitive and add the following endings:

ar verbs	-er and -ir verbs
Hablaba	comía
Hablabas	comías
Hablaba	comía
Hablábamos	comíamos
Hablabais	comíais
Hablaban	comían

Near future – reminder!

Voy a + infinitive (just like in English...!)

Voy a hacer = I'm going to do
Vamos a comer = we're going to eat
Vamos a jugar = we're going to play

Simple future – reminder!

This is when we want to say 'I **will** do x, y, z'

Most of the time put these endings on to the **INFINITIVE**

yo	-é
tú	-ás
usted, él, ella	-á
nosotros	-emos
vosotros	-éis
ustedes, ellos, ellas	-án

Note: iré = I will go / seré = I will be
haré = I will do / tendré = I will have

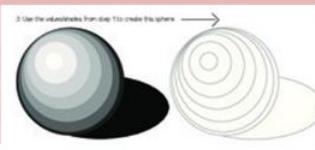
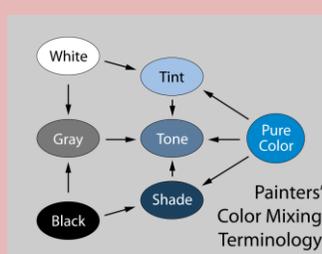
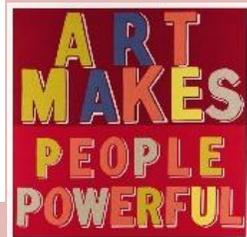
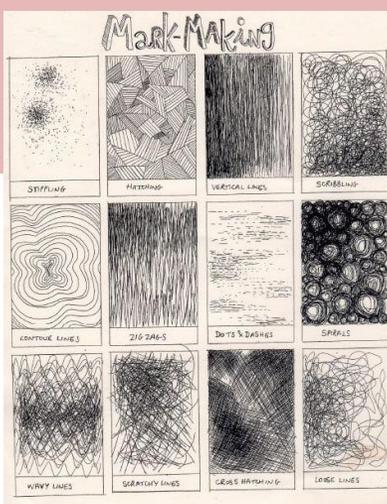
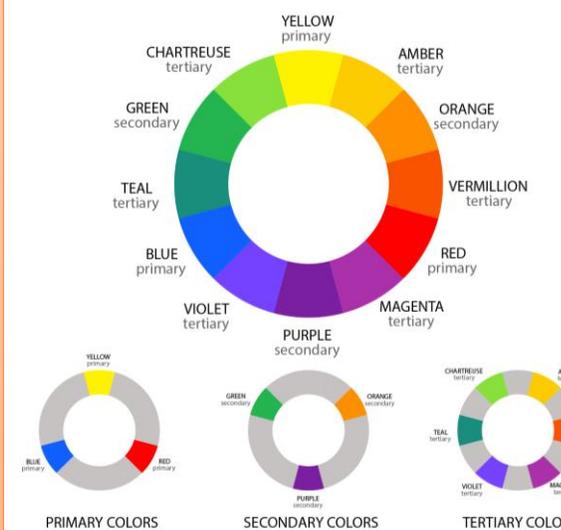
The Fundamentals of Art

ESSENTIAL EQUIPMENT:

- PENCIL PACK (2B, 4B, 6B ETC)
- ERASER
- SHARPENER
- SKETCHBOOK

OPTIONAL EQUIPMENT:

- DRAWING PENS
- WATERCOLOUR SET
- WATERCOLOUR PENCILS
- PAINTBRUSHES



Positive/Negative Shapes

Positive shapes – subject or dominant shapes on the picture plane

Negative shapes – background areas



ATTITUDE

Be positive and try your best!

RESPECT

Respect others, work and the room

THINK

Understand and demonstrate.

IMAGINE

Be creative, use you imagination!

SPOTLESS

Tidy up after yourself.

TARGET

Follow directions.

COLOUR

BRIGHT
BOLD
VIBRANT
PRIMARY
SECONDARY
TERTIARY
RADIANT
VIVID
DULL
CONTRASTING
COMPLIMENTARY
HARMONIOUS
MONOCHROME
NATUARL
SATURATED
PASTEL
COOL
WARM

LINE

FLUENT
CONTINUOUS
CONTROLLED
LOOSE
POWERFUL
STRONG
ANGULAR
FLOWING
DELICATE
SIMPLE
THICK
THIN
BROKEN
OVERLAPPING
LAYERED
MARK MAKING

SHAPE/Form/SPACE

CLOSED
OPEN
DISTORTED
FLAT
ORGANIC
POSITIVE
NEGATIVE
FOREGROUND
BACKGROUND
COMPOSITION
ELONGATED
LARGE
SMALL
2D
3D
TWISTED
JAGGED

PATTERN AND TEXTURE

REPEATED
UNIFORM
GEOMETRIC
RANDOM
SYMMETRICAL
SOFT
IRREGULAR
UNEVEN
ROUGH
BROKEN
GRID
FLAT
WOVEN
ORGANIC
SMOOTH
ABSTRACTED

tone

BRIGHT
DARK
FADED
SMOOTH
HARSH
CONTRASTING
INTENSE
SOMBRE
STRONG
POWERFUL
LIGHT
MEDIUM
DARK
LAYERED
DEPTH
DEVELOPED
SOFT

A01 EXPLORE

DEVELOP

DEVELOP IDEAS

INVESTIGATE & RESEARCH
OTHER ARTISTS WORK

ANALYSE

ANNOTATE

A02 REVIEW

REFINE

EXPERIMENT

EXPLORE DIFFERENT IDEAS
AND MEDIA
A RANGE OF TECHNIQUES
& PROCESSSES

SELECT

IMPROVE

A03 EVIDENCE

RECORD

PRESENT IDEAS

PRIMARY OBSERVATION
DRAWING, PAINTING,
PRINTING, PHOTOGRAPHY,
WRITING, PHOTPGRAPY...

ANNOTATE

DIFFERENT MEDIA

A04 OUTCOME

PRESENT

FINAL IDEAS

DEVELOPED AS PLANNED
CLEARLY RESPONDS TO
ARTISTS EXPLORED

CONNECTION

CONCLUSION

ART ANALYSIS GUIDE

CONTENT/DESCRIPTION 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?
- What message does the image communicate?
- Do you the year of the piece? What was happening in the world at the time? Does that have an influence on the piece?

PROCESS

- What type and direction of light was used/created? (harsh, soft, artificial lamp/natural lighting)
- How was this image 'built'?
- 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 is 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 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?



JOURNAL PROJECT

TERM 5 and 6

Potential media...

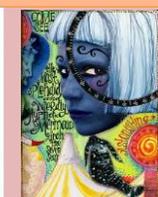
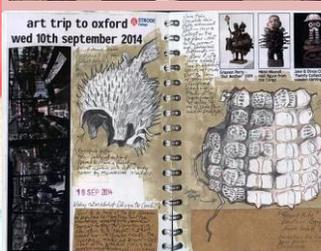
- Drawing
- Painting
- Photography
- Photoshop
- Manual manipulation
- Mixed media
- Collage
- Lino
- Mono print
- Collagraph
- Tetra Pak print
- Poly print
- Typography
- Graphic design
- Fabric/textiles
- Wire
- Clay
- Wax resist
- Film
- Mod roc

Artists, photographers, makers you could look at...

- Luke Dixon
- Pablo Picasso
- Henry Moore
- Jean Michel Basquiat
- Barbara Hepworth
- William Morris
- John Piper
- Paul Nash
- Cy Twombly
- Edmund De Waal
- Wassily Kandinsky
- Maggi Hambling
- Richard Long
- Andy Goldsworthy
- Tracey Emin
- Matt Collishaw
- Polly Morgan
- Henri Matisse
- Andy Warhol
- Sarah Graham
- Hieronymus Bosch
- Pierre-Auguste Renoir
- Jeff Wall
- Edward Hopper
- The Dutch Masters
- Jon Everett Millais
- Banksy
- Blek Le Rat
- Hilma Af Klint
- Cornelia Parker
- Peter Blake
- Cindy Sherman
- Henry Fox Talbot
- Man Ray

Journal Project independent tasks:

- Journal project mind map/mood board, visual identity
- Artist links
- Photo shoot – go for a walk and document through photography and sketches
- Mark making
- Researching and creating work inspired by a news article or world issue – building contextual research
- Exploring texture, gathering textures, photography and studies
- Clay workshop
- Colour blocking and colour theory
- Collection of typography
- Alphabetic photography and typography
- Art and text – lyrics, poetry, text and illustration
- Photography and photoshop/manual manipulation – student choice
- Mixed media/collage/graphic design and posters
- Zooming in, abstraction through close up studies of the world around you
- Virtual gallery or museum trip/real gallery or museum trip – documentation
- Curation of an exhibition of your work

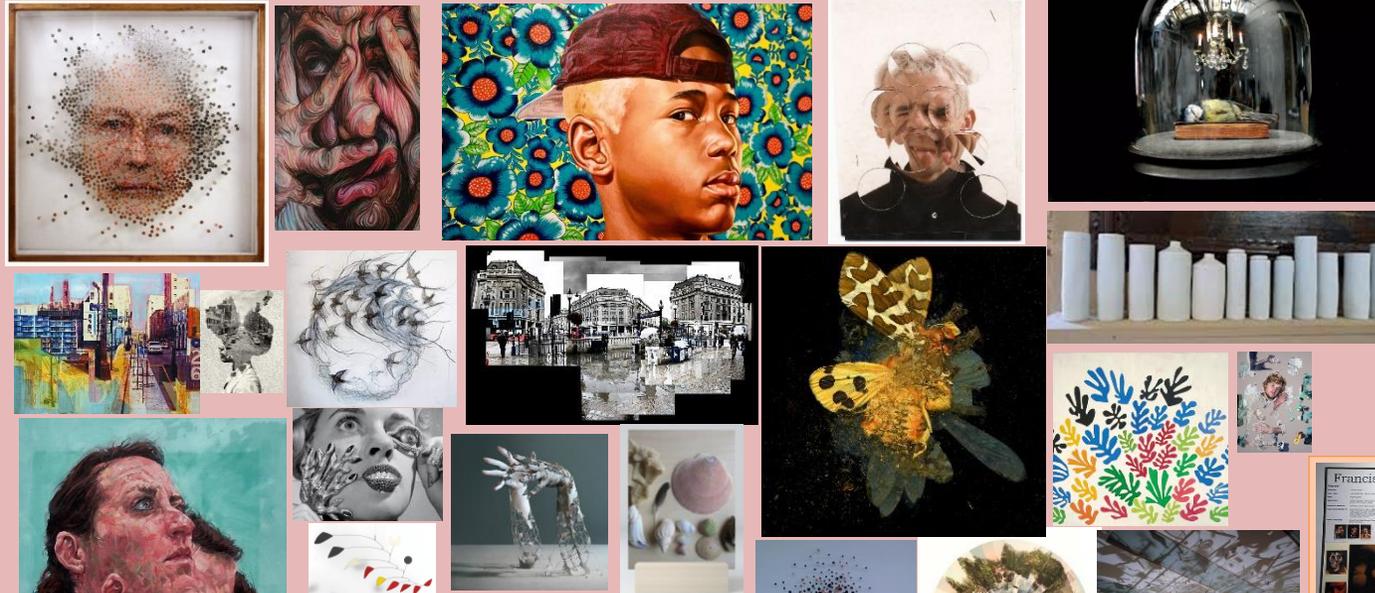


MAJOR PROJECT

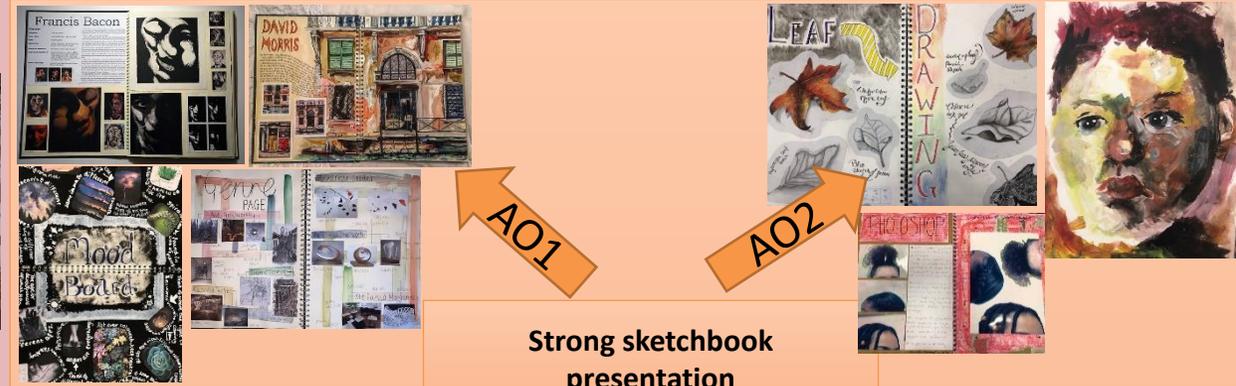
TERM 5 and 6

Your major project title is Collections and Curiosities with the sub-themes of; **PEOPLE, PLACE and PATTERN.** You will have scope within these titles to work more independently.

- 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



EXAMPLE OUTCOMES FOR COLLECTIONS AND CURIOSITIES



AO1

AO2

Strong sketchbook presentation



AO3

AO4

MAJOR PROJECT

TERM 5 and 6

ASSESSMENT OBJECTIVES, THE MINIMUM EXPECTED

ASSESSMENT OBJECTIVES SPECIFICS

A01
 Mood boards
 Mind maps
 Genre pages
 Initial ideas
 Artist analysis
 Contextual research
 Gallery visits

A02
 Experimentation
 Different materials
 Different techniques
 2D and 3D
 Trials
 Photoshop

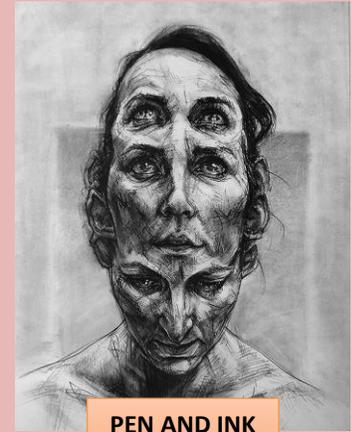
A01
 AIM TO HAVE AT LEAST 4-8 DIFFERENT ARTIST ANALYSIS PAGES (THESE CAN BE SMALLER INSERTS TO EXPERIMENTS)

A02
 YOU SHOULD DEMONSTRATE A WIDE RANGE OF EXPERIMENTATION. AIM TO EXPLORE AT LEAST 6 OF THE EXPERIMENTATION EXAMPLES ON THIS PAGE.

A03
 YOU NEED TO SHOW INITIAL DRAWINGS/STUDIES EXPLORING THE WORK OF YOUR ARTISTS. YOU MUST HAVE A PHOTOGRAPHY ELEMENT – PLEASE CONTINUE TO DEVELOP STUDIES FROM SHOTS.

A04
 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.

EXPERIMENTAL MARK MAKING – THIS CAN BE USED AS RESEARCH AND WITHIN YOUR STUDIES.



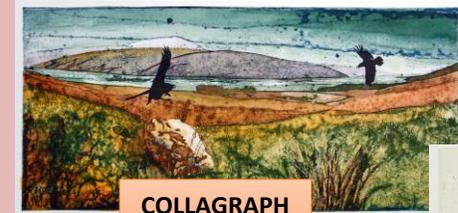
PEN AND INK



PHOTOGRAPHY



MONOPRINT



COLLAGRAPH

A RANGE OF WORKSHOP AND EXPERIMENTATION IDEAS



EXPERIMENTAL DRAWING



PAINTING



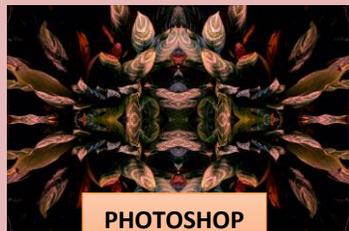
SCREEN PRINT

A03
 Recording
 Drawing
 Photography
 Primary recording
 Recording from secondary resources

A04
 Final outcome
 All planning
 Trials
 Test outcomes
 Colour theory
 Colour plans
 Annotations of ideas



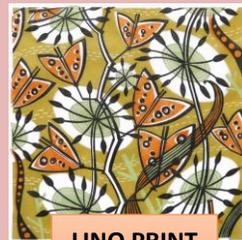
MIXED MEDIA



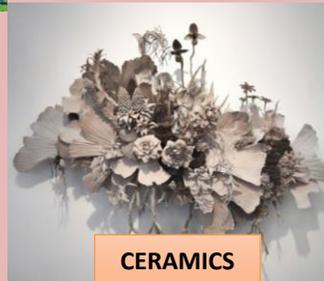
PHOTOSHOP



WIRE



LINO PRINT



CERAMICS



AO 3: Demonstrate knowledge & understanding of how drama and theatre is developed and performed.
30% of final mark.

Interpreting Theatre Section A

You need knowledge & understanding of everything that is involved in staging & rehearsing & performing a play, including the costumes, the lighting, the acting... you can get questioned on any of these.

The Caucasian Chalk Circle – Bertolt Brecht 1944

Themes

Who does the land rightly belong to?

*...That what there is shall go to those who are good for it
Children to the motherly, that they prosper,
Carts to good drivers, that they be driven well
The valley to the waterers, that it yield fruit.*

The Singer P 99 {final speech}

Who does the child rightly belong to?

Issues

Politics

Themes, issues and politics

Brecht was a pacifist and a communist. A central theme of this play is that land and property should belong to those people who can make the best use of it and not those who happen to, 'own' them through some fortune of history- this is a key communist belief. This political position is set up in the prologue of the play which is set in a valley in the Caucasus (hence the, Caucasian Chalk Circle) region at the end of the second world war between the original inhabitants of the valley- the Goat Herders and the Fruit Growing Collective who moved in when the Goat Herders fled at the beginning of the war and the Nazi invasion. The Fruit Growers are seen to have made the best use of the land and cared for it the most and so it is decided that they should rightfully have the valley. The story of the chalk circle is a story within a story and is told' by the musician/ singer as a parable – a way of teaching us this by showing that Grusha should keep little Michael rather than the birth mother- because Grusha has shown herself to be the better mother by caring for the child the best. America is a Capitalist country and so the first productions of The Caucasian Chalk Circle, missed out the prologue because they didn't agree with this political view on ownership of things.

Communism and Capitalism

This theme was referred to earlier when discussing the Prologue. It would be worth discussing this further when considering the story of Grusha and the chalk circle. The Caucasian Chalk Circle is a political play about the complexities of making decisions, the precarious validity of the law, and humans' behaviour toward their fellows. Bertolt Brecht has the Singer sum up the meaning of the play in the song at the end:

*Take note what men of old concluded
That what there is shall belong to those
who are good for it, Children to the maternal,
that they prosper; Carts to good
drivers, that they are driven well;
The valley to the waterers,
that it yield fruit.*

Ownership and Belonging

The questions asked in the play are - who does the land rightly belong to? Those who have lived there for a length of time, or those who can make good use of it? In the same way, the question is asked – who does the child rightly belong to? The one who gave birth to the child, or the one who cared for him and brought him up?

Grusha's decision to take on the abandoned, Governor's child, even though it will be bad for her, allows the play to explore themes of, **sacrifice** and the consequences for the poor- " Oh, the temptation to do good"

The, Judge- Azdak is the vehicle that allows the play to explore issues of **justice and the law**. We are asked to think about whom does the law serve? Does it serve the rich and poor equally?

Motherhood

Does one become a mother simply by giving birth or is it the act of caring and raising a child that makes a mother? In the pivotal scene, Azdak rules in favour of Grusha as Michael's true mother, which sends a clear message from Brecht about the importance of love and care in society.

Justice

Brecht uses the character of Azdak to illustrate this theme. Although he regularly accepts bribes from wealthy plaintiffs, he almost always rules in favour of the poor.- or at least in favour of serving justice. Azdak's "radical" approach to justice and ensuring that the voices of the poor and downtrodden are also heard earns him great respect and renown.

The play – The Caucasian Chalk Circle: Plot, characters, genre, themes- other bits and bobs too



Original 1947 American college production using some of Brecht's staging ideas. Do note that they did keep the *proscenium arch*.

Staging a play

This phrase is used with various meanings- mostly though if you are asked about staging a play, you are being asked about all of the things that must be considered and done in order to put on (stage) a production of a play for an audience. These include; the chosen **ground plan** – proscenium, in- the- round etc., **the costume**, choice of **set, props' lighting design, performance style** et cetera et cetera.

Your exam board tend to state exactly which ones you should consider and write about in your answer to the question. **ONLY write about the things they ask for**

!!



Staging the Test of The Chalk Circle

Genre: Epic Theatre

The play is **epic** in the general sense as well as a Brechtian sense:

- It has many locations.
- It takes place over a long time- over two years.
- It has many characters- 48 + a number of extras !!
- The opposite of *Epic theatre* would be, *classic theatre* or *naturalistic theatre*- these genres tend to observe the unities of Time, Place & Action- (24hrs, one setting, one plot strand (and few characters). Classic productions like to use proscenium arch ground plans- I wonder if you can work out why...

Some thoughts on answering questions on staging a production or a certain scene from the play and the 'Original stage conditions'.

When answering questions on how you would stage a production of The Chalk Circle, you can be as imaginative as you wish just as long as your ideas, 'work'.* You do not have to do it in a Brechtian way – you do not have to use all, or any, of the; **distancing/ alienating/ strange-making/ verfremdung** techniques that he did. You have the choice to use them if you see fit. **You must**, however, refer to the way that it was originally staged by Brecht in your answers if it asks for them. This drama course requires you to know about the original (Brechtian) staging conditions, so you have to show that you know about them, even if you don't use them. (see the section on Brechtian techniques.)

My thoughts about this are that you should use some of the techniques that you think will be useful and say a little bit about some that you won't be using, just to demonstrate your knowledge about these other techniques. The highest marks will go to students who can justify their choice of staging in terms of the **meaning** that they want to communicate and the **impact** (effect) that they want to have on the audience.

***By, 'work' in this context, I mean, ideas that fit the intentions of the play – ideas that bring the play to life and make it 'work' for an audience in performance.**



The Characters

Grusha

Grusha, the young maid servant, is at the heart of the story and can be described as the main character of the play. She represents the good people in society and some of her character traits are loving and caring, courageous, determined and decisive. Any actress taking on this role must realise that Grusha's character develops from being an immature and naïve girl at the beginning of the play to a responsible young woman at the end. This comes about as a result of the emotional journey she undertakes to protect the child. The actress should use her face, body movements and voice to convey the different emotions her character experiences. Through the character of Grusha, Brecht shows that people who make sacrifices will be rewarded and the tide changes in their favour. Because of her courage and sacrifice, she transforms into the mother of the child and her love for Simon is also rewarded.

Two of these central characters are important to the message of the play, namely **Grusha** and **Azdak**. In some ways the play is the story of characters- their two journeys- their two stories.

The **Caucasian Chalk Circle** has 48 named characters and many extras. The fact of there being so many characters means that even in the biggest of productions there will be some **multi-role playing**. In most small scale and touring productions most actors will be playing three or four different roles. This can of course be useful in reminding the audience that there is an actor playing' the role and not a real life person.

Actors often say that they like to play horrible characters- which character would you most like to act? Which would best suit you?



Dom Coyote as Azdak

Azdak

Azdak was the village 'scrivener' or scribe and was an honest man, except for the times he would be accused of stealing the Fat Prince's rabbits. He is introduced by the Singer at the beginning of scene 4: Hear the story of the Judge How he turned judge, how he passed judgment, what kind of Judge he was. On that Easter Sunday of the great revolt, when the Grand Duke was overthrown And his Governor Avbashwili, father of our child, lost his head The Village Scrivener Azdak found a fugitive in the woods and hid him in his hut. The fugitive was the Grand Duke himself, and without knowing it, Azdak helps him and saves his life. Azdak is upset at being a traitor and repents and goes to seek justice. Instead he ends up becoming a Judge and it is he who decides in favour of Grusha in the chalk circle. Azdak can be considered a trickster figure who turns the law upside down. He, like Grusha, risks his life to make a difference. Through his character and his actions Brecht once again suggests that this is how justice will come. Once again, an actor taking on this role has the challenge to show how Azdak develops from a disreputable figure to be the 'wise' judge at the end.

Juliet Stevenson's interpretation of Grusha. Theatre De Complicite.

When an actor plays more than one character, it is called, **multi-role playing**.



Central characters

Simon Chavchava

Simon Chavchava is the soldier who falls in love with Grusha and she promises to marry him when he returns from the war. However, she is forced to marry another man, Yussup, before Simon returns. Thanks to Azdak, who mistakenly annuls Grusha's marriage, Simon and Grusha are allowed to marry after all. Simon adopts Michael as his own son. In accordance with Brechtian techniques, actors will play more than one role. This was frequently used and served to remind the audience that the characters were in fact played by 'actors in role'

A note or two on Brechtian technique

Brechtian techniques **Vefremdungseffekt** 'When something seems 'the most obvious thing in the world' it means that any attempt to understand the world has been given up'. Brecht The closest translation of Vefremdungseffekt is 'to make strange'. Brecht's distancing or **V effekt** was an attempt to distance the audience from identifying too closely with a character. The aim was to work against the sense of something being 'right' or 'natural' and ask the audience to think more clearly about what is happening; to be critical and to question characters' actions. 'The V effect consists of the turning the object of which one is to be made aware... from something ordinary, familiar, immediately accessible, into something peculiar, striking and unexpected...



A tender scene between Simon and Grusha. How is the tender mood created through gesture, tension, looks, facial expression, composition and body language?

Natella Abashwili

Natella Abashwili is a delight for any actress to portray. She is the selfish wife of the Governor, who leaves her baby Michael behind, caring more about packing her dresses than saving her child. After the civil war, she tries to get Michael back in order to reclaim the Governor's estates. She is used to highlight some of the major themes in the play, namely justice, family, class warfare and religion. For an actress portraying her, the character traits are **selfishness, self-concern, jealousy and meanness**. She repeatedly abuses the poor and shows no concern for the less fortunate.

The actors were **not to get under the skin** of the character or find the emotional truth and transform themselves into that character, **but** were to be, 'distant' from the character they were playing and to show and hold up for scrutiny a character and their actions. The actor should play the character, at arm's length. Brecht was concerned that his audience did not get swept along by emotion and empathy with a character, but were critical and alert. This did not mean that emotion did not have a place in his theatre; it was a question of emphasis. Brecht used a number of techniques to help achieve the **V effect**: ° narration ° coming out of role ° third person narration ° direct audience address ° speaking of stage directions, ° placards ° song and dance ° montage.

Costume – thinking like a costume designer

You also need to think about colour and fabric for the costumes that you choose for the characters. You also need to think of other things too, like the cut- the fashion, the period of the costume. It is very important that you also consider the culture and country of the characters that you are costuming in this production. The play is set in the Caucasus- the area around modern day Georgia, Azerbaijan and Armenia, and called Grushinia in the play. Let's sum up- your chosen costume needs to show the characters personality (confident, shy, fashionable, outgoing, dull), cultural background (European Caucasian, oriental), their social class (Aristocratic, working class, rich or poor) the period (middle ages, modern, period). Remember that you will show these things through the fabrics you choose (expensive silks, wools, leathers, cheap nylons etc.). You will show it through your choice of colours- earthy, maybe dowdy browns and greys or vibrant yellows and reds. Greys can also be smart so be careful and be imaginative. The cut and style will show what culture the character is from- color will help too. You should enjoy thinking about these things.

Grusha in a costume suggesting the Caucasian region



Note the way that the long sash scarf instantly makes the character non-European- much more, 'eastern'- oriental- like, almost – in fact very Georgian, Caucasian.

Look at the photograph right and how the fur hat on Natella instantly gives her a sense of wealth and grandeur and opulence and status- she obviously loves her clothes and showing her wealth- Appearance is everything to her. Notice how this is augmented and complemented with the fine silk / satin layered dress with lace and brocade. Notice the velvet emphasised cuffs. Then contrast this with the more muted, almost washed out pinks of the simple cooton of Grusha's dress. Appearances are less important to Grusha. The dress is something that can be worked in- it is also something her modest means can afford. It is also modest in the sense that it covers her body. She is not one to show off. Notice too, the simple & practical way that she wears her hair in two plain plaits. Tidy and reserved and practical for working in. Observe how I have assumed all of these things about the two characters from their costume alone. Most excellent costume designer.

The test of the chalk circle – Grusha & Natella



For Brecht, Costume was NOT to show a 3D naturalistic character- instead costume was to **represent a stereotype**, e.g. a typical farmer. It was used to denote a character's role or function in society, their wealth or class. Costume was sometimes incomplete and fragmentary, e.g. tie and briefcase to represent a businessman. • Makeup and costume used to depict a character's social role in the play. There were some makeup and mask use, but non-realistic and "theatrical", e.g. grotesque and/or caricatured.

Set

The set can be a simple painting or photograph of the required setting (place and time) on the back wall. This is called a **backdrop**. The backdrop can also be painted onto a canvas that is, 'dropped in' from the **'flies'** above the stage. The setting can also be projected onto the **cyclorama** or suggested through a gobo covering one of the lanterns. The gobo is usually made of steel (fire proof). A gobo could be cut into the silhouette of trees (see diagram on slide on 'lighting') so that when the light shines through it, it casts images of a forest on the **cyclorama**.

The set can also be 3 dimensional as well i.e.. It could be **real** tables and chairs on the stage, or 'real' trees. **Naturalistic productions** like to have every detail of the setting exactly as it would be in life. Stanislavski famously had real, mature fir trees dug up and transported from Norway for one of his productions of *The Wild Duck* (a play by Ibsen, a Norwegian playwright). **Brecht** was not a naturalistic playwright though, he used selective pieces of representative set- just enough to convey the time, place and atmosphere. I think that you should do the same.

When choosing your set for a scene you should consider the fabric, material – is it wood- steel- leather- plastic? You should consider the colour and how the colour fits in with the overall design concept (the costume and lighting colour and design, for example). Take note of the use of steel scaffolding and wood structures in these two productions



Grusha crossing the broken bridge



I like the way that two simple lengths of jute rope span stage left and right and how they are held up by two of the actors (very non-naturalistic- very Brechtian !) I also like the economic use of the white cloth running underneath the bridge from upstage to downstage and effectively **representing** the icy glacier river far below. I like the colour scheme of natural shades of brown and the natural hessian fabric complementing the natural jute rope.

Brecht only used scenery and props that were directly necessary for **telling the story**. His stages would therefore **be almost bare and empty**. The photo above, from the original production, indicates that the director, Henry Goodman, followed Brecht's ideas. there was always a sense of authenticity to production elements apart from a little sound and lighting. there are examples of props being as important as characters in his plays.

Summary: When answering questions about use of set, consider; colour, fabric/ material (steel, wood, iron, hessian), style (Naturalistic or representative). Think if you want a **backdrop** to show the setting too and also think about levels of the set to make the **stage picture** interesting and for the actors to use, stand on or sit on. Think how the actors interact with the set, as well as what it shows to the audience.

Remember that you can be asked questions on any aspect of a stage production. This means that as well as thinking about the ways that you would 'play' the characters and how you would direct the action. You need also need to think about how you would use lighting to show **setting** and **atmosphere**. You will need to consider your use of **set**, **costumes** and **personal properties (props)**. Also, you will need to think about your use of **hair** and **makeup** to show what the characters are like.

Lighting.

You need also need to think about how you would use lighting to show **where and when** the scene is set. You also need to think about how you might vary the **colour** of the light and the **intensity** (how bright/ how dim) to create and convey the right, **'atmosphere'** for a given scene. Dimmed blue lights can suggest an evening setting and a sombre atmosphere. Bright 'straw' lighting can suggest a sunny afternoon. Intense bright white lighting creates a harsh atmosphere- and with added blue it can create a 'cold' atmosphere- maybe a scene where the characters feel isolated, alone, alienated. Deep red lighting creates 'moody' and intense atmospheres. Red lighting, in the right setting can suggest passion, too. The lighting works in conjunction with the other elements of performance to create atmosphere or suggest a setting and a time of day. The particular feeling and meaning your lighting communicates depends on your chosen set, positioning of the actors on stage- their facial expressions, body language etc. Everything affects everything- you have to consider all. How might you use lighting to suggest the icy glacier at the 'Broken Bridge' in the, 'Flight into the Northern Mountains'? What lighting state would you choose to create the setting and atmosphere at Lavrenti and Aniko's farm house in the Northern Mountains? You will want to say whether you would use flood lights or spotlights to highlight certain moments or characters. If the lighting state covers the whole stage it is called, 'a wash'.

You might also want to consider the angle that the stage scene is lit from. Low level side lights cast long shadows over the set in much the same way that bright evening sunshine casts shadows on the ground. You could use this lighting to suggest an evening set scene. Side lighting can also create a very edgy, sketchy atmosphere with sharp angles suitable for a nightmare scene or a super tense atmosphere. Floor lighting can create a sense of morning or a scene from hell, depending on the chosen colours and intensity.

Lighting technicians and designers often bounce lighting off the back and side walls. The white painted back wall of the stage is called the cyclorama- it is painted white so that it easily reflects and projects the lighting colours.

Brecht wanted the lights to be in full view of the audience, as were the operators, to ensure actors were in the same world as the audience. Light would indicate the passage of time or change of scenes rather than create mood or atmosphere. He believed in using harsh white light as this "illuminates the truth".



See how pools of light are created by a series of spotlights from the lighting rig above. The pools of light seem to separate the upper class Governor's wife from the working class Grusha and Simon Shachava. The grand costumes of the Governor's wife and the more sombre and muted tones and colours of the working class characters.

- **Brecht** wanted the lights to be in full view of the audience, as were the operators, to ensure actors were in the same world as the audience. Light would indicate the passage of time or change of scenes rather than create mood or atmosphere. He believed in using harsh white light as this "illuminates the truth".

Summary: When answering questions on lighting a scene, consider how the **colour** and **intensity** of the lights affect the **atmosphere/ mood**. How the **side lights** can create shadows. Think whether you want to make characters 'stand out' through spotlights and how you want to use floods to give a wash of colour over the entire stage

Animal qualities & characteristics

Some actors find this very useful. They think about which animal their character is most like; it could be an Internal Characteristic like they are 'crafty' like a fox, or maybe it is a simple physical thing (external character)- the way a large cat like a leopard and when the actor

You could think, now about the key qualities of the central characters and what animal you associate these qualities with:

Azdak – dancing bear- All arms and anarchy- buffoon- clown – powerful Grusha- -'loyal, straightforward, determined- think what animal you associate with these qualities and how this might help an actor playing, Grusha, 'find' the role and how to play her' (think like Grusha, behave like her, speak like her etc.). Do the same for the other key characters

Rehearsal techniques

Acting- Rehearsal & Performance

You will get questions on how you would prepare a role, how you would rehearse a role and how you would act (perform) a role, so let's get clear on these here, now.

Rehearsal Techniques

Make them as relevant as you can to the scene, character and situation that you are being asked about. Be specific -don't

Actors need to know what their character is like (**Hot seating/ Given Circumstances**) what their relationships are like with the other characters(status relationships & status games). The actor often needs to know what the character wants (**Actor's objective/ character motivation**). They will certainly need to identify what the character is feeling and be able to 'feel' those emotions themselves (**emotion memory**). Sometimes actors get stuck and need assistance- this can be many things; they are misinterpreting the character, or, they understand the role but just can't, 'get into role'- can't find it in themselves, or simply, just, 'not feel it'. A perceptive, skilful and experienced director is essential in these moments and situations- they will work with the actor to free their imagination (creative 'if') find their character- hot seating, suggestions, guidance) some directors can assist actors by suggesting moves, a way of standing, sitting or speaking that enable the actor to find a way to play the character

Hot Seating

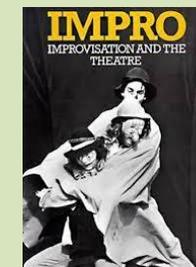
Asking an actor questions about their character. The actor usually answers , 'in- role'.

This technique has many uses in the hands of a skilful director. It can help the actor discover unknown details about their role- secrets that can unlock a character for an actor- or excite them about the process. Questions can establish the character's relationships with others- how they feel about them – their attitude to them. The questions can invent' credible and useful back stories to make sense of things for the actor, or simply to inspire them. This is a good, 'go – to' rehearsal technique in many rehearsal situations and when you are asked to write about the rehearsal techniques that you would use- just be sure to explain WHY you are using it & WHAT you want to achieve with the actor

Rehearsals are the way that a play is made ready for performance to an audience. A key aspect of this is getting the actors to know how to play their character. This can be a complex and sometimes, tricky business. Business. When answering a question, make sure you 1) interpret the character and the situation that they are in, including the relationship with the other characters and suggest a rehearsal technique that will help the actor with that specific character in that specific situation.

Status exercises, games, techniques and relationships

Keith Johnstone did much excellent work on status and you can read it in his book, Impro. You did lots of good work on status and social class in Year 8 so you know what High & Low Status mean. You know how to show them through changing your voice, body, space & use of time. Suggest, Status rehearsal techniques for actors when a scene involves characters vying for power or trying to get one up on one another- or trying to work each other is like, in the scene by the Broken Bridge between the merchants and Grusha, for example.



- Hot Seating
- Animal qualities & characteristics
- Status games (Keith Johnstone)
- Status technique (
- Motivation – (going through key lines
- Emotion memory
- Given Circumstances
- The Actor's Objective
- The Method of Physical Actions

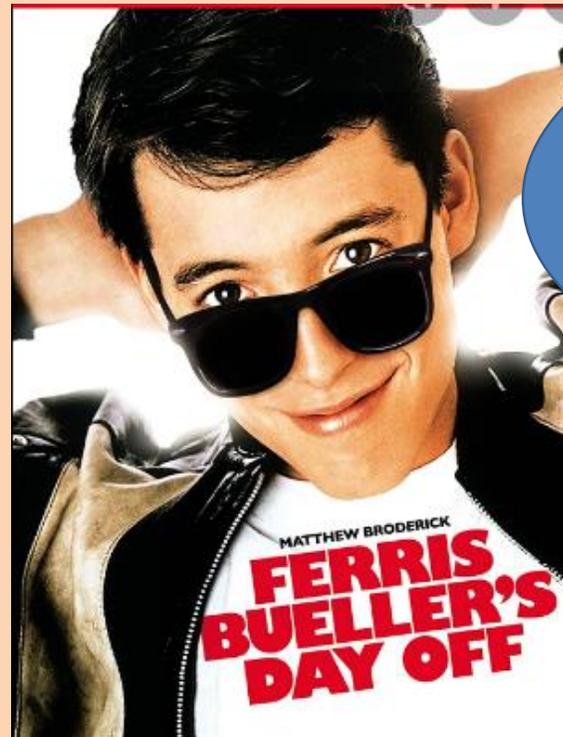
GENERAL INFORMATION TO HELP YOU WITH YOUR NEA

WHAT IS YOUR FAVOURITE GENRE?

KEY TERMINOLOGY (GENERAL)	DEFINITION
GENRE	THE TYPE OF FILM EG. ROMANCE, COMEDY, SCIENCE FICTION, THRILLER
STEREOTYPES	WIDELY HELD BUT FIXED AND OVER SIMPLIFIED IMAGE OR IDEA OF A PARTICULAR TYPE OF PERSON OR THING
CONVENTIONS	AN ACCEPTED WAY OF DOING SOMETHING...THE ASPECTS OF A MEDIA PRODUCT THAT MAKE IT IDENTIFIABLE IN TERMS OF GENRE
ARCHETYPAL	VERY TYPICAL OF A CERTAIN KIND OF PERSON OR THING
TODOROV'S PARADIGM	TODOROV'S NARRATIVE THEORY – PLEASE REFER TO TERMS 1 & 2 KNOWLEDGE ORGANISERS
PROTAGONIST	LEADING CHARACTER OR ONE OF THE MAJOR CHARACTERS
ANTAGONIST	A CHARACTER WHO IS ACTIVELY HOSTILE TO SOMEONE OR SOMETHING – AN ENEMY
MISE-EN-SCENE	THE ARRANGEMENT OF SCENERY, PROPS, LIGHTING, COSTUMES ETC
CINEMATOGRAPHY	THE ART OF PHOTOGRAPHY AND CAMERAWORK IN FILM-MAKING



HORROR



For this year's NEA, you can choose from Sci-Fi, Action, Romance, Horror or the 'Teenage Film'.



FOR THIS PART OF THE COURSE, YOU WILL NEED TO BE ORGANISED, SELF-MOTIVATED AND INDEPENDENT. THIS PART OF THE COURSE IS VITAL AND NEEDS TO BE COMPLETED BY EVERYBODY. THERE IS NO PLAN B. THIS IS AN EXCELLENT WAY TO ENSURE THAT YOU ENTER THE EXAMINATION HALL IN YEAR 11 WITH EXCELLENT MARKS UNDER YOUR BELT.

YR 10 FILM STUDIES THE NEA

NEA = 30% of whole GCSE (Production = 20%, Evaluative Analysis = 10%)

PRODUCTION:

An extract from a screenplay for a genre film (800 – 1000 words) and a shooting script of a key section from the screenplay (about 1 min of screen time about 1 page of screenplay)

PLUS...

Evaluative Analysis of between 750 – 850 words. This analyses your production in relation to other professionally produced films/screenplays.

The NEA must be individual – no group submissions are allowed. There are strict controls in place regarding supervision, support and ensuring no plagiarism/copying takes place.

We have a choice of genres to work with!

OUR QUALIFICATION IS CALLED EDUQAS GCSE FILM STUDIES <https://www.eduqas.co.uk/qualifications/film-studies-gcse/>

IMPORTANT INFORMATION ABOUT NEA

The screenshot shows a digital screenplay viewer with a scene from 'The Hobbit'. The scene is titled 'EXT. SUBURBAN HOME - NIGHT' and 'INT. SUBURBAN HOME - KITCHEN - NIGHT'. The text includes character actions, dialogue, and camera directions. Annotations with dashed lines point to various parts of the script, explaining terms like 'FADE IN', 'SCENE NUMBER', 'TRANSITION', 'EXTENSION', 'PARENTHETICAL', 'SHOT', 'SCENE HEADING', 'ACTION', 'CHARACTER', 'DIALOGUE', 'INTERCUT', and 'SUBHEADER'.

FADE IN: Marks the start of the screenplay.

SCENE NUMBER: Generally numbered only in the shooting script.

TRANSITION: Used as transitional instructions for editing.

EXTENSION: Clarifies where a character is when they can't be seen.

PARENTHETICAL: Provides info on how the actor should say the line.

SHOT: Indicates the camera angle or movement in a scene.

SCENE HEADING: One line description of the location and time of day.

ACTION: The description of the actions in a scene.

CHARACTER: Identifies the character who is speaking.

DIALOGUE: The lines of speech your character says.

INTERCUT: Instructions when cutting to multiple locations.

SUBHEADER: Used when there are minor changes in a location.

SCREENPLAY/SEQUENCE - GENRE OPENINGS

HOW ARE THINGS PACKAGED FOR THE VIEWER?

ANALYSE THE
RELATIONSHIP BETWEEN
REPRESENTATION AND
GENRE

HOW MUCH OF THE
WORLD IS REPRESENTED
THROUGH THE MEDIA?

HOW DO AUDIENCES
READ REPRESENTATIONS
DIFFERENTLY

LOOK AT HOW FILMS
COMMUNICATE
MESSAGES

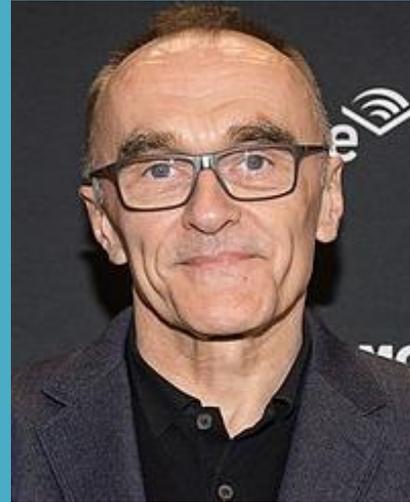
EXAMINE THE NEGATIVE
AND POSITIVE ASPECTS
OF STEREOTYPING



STUDYING
REPRESENTATION



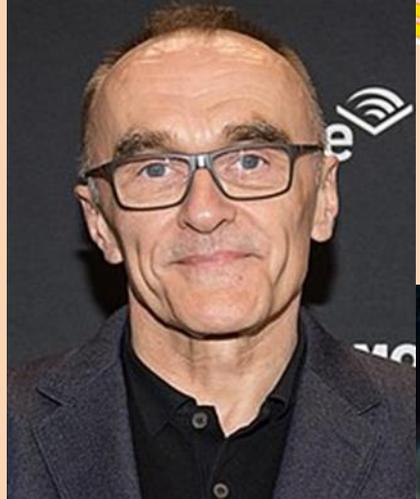
SLUMDOG MILLIONAIRE – DANNY BOYLE



In 2008, Boyle directed *Slumdog Millionaire*, the story of an impoverished child (Dev Patel) on the streets of Mumbai, India, who competes on the local version of Who Wants to Be a Millionaire?, for which Boyle won Academy and BAFTA Awards for Best Director. The most successful British film of the decade, the film won eight Academy Awards and seven BAFTA Awards.[36][37] Boyle commented, "To be a film-maker...you have to lead. You have to be psychotic in your desire to do something. People always like the easy route. You have to push very hard to get something unusual, something different." The success led a deal with Fox Searchlight.

Despite the commercial success of *Slumdog Millionaire*, Boyle also faced great criticism for his portrayal of India through a Western, idealized lens. Boyle argued he showed India's lust for life" and "resilience.

TECHNICAL CODE	TERMINOLOGY	DEFINITION
EDITING 	STRAIGHT CUT	Smooth cut between one shot and the next
	FADE	Where a shot gradually turns black or white
	DISSOLVE	A technique that creates gradual fade from one image to another. Often used to connect images in some way.
LIGHTING 	WIPE	Where one shot replaces another by travelling from one side of the frame to another
	HIGH KEY	When bright colour is created through the use of lots of filler lights – few/no shadows
	LOW KEY	When fewer filler lights are used to help create pools of shadows
SOUND 	CHIAROSCURO	An Italian term usually used in art to refer to the high contrast light and dark in paintings. Used in cinema to describe the use of high and low key lighting in film noir films (lots of dark shadows, city scapes, shadowy characters)
	DIEGETIC	Sound that is part of the film's world e.g. birds singing, traffic passing
	NON-DIEGETIC	Sound that is not part of the film's world e.g. musical score or voice over narration
	PARALLEL	Music that matches the action on screen
	CONTRAPUNTAL	Sound that does not seem to 'fit' with the image on screen. It often works to add another layer of meaning or irony to what we see.
	INCIDENTAL MUSIC	Music used as a background to create /emphasise an atmosphere.
	PLEONASTIC	Emphasized sound to appeal to emotions or draw attention to significant action or prop eg. taking safety off a gun
DIALOGUE	A conversation between two or more people	



FILM STUDIES TERMS 5 & 6
TECHNICAL CODES



TERM	DEFINITION
LINEAR NARRATIVE	Is a story that takes place in a sequential manner. Generally, starts with the beginning, moves to the middle and concludes everything at the end (with all loose ends tied up nicely).
NON-LINEAR NARRATIVE	Where events are portrayed out of chronological order or the logical order presented in a story. The pattern of events jumps around. Also known as disjointed narrative or disrupted narrative. Flashbacks a common theme.
OPEN NARRATIVE	Has no sense of ending and they can go on forever (eg a soap opera such as Eastenders or Hollyoaks. Have lots of characters)
CLOSED NARRATIVE	Where a story is when story is fully told and completed by the end of the film. Generally consists of clear beginning, middle and end.
MULTI STRAND NARRATIVE	Where a story is told from the points of view of several different characters.
DENOUEMENT	The final part of a play, film or narrative in which the strands of the plot are drawn together and everything is explained or resolved. Example would be at the end of every 'Death in Paradise' episode when all suspects are gathered together, the murderer is exposed and how they committed the crime is explained.
ENIGMA CODES	Not the WW2 film. This is simply the idea that a film text (does not have to be a film) portrays a mystery to draw the audience in and keeps them interested.
NARRATIVE FUNCTION	The importance of a particular type of character to the ways the story is told and understood (we can make predictions once we have identified their character type)

TODOROV'S NARRATIVE STAGES

- **Equilibrium:** everything in the film world is normal (not necessarily good, but it is normal).
- **Disruption:** something happens (usually caused by the film's main antagonist) to disrupt normal life.
- **Recognition of disruption:** the protagonist/s realise that something is wrong in their world or discover the disruption.
- **Attempt to solve:** the main protagonist goes on a journey to solve the disruption.
- **New equilibrium:** the disruption is solved and a new normality occurs (things can never be the same as they were before the disruption, but a new 'normal life' is created).

Propp's Character Theory

<http://foxhugh.com/literary-elements/character-theories-and-types/>

Vladimir Propp developed a character theory for studying media texts and productions, which indicates that there were 7 broad character types in the 100 tales he analysed, which could be applied to other media.

- 1) The (magical) helper (helps the hero in the quest)
- 2) The dispatcher (character who makes the lack known and sends the hero off)
- 3) The donor (prepares the hero or gives the hero some magical object)
- 4) The false hero (perceived as good character in beginning but emerges as evil)
- 5) The hero [AKA victim/seeker/paladin/winner, reacts to the donor, weds the princess]
- 6) The princess (person the hero marries, often sought for during the narrative)
- 7) The villain (struggles against the hero)



- Devices**
- Repetition** – exact repeat of a musical idea
 - Contrast** – a change in the music
 - Anacrusis** – A note before the first beat
 - Imitation** – when another part copies a musical idea
 - Sequence** – A repeated idea but at a different pitch
 - Ostinato** – a repeated pattern or phrase
 - Syncopation** – off-beat
 - Dotted rhythms** – lengthening a note by half of its value by placing a dot after it
 - Drone** – a long held note
 - Pedal** – a held or repeating note against which harmonies change
 - Canon** – melody is repeated in another part whilst the original melody continues to play
 - Conjunct movement** – (mainly) stepwise melody
 - Disjunct movement** – leaping melody
 - Broken Chord/Arpeggio** – notes of a chord are played separately one after the other
 - Alberti bass** – broken-chord accompaniment (I, V, III, V)
 - Regular phrasing** – balanced melody
 - Motifs** – short melodic or rhythmic ideas
 - Chord progressions** – a series of related chords
 - Modulation** – changing key

Musical Forms and Devices

Musical Forms	
Binary (A, B)	Rondo (A, B, A, C, A)
Ternary (A, B, A)	Variation (T, V1, V2, V3)
Minuet and Trio (M, T, M)	Strophic (A, A, A)

- Key words**
- Accidental** – changes the pitch of the note
 - Cadence** – two chords played one after the other to produce the end of a phrase
 - Interval** – the distance between two notes
 - Unison** – all parts singing the same notes
 - Accented** – when emphasis is placed on a note
 - Chromatic** – music goes up or down in semitones
 - Sotto voce** – hushed voice/soft voice/under the voice
 - Suite** – a collection of short musical movements
 - Diminution** – making the note values shorter
 - Subdominant** – the 4th note of a scale and its chord



Treble Clef (used by the violin)



Bass Clef (used by the cello)



Alto Clef (used by the viola)

- The Baroque Era (1600-1750)**
Bach, Handel, Vivaldi, Corelli, Lully, Purcell
- The Classical Era (1750-1810)**
Haydn, Mozart, Beethoven
- The Romantic Era (1810-1910)**
Schubert, Mendelssohn, Chopin, Schumann, Liszt, Wagner, Verdi, Brahms, Tchaikovsky, Dvorak

GCSE MUSIC SUMMARY OF ASSESSMENT

Component 1: Performing
Total duration of performances: 4-6 minutes
Non-exam assessment: internally assessed, externally moderated
30% of qualification

A minimum of two pieces, one of which must be an ensemble performance of at least one minute duration. The other piece(s) may be either solo and/or ensemble. One of the pieces performed must link to an area of study of the learner's choice.

Component 2: Composing
Total duration of compositions: 3-6 minutes
Non-exam assessment: internally assessed, externally moderated
30% of qualification

Two compositions, one of which must be in response to a brief set by WJEC. Learners will choose one brief from a choice of four, each one linked to a different area of study. The briefs will be released during the first week of September in the academic year in which the assessment is to be taken. The second composition is a free composition for which learners set their own brief.

Component 3: Appraising
Written examination: 1 hour 15 minutes (approximately)
40% of qualification

This component is assessed via a listening examination.

Eight questions in total, two on each of the four areas of study.

Area of study 1: Musical Forms and Devices
Area of study 2: Music for Ensemble
Area of study 3: Film Music
Area of study 4: Popular Music



Area of Study 2

REEEWIND!!!



Music for Ensemble

Texture

Monophonic – single melodic line for an instrument or voice or when instruments/voices are unison

Homophonic – One main melody plus harmonic accompaniment of chords (inc. broken chords)

Polyphonic Texture – Number of melodic lines heard independently of each other.

Textural Devices

Unison (2 or more musical parts sound at the same pitches at the same time - can be in octaves) (monophonic)

Chordal - parts move together producing a series or progression of chords (homophonic)

Melody and accompaniment – the tune is the main focus of interest and importance, and it is ‘accompanied’ by another part/parts which support the tune (homophonic)

Canon or imitation - the melody is repeated exactly in another part while the initial melody is still being played (polyphonic)

Counter melody – a new melody played at the same time as a previous melody

Layered – when more parts are added on top of each other

Musical Theatre

Instrumentation (timbre)

Texture

Sforzando (sfz) – a sudden, forced accent on a note or chord

Colla voce – When the accompaniment has to follow the vocal part, without strictly sticking to the tempo

Recitative – a vocal style that imitates the rhythms and accents of the spoken language

Declamatory writing – a type of vocal writing, similar to recitative in that it has speech-like quality

Sforzando (sfz) – a sudden forces accent on a note or chord

Basso Continuo – continuous bass line

Rhythm Section – underlying rhythm, harmony and pulse of the accompaniment

Pentatonic – a 5 note scale

Improvisation – music is made up on the spot

Stanza – another word for a verse

Swing style – dotted rhythm feel to the beat

Call and Response – Music sung or played by the leader and responded to by the rest of the group

Blues scale – minor pentatonic scale + flattened 5th

Blues notes – flattened 3rds, 5th, 7th notes

Riffs – short repeated musical pattern

Duet – 2 performers

Trio – 3 performers

Quartet – 4 performers

Quintet – 5 performers

Sextet – 6 performers

Septet – 7 performers

Octet – 8 performers

Jazz and Blues Trios

Vocal Ensembles: duets, trios, backing vocals

Trio Sonata

A work in several movements for 1 or 2 soloists + basso continuo

String Quartet

Mvt 1 (sonata form)

Mvt 2 – slow (ABA or T&V)

Mvt 3 – moderate dance (minuet and trio)

Mvt 4 – fast sonata or rondo form

12-bar structure

I, I, I, I,

IV, IV, I, I,

V, IV, I, I/V

A Short History

Early films had no soundtrack (“**SILENT CINEMA**”) and music was provided live, usually **IMPROVISED** by a pianist or organist. The first **SOUNDTRACKS** appeared in the 1920’s and used existing music (**BORROWED MUSIC** – music composed for other (non-film) purposes) from composers such as Wagner and Verdi’s operas and ballets. In the 1930’s and 1940’s Hollywood hired composers to write huge Romantic-style soundtracks. **JAZZ** and **EXPERIMENTAL MUSIC** was sometimes used in the 1960’s and 1970’s. Today, film music often blends **POPULAR, ELECTRONIC** and **CLASSICAL** music together in a flexible way that suits the needs of a particular film.



Area of Study 3

REEEWIND!!!



How music is used in film

- To create an atmosphere.
- To create a specific or geographic setting.
- To set the era, time or period, e.g. the use of classical music for a film set in the 18th century
- To support the physical action and control the pace.
- To support the emotions of the characters and evoke certain emotions in the audience.
- To generate tension and build suspense.
- To support characters, situations and places through the use of a **leitmotif**.
- To predict events or inform the audience of impending events, e.g. when the *Jaws* theme is heard, but the shark has not yet been seen in the film. The audience are aware of the forthcoming danger, but the on-screen characters are not.
- To create a sense of space, breadth, depth i.e. the 'size' of something.

Musical Devices and Techniques

Leitmotif – A short musical theme or idea that is associated with a character, place, object or situation – often abbreviated to 'motif'.

Ostinato – A short repeating musical idea. In film music this could be a melody, rhythm or chord sequence. Often, other parts will be layered over the ostinato to emphasise a build up of the action or tension in the film

Riff – Similar to the ostinato. The word riff indicates music from a popular or modern genre.

Layering - Building up the musical ideas to fill out the texture, to achieve a more powerful or interesting outcome.

Minimalism - A style of music characterised by the repetition of small cells of music, which evolve very gradually to create a hypnotic effect. Often used by film composers to establish the mood of a scene.

Topic 2 – Use of Musical Elements

Melody – This adds character and shape to musical ideas. It is common in film music to have a variety of different themes of equal importance. An important melodic theme will often be referred to as a **Leitmotif**.

Tempo – This will often reflect the action on the screen.

Metre - The time signature used – how many beats in each bar and what type of beats they are.

Rhythm – Different length durations of notes and rests to create a pattern. There many rhythmic devices used in film music – please refer to your film music PowerPoint resource.

Harmony – The way in which chords are used to create interest and complexity to the music.

- **Diatonic** – Chords that use notes from a specific key.
- **Chromatic** – Use of notes that are not in the key.
- **Dissonant** – Chords that use notes that do not 'fit' together well.

Intervals – The gaps between notes. Some intervals are very effective in film music in creating a certain mood, atmosphere and tension.

Fanfare – A short musical flourish or call to attention based on chords. It is often associated with an announcement or significant event.

Tonality – This refers to whether the music is Major, Minor or Atonal (no key/tone).

- **Atonal** – No sense of a tonic or 'home' key. Often use by composers to create an unsettling feeling.

Topic 1 – The Film Industry

Main categories of films:

- Action
- Adventure
- Animation
- Biography
- Documentary
- Children's film
- Comedy
- Crime
- Disaster
- Fantasy
- Horror
- Musical
- Mystery
- Romance
- Sci-fi
- Spy
- Thriller
- War
- Western

There are 2 main categories of film music:

- **Diegetic** – The music is heard as part of the storyline, e.g. music heard on a speaker during the scene.
- **Non-Diegetic** – Back ground music that supports the on-screen action. It is only heard by the audience.



Area of Study 4

REEEWIND!!!



Toto's Africa Knowledge Organiser

Background

Africa is a song recorded by the American rock band **Toto** in 1981 for their fourth studio album entitled **Toto IV**. It is a soft-rock love song with features of African music. The song was written by band members **David Paich** (born June 25th 1954) and **Jeff Porcaro** (born April 1st 1954 and died August 5th 1992). Africa was released as the third single from the album on September 30th 1982 through Columbia Records. In 2012, Africa was listed by music magazine **NME** in 32nd place on its list of '50 Most Explosive Choruses'.

The Structure

Verse / Chorus Form:

- Intro** 4 bars
- Verse 1** Bars 5 - 39
- Chorus 1** Bars 40 - 57
- Link 1** Bars 58 - 65
- Verse 2** Bars 14 - 39
- Chorus 2** Bars 40 - 57
- Link 2** Bars 58 - 65
- Instrumental** Bars 66 - 82
- Chorus 3** Bars 40 - 92
- Outro** Bars 93 - 96

Keyword	Definition
Grace notes	Ornamental notes not essential to harmony or melody
Harmonic rhythm	The rate at which the chords change
NME	'New Musical Express' a British music journalism website and former magazine that has been published since 1952.
A pentatonic scale	A scale consisting of 5 notes
A riff	Short repeated phrase typical in rock music (ostinato)
Syncopation	Playing off the beat, stressing unaccented usually beats
Triplets	Playing 3 notes in the space of 2
Split Common Time	4/4 time that has been cut rhythmically. Written 2/2 or known as pick up
Anacrusis	Notes of a phrase which begin before the main beat. Also Melody moving by step
Conjunct	Singing many notes to one syllable
Syllabic	A chord held on, harmony may change over the same chord
Sustained chord	A melody moving in an upwards direction
Ascending melody	A melody moving in an downwards direction
Descending melody	A second melody playing over existing melody as decoration
Counter melody	Parallel movement of 2 lines in harmony, homophonic.
Parallel harmony	

A The **Introduction** is in **B major** and uses **3 chords**: C# minor C# minor C# minor

B major D#m G#m A/E C#m
The **Intro** reappears at the end of each line making each line an unusual 9 bar phrase

F# minor D A E
And then a slightly tricky ending before heading straight back into the introduction
C# minor E A

Instrumental
Performed on the synthesizer.
Completely homophonic in parallel harmony.
First: A descending melody using a B major pentatonic scale with the notes falling into groups of three and ending with a triplet.
Then: An ascending and descending melody using the E major scale which contains more rhythmic variety than the first. Then returns to B major.

The **Outro** is a repeat of the introduction.
On the recording the music repeats continually and the texture is gradually reduced each line so that by the end the music is reduced to only the rhythm track heard at the beginning of the song accompanied by the bass line of Riff a.

Toto's Africa Musical Elements Overview

Dynamics
Most of the song is **mezzo-forte** whilst the choruses are **forte**.

Rhythm and Metre
Ostinato rhythms, consisting almost totally of quavers
Constant use of syncopation.
The time signature is 2/2 (split common time) throughout
Moderately fast.

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

Timbre
Rock Band Line up:
Drum kit with additional percussion
Lead and bass guitars
Synthesizers
Male lead vocals and male backing vocals.
African percussion used such as congas, marimbas, xylophones and cowbells.

Melody
The melody is mostly conjunct (moving in step)
Includes occasional use of the pentatonic scale.
The pitch range of the vocal line is just less than two octaves on the printed score, but it is wider on the recording with the vocal improvisations towards the end of the song.
Verse 2 is accompanied by a **countermelody** or **descant**, played on a flute-like instrument, which can be heard across the top of the texture. It changes pitch conjunctly, moving at the same speed as the harmonic rhythm.

Texture
Homophonic chords
Melody and Accompaniment
Parallel harmonies in the vocal part during the chorus

Melodic Analysis

Riff A – bars 1 & 2: A distinctive syncopated rhythm pattern mostly repeating chord IV and concluding with chords vi and ii:

Riff A

With the exception of the Chorus, Riff A makes an appearance in every other section of the song.

Riff B – bars 3 & 4: starts with an anacrusis and is an ostinato pattern of five notes – based on the E major pentatonic scale – over a sustained chord ii:

Riff B

Use of African Instruments



Chorus 3

A new electric guitar riff is heard on the recording in the last bar of each phrase:



Phrase 3 - I bless the rains down in Africa - is heard five times, making this section significantly longer than before.

A solo vocal improvisation is heard at the end of the second, third and fifth repeats. Each one is different, the first two using the lyrics *I bless the rain*, whilst the final one uses, *I'm gonna take the time*.

African Influences

Riff A and B:

- Use of syncopation
- pentatonic scale
- Irregular ostinato groupings that cut across the 2/2 time signature.

The instrumental sonorities:

- Xylophones and marimbas – suggest the sounds of pitched percussion instruments which originate from the various countries of the African continent.
- Polyrythms created

Start of the song:

- An additional eight bar introduction, performed only by unpitched percussion instruments. This is heard before the vocal score begins and contains African influence in its use of layered rhythm parts and ostinatos.

Vocals

- Homophonic texture in the vocal parts – movement in parallel harmony

Introduction (instrumental) X4

Verse 1:

B D#m G#m

I hear the drums echoing tonight

B/F# A/E C#m G#m (INTRO)

But she hears only whispers of some quiet conversation

B D#m G#m

She's coming in, 12:30 flight

B/F# A/E C#m G#m (INTRO)

The moonlit wings reflect the stars that guide me towards salvation

B D#m G#m

I stopped an old man along the way

B/F# A/E C#m G#m (INTRO)

Hoping to find some old forgotten words or ancient melodies

B D#m G#m (INTRO)

He turned to me as if to say, "Hurry boy, it's waiting there for you"

Chorus:

F#m D A E

It's gonna take a lot to drag me away from you

F#m D A E

There's nothing that a hundred men or more could ever do

F#m D A E

I bless the rains down in Africa

F#m D A (C#m E F#m E)

Gonna take some time to do the things we never had (ooh, ooh)

Introduction (instrumental) X2

Verse 2:

The wild dogs cry out in the night

As they grow restless, longing for some solitary company

I know that I must do what's right

As sure as Kilimanjaro rises like Olympus above the

Serengeti

I seek to cure what's deep inside, frightened of this thing

that I've become

Chorus 2 (same as chorus 1)

Introduction (instrumental) X2

Synthesizer solo

B / D#m / G#m / B / A / C#m / G#m /

B / D#m / G#m / / / (INTRO)

Hurry boy, she's waiting there for you

Chorus 3

It's gonna take a lot to drag me away from you

There's nothing that a hundred men or more could ever do

I bless the rains down in Africa X 5

Gonna take some time to do the things we never had (ooh)

Outro (same as introduction) x 8

Keywords

Lever: Is a bone and shown as a straight line



Fulcrum: Is a pivot or joint and shown as a triangle



Effort: Is a force provided by muscles and is shown by an arrow



Load: Is the weight of the body/ object being moved, it is shown as a square



AQA GCSE PE

Paper 1

Chapter 2:

Movement Analysis

2.1 Types of Levers

Mechanical Advantage

1 st Class Lever		Advantage – High or Low
		Will vary depending on the distance of the load and the effort from the fulcrum
2 nd Class Lever		Advantage - High
		Able to lift heavier loads owing to its large effort arm
3 rd Class Lever		Advantage - Low
		Provides speed and wide range of movement owing to a long resistance arm

Lever systems

1 st Class Lever		The fulcrum is surrounded by the effort and the load	 Heading a ball
2 nd Class Lever		The load is surrounded by the fulcrum and the effort	 Calf raises
3 rd Class Lever		The load is surrounded by the fulcrum and the effort	 Bicep curl

Each lever system can be identified by the component in the middle:

One F (fulcrum)

Two L (load)

Three E (effort)



Effort = Biceps
Load = water
Fulcrum = hand/oars
1st class lever
(fulcrum in the middle)



Effort = Triceps
Load = Body weight
Fulcrum = Feet
2nd class lever
(load in the middle)



Effort = muscles
Load = bat/ball
Fulcrum = shoulders
3rd class lever
(effort in the middle)

2.3 Planes of movement and Axes of rotation

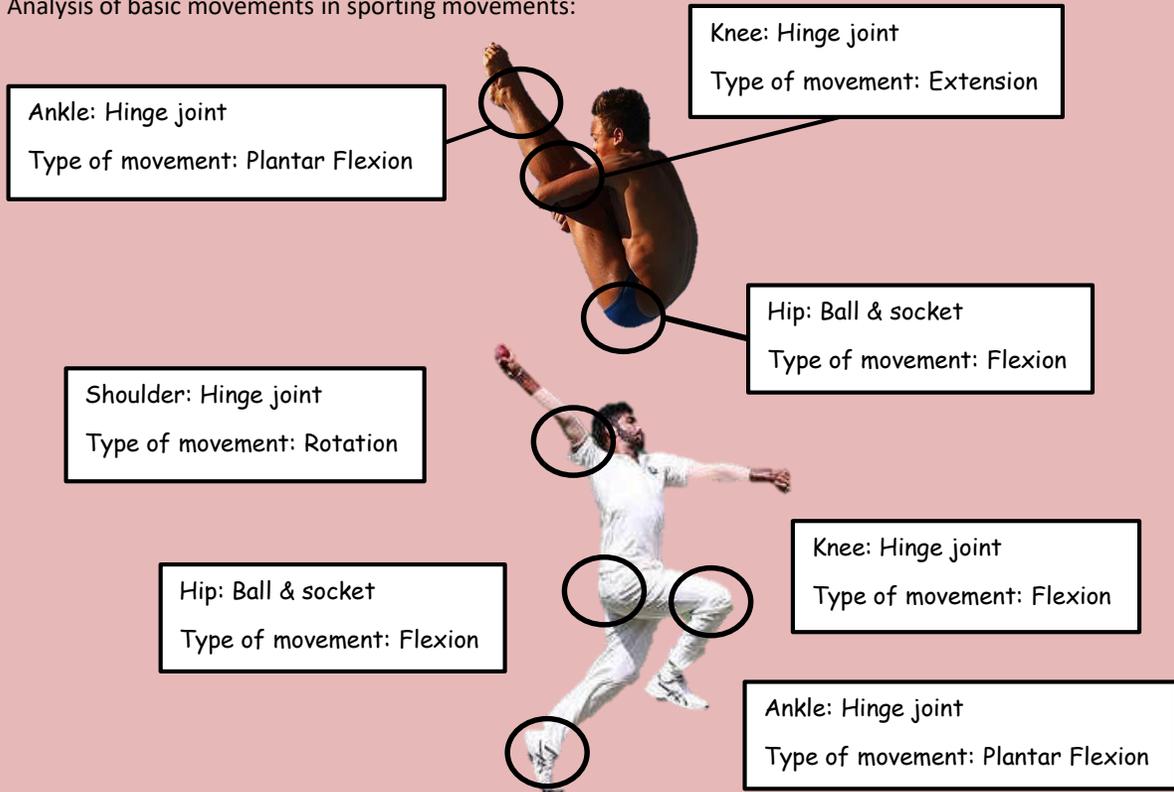
We move in planes around axes.

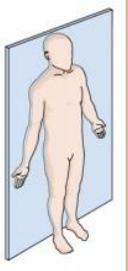
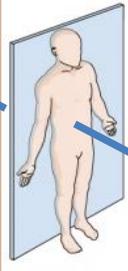
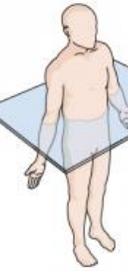
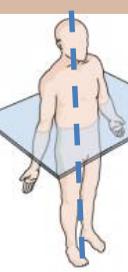
Plane: Is an imaginary line that movement direction occurs in

Axis: IS a line about which the body or boy part can turn.

2.2 Basic Movements

Analysis of basic movements in sporting movements:



Plane of movement	Axes of Rotation	Sporting example
 <p>Frontal Plane Separates the front and the back of the body</p>	 <p>Sagittal Axis Goes from the front to the back of the body</p>	 <p>Cartwheel The only movements are abduction and adduction</p>
 <p>Sagittal Plane Separates the left and the right side of the body</p>	 <p>Frontal Axis Goes from one side to the other side of the body</p>	 <p>Somersault The only movements are flexion and extension</p>
 <p>Transverse Plane Separates the top and the bottom of the body</p>	 <p>Longitudinal Axis Goes from the top of the body to the bottom of the body</p>	 <p>Full Twist The only movements are rotating and twisting</p>

Fitness Component Strength:

1. Pick one of the components of fitness that you feel is a strength.
2. Give a definition of this component.
3. Explain why it is important for **your** sport – when/why/how you use the fitness component when playing – specific skills or techniques it is important to – how it links to the success of your performance and the consequences if it is not successful
4. Give examples from at least 2 different recent matches/performances where this fitness component was important to your performance and the outcome/impact it had as a result of being a strength of yours.

“in a recent game against I was able to demonstrate as in the match I was able to This had an impact on myself and the team because.....”

5. You must use specific terminology from your sport and link to your position.

Fitness Component Weakness:

1. Pick one of the components of fitness that you feel is a strength.
2. Give a definition of this component.
3. Explain why it is important for **your** sport – when/why/how you use the fitness component when playing – specific skills or techniques it is important to – how it links to the success of your performance and the consequences if it is not successful
4. Give examples from at least 2 different recent matches/performances where this fitness component was important to your performance and the outcome/impact it had as a result of being a strength of yours.

“in a recent game against I was able to demonstrate as in the match I was able to This had an impact on myself and the team because.....”

5. You must use specific terminology from your sport and link to your position.

AQA GCSE PE Non-exam Assessment Analysis and Evaluation of Performance 25 marks

Part 1 Analysis (15 marks)

Skills/ Techniques:

Attacking skills:

- Passing
- Dribbling

Defending skills

- Marking a player, the ball, space

Tactics:

- Set plays
- Awareness of opposition

Fitness components:

- Agility
- Balance
- Cardiovascular endurance
- Coordination
- Flexibility
- Muscular Endurance
- Power
- Reaction time
- Speed
- Strength

Skill/ Tactic Strength:

1. Pick one skill from your sport that is a strength *e.g. dribbling*
2. Explain what the skill is (describe the perfect model) and say why it is important for **your** sport.
3. Say why you think it is a strength – what is the outcome when performing the skill, for you and for your team mates and the impact on the game as a whole.
4. Give examples from at least 2 different recent matches/performances and explain these. This about what happened, how do you know it was good and what was the impact for you and your team.

“in a recent game against I was able to demonstrate as in the match I was able to This had an impact on myself and the team because.....”

5. You must use specific terminology from your sport and link to your position.

Skill/ Tactic Weakness:

1. Pick one skill from your sport that is a weakness *e.g. shooting*
2. Explain what the skill is (describe the perfect model) and say why it is important for **your** sport.
3. Say why you think it is a weakness – what is the outcome when performing this skill for you and for you team mates and the impact on the game as a whole.
4. Give examples from at least 2 different recent matches/performances and explain these. This about what happened, how do you know it was a weakness and what was the impact for you and your team.

“in a recent game against I was struggled with as in the match I wasn't able to This had an impact on myself and the team because.....”

5. Explain the technique that you use. Say why it is wrong/why it doesn't work for you and say what the correct technique should be.
6. Say why improving this would help **you** in your sport.
7. You must use specific terminology from your sport and link to your position.

Evaluation (10 marks)

Using appropriate theoretical content included in the specification, you should produce an action plan that suggests ways to improve upon the weaknesses identified in section A.

This plan of action must include:

Part 2 Evaluation

1. An appropriate training method to improve the fitness weakness
2. A full description of one training session that provides an example of what could be used
3. An explanation of how prolonged use of the training method could improve the fitness weakness
4. Another strategy other than a training method that could improve the skill weakness

Part 3 Evaluation

1. An explanation of how the additional specification content selected could lead to improvement of the skill weakness

Plan of action:

Suggests ways to improve upon the weaknesses they have identified.

Part 2: Fitness Weakness

Part 3: Skill Weakness

Part 2: Fitness component Weakness

Appropriate Training Type:

1. Select a type of training that trains the fitness component weakness – advantages and disadvantages of this type of training
2. Explanation of the type of training – how it is carried out
3. Explanation and justification linked to you and your personal needs
4. Detailed and relevant safety considerations

Training Session:

1. Description of one session
 - Thorough explanation of what will happen in the session
 - Training intensities (Aerobic / Anaerobic Training zones or One Rep Max) – linked to performance and improving the fitness component
2. Principles of training (SPORT/ FITT)
3. Injury prevention:
 - warm-up and cool down
 - match the type of training and the intensity to the performers individual needs
 - Wear appropriate clothing and footwear
 - Keep hydrated
 - Do not over train
 - Stretch
 - Always use the correct technique

Long term benefits of this type of training:

If you complete the training for a prolonged period of time what will the improvement look like and how will you ensure you continue to improve as time progresses.

Progressive Overload – FITT Principle

Types of Training:

1. Circuit training (All Fitness Components)
2. Continuous training (CV Endurance)
3. Fartlek Training (CV Endurance)
4. Interval/ HIIT Training (CV Endurance)
5. Plyometric Training (Power)
6. Static Stretching (Flexibility)
7. Weight Training (Muscular strength, power, muscular endurance – Sets/ Reps)

Principles of Training:

1. Specificity – specific to the sport
 2. Progressive - gradual
 3. Overload – increasing the stress
 4. Reversibility – loss of gains
 5. Tedium – boredom
- FITT: increasing workload to achieve overload
1. Frequency – how often
 2. Intensity – how hard
 3. Time – how long
 4. Type - type of training

Part 2: Skill/ Tactic Weakness

Appropriate additional content from Specification:

1. Select the right theoretical content that will bring about improvement to the skill or tactic, explaining how this will happen:
 - Goal Setting
 - Information processing
 - Guidance and feedback on performance
 - Arousal
 - Aggression
 - Motivation

Explanation of how this could lead to improvement:

How will your chosen area of theory content bring about the desired improvement – how will you use it to ensure your skill weakness improves?

NCFE Technical Award in Health and Fitness

Unit 2: Preparing and planning for health and fitness

LO1: Understand the impact of lifestyle on health and fitness

1.1 Lifestyle factors

1.1.1 Activity levels

A person's lifestyle involves a series of choices

Many Factors can affects a person's lifestyle choices:

- Disposable income
- Where you live
- Family, friends and their lifestyles
- Opportunities and facilities
- Education levels

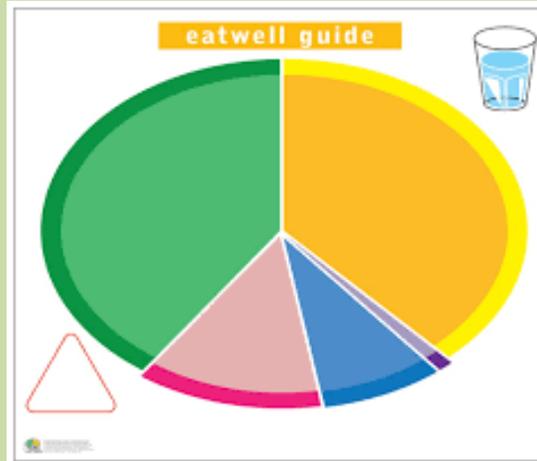
Active lifestyle	A lifestyle in which a person chooses to include suitable levels of exercise.
Sedentary Lifestyle	A person's choice to have little or no exercise.

Aerobic Exercise	Strength Exercise
Brisk walking	Lifting weights
Hiking	Use of resistance bands
Pushing a lawn mower	Heavy gardening
Recreational sport	Own weight exercises – press ups, sit-ups
Skateboarding	

1.1.2 Diet

Nutrient:

A nutrient is a substance that is essential for our bodies to grow, repair and work properly.



Nutrient	Specific need	Sources
Carbohydrates	<ul style="list-style-type: none"> • Main and preferred energy source for all types for activity • Required for low and high intensity exercise 	
Fats	<ul style="list-style-type: none"> • Also an energy source • Required for low intensity energy and insulation • Two forms: <ul style="list-style-type: none"> • Saturated fat (usually animal fat) • Unsaturated fat (vegetable fat/oils) 	
Protein	<ul style="list-style-type: none"> • Required for growth and repair • Small part of play in energy 	
Minerals	<ul style="list-style-type: none"> • Required for bone growth • Required for the maintenance of regular body functions 	
Fibre	<ul style="list-style-type: none"> • Required to reduce cholesterol • Helps soften stool to prevent constipation 	
Water	<ul style="list-style-type: none"> • Required to prevent dehydration 	

Guideline for for suggested exercise and activity can be found at:

<https://www.nhs.uk/live-well/exercise/>

NCFE Technical Award in Health and Fitness

Unit 2: Preparing and planning for health and fitness

LO1: Understand the impact of lifestyle on health and fitness



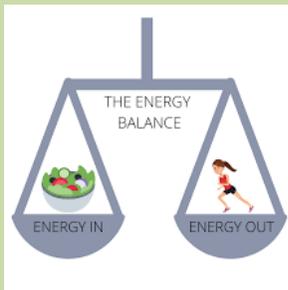
1.1.2 Diet

Balanced diet – one where all the nutrients are obtained in the correct quantities from a range of different food stuff

- 55-60% - Carbohydrates
- 25-30% - Fat
- 15-20% - Protein

Energy Balance – Consuming a suitable number to calories to satisfy the energy demands. (amount consumed and the amount required)

Energy is balanced	Amount consumed equals the amount needed and no weight is put on or lost
Positive energy balance	Amount consumed is greater than what is needed, resulting in weight gain
Negative energy balance	Amount consumed is less than what is needed, resulting in weight loss



Recommended Daily Allowance (RDA)

The number of calories, amount of nutrients, that is recommended you consume on an average day.

- Men: 2500 kcal per day
- Women: 2000 kcal per day

Recommended Allowance for a 19-64 yr old:

- Eat less than 70g of fat per day
- Eat less than 20g of saturated fat per day
- Eat at least 260g of carbohydrate
- Eat no more than 90g of sugars
- Eat approximately 50g of protein
- Eat less than 6g of salt

Eating habits:

- Eat a healthy, but substantial breakfast to give your body the energy-boost it requires for the day ahead.
- Avoid late night snacks, as potential energy consumed will not be wholly used during sleeping hours, so will be converted to fat.
- Aim to eat mini-meals regularly rather than huge portion in one go. This allows the body to sensibly 'top-up' regularly during the day without feeling bloated or having psychological worry about over-indulging.
- Aim to balance your nutrient intake during the day, with all main meals featuring carbohydrates, protein fat, fibre, vitamins and minerals and water.
- Snacking is fine as long as it is healthy – nuts are a good examples of a high source of protein deemed healthy to snack on.

1.1.3 Rest and recovery

Sleep – is a component of a person's rest

Health	Mental health is affected by sleep. People who worry a lot tend not to sleep. Physical health is good as sleep helps the body recover and repair.
Attitude	People with a positive attitude towards sleep tend to sleep better. Aim for 7-9 hours of sleep per night, with time to relax before going to bed.
Environment	Temperature, noise levels and light all play a part in a person's ability to sleep.
Lifestyle	What you eat and drink can affect your sleep.



NCFE Technical Award in Health and Fitness

Unit 2: Preparing and planning for health and fitness

LO1: Understand the impact of lifestyle on health and fitness



1.1.3 Rest and recovery

Recovery between physical activity sessions: further steps that can be taken to recover from physical exertion.

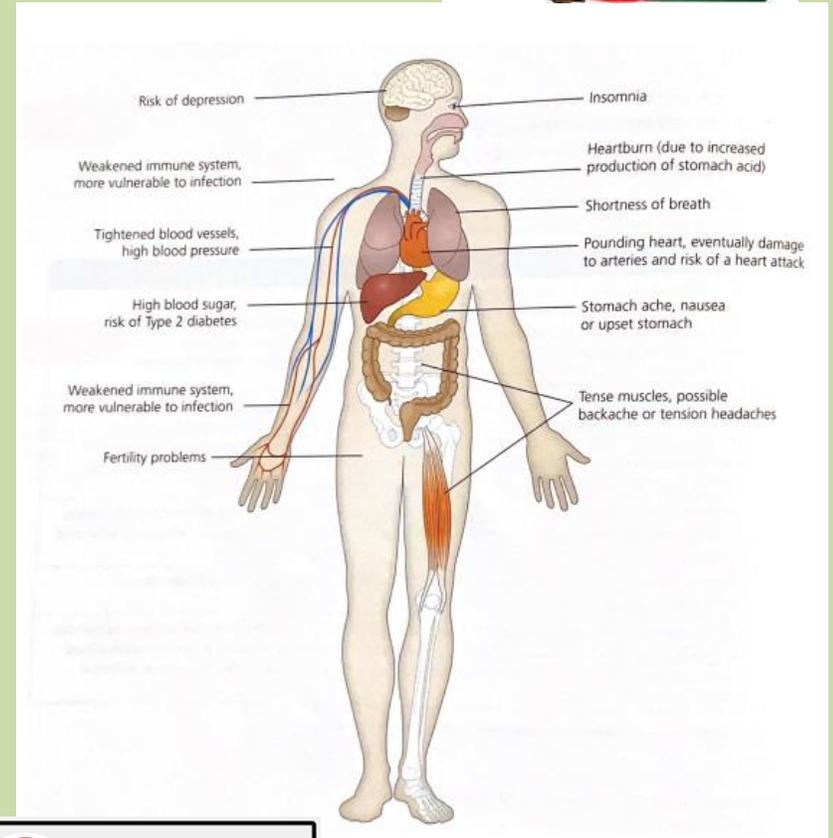
Diet can be manipulated	To improve performance or assist recovery – intake of fluid to rehydrate, carbohydrates to replenish energy stores and protein for muscle growth and repair.
Massage	Involves rubbing and ‘kneading’ of the muscles as it reduces pain and encourages blood flow through the muscles.
Ice baths	Performer stays in the ice bath for a few minutes – helps to remove waste products and prevent DOMS (delayed onset of muscle soreness).

Rest between physical activity repetitions – dependent on the type and intensity of the activity

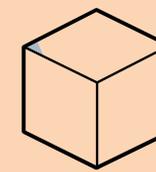
1.1.4 Other factors

Many factors affect the health and fitness of a person – some factors can result in negative effects

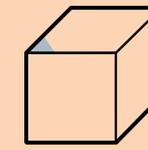
Recreational Drugs	These include cannabis, cocaine and ecstasy. Each can be linked to health problems – asthma, increased blood pressure.
Performance enhancing drugs	Illegally taken by some athletes to enhance their performance but all have a variety of serious side effects.
Smoking	Irritates the respiratory system and reduces the lungs’ ability to function efficiently.
Alcohol	In large quantities, alcohol can cause behavioural changes as well as addiction and liver damage.
Stress	Stress can cause an increase in blood pressure, put stress on the heart and weaken the immune system.



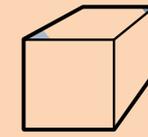
How to creatively and effectively communicate your design ideas.



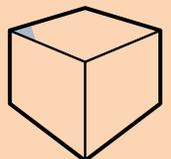
Isometric



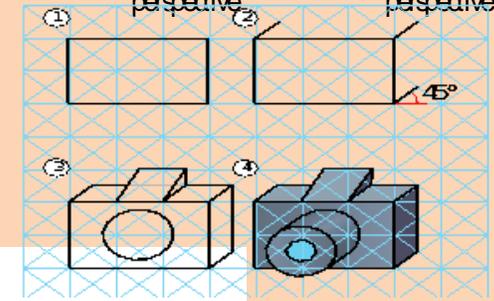
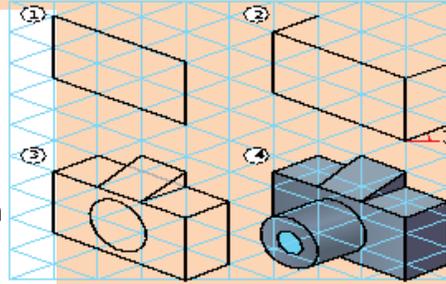
Oblique



One-point perspective



Two-point perspective



Isometric

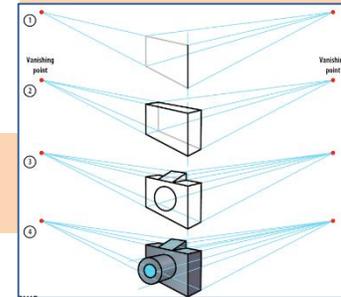
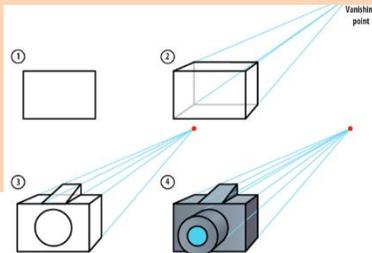
Isometric drawings look more realistic than oblique ones and are based on 30-degree lines. For support, use isometric grid paper to guide your angles:

- 1 Instead of drawing the 2D front view in oblique, you begin with an edge of the product – draw this as a vertical straight line.
- 2 From this line, create **construction lines** going off at 30 degrees.
- 3 Fill in the next vertical lines.
- 4 From these vertical lines, draw your next construction lines going off at 30 degrees (repeat steps 3 and 4 depending on the complexity of your drawing).
- 5 Within these construction lines, draw your product.

Oblique

Oblique projection is the simplest method of creating 3D designs based on 45-degree lines. For support, use oblique grid paper to guide your angles:

- 1 Draw the front view in 2D.
- 2 From each corner, draw construction lines projecting out at 45 degrees.
- 3 On the construction lines, measure half the true length.
- 4 Draw the back of the product to complete the product.



One-point perspective

One-point perspective is often used in interior design, as it quickly creates an image with a good sense of depth that enables the customer to rapidly visualise the designer's idea. This then allows the designer and customer to work together to develop and adjust the idea to suit the customer's requirements.

One-point perspective is the easier type of perspective drawing.

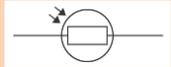
- 1 Just like oblique drawing, start by drawing the front view in 2D.
- 2 From each corner, create construction lines to a point in the distance called a single **vanishing point**.
- 3 Draw your next vertical lines between your construction lines.
- 4 Join up your vertical lines with horizontal lines (keep these faint).
- 5 Draw your product within these lines

Two-point perspective

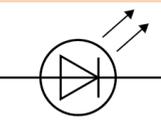
Two-point perspective is often used by architects when developing their ideas in 3D, as it gives a speedy realistic interpretation. Like interior designers, the architects can work alongside their customer to develop their ideas to the customer's requirements. Two-point perspective uses two vanishing points either side of the object to produce a more realistic representation of the product.

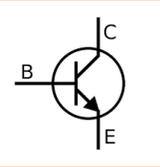
- 1 Just like isometric drawing, you begin with an edge of the product – draw this as a vertical straight line.
- 2 From each corner, create construction lines to two vanishing points.
- 3 Draw in your next vertical lines between the construction lines.
- 4 From these vertical lines, draw construction lines going off to the vanishing points.
- 5 Draw in your product between your construction lines.

Electronic systems can have singular or multiple input and output devices, and sometimes they have a controller between them. The system reads the input signals and controls the output signals according to the instructions in the program it has been given: INPUT DEVICE - CONTROL - OUTPUT DEVICE For example, when you use a computer you move a mouse or press buttons on a keyboard. These are input devices that give information to the computer. The computer controller reads the inputs, and its program tells it what to do. The output devices could be the screen, a printer, a laser cutter, or a very complicated robot in a huge factory. To design an electronic system, you need to know about the input devices and output devices you could use.

Sensors A sensor is affected by the conditions around it. Sensors are good input devices because they can give an input signal to an electronic system.	
A thermistor is a temperature-dependent resistor. Its resistance changes with temperature. <ul style="list-style-type: none"> • When it is hot, the resistance is low. • When it is cold, the resistance is higher. Some electronic thermometers use a thermistor. As the temperature changes, the system measures the resistance of the thermistor and turns it into a number to display on a screen. 	
Light-dependent resistor When light falls on the sensing area of a light-dependent resistor (LDR) its resistance changes: <ul style="list-style-type: none"> • In the light resistance is low, so electricity flows. • In the dark resistance is high, so not much electricity flows. 	

Key terms
Input device: something that can give an input signal to the system.
Output device: something that responds to an instruction of change in control elements.
Input signal: information given to the system by an input device.
Output signal: an instruction the system gives to an output device.
Program: a set of instructions the system controller has been given to make the electronic system do what it is supposed to do. If a transistor is used, there is no program, just a simple switching action due to the rise in voltage on the base of the transistor above 0.6 volts.
Resistance: an electrical quantity that is a measure of how the device or wire reduces the electric current flow through it.

Outputs In an electronic system, output devices are controlled by the system. They can be simple things like lights that are turned on and off or complex things like computer screens that output a lot of information.	
Buzzer A buzzer makes a sound. Buzzers can be useful in a sensing device to give people a warning that something needs their attention.	
Light-emitting diodes A light-emitting diode (LED) gives out light when electricity is passed through it. LEDs can be small coloured indicator lights or bright enough to light up a room in a house.	

Control devices and components. As well as sensors, there are some other components that can be used to give an input signal to an electronic circuit.	
A single-throw switch has a button that switches between on and off. It is a simple control device that the user can operate to turn a circuit on or off.	
A resistor is a component that can be added to a circuit to change its resistance. This means it can Limit the flow of electricity through part of the circuit. Resistors can be used to: <ul style="list-style-type: none"> • protect delicate components by stopping too much electricity flowing through them • help control the flow of electricity around a circuit. 	
A transistor acts like a tiny electronic switch. It has three connections. A small voltage at the base connection turns it on and lets a larger current flow into the collector and out of the emitter. Transistors are useful in sensing circuits to amplify (make bigger) the small current you get from some sensors. A transistor is a semi-conductor that acts Like an electronic switch depending upon the voltage across the base and emitter. You can get a single transistor to build into your own circuits. Transistors can be made extremely small by etching them onto silicon wafers known as silicon chips.	

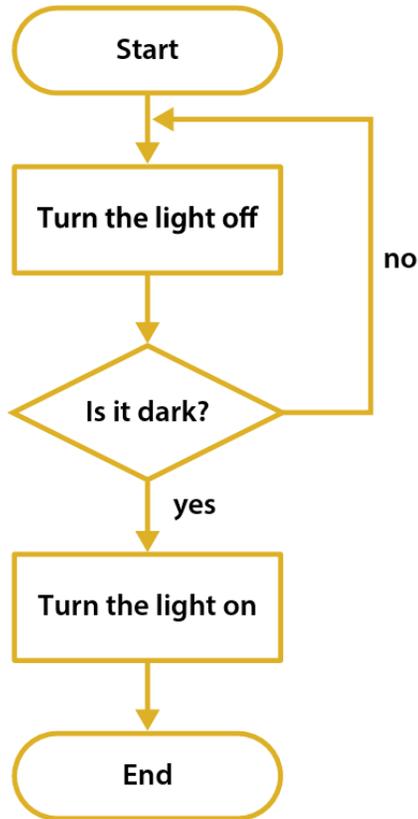
Programmable components are used in a variety of applications, for example alarm systems. In school they allow you to add intelligence to your projects. There are many types of PIC (Programmable Interface Controllers) micro-controllers available, for example the GENIE range. These are programmed and tested by software that makes use of flowcharts.

- A flowchart is a good way to plan a computer program.
- A flowchart uses instructions and yes/no questions to create a program.
- Analogue inputs give a range of values to the controller.
- Time delays and counts are useful in a program.
- Feedback loops allow a program to monitor a sensor.

comes on in the dark.
gets light.

A rectangular box is an instruction, so it tells the program to do something.

A diamond-shaped box is a question, so the program can decide something.



Inputs and decisions: switching outputs on or off.

An electronic system uses the questions in its program to make decisions. These decisions tell its output devices what to do. When the control program detects an input, it moves to the next part of the program, and follows the instructions to make an output happen. It is important for a designer to know exactly what they want a product to do, and then break it down into a set of simple steps that can be put into a flowchart.

How to process and respond to analogue inputs

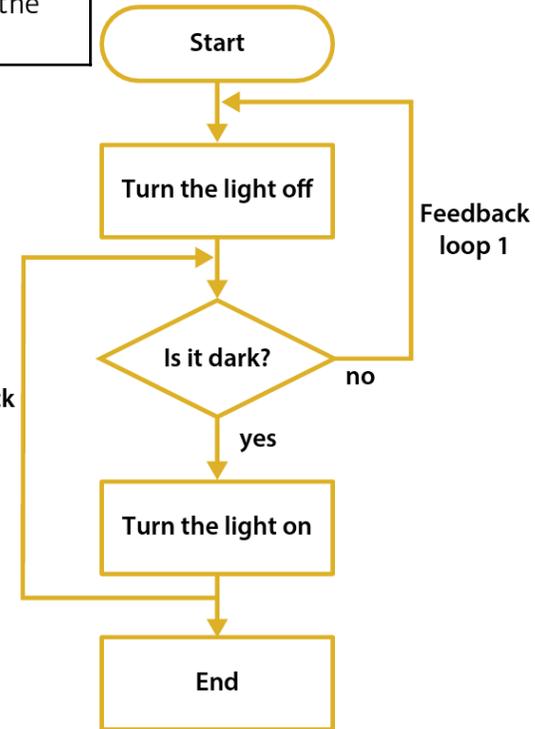
Some sensors give out an analogue signal. This means they can give a range of values. LDRs and thermistors are analogue devices. Their resistance goes up and down as Levels or temperatures change. This means a system can be programmed to respond to different Levels. The outside light has a variable resistor that lets you change the light level at which the Light turns on.

How to use simple routines to control outputs

There are some simple routines that can be added to a program to change what happens:

- **Time delay.** A program instruction that says 'wait 10' means the program will wait 10 seconds then go on to the next instruction. You could use this to make a light flash on and off as quickly or slowly as you want.
- **Count.** A program can be told to count how many times it gets an input, and perhaps give an output every ten pushes of a button.
- **Feedback loop.** This sends the program back to an earlier point to do the same thing repeatedly. This is how a system monitors a sensor - it goes around in a loop asking the same question until the answer changes. The flowchart below shows a second feedback loop added to the circuit. Now the light comes on in the dark and goes off when it gets light.

Feedback loop 2



Feedback loop 1

Figure 1.7.1 A flowchart for a simple outside light that comes on in the dark. The light is off to start with, comes on when it gets dark and just stays on forever

NEA - Investigating
Identify a design problem
Identifying user requirements
Investigating existing products
Research
Design brief
Specification



NEA – Design
Initial design ideas
Review of initial design ideas
Developing your design idea

You will undertake a project as part of your **non-examination assessment**, which is 50% of your GCSE grade.

The project will test your skills in investigating, designing, making and evaluating a prototype of a product that will allow you to apply the skills you have acquired and developed throughout your study.

The exam board provide three themes, each with two contextual challenges. You are required to choose one of these challenges and analyse it on an individual basis.

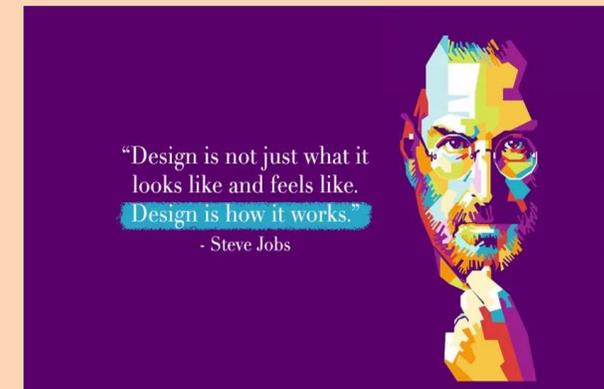
Having selected a contextual challenge to work within, you should develop a range of potential ideas and then realise one through practical making activities.

The project must allow you to apply knowledge and understanding in a product development process to investigate, design, make and evaluate your prototype.

This project will require you to follow an iterative design process rather than a linear process requiring you to continually test, evaluate and refine ideas.

The content and assessment criteria are set out in a linear format to show what is required at each stage of the total project, but following an iterative process you will do work on different stages at a variety of points throughout your project.

NEA - Making
Manufacturing
Material selection
Manufacturing processes
Planning your manufacture
Manufacture log
Safe manufacture
Quality assurance



NEA - Evaluate
Analysis against specification
User requirements
Testing to ensure fitness for purpose
Sustainability – life cycle analysis

Hardwood comes from a broad leaved tree whose seeds are enclosed in a fruit. They grow quite slowly, often taking over 100 years to be big enough to be used for timber.



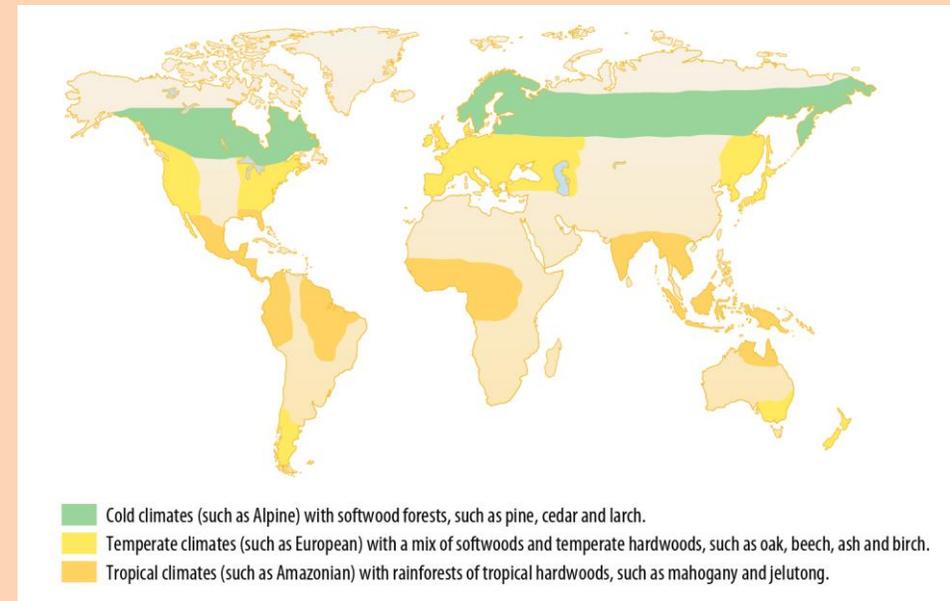
Timber is wood that has come from tree trunks and has been dried and cut into planks. Timber has been used as a building material for thousands of years to make homes, furniture and tools. Timber is still used a lot as trees grow naturally, their wood is easy to work with and it is relatively strong and lightweight.

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



Hardwoods	Advantages	Disadvantages	Common uses
Oak	Strong and durable Has an attractive grain when well finished	Expensive, becoming rarer Harder to work than other woods Corrodes iron and steel	Building houses and boats, high quality furniture, wine and whisky barrels
Mahogany	Has a very attractive finish Quite easy to work with	Expensive, environmental problems with sourcing from tropical forests, oil in the wood can cause skin or breathing problems	High quality furniture, jewellery boxes and window frames
Beech	A tough wood Does not crack or splinter easily Hard	Expensive, not very resistant to moisture Not suitable for exterior use	Toys, cooking implements, solid wood and laminated furniture
Ash	Strong, tough and flexible Finishes well	Low resistance to rot and insect attack	Handles for tools, sports equipment and ladders
Balsa	Very lightweight Easy to cut	Much too soft and weak for most products	Model making, surfboard cores, buoyancy aids
Jelutong	Even close grain Easy to cut and shape	Soft and not very strong Not good for structural use	Model making, moulds for casting or vacuum forming
Birch	Regular even grain Easy to work	Low resistance to rot and insect attack	Veneers to make plywood and surface cheaper materials that are used for furniture or doors

Softwoods	Advantages	Disadvantages	Common uses
Pine	Very durable, easy to work, quite cheap as it grows quickly enough to be forested, reasonably strong and lightweight	Can warp, crack and splinter more than some other woods	House construction for roof joists and floorboards Furniture doors and 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 and boats
Larch	Tough, durable and resistant to water It can be used outside untreated and weathers to a silvery grey	Costs more than other softwoods	Small boats, yachts, exterior cladding on buildings



Manufactured timbers use natural timbers to make boards that have different properties to plain timber. Because of the size of a tree trunk timber is limited to fairly narrow planks. If you need large, thin sheets of wooden material you will need a manufactured board.

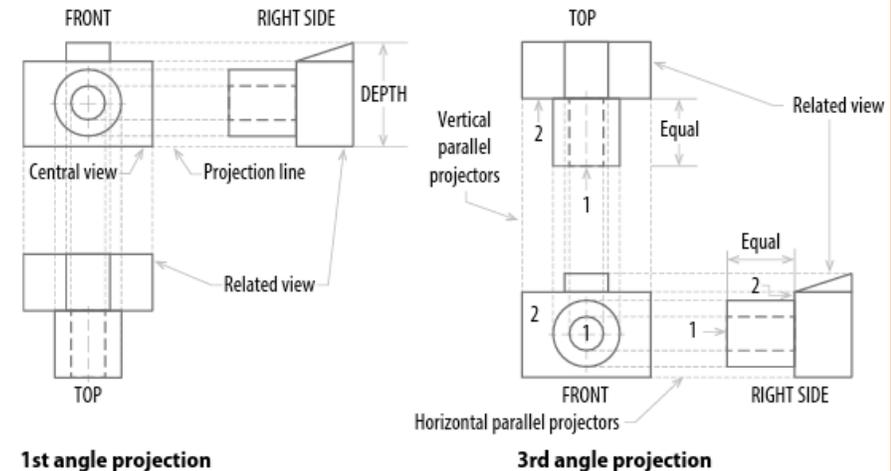
Boards	Advantages	Disadvantages	Common uses
Plywood	Flat and structurally sound, surface looks like real wood, resistant to warping, cracking and twisting	Quite expensive, edges can look rough, susceptible to water damage if using the wrong grade	Building and furniture panels that need some strength
MDF	Cheap (made from waste wood), smooth ungrained surface is good for painting or staining, easy to machine	Poor aesthetics, so needs coating, weak compared to real or plywood, tools blunt quickly due to glue content	Flat pack furniture, wall panels, display cabinets, storage units and kitchen units
Chipboard	Use waste materials so is cheap to produce	Poor structural strength, especially in damp conditions, surface is very rough so usually plastic coated	Desktops, kitchen worktops, cheap flat pack furniture



Orthographic views

Orthographic projection is used to show the detail and measurements of the product clearly from a range of angles so that a stranger could use the drawing to work out the shape and dimensions for manufacture. A furniture designer would be a perfect example of someone who may use orthographic projection.

To create an orthographic projection, you draw the front view, side view and plan view of your product in 2D. You can either draw them out by hand or generate the views using various CAD programs from your CAD model. You can use first angle projection or third angle projection – although the views may appear the same, the order that they are laid out differ.



1st angle projection

3rd angle projection

Figure 1.17.7 First and third angle projections for orthographic projection showing all sides of the product

Mechanical properties		Physical properties	
Strength	Ability to withstand force, e.g. by resisting squashing (compression) or stretching (tension)	Density	Compactness of a material, defined as mass per unit volume
Elasticity	Ability to return to original shape once deforming force is removed	Electrical conductivity	Ability to conduct electricity
Plasticity	Ability to permanently deform without breaking when subjected to a force	Thermal conductivity	Ability to conduct heat
Malleability	Ability to be permanently deformed in all directions without fracture	Size	Dimensions of the material
Ductility	Ability to be deformed by bending, twisting or stretching	Corrosion	Metal is eaten away as it reacts with oxygen and water in the air. Rust is formed through the corrosion of iron or steel
Hardness	Ability to resist deformation, indentation or penetration	Aesthetics	Appearance of a material, e.g. grain
Toughness	Ability to withstand sudden stress or shocks	Optical	Ability to absorb or reflect light
Brittleness	Inability to withstand sudden stress or shocks	Joining	Ability to be joined to other materials
Durability	Ability to withstand deterioration over time	Magnetism	Attraction to magnetic material
Stability	Ability to resist changes in shape over time		
Stiffness	Ability to resist bending		

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 Guest houses Bed and breakfasts Farmhouses Motels Holiday parks Some public houses	Restaurants Fast food outlets Public houses Bars Delicatessens Take away outlets School meals Burger vans	Hospitals Prisons Meals on wheels Residential care homes Armed services

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 serve 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 SERVICE	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 SERVICE	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. deli's, 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 pre-made and proportioned food but can be expensive
- Independent suppliers

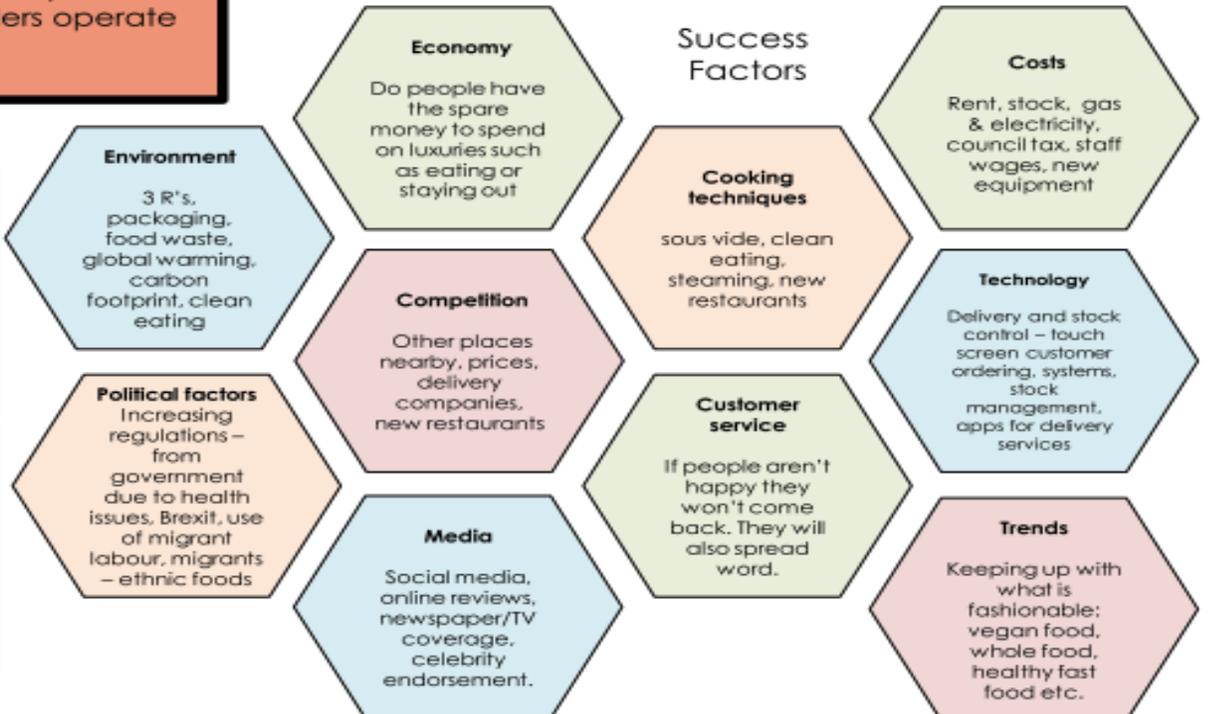
Hotel job roles
Hotel manager
Barmen/maids
Supervisor
Waiter/waitress
Housekeeper
Chambermaid
Receptionist
Porter
Concierge

Minimum Wage

21-24 £7.70 p/h
18-20 £6.15 p/h
16-17 £4.35 p/h
Under 19 £3.90 p/h

LO1 The environment in which hospitality and catering providers operate

Permanent (Over 36hrs a week) 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) 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 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 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



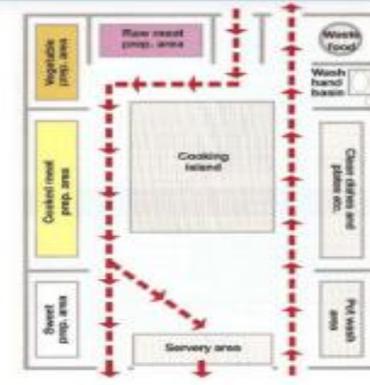
Hospitality and Catering

Kitchen

Front of House

Documentation					
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
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 should 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

Customer needs

Local Residents	Business Customers	Leisure Customers
<ul style="list-style-type: none"> Value for money Good standard of customer service so they return Catering for local needs (culture, religion) Consistent dishes served Loyalty schemes Recognised by staff- feel welcome Menu specials Theme nights OAP discount day Child friendly Entertainment Mailing list or email for special offers 	<ul style="list-style-type: none"> Dedicated corporate (business) contact at establishment Discounted rates Meeting rooms Water, juice on tables Presentation equipment, projector, tv, Office facilities- printer, phone, fax, internet, stationery Tea and coffee for breaks Lunch or other meals- buffet or restaurant Accommodation if attendees are from a long distance Quick service for lunch meetings 	<ul style="list-style-type: none"> Value for money Good facilities Families want child menus, play area, child friendly Tourists want local food, easy to communicate Older people may want more formal service Good customer service Varied choice of menu Dietary needs eg allergies, intolerances, vegetarian catered for without having to ask for special foods Facilities for physically impaired customers

LO2 Understand how hospitality and catering provisions operate



- 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



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

HASAWA – Health and safety at work act

Employers must:

- To protect the health, safety and welfare of staff
- Carry out risk assessments
- To provide and maintain safe equipment and safe systems of work
- Safe use, handling, storage and transport of articles and substances
- Provide a safe workplace with a safe entrance and exit
- Provide information, instruction, training and supervision on how to work safely
- Provide a written safety policy
- Make sure there are toilets, places to wash and drinking water for workers
- Make sure that there is first aid provision
- Provide PPE for jobs if needed
- Have insurance to cover injury or illness at work
- Ventilation lighting and emergency exits
- Provide a health and safety law poster entitled "Health and Safety law: What you should know" displayed in a prominent position and containing details of the enforcing authority.

COSHH – control of substances hazardous to health regulations

SUBSTANCES COVERED BY COSHH:

- Chemicals including cleaning chemicals
- Micro-organisms
- Dusts
- Medicines, pesticides, gases
- HSE list (Health and safety executive)

Employees must:

- Use control measures and facilities provided by the employer
- Ensure equipment is returned and stored properly
- Report defects in control measures
- Wear and store personal protective equipment (PPE)
- Removing PPE that could cause contamination before eating or drinking
- Proper use of washing, showering facilities when required
- Maintaining a high level of personal hygiene
- Complying with any information, instruction or training that is provided

RIDDOR – Reporting injuries, disease and dangerous occurrences regulations

RIDDOR is the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013. The law requires employers and other people in control of work premises (known as the 'responsible person') to report to the Health and Safety Executive (HSE) and keep records of the following:

- Death
- Injuries resulting in over 7 days off work (7 day injuries)
- fractures (except fingers, thumbs and toes);
- amputation of limbs or digits
- loss or a reduction of sight;
- crush injuries
- serious burns (over 10%)
- unconsciousness caused by a head injury or asphyxia;
- any other injury needing admittance to hospital for more than 24 hours.
- Hypothermia

Manual handling operations regulations

- Require you to avoid any manual handling operations at work which involve a risk to health – so far as reasonably practicable.
- If it is not reasonably practicable to avoid any manual handling operations, you must carry out a manual handling risk assessment to identify how the risk is caused, so each factor can be addressed and measures taken to control the risk.
- Provision of information, instruction and training to staff are legal requirements

What is manual handling:

Any transporting or supporting of a load by hand or bodily force
Lifting, putting down, pushing, pulling, carrying or moving

PPER – Personal protective equipment at work regulations

PPE is equipment that will protect the user against health or safety risks at work. Includes clothing and other items worn by staff to protect themselves from work hazards
It can include items such as Gloves, goggles, hard hats, hearing protectors, warm clothing (in cold conditions), safety shoes or boots, respirators etc
Hearing protection and respiratory protective are not covered by these Regulations there are specific regulations that apply to them. these items need to be compatible with any other PPE provided.

PPE could include:

- non-slip shoes where there is a slipping risk;
- 100% cotton garments (for example, chefs' whites) where there is a risk that the material may aggravate burns in the event of a fire
- where caustic cleaning substances are used, long-sleeved vinyl gloves, goggles, a visor and possibly respiratory equipment.

LO3 Meeting health and safety requirements

Security hazards

Workers can be at risk from security hazards in the same way they are from safety hazards. Security risks include

- Disagreements between customers
- Customers being intoxicated (alcohol)
- Customers who have used drugs
- Verbal abuse
- Physical assaults

Prevention

- Brightly lit areas
- CCTV
- Easy escape routes
- Area for handling larger sums of money
- Appoint more senior staff to deal with problems and complaints
- Train staff to diffuse angry customers
- Contact local police if necessary
- Make sure lone workers are aware of risks
- Keeping doors and windows secure and locked

RISK ASSESSMENTS:

When you carry out a risk assessment you need to think about how likely it is to happen and what the consequence might be if it did. E.g. A spillage is very likely to happen in a restaurant kitchen.

	Probability		Severity
1	Not very likely to happen	1	If it did happen the harm would be minimal and could be dealt with by an untrained person (e.g. might just need a plaster)
2	1 in 4 (25%) chance	2	Might need to visit a professional for advice or treatment (e.g. might need stitches)
3	2 in 4 (50%) chance	3	Would take a few weeks to heal, but not a serious injury.
4	3 in 4 (75%) chance	4	Could cause serious injury or damage, but would eventually be resolved (e.g. broken leg)
5	Very likely to happen	5	The result could be permanent disability, destruction of a building or in extreme cases, death.

Allergies
A food allergy is a rapid and potentially serious response to a food by your immune system. It can trigger classic allergy symptoms such as a rash, wheezing and itching. Anaphylaxis is most commonly caused by food allergies, but can also be caused by other things, such as insect bites and drug allergies.

Wait staff should have a good knowledge of which allergens are present. When using pre prepared ingredients, kitchen staff should check the labels carefully to identify any allergens



Intolerances
Food intolerances are more common than food allergies. The symptoms of food intolerance tend to come on more slowly, often many hours after eating the problem food.

Lactose intolerance

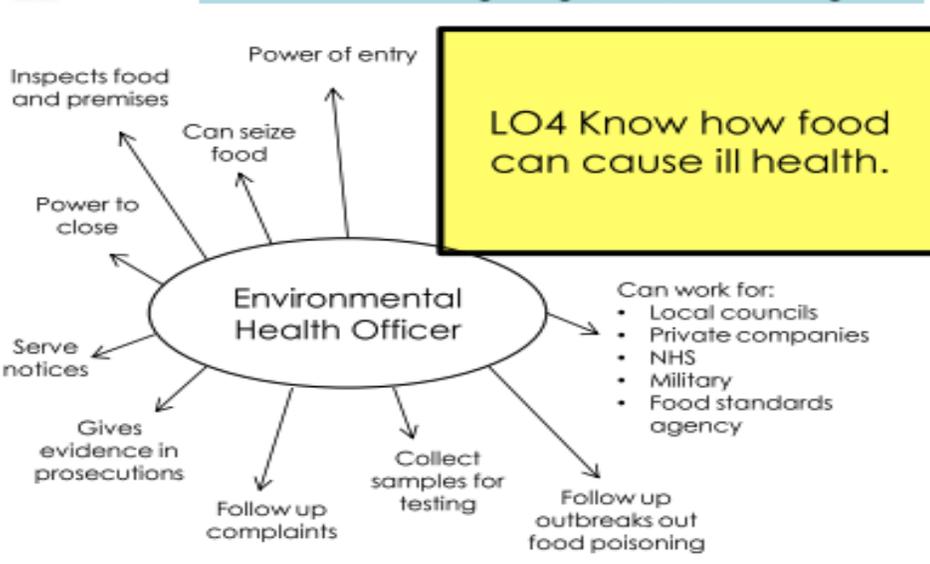
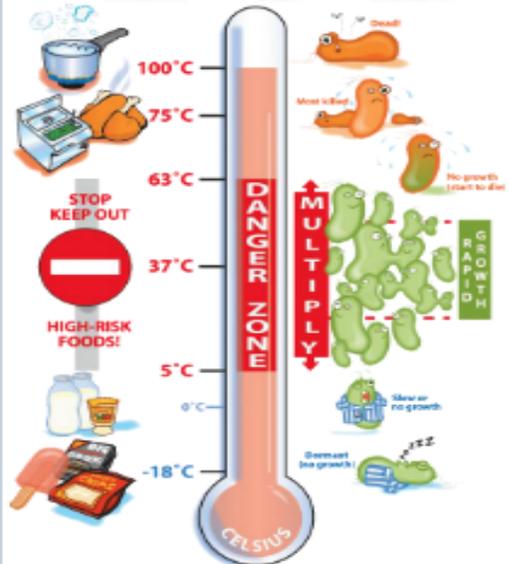
- Avoid milk and milk products
- Experience nausea, bloating, pain in the abdomen and diarrhoea
- Eat lactose-reduced products or alternatives such as goats cheese, soya milk, feta cheese, rice milk

Celiac disease/gluten intolerance

- Causes diarrhoea, anaemia, weight loss
- Gluten is found in many cereals plants primarily wheat, rye, barley and some oats
- Avoid pasta, bread, cereals flour based foods

Yeast intolerance

- Yeast is present in a variety of foods, commonly bread, baked products and alcoholic beverages. Very ripe fruits contain natural yeasts
- Symptoms include flatulence, bad breath, fatigue, irritability, cravings for sugary foods, stomach cramps, bad skin and indigestion.
- Fermented foods e.g. vinegar, wine, salad dressing



LO4 Know how food can cause ill health.

	Found In	Symptoms	Onset	Duration
Campylobacter	Poultry, raw meat, unpasteurised milk products, water	Headache, abdominal pain, bloody diarrhoea	2-5 days after infection	Up to 10 days
Salmonella	Raw meat, unwashed vegetables, eggs undercooked chicken	Fever, diarrhoea, vomiting, abdominal pain, blood in poo	12-72 hours	4-7 days can be up to 3 weeks
E-Coli	beef, chicken, lamb, unpasteurised milk cheese, spinach, salads, raw veg	Abdominal cramps, bloody diarrhoea, nausea	Up to 24 hours	Up to 24 hours
Clostridium perfringens	Undercooked meats, large volumes of food, casseroles, gravies	Stomach cramps, fever, diarrhoea (not usually vomiting)	6-24 hours	4-7 days can be up to 3 weeks
Listeria	Raw foods, fridge temperatures, unpasteurised milk, cheese, smoked salmon, pate, raw sprouts	Headache, stiff muscles, confusion, fever, convulsions	3-70 days (21 typical)	3 weeks
Bacillus cereus	Rice, leftover food, foods at room temperature, sauces and soups	1) Watery diarrhoea, cramps, 2) vomiting and nausea	1) 30 min-6 hrs 2) 6-15 hours	24 hours
Staphylococcus aureus	Foods made by hand and no additional cooking Salads, ham, tuna chicken, cream pastries, sandwiches, dairy products, meat, eggs	Projectile vomiting, diarrhoea, abdominal cramps, fever	1-6 hours	24-48 hours

Food related causes of ill health
Microbes - Some microorganisms cause food borne illness which is not classified as food poisoning because of other symptoms they cause. The two main ones are: Norovirus From leafy greens such as lettuce, fresh fruits and foods that are not washed before eating and Toxoplasmosis From infected meat (also cat poo but you wouldn't eat that)

Chemicals - Some chemicals can end up in our food and potentially make us ill. These chemicals could come from: hormones, pesticides, fertilizer, packaging additives, cleaning fluids

Metals - When ingested metals can be extremely harmful to the body. Some metals can be found in food because they occur naturally, they enter the food chain or residues of metals can be found in food.

Poisonous plants - Some plants can be poisonous when eaten, these could be contaminants such as weeds or naturally occurring foods such as rhubarb leaves, raw potatoes and uncooked kidney beans.

Food Safety Act
Food businesses:
- Must ensure that the food served or sold is of the nature, substance or quality which consumers would expect
- Ensure that the food is labelled, advertised and presented in a way that is not false or misleading, e.g. photos on menus that do not look like the dishes served to customers

Food Safety (General Food Hygiene Regulations)
- Food premises
- Personal hygiene of staff
- Hygienic practices
Food businesses must:
- make sure food is supplied or sold in a hygienic way;
- identify food safety hazards;
- know which steps in your activities are critical for food safety;
- ensure safety controls are in place, maintained and reviewed.

Food Labelling Regulations
This information is required on packaging by law:
• the name of the food
• weight or volume
• ingredient list & allergen information
• genetically modified ingredients
• date mark and storage conditions
• preparation instructions
• name and address of manufacturer, packer or seller & place of origin
• lot (or batch) mark
• nutrition information

AQA Design and Technology Textiles 8552 – NEA Controlled Assessment

This project work is the coursework for your GCSE. It covers 50% of your GCSE marks and gives you the opportunity to show your ability to design and make a high quality product in answer to a specific design brief. The controlled assessment is split into three parts, AO1 (research) is 20% of the grade, AO2 (designing, modelling and making) is 60% and AO3 (evaluating) is worth 20%.

Your project will involve **a lot** of work. 30-35 hours in total in class time, plus you will need to put in time after school and at home on your folder work. It is therefore important that you choose to make a product you are interested in. It is expected that you plan and organize your time wisely during lesson time and for homework.

The assessment criteria for the NEA are split into six sections as follows.

	Section	Criteria	Maximum marks
AO1 (Phase 1) Identify, investigate & outline design possibilities	A	Identifying & investigating design possibilities	10
	B	Producing a design brief & specification	10
A02 (Phase 2) Design & make prototypes that are fit for purpose	C	Generating design ideas	20
	D	Developing design ideas	20
	E	Realising design ideas	20
A03 (Phase 3) Analyse & evaluate	F	Analysing & evaluating	20
Total			100

Each section of your coursework folder is worth a different amount of marks.

As you can see, the sections in AO2 covering the Development of your design and the practical (Making) are worth almost $\frac{2}{3}$ of the overall folder grade.

REMEMBER: you should only have 20 pages in your folder so **WHAT you include** in your folder is important.

You can use the coursework guide to help you present your work. The following symbols

HOW TO USE THE GUIDANCE TEMPLATES:

What do the symbols mean on each slide?

Red text must be read then deleted.



Each page will have guidance for you to follow. They will include **details of what to include** in your work. They will always be written in red and **MUST** be deleted.



This icon indicates that you must **add an image, graph or photograph** to help illustrate your work. You **MUST** add appropriate labels to whatever you use.



This icon is used to highlight sections of the project that require **feedback** from your client.



This icon is used to indicate which pages require a **summary / conclusion** needs to be added.



This icon is used to indicate which sections you have sought **inspiration** from other designers on.

AO1: Investigating the Design Context

Contextual challenges:

You will be given a Contextual Challenge to choose as a starting point.



WHAT'S THE PROBLEM? Now describe several potential design possibilities that may exist within that area (For each possibility describe what they would do and how they may benefit the user).
What problems exist for the client / user. Focus on the problems not the solution.

1. Create a mind-map of your first thoughts.
2. **Describe your potential user.**
3. Make a list of ideas for potential products.
4. **Make a list of things you need to think about before you start the project.**
5. How can the work of others influence you? Who will you choose?
6. **Create a Research Plan. Make a list of research tasks you need to complete.**
7. Make a list of questions you need to ask your user.

These are the things I need to think about in my project:

- How much space will it take up?
 - How hard will it be?
- Is there a power outlet nearby?
 - What's the scoring system?
 - How will you make it fun?
 - How durable is it?
 - Component cost?
- What are the available materials?
 - How safe will it be?
 - What is the set up time?
- What are the key game aesthetics?
 - What is the cost to use the game?
- What are the tools required to make the game?
 - How much power is required to run?
 - What is the weight?
 - What are the colour schemes?

You will be choosing **ONE** of these contextual challenges as the basis of your coursework so consider:

- What sorts of textiles do **YOU** like designing/making most? (Fashion? Furnishings? Toys?)
- What products are **YOU** good at making?
- Cost – **YOU** will be designing and making the product for quite a while. What will you parents want you to make and what can they afford? **YOU** will need to provide materials and components.
- Which target groups do **YOU** find most interesting to design for? (Teenagers, Men, Women, Children, Elderly?)

Use the Coursework guidance to help you and always refer to the coursework mark scheme to make sure you are on track.

FEASABILITY STUDY

Problem Outline

Begin by describing the context that you intend to investigate in order to bring improvement to it. Then describe several potential design possibilities that may exist within that area (For each possibility describe what they would do and how they may benefit the user).

State the area or project you have chosen. Give a detailed description of what your client or user would do in this situation if they have **not got** the product you are about to design. What problems exist for the client / user. Focus on the problems not the solution.

Client Profile

Explain who your product is going to be designed for. State their age range and gender as well as their interests. Give as much detail as possible e.g. why do they need you to design a solution?

AND
OR

User Profile

Explain who, specifically your product is going to be used by. State their age range and gender as well as their interests. Give as much detail as possible e.g. disposable income available.

1. Read through the list of the 3 Contextual Challenges.
2. **Think** about them and what you believe each one means. Consider:

Key words...What is each **CONTEXTUAL CHALLENGE** asking you to do?

Initial Thoughts...What is interesting you about them?

Images...What colours, shapes, patterns, and images could be linked to the challenges?

3. Once you have had a really good think, create a mind-map of your thoughts about each one. You can keep adding to the mind-maps as more thoughts occur.



PICTURE OF PROBLEM



PICTURE TO ILLUSTRATE
TYPICAL USER

AO!: Identifying the needs of the user

You should have a collection of **primary** and **secondary** research.

Primary research is information you have gathered yourself, e.g. interviews/questionnaires, evaluating existing products, visits, exhibitions, emails/letters.

Secondary research is information that has already been collected by someone else, e.g. trend predictions, books, Internet, magazines.

- One of the most important pieces of research a designer does at the beginning of a project is to investigate the client.
- This is a very **influential piece of research** as the client is the person they are making the product for so they **need to know exactly what the client wants** the product to be like.
- They **continue to have contact** with the client **throughout the project**.
- You will work in the same way as a designer, so the first piece of work you will do is a case study/client profile.
- A case study/client profile is a piece of **primary research**.

Customer/Client Profile:

This is an interview or an overview of your intended user. If you are making a costume it should be focused at the theatre your costume is for.



- A **CASE STUDY/CLIENT PROFILE** looks in detail at the person/people you are making the product for.
- It is a way of gathering information that will help the designer make sure they **MEET THE CLIENT'S NEEDS**.
- One product might have a **VARIETY OF CLIENTS**, e.g. a designer designing a product for a theatre production might have to consider the actor, the director as well as the audience!

Decide:
 What do you need to find out?
 What questions do you think you need to ask to get the information to help you progress further?
 What type of questions can you ask?



To make it easier to remember all the areas you might need information on, use **ACCESS FM** to help you...

- Aesthetics**
- Cost**
- Customer**
- Ergonomics**
- Size**
- Safety**
- Function**
- Materials**
- Manufacture**

Consider how you will take the survey. How are these two examples presented?

Survey

This is a questionnaire for a bag designed for holding personal items.

Question:		Person 1	Person 2	Person 3	Person 4	Person 5	Person 6
What colour would you want the main part of the bag to be?	Black Blue Green Red white						
How would you like to dispose of the bag when you no longer want it?	The bin Charity shop/ textile bank Pass down to family or friend						
Where would you use/ wear the bag?	Shopping Parties Gatherings Visiting attractions						
How much would you pay for a bag?	£15 £20 £30 £40 £50 £60+						

Pyjama Questionnaire:

Please could you answer the following questions:

1. What age are you?
 15-16yrs 17-18yrs 19-20yrs 21-22yrs
2. Where do you wear pyjamas most?
 In bed – just to sleep in On the sofa – for lounging around in For sleep overs
3. What time of year would you wear pyjamas the most?
 All year round Autumn/Winter Spring/Summer
4. Which era are you most influenced by?
 1920s   1940s 

CLIENT / USER INTERVIEW

Introduction -

Explain why you are going to carry out an interview with your chosen client (Primary research).

Use the headings below to help you structure your questions.

Function -

- What do you want it to be able to do?
- Where?
- How often?
- How many should it hold?
- Storage issues?
- Is weight important?
- Desirable features?

Aesthetics -

- Preferred styles / things it should match?
- Generic / bright / warm colours?

Cost -

- Price range you might expect?

Size -

- Things it needs to fit?

Other -

- What else is important that you need to ask about?

Client / User -

Name the person /persons you interviewed and state why you chose them.

Answers -

Write down the answers that your client / user gave to your questions. The more detail they give the better.

Summary

Summarise what you have learnt in this space.

AO1: Investigating Existing Products

Product Analysis involves 'disassembling' an existing product to identify its key features.

Analyse

- The function.
- The aesthetics.
- Key design features.
- Construction methods.
- Fibres.
- Environmental issues.

Assess

- The ergonomics of the product.
- The size.
- Component parts.
- Method of manufacture.
- Cost.

Look at the examples of existing product analysis sheets. How do they compare?

IMAGE	SHOP/DESIGNER	PRICE (£)	PRODUCT DESCRIPTION	MATERIALS	SIZES	SUSTAINABILITY	ASPECTS I LIKE	ASPECTS I DISLIKE
	Louis Vuitton	£975.00	Silver coloured hardware - Natural cowhide leather handles - Zipped closure - Removable shoulder strap - Interior flat pockets - Burgundy textile lining	Leather	12.6 x 13.78 x 4.33 inches (length x height x width)	Natural material, more durable good for nature.	It's a strong material and will last a long time. It's not a throw away fashion.	The price is very high, some people may not afford it.
	Louis Vuitton	£1,060.00	- Rounded leather handles for a more comfortable grip - Adjustable and removable shoulder strap - Removable name tag - Padlock for extra security - Internal D-ring for attaching keys - Cabin size	Leather	21.7 x 12.2 x 9.4 inches (length x height x width)	Natural material, more durable good for nature.	It's a strong material and will last a long time. It's not a throw away fashion.	The price is very high, some people may not afford it.

Existing product analysis



Young girls age 6-7 summer dress -

My existing product is a child's dress age 6-7 it is medium length, light weight and flowing, it fits nicely at the top and flows out at the waist, the dress is gathered from the bottom of the waist. It is a sleeveless dress which insures the child is cooler in the hot weather. It has a large collar which is hemmed with a white bow at the front of the neck, this is for decorative purposes and give more shape to the neck of the dress.

The bottom of the skirt is hemmed and dress has an inside lining this is to provide more comfort for the child as if there was no lining the fabric where the seams have been sewn would rub against their skin causing irritation, especially when the child is running around. The dress is fastened with buttons at the back of the garment this is in order to prevent choking hazards as the child cannot pull the buttons off as they are unable to reach the back whilst they are wearing the dress, However the dress is easy to take on and off.

The care label shows the temperature at which it can be washed at, where it is made, where it was purchased, if it is flammable, the age, whether you need to wash it inside out or not, what material it is made from and if it can be ironed. This garment is made from 100% cotton, this means the child will not get too hot as it does not contain fibres like polyester. It shows the product is best to be washed at 30 degrees, this is sustainable as it is a climate wash meaning it uses less energy.

What is it made of?

100% cotton

Existing Product Analysis

To get a better understanding of what is available on the market today, I am going to investigate and look at different soft furnishings and consider their target audience, function, cost, ergonomics and anthropometrics and suitability for use.

I to visit Dunelm to look at soft furnishings, as it is a popular 'high street' chain, and found that cushions were really popular and they had many different ones in stock. Cushions are a popular choice for soft furnishings as they can be practical and decorative. They can be used around the home in a variety of ways; in living rooms, bedrooms, conservatories and can make the user more comfortable as well as complementing the interior decor of the users home.

This cushion is rectangular, it is made from soft luxurious velvet and has a decorative beaded peacock feather design on the front. The most popular shape on display was square so this stood out from the others available making it more unique.



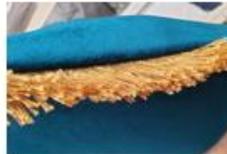
The cushion cover is fastened with a zip. Zips are a good practical way of fastening products and are easy to use. Although this zip matches the fabric colour, there is a facing which hides it and as well as hiding the zip this also stops it from being a finger trap hazard - important around young children. Having a fastening means that the cushion cover is removable for washing or changing the cushion pad.



This cushion cost £22. It is quite expensive so would not appeal to all customers users on a budget. It could be given as a gift for birthdays or young professionals/new homeowners.



The front of this cushion had a decorative beading/stitch design inspired by peacock feathers. This explains the high cost as this feature would take time to apply is very intricate. The colours harmonise well together and match the gold fringing around the edge of the cushion. The beaded design would mean that this cushion would probably be more decorative and the beads could be a choking hazard and could be swallowed by young children.



There is gold fringing around the edge of the cushion which adds extra decoration and complements the peacock feather design on the front. This type of feature adds elegance.



The cushion measures 30cm x 50cm. It is made from a mix of synthetic and natural materials - viscose and cotton and has a polyester lining. I can see that it is not able to be machine washed. The care label also informs the user that they must keep the cushion away from fire meaning that this product is potentially flammable.

I think that this cushion is very decorative and I like unique shape and design. I like the complimenting colour scheme and beaded feather design. I think it would appeal to young professionals/new home owners or to be given as a gift because of the price. The intricate beading detail is also reflected in the cost. The materials are sophisticated, luxurious yet hardwearing and the lining adds to durability meaning that it will last a long time and not become a fast-fashion/throwaway item. Because it cannot be machine washed it makes it impractical to care for and this can be off putting. I really liked the fringing and think that having detail around the edge completes the product.

Use the Coursework guidance to help you and always refer to the coursework mark scheme to make sure you are on track.

EXISTING PRODUCT ANALYSIS

Introduction - Explain here you are going to do and state why you will need to know about it during your project.



FULL PICTURE OF PRODUCT

Function

Describe what it does, then describe the features that make it work well.

Aesthetics

Describe the features that make it look good. Why is it / that part that shape? Why is it / that part that colour? Will it blend in or stand out.

Materials

Name the specific materials used and describe the properties that make them suitable. (Strong, tough, hard, durable, malleable, etc.)

Ergonomics & Anthropometrics

Describe the features that make it easy or difficult to use by people. Focus on the position and size of parts. Describe how it has or hasn't been made safe. (Sharp corners, finger traps, small parts that could get swallowed, etc.)

Cost

State how much it costs. In your opinion is this expensive or cheap?

Do you think it gives the user value for money? Why?



FULL PICTURE OF PRODUCT

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Describe what it does, then describe the features that make it work well.

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Describe the features that make it look good. Why is it / that part that shape? Why is it / that part that colour? Will it blend in or stand out.

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Cost

State how much it costs. In your opinion is this expensive or cheap?

Do you think it gives the user value for money? Why?

Summary Summarise what you have learnt in this space.



AO1: Further Research

Look at the work of others and investigate how they were influenced. It is worthwhile researching other designers and organisations and how they have developed. You can link this back to your client – who appeals to them.

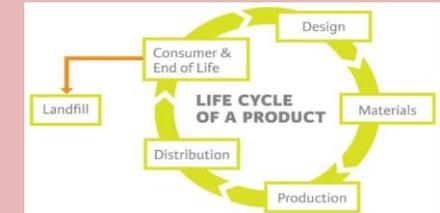


Think about the 6 R's of sustainability – explain how they can be incorporated into your product:

- Recycle
- Reuse
- Rethink
- Refuse
- Reduce



Discuss Social, Moral and Ethical Implications of your product. Consumer values and choices are influenced by societal, cultural, moral and environmental issues. Societal, cultural, and moral factors that impact on textile design.



Ways to be more sustainable:

Be very aware of what is acceptable and what is not acceptable in society.

Use less material: *can you make things smaller, thinner lighter or with less parts?*

Issues with making products: Most people would prefer the products they want to be low cost and good quality.

Use renewable material/energy: *materials that can be regrown or recycled easily like wool or steel. Solar or wind power, no batteries.*

Be more eco-friendly: *Reuse old materials, recycle waste, and refuse polluting materials.*



Use the Coursework guidance to help you and always refer to the coursework mark scheme to make sure you are on track.

FURTHER RESEARCH

Introduction - Explain here what further research you need to do and state why you will need to know about it during your project.

Environment



PICTURE ILLUSTRATING FACTOR

Description – Get a picture(s) of what your design has to fit. Add the sizes - cms, Explain why this will have an impact on your design.

Properties

Description – Describe the main properties that will be needed and why. The main ones are, for example:

- Strength
- Toughness
- Durability

Anthropometrics



PICTURE ILLUSTRATING FACTOR

Description – Insert a table of the important human sizes your project needs and highlight the specific sizes in the table. Use this information to decide on a size, (or range of sizes) for specific parts of your project, state the size and say why?

Social Impact

Description – Explain the benefits that owning this product will bring to peoples lives. Eg.:

- Helps the user achieve a task quicker/easier/safer.
- Enjoy a task more improving quality of life.
- Helps them stay healthy.

Economic Impact

Description – Explain how this product may save the user money in the long run. Eg.

- Items may not get damaged / lost and need replacing.
- A bird box would stop birds nesting in gutters which would then need a tradesman to be hired to come and clean it out.

Summary



Summarise what you have learnt in this space.

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 that 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 improve comfort when skateboarding. It also needs to 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 worn 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 has 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.

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 colours to show the fate of the character later on in the show. The garment could include beading to give the illusion of ice and snow glinting in 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 unknown 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 fate that will befall the character. The dress should contain illusion on the bodice and sleeves and neck that is a translucent off white or bright 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 the garment and found that they ranged from £100-£500. 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 costumers 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 its 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, eg. 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

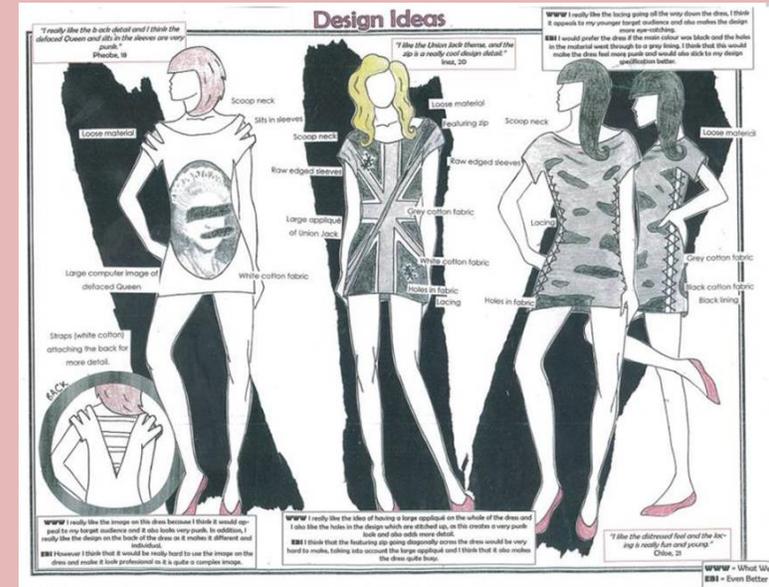
- Re-read your **DESIGN BRIEF**
- Look at your **RESEARCH**
- Re-read your **SPECIFICATION/DESIGN CRITERIA**.

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.



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.

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?

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.



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.

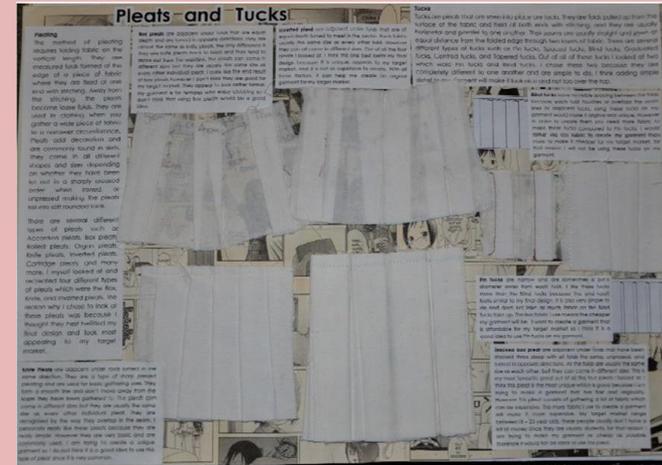
3. Development And Refinement Of Design Ideas

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



DEVELOPMENT

Selection

Explain which concept you are going to develop into your final solution. Justify your selection.

You must refine and improve your 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 suggest 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.

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?