

The Trafalgar School at Downton

Knowledge Organiser

Year 11: Terms 1 and 2



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

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Using a Knowledge Organiser well

What is a Knowledge Organiser?

A Knowledge Organiser is a document that sets out the key information you need to understand, learn and memorise in each of the subjects you study this term.

Why do I have to carry my Knowledge Organiser around with me?

Your teachers will want you to use your Knowledge Organisers in lessons. They are yours forever and you may want to annotate or highlight on them when your teacher talks about things in them. They will certainly be used in lessons when you have a cover teacher and you can use them whenever you find yourself with some spare time.

How should I use my Knowledge Organiser?

You should use your Knowledge Organiser to learn this key information and commit it to memory. Your teachers will often quiz you on the information on the Knowledge Organiser in your lessons. The best way of using it is to use the look, cover, write, check method which you will have been introduced to in your Knowledge Organiser launch assemblies.

What do I do with my Knowledge Organiser at the end of the term?

You don't have to carry your Knowledge Organiser around with you anymore but you should keep it somewhere safe where you can easily get it out and use it. Remember that the information on the Knowledge Organiser includes things you will need to remember for your GCSE exams, so your teachers will continue to quiz you on it.

Why is a Knowledge Organiser important?

New GCSE specifications mean that students have to memorise more facts, equations, quotations and information than ever before and there are things you will learn right from the start of year 7 that you will need to know in year 11 when you sit your GCSE exams – the Knowledge Organiser helps you to identify the things that you need to try and commit to your long term memory and return to over and over again during your time at secondary school. There are also things that we think it is important you learn about and remember that might not be in a GCSE exam but represent useful knowledge for life.





WHAT WE EXPECT FROM YOU

BE ON **TIME** ●

BE **EQUIPPED** ●

PEN, PENCIL, RULER, KNOWLEDGE ORGANISER & EXERCISE BOOK (AS A MINIMUM)

LISTEN TO STAFF AND **ALWAYS**
COOPERATE ●

DO NOT INTERRUPT **LEARNING** TIME ●

COMPLETE **ALL WORK** SET
BEST WORK, FIRST TIME ●

SHOW **RESPECT** ●

WEAR UNIFORM **PROPERLY** AND
WITH **PRIDE** ●

MOBILE DEVICES/SMART
WATCHES TO BE IN **YONDR** CASE ●

Being Trafalgar

At the end of your time at the school your knowledge organisers will provide you with lots of help and support when you prepare for your GCSE exams.

To help yourself you should:

- Keep your Knowledge Organisers as tidy as possible
- Highlight parts of them as you go through learning lessons or add in post-it notes etc. to help you learn key knowledge
- Keep your used Knowledge Organisers safe at home. If you have used them since Year 7 you will end up at the end of Year 11 with 14 Knowledge Organisers. Line them up on your shelf at home and keep coming back to them for your revision, homework and learning
- Show them to your parents and talk through with them the facts and knowledge you have learned about in lessons – help them to learn new things too!
- Take your Knowledge Organiser for the term you are in to school every day and use it in every lesson you can!

Learning the knowledge in the organiser

Your Knowledge Organiser is a vital document. It contains all the key things from your lessons that you will need to work on committing to your long-term memory.

The best method to use when you are working on memorising things from your Knowledge Organiser is to self-quiz, using the Trafalgar Revision Method, below:

Really read and understand	Read the information 3 or more times and ask for help in understanding
Reduce the knowledge	Rewrite the information, making revision cards or mind maps
Remember	Reread and test that you can remember
Repeat	Repeat the process above until you can recall the information quickly and accurately. Only at this point have you acquired the knowledge!

How do I remember? Activating your memory

Students often say “I can’t remember” and the reason for this is that the information they are trying to remember and learn is not yet in their **long term memory**.

Your long term memory gets activated by repetition over a number of days. And so repeat the following process to embed knowledge in your long term memory.

Look	Read the information 3 or more times 
Cover	Now cover what you have just read up
Write	Now try and write down the information you have just read 
Check	Did you write down the information correctly? If you made mistakes, correct them with a different colour pen and repeat daily until you “just know it”.



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.'

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



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

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.

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'.



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



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

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.

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.'



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.

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

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

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

The dog knocked over the vase with a crash!



Dancing on the water, the sun shone endlessly.



'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.'

COMMON MISTAKES

The verb lay means to place something down (it requires an object to act upon):

I will lay the bone here.

I laid the bone down.

I'm laying all of my bones down here.



The verb lie indicates the act of reclining (something moving on its own or already in position):

I am going for a lie down.

I think I will lay down.

I have lain here all day.

I'm still lying in bed!



There is no such thing as should of, could of, would of, might of:

THE CORRECT EXPRESSIONS ARE

- "should've"
- "could've"
- "would've"
- "might've"



AND THEY ARE CONTRACTIONS OF

- "should have"
- "could have"
- "would have"
- "might have"





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,

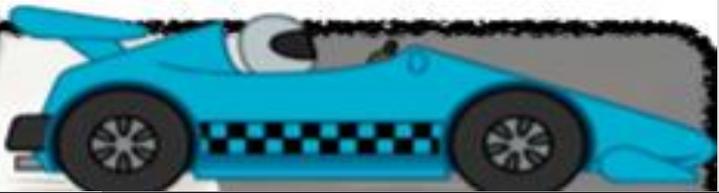
Meanwhile, Later that day, Seconds later, Subsequently, That afternoon,

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, 2009 Wimbledon champion has already 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

clear title

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

221B Bakers Street
London
NW1 6XE

reader's
address

Writing
Forms

writer's
address

35 Hibiscus Crescent
Andover
Hants
SP10 3WE

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, there is another side to this case: uniforms breed uniformity. We are a culturally diverse nation and 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.

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.

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 the 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

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.

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;

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).**

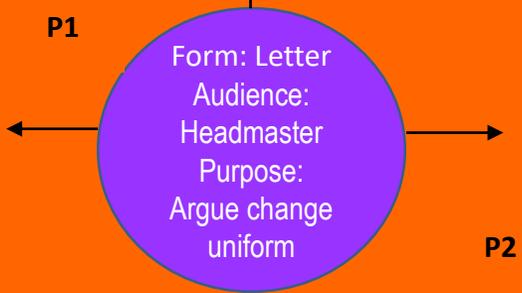
Conclusion:
To conclude,
repeat RQ,
Yes.

Yours
Sincerely

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.

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?

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

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

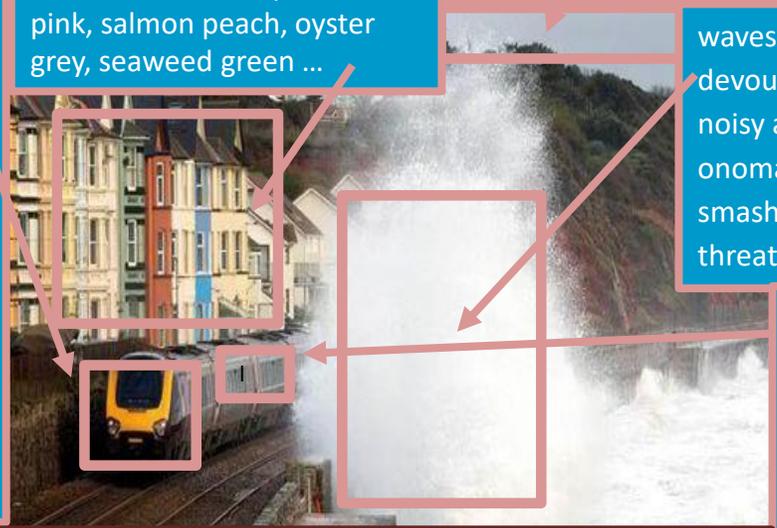
Personify train - a victim moving along railway line, past houses, towards destination - metaphor: caterpillar train sways and pitches precariously along the track to its daily destination. Snatching bites, the sea salt nips at its metal skin as it passes, gnawing at it, killing it. Rattles. Will it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

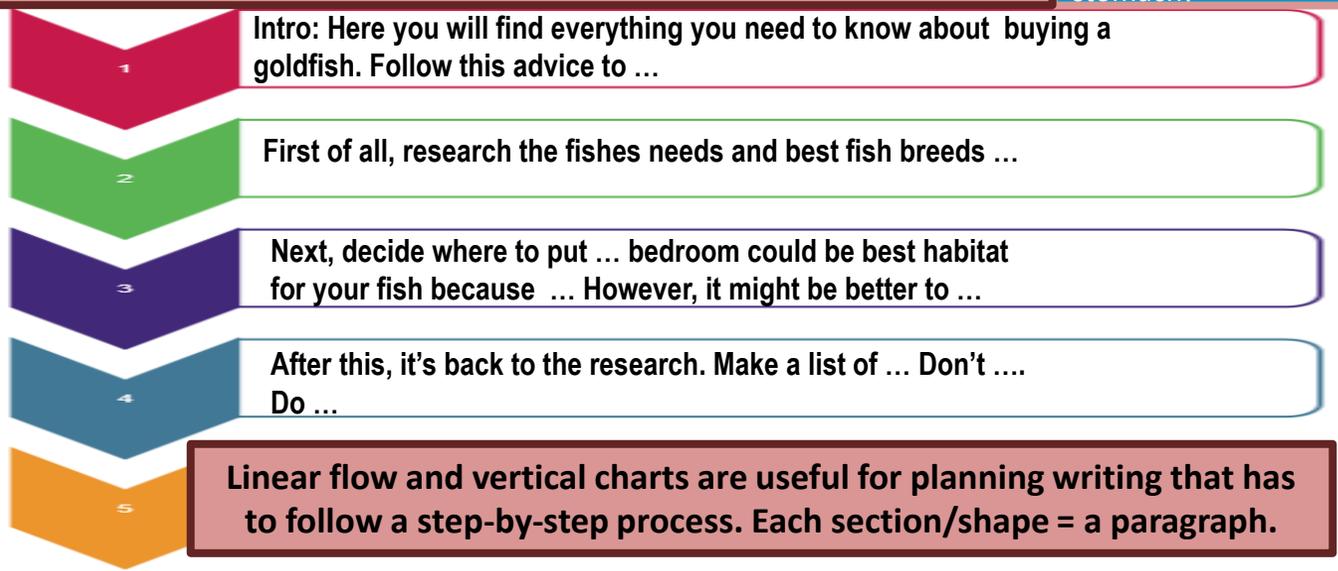


The Grid Plan is good for making sure you include lots of different methods, or to compare two/more things side-by-side. Each row/column = a paragraph.

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!



Most often

Mis^Spelled^A
words

- acceptable
- acquire
- anarchy
- anguish
- apparent
- appearance
- bureaucracy
- committed
- conscientious
- contentious
- deceit
- embarrass
- exhilarate
- fluorescent
- futile
- gauge
- guarantee
- humorous
- indispensable
- linguish
- manoeuvre
- occasionally
- particularly
- plausible
- queue
- reference
- schedule
- successful
- separate
- unnecessary

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.

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

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



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

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



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

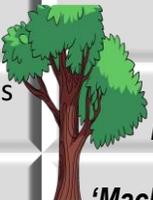


People believed they were part of a strict hierarchy, **The Great Chain of Being**, with God at the top. Kings were thought to have been appointed by **divine right** (selected by God), so higher than the rest of mankind; to question this was to question God himself. King James I (James VI of Scotland)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

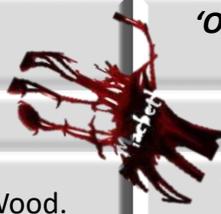
Year 11 Terms 1&2

Macbeth KNOWLEDGE ORGANISER

Scene-by-Scene Summary and Key Quotations:

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

Scene-by-Scene Summary and Key Quotations:

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

The Structure of a Tragedy Play:

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

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

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

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

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

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

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



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

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



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



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



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

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

LOYALTY

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



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

dramatic irony

Dramatic irony is when the audience is aware of something one or more character is not. Duncan trusts Macbeth while the audience know he's plotting his murder.

soliloquy

A soliloquy is a speech said by a character alone on stage. Shakespeare uses Macbeth's soliloquies to reveal his inner torment.

aside

An aside is intended to be heard by the audience, but not heard by other characters nearby on stage. Shakespeare reveals Macbeth's ambitions through asides.

iambic pentameter & blank verse

He writes most of the play in iambic pentameter and blank verse (not rhyming): da-DUM/ da-DUM/ da-DUM/ da-DUM /da-DUM. This controlled meter conveys power and authority.

prose

Normal speech. Shakespeare uses it to show **lack of power** (Lady M's attendants, the Murderers), **loss of formality** (M's letter to LM) or **loss of control** (LM sleepwalking).

trochaic tetrameter

A rhythmic pattern of four 'trochees' per line: DUM-da/DUM-da/DUM-da/DUM-da. He uses this when the witches speak their spells, making it sound like eerie chanting: DOUble/ DOUble/ TOIL and / TROUble

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

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



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



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



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



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

Motifs and symbols



Blood



Dark & Light



Animals



Storms



Children



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

alliteration

A number of words having the same first letter or sound placed close together in a series of words.

allusion

An indirect reference to a person, place, thing or idea of historical, cultural, literary or political significance. The writer would expect the reader to recognise the reference and so understand what's being alluded to.

an Act

A main division of a drama. Shakespeare's plays consist of five acts that are subdivided into scenes.

foil

A secondary character who contrasts with a major character and, in so doing, highlights various facets of the main character's personality.

foreshadow

A hint of what is to come in the story. This is often used to keep the audience in a state of expectancy.

a Scene

A small unit of a play in which there is no shift of locale or time.

metaphor

A figure of speech in which a word or phrase is applied to an object or action to which it is not literally applicable but suggests a comparison. Unlike similes, metaphors do not use 'like' or 'as'.

simile

A figure of speech that states a comparison between two unlike things which are similar in one aspect. Similes are introduced by 'like' or 'as'.

symbolism

One object representing another to give an entirely different meaning that is much deeper and more significant.

personification

A figure of speech in which a thing, an idea or an animal is given human attributes.

repetition

Using a word or phrase more than once.

Key events (AO1)	Associated quotes
<p>A miserly old man called Ebenezer Scrooge is mean, selfish and cruel to all around him. One night when returning home he is visited by the ghost of his old friend and business partner Jacob Marley. Marley tells Scrooge he must change his ways and live a life of generosity or he will be punished and forced to walk the earth forever more. Scrooge is visited by three spirits (The Ghosts of Christmas Past, Present and Yet-to-Come) who all show him visions of his life and how his life will be if he doesn't change. Filled with regret, sorrow but a determination to change, Scrooge is returned to his home on Christmas Day where he sets out to change his life and use his wealth to help others. He goes on to embody the Christmas spirit better than anyone else.</p>	
<p>Stave 1: Marley's Ghost</p>	
<p>We discover Jacob Marley, who was Ebenezer Scrooge's business partner, died seven years ago. Scrooge is working in his counter-house, along with his clerk - Bob Cratchit. Scrooge's nephew Fred arrives and wishes him a Merry Christmas, but Scrooge dislikes his enthusiasm for the festive and answers: "Bah! Humbug!" Scrooge argues that Christmas is like any other day when there is money to be paid through bills. Fred has a different attitude, proclaiming Christmas to be a "as a good time: a kind, forgiving, charitable, pleasant time: the only time I know of, in the long calendar of the year, when men and women seem by one consent to open their shut-up hearts freely." Fred invites his uncle to visit him and his friends for Christmas, but Scrooge refuses. Two portly gentlemen then come into Scrooge's counter house and ask Scrooge if he would donate money for the poor. Scrooge asks them if the prisons and workhouses are still open and dismisses them - saying he wishes to donate nothing and to be left alone. The weather is getting colder and colder. Outside, a Christmas caroler tries to sing a song through the keyhole of Scrooge's office door but Scrooge scares him off. After closing up the counting office and before he goes home, Scrooge tells his clerk Bob Cratchit that he wants him to work on Christmas Day, but eventually he is persuaded to allow him to have the day off - but Cratchit must turn up all the earlier the next day.</p>	<p>"Scrooge was his sole executor, his sole administrator, his sole assign, his sole residuary legatee, his sole friend and sole mourner."</p> <p>"Bah! Humbug!"</p>
<p>Scrooge continues his usual routine of having dinner in a tavern and then returns home through awful, foggy London streets. As he arrives at his front door he thinks he sees Marley's face on the door knocker until it turns back into an ordinary knocker. He is surprised but refuses to accept what he has seen. Scrooge thinks he sees a hearse going up the stairs in front of him. He rushes into his room and locks the door behind him, putting on his dressing gown as well. He eats gruel by the fire, but suddenly the carvings on the mantelpiece change into pictures of Jacob Marley's face. Again, Scrooge is reluctant to accept what he has seen. All of the bells and in the room start ringing and Scrooge hears footsteps coming up the stairs. A ghost floats through the door - it is Jacob Marley - see-through and covered up in chains, cash-boxes, keys, padlocks, ledgers, deeds and heavy purses wrought in steel. Scrooge tries to deny Marley's Ghost exists, claiming he is just a symptom of food poisoning. The ghost explains to Scrooge that he has spent seven years wandering the world in his chains as a form of punishment for the way he lived his life. Marley's Ghost tells Scrooge he has come back to save Scrooge from the same fate he has suffered. He informs Scrooge that he will be visited by three different spirits over the next three nights. The first one will come at one o'clock, the next the same time and the final one will be there on the last stroke of midnight. The ghost moves towards Scrooge's window which opens by itself. Scrooge is terrified and full of fear. The ghost tells Scrooge to look out of the window and he sees many spirits, all covered in chains. They are all shouting about how they did not lead caring and honourable lives and did not help others. Marley disappears and Scrooge goes back to bed and falls asleep.</p>	<p>"Are there no prisons?" asked Scrooge.</p> <p>"Plenty of prisons," said the gentleman, laying down the pen again.</p> <p>"As a good time: a kind, forgiving, charitable, pleasant time" Fred on Christmas</p>



<p>Stave 2: The First of the Three Spirits</p> <p>Scrooge wakes up at midnight and is confused. When he went to sleep it was 2am! To begin with he believes he must have slept through an entire day or it's noon and the sun isn't out. He remembers that Marley's Ghost told him the first spirit will arrive at 1am. Terrified and anxious, Scrooge waits. At one o'clock Scrooge's curtains on his bed are blown away by an unusual, child-like character who exudes wisdom and experience. The spirit has a cap to cover the light that comes from its head. Scrooge is taken to the rural countryside where he was born and raised. He visits his old school, sees his young friends and remembers many parts of his childhood. The effect of seeing these memories makes Scrooge cry. The ghost moves Scrooge into the school where a lonely little boy - Scrooge as a youngster - is all alone at Christmas time. Scrooge and the ghost continue to visit different Christmases of the past and eventually we see a little girl - Scrooge's sister Fan - who runs into the room and tells Scrooge she has come to take him home. She says their father has allowed Ebenezer Scrooge to come home. Young Scrooge hugs his sister. Scrooge reveals to the ghost that Fan died years ago and she is the mother of his nephew Fred. The Ghost of Christmas Past and Scrooge visit other Christmases and see a party being held by Fezziwig, a merchant who had Scrooge as an apprentice when Ebenezer was younger. Scrooge sees an older version of himself in conversation with Belle - his fiancée. She tells Scrooge she is ending their engagement as his love of capital gain and greed has ruined their love that used to be everything to Scrooge. Scrooge is taken to see a more recent Christmas where an older Belle talks to her new husband about her former fiancé Scrooge. Her husband says that Scrooge is alone in the world. Scrooge is struggling to deal with these scenes and begs the ghost to allow him to go back home. Full of anger, sadness and loss, Scrooge grabs the ghost's cap and pulls it over the child's head, and the light begins to diminish. By the time he gets to the ground, Scrooge finds himself back in his bedroom, where he goes to bed again and falls asleep straight away.</p>	<p>"A solitary child, neglected by his friends, is left there still." Scrooge said he knew it. And he sobbed.</p> <p>"Scrooge [...] wept to see his poor forgotten self as he used to be."</p> <p>"Spirit!" said Scrooge in a broken voice, "remove me from this place."</p>
<p>Stave 3: The Second of the Three Spirits</p> <p>In the distance the church clock strikes one and Scrooge wakes up in shock. He is glad to be awake and is waiting for the second spirit to arrive, but none seems to come. Scrooge waits 15 minutes and then suddenly a bright light beams down onto him. Scrooge moves into his other room where he finds the second spirit waiting for him. The Ghost of Christmas Present is very different to the first spirit. He is a giant, covered in green robes and sits on top of a throne made of a huge Christmas feast. He has a booming, loud voice and tells Scrooge he has more than 1800 brothers (one for each Christmas). He lives for only a single day. The spirit tells Scrooge to touch his robe, and when he does so the feast and room disappear. Scrooge finds himself in the middle of London on Christmas morning. It is very busy and full of life. He sees all sights of a joyful Christmas day as people shovel snow, take presents to each other and say to each other: "Merry Christmas!" The ghost and Scrooge then move on to visiting Bob Cratchit's family - remember that Cratchit is Scrooge's clerk. Mrs Cratchit prepares a Christmas meal of goose and all the trimmings. They are poor and this meal is one of the few treats they set money aside for. The eldest daughter Martha comes back from her job at the milliner's. Peter, the eldest son, wears a stiff-collared shirt which he received from his father. Bob arrives carrying his young son Tiny Tim on his shoulders. Tiny Tim has a debilitating condition that makes him very weak. The family is happy even though they have little food to celebrate Christmas with. Scrooge begs the Ghost to know whether Tiny Tim will survive. The spirit replies that given the current conditions in the Cratchit house, there will be an empty chair at next year's Christmas dinner. They move on to other people celebrating Christmas, including an isolated community of miners, lighthouse workers celebrating, and a crew on board a ship. Next they move on to Fred's Christmas party, where Scrooge enjoys watching the many party games, although none of the party guests can actually see him. As the night carries on, the Ghost of Christmas Present grows older. Lastly they come to a huge expanse of emptiness. Scrooge sees a pair of starving children who travel with the Ghost beneath his robes; their names are Ignorance and Want. Scrooge inquires if nothing can be done to help them. Mockingly, the ghost echoes Scrooge's own words from Stave 1: "Are there no prisons? Are there no workhouses?" The spirit vanishes as the clock strikes midnight and Scrooge sees a strange hooded ghost moving towards him.</p>	<p>"Oh, a wonderful pudding! "</p> <p>Fred on Scrooge: "I mean to give him the same chance every year, whether he likes it or not, for I pity him."</p> <p>"Are there no prisons?" said the Spirit, turning on him for the last time with his own words. "Are there no workhouses?"</p>



Stave 4: The Last of the Three Spirits

This new phantom is very different to the other spirits. He wears a black hooded robe and moves towards Scrooge. Scrooge cannot help but kneel before him and asks if he is The Ghost of Christmas Yet to Come. The phantom says nothing and Scrooge feels terrified. Scrooge is still hugely affected by the visits of the last two spirits and asks the phantom to share his lesson so he can avoid the fate of Jacob Marley. The ghost takes Scrooge to the London Stock Exchange, where he overhears a group of businessmen discussing the death of a wealthy man. Next they see a pawn shop in a poor part of London, where a group of low-lives sell personal items taken from a dead man.

Scrooge sees the body of the dead man all alone and demands to be shown someone who feels sorry for this man who has died. The ghost shows the dinner table of a poor family, where a husband and wife express relief at the death of a man to whom they owe money. They move on to the Cratchit household again, where the family struggles to cope with the death of Tiny Tim. Scrooge is desperate to know the identity of the dead man, struggling to understand what point or lesson the ghost is trying to make. Suddenly, he finds himself in a rundown churchyard where the spirit points him toward a freshly dug grave. Scrooge approaches the grave and reads the inscription on the headstone: EBENEZER SCROOGE. Stunned, Scrooge grabs at the spirit and begs him to stop the events of his nightmarish vision. He promises to honour Christmas within his heart and to live by the lessons of Past, Present, and Future. The spirit's hand begins to tremble, and, as Scrooge continues to ask for mercy, the phantom's robe shrinks and collapses. Scrooge finds himself returned to his bed.

"He felt that [...] its mysterious presence filled him with a solemn dread."

"I will honour Christmas in my heart, and try to keep it all the year."

"My little, little child!" cried Bob. "My little child!"

Stave 5: The End of It

Scrooge realises he has a chance to live the rest of life in a way that will make him truly happy. He praises of the three spirits and the ghost of Jacob Marley. When he realises he has been returned back to Christmas morning, he begins shouting "Merry Christmas!" as loud as he can. Full of energy and excitement, Scrooge struggles to dress properly and dances while he shaves. As quickly as he can, Scrooge runs into the street and offers to pay the first boy he meets a colossal sum to deliver a great Christmas turkey to Bob Cratchit's family. He meets one of the portly gentlemen who in Stave 1 asked for donations to the poor. Scrooge apologises for his rudeness, and whispers into the man's ear the massive sums of money he promises to give to charity. Scrooge moves on to Fred's Christmas party and shows such joy and enthusiasm that the other guests cannot understand Scrooge's sea change in behaviour.

The next morning, Scrooge arrives at the office early and decides to put on his usual stern and serious expression when Bob Cratchit enters eighteen and a half minutes late. Scrooge, pretending to be disgusted, begins to criticize Bob, before suddenly telling Bob he will give him a large raise and will assist his family as much as he can. Bob cannot believe it, but Scrooge promises to keep his word. We are told by the narrator that Scrooge is as good as his word: He helps the Cratchits and becomes a second father to Tiny Tim who does not die as predicted in the ghost's dreadful vision. Many people in London are puzzled by Scrooge's new behaviour, but Scrooge merely laughs at them. Scrooge brings the Christmas spirit into every day, respecting the lessons of Christmas more than any man alive. The narrator finishes the story by saying that Scrooge's words and thoughts should be shared by of all of us ... "and so, as Tiny Tim observed, God bless us, Every one!"

"I don't know how long I've been among the Spirits. I don't know anything. I'm quite a baby."

"I'll send it to Bob Cratchit's!" whispered Scrooge, rubbing his hands, and splitting with a laugh.



THE CHARACTERS



	Character summary	Key Quotes	Associated themes or ideas:
The Ghost of Christmas Past	The first of the three spirits to visit Scrooge, The Ghost of Christmas Past takes Scrooge on a journey through his memories – ones he enjoys remembering and others that bring up emotions that he has long since buried. We see his absolute joy at seeing Fan and Fezziwig again, but his immense sorrow and regret for what happened between him and Belle. The Ghost is presented as very unusual looking and re-reading and re-analysing the use of description of the character would be very useful to you as part of your revision.	<p>"It wore a tunic of the purest white, and round its waist was bound a lustrous belt, the sheen of which was beautiful."</p> <p>"Why did his cold eye glisten, and his heart leap up as they went past? Why was he filled with gladness when he heard them give each other Merry Christmas, as they parted at cross-roads and-by ways, for their several homes? What was merry Christmas to Scrooge? Out upon merry Christmas! What good had it ever done to him?"</p>	Supernatural Memory and the Past Compassion and Forgiveness Regret Sorrow Guilt and Blame Choice Isolation Christmas Spirit Family Emotional Warmth Time
The Ghost of Christmas Present	The second of the three spirits that is presented a giant representing all that is great and good about Christmas Day. He is more dominating than the previous spirit and mocks Scrooge's own words from Stave 1 when Scrooge previously asked about prisons and workhouses being in operation. This spirit shows to Scrooge how everyone across society takes joy from Christmas and celebrate together, they do not isolate themselves like Scrooge has done. In particular, the visit to the Cratchits and Scrooge seeing the love for Tiny Tim hits him hard.	<p>"I am the Ghost of Christmas Present," said the Spirit. "Look upon me."</p> <p>"[Tiny Tim] told me, coming home, that he hoped the people saw him in the church, because he was a cripple, and it might be pleasant to them to remember upon Christmas Day, who made lame beggars walk, and blind men see."</p>	Christmas Spirit Family Compassion and Forgiveness Isolation Emotional Warmth Supernatural Choice Guilt and Blame Time Self-awareness
The Ghost of Christmas Yet-to-Come	The final spirit is a dark, silent phantom that terrifies Scrooge and in some ways resembles the Grim Reaper, a classical symbol of death. This spirit shows Scrooge how the death of an isolated and friendless man sees vagabonds still his personal items, people celebrating his death and others suffering at his lack of compassion in life. Finally, the Ghost shows Scrooge his own gravestone and it is as this point that Scrooge has his epiphany.	<p>"He lay, in the dark empty house, with not a man, a woman, or a child, to say that he was kind to me in this or that, and for the memory of one kind word I will be kind to him."</p> <p>"We may sleep to-night with light hearts, Caroline."</p>	Supernatural Regret Sorrow Choice Time Guilt and Blame Transformation Emotional Coldness Isolation Death Family

	Character summary	Key Quotes	Associated themes or ideas:
Jacob Marley	Scrooge’s former business associate and friend. Marley passed away seven years ago on Christmas Eve. Marley inspired Scrooge to be selfish, greedy and utterly ruthless when dealing with other people. However, it is Marley that comes back to Scrooge as a ghost to tell him to change his ways or end up with the same fate as him, cursed to forever travel the world filled with regret and sorrow.	"It is required of every man," the Ghost returned, "that the spirit within him should walk abroad among his fellowmen, and travel far and wide; and if that spirit goes not forth in life, it is condemned to do so after death. It is doomed to wander through the world -- oh, woe is me! -- and witness what it cannot share, but might have shared on earth, and turned to happiness!"	Christmas Spirit Regret Sorrow Greed Supernatural Choice Time Guilt and Blame Emotional Coldness Memory and the Past Compassion and Forgiveness
Ebenezer Scrooge	The central protagonist (main character) of the novella, Scrooge is a selfish, greedy but ultimately isolated elderly man that has spent much of his life hoarding his wealth away from others despite being surrounded by poverty and suffering. He is initial cruel and callous to everyone else before the visits of Marley’s Ghost and the Three Spirits bring about his epiphany and the change in his character. Through the help of the narrator we follow Scrooge on his journey through his own past, present and potential future and celebrate his embracing of the Christmas spirit at the end.	“Bah! Humbug!” "Since you ask me what I wish, gentlemen, that is my answer. I don't make merry myself at Christmas and I can't afford to make idle people merry." "I will honour Christmas in my heart, and try to keep it all the year. I will live in the Past, the Present, and the Future."	Isolation Christmas Spirit Regret Sorrow Greed Choice Guilt and Blame Emotional Coldness Emotional Warmth Catharsis Transformation Memory and the Past Compassion and Forgiveness
Fred	Scrooge’s nephew and the son of Ebenezer’s sister Fan. Fred embodies everything good about Christmas and is filled with joy and happiness everywhere he goes. He is the antithesis of Ebenezer Scrooge. When Scrooge sees Fred spending Christmas with his friends Fred refuses to criticise Scrooge, only saying he pities him. Fred is delighted to see his uncle in Stave 5.	“He had so heated himself with rapid walking in the fog and frost, this nephew of Scrooge's, that he was all in a glow”	Family Christmas Spirit Memory and the Past
Other characters	Bob Cratchit – An honourable man and a wonderful father. Scrooge comes to respect him very much. He is part of the Cratchit family including his wife, Martha, Belinda and Peter. Tiny Tim - Bob’s crippled son who everyone loves and everyone pities. Dickens was arguably trying to evoke immense sympathy from his readers for this weak but wonderful young boy. Tiny Tim survives his illness thanks to Scrooge’s financial help. Fan and Belle – Scrooge’s sister and former fiancée. They represent Scrooge’s past and his regrets. Fezziwig – Scrooge’s old boss who represents the Christmas Spirit. The portly gentlemen – Scrooge is rude to them but apologizes to one of them in Stave 5. They raise money for charity.	"I have come to bring you home, dear brother!" said the child, clapping her tiny hands, and bending down to laugh. Fan (Stave 3) "God bless us every one!" said Tiny Tim, the last of all. (Stave 3)	Christmas Spirit Family Memory and the Past Guilt and Blame Emotional Warmth Isolation Regret Sorrow Transformation Charity

Form (AO2)	Why is this significant?
Allegory	An allegory is a type of story that has a hidden meaning, where characters represent bigger themes and ideas. A Christmas Carol represents turning away from greed, selfishness and an obsession with money and turning towards helping others and using your wealth to good for friends, family and society.
Frame Story	A Christmas Carol begins with a narrator introducing the story and finishes with the narrator summing it up and ending it, this is known as a 'frame story'. At the beginning Scrooge's character is established by the narrator and at the end his dramatic shift in personality is explained by the narrator as well. In between these two parts of the plot we find out other stories from Scrooge's past, present and future in order for him to have his epiphany and change.
Cyclical Structure	A cyclical structure to a text is where it begins and ends in the same way. In Stave 1 Scrooge is rude and unkind to Bob Cratchit, two portly gentleman raising money for charity, and his nephew Fred. In the final stave he sees all these people again and is able to apologise and show them his transformation. It's a structure that works very well for emphasising Scrooge's change in personality.
'Staves' instead of 'Chapters'	A stave could refer to a wooden plank used to help in construction (a bit like scaffolding). It can also refer to a musical staff or symbol - used with sheet music. Whilst Dickens most likely used 'staves' instead of chapters in A Christmas Carol because he wanted to associate the plot with a literal 'Christmas Carol' or song, it could be said that each chapter helps in the construction of Scrooge as a transformed man.

Linguistic devices (AO2)	Why is this significant?
Pathetic fallacy	This is where a writer gives human feelings to non-human objects or places to get across a tone or emotion to readers. For instance, the weather is very foggy and dingy as Scrooge walks through London in Stave 1, indicating mystery and a lack of harmony in Scrooge's world. In Stave 1 he is surrounded by the "Piercing, searching, biting cold", echoing Scrooge's cold heart and lack of human warmth. By Stave 5 after Scrooge has transformed into a joyful human being the weather has also changed: "No fog, no mist; clear, bright, jovial, stirring, cold; cold, piping for the blood to dance to".
Epiphany	An epiphany is a sudden realisation of something. Scrooge has an epiphany as he reveals after seeing his own gravestone that he must love with Christmas in his heart (Stave 5). Because of this epiphany he is then able to go out at the end of the text and share his wealth with others and actually feel happy.
Symbols	Each of the ghosts acts as a symbol for something much greater. The Ghost of Christmas Past embodies Scrooge's regrets that he changed so much from his past, that he did not make the most of his family and that he has lost his fiancée Belle. The Ghost of Christmas Present is a symbol of the happiness and joy all people feel at Christmas despite their often harsh and deprived conditions. The Ghost of Christmas Yet-to-Come symbolises what will happen to Scrooge and his friends and family if he does not change.
Metaphors and Similes, Personification, Parallelism, and Descriptive Language	Dickens needs to use a lot of descriptive language to get across not only the Christmas London settings but also the unusual spirits that visit Scrooge. Marley's Ghost needs to be terrifying, the Ghosts of Christmas Past and Present are not human but supernatural. He uses numerous metaphors and similes to get across both characters and setting to his readers. Dickens was a master of description and this shines through in A Christmas Carol. Metaphor example: "But he [Scrooge] was a tight-fisted hand at the grindstone" Simile example: "It was a strange figure -- like a child: yet not so like a child as like an old man..."



Context key idea (AO3)	Why is this significant?
<p>Philanthropy and Dickens' Sense of Social Justice</p> 	<p>Although now in Britain we have what is known as the welfare state (which includes support for the neediest including the NHS, social housing, unemployment benefits and more), there is was little government support for the poorest in society during the Victorian era. Many wealthy Victorians who were socially conscious (meaning they felt a responsibility to help those who could not help themselves) became heavily involved in philanthropy. They used their own money to give to charities and to set up their own charities to help those that needed help. Charles Dickens was one such person and he used his own money to help others, as well as working with wealthy benefactors to make changes in society, too. Dickens was philanthropic advisor to Angela Burdett-Coutts (1814-1906), known as 'the richest heiress in all England'. Dickens used her wealth to give to social causes as well. In 1847 her money was used to create Urania Cottage for homeless women. Under his guidance she also supported the Ragged School Union, which was founded in 1844 to provide free education to poor children by Lord Shaftesbury. Moreover, Dickens used his writing to act as a social commentator – bringing to the attentions of his middle and upper class readers the need for social upheaval. Some of his characters play a positive philanthropic role, such as Mr Brownlow in Oliver Twist, the Cheeryble brothers in Nicholas Nickleby, and Mr and Mrs Garland in The Old Curiosity Shop.</p>
<p>Victorian Deprivation</p>  	<p>Workhouses existed well before the Victorian era, but the 1834 Poor Law Amendment Act meant it a legal requirement for all able-bodied people to work in workhouses to get their 'poor relief' (financial support). Before this time the poorest in society had to rely on charity and hand outs to survive. However, Victorians saw poverty as a kind of illness or disease in society that needed to be eradicated. Governments were keen to move the poorest indoors, away from everyone. However, those in charge of the country made workhouses places to be feared in order to prevent 'lazy' citizens thinking it was an easy option instead of going out to find work. Workhouses meant the poorest would work for food and a place to sleep, but many people saw it as a form of slavery. Workhouses also took in orphans, abandoned children, the mentally ill, the disabled, unmarried mothers and the elderly. Despite their age or abilities, all were required to work long and demanding hours. Whenever someone entered a workhouse they were stripped, bathed whilst being supervised and then provided with a uniform. This uniform separated them from the rest of society. If those from workhouses were out in the streets everyone else would instantly know they were in a workhouse. Often children were 'hired out' to wealthy business men and made to work in awful places such as mines. You were not allowed to try to contact your family and doing so could result in being punished. The standard of education provided was awful and would not help those within the workhouses get out of them. The food given to those in the workhouses was of a poor quality, simple and the same every day. Food was seen as a tool to keep you working, not as something to be enjoyed.</p>

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	3
	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.



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.



Websites to help you with understanding and revision

- HegartyMaths.com
- CorbettMaths.com
- Trafalgar Maths Site
- Maths Genie
- Maths Bot







Rounding to a decimal place (d.p.)

Decimal places are the digits after the decimal point.

3 . 2 6 4

3.264 to 1 dp = 3.3

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

3.264 to 2 dp = 3.26

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

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

Rounding to significant figures (s.f.)

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

7 639 to 1 sf = 8000

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

10 240 to 3 sf = 10 200

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

0.0749 to 2 sf = 0.075

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

Estimation

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

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

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

Keywords:

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

Rounding to the nearest..

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

Example

Round 293 to the nearest 10

The 9 is in the tens column, the number after it is 3 which is less than 5 so we leave the 9 the same.

Answer: **290**

Example

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

Answer: **1 600**

Error Interval and Upper & Lower Bounds

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

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

If 0.6 has been rounded to 1 decimal place.

The error interval is:

$$0.55 \leq x < 0.65$$

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

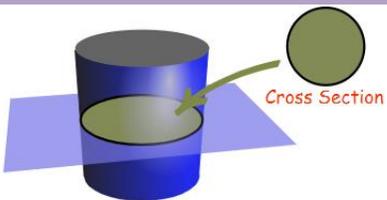
Note: the lower bound inequality can be 'equal to', but the upper bound cannot be 'equal to'.

< less than
≤ less than or equal to
> greater than
≥ greater than or equal to
= equal to
≠ not equal to

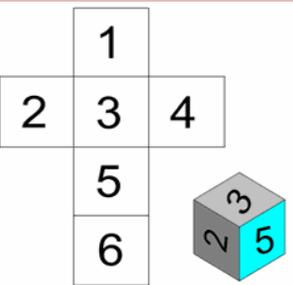
Rounded Value ≤ actual value < Rounded value
- half a unit + half a unit

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

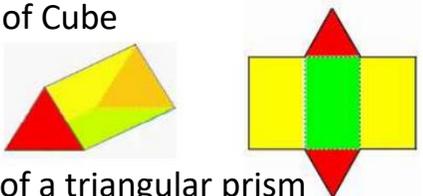
A prism is a 3D shape which has a continuous cross-section.



The surface area of an object is the sum of the area all of its faces. It is measured in units squared e.g. cm².



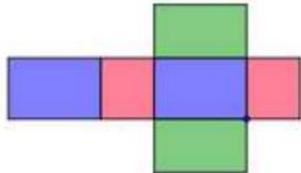
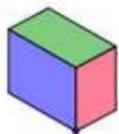
Net of Cube



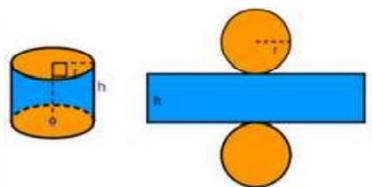
Net of a triangular prism

Know the names

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



Net of a cuboid

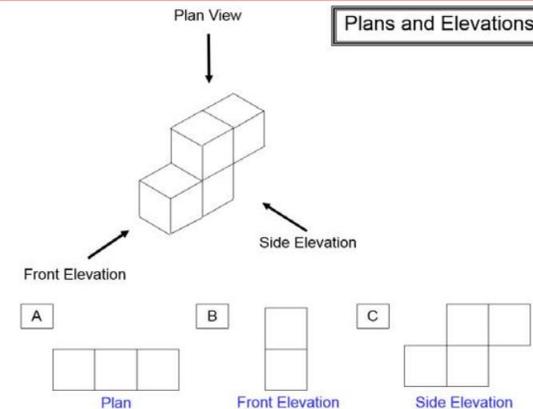


Net of a cylinder

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

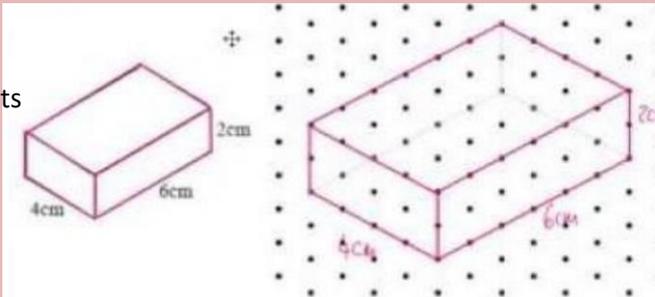
Plans and Elevations

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



Isometric Drawing

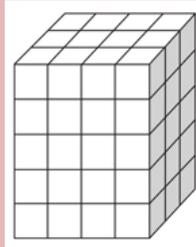
A method for visually representing 3D objects in 2D. You might be asked to draw the 3D object from the plan view and elevations.



Volume

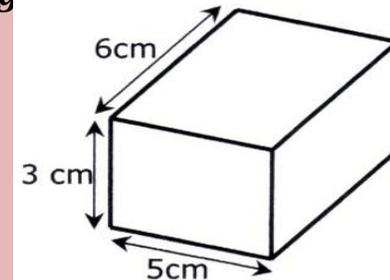
$$V = \text{Length} \times \text{Width} \times \text{Height}$$

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



Units: mm³, cm³, m³ etc.

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



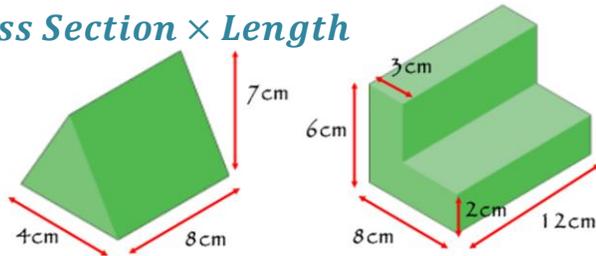
$$\text{volume} = 6 \times 5 \times 3 = 90 \text{ cm}^3$$

Volume of Prisms

HegartyMaths clip 570-571

$$V = \text{Area of Cross Section} \times \text{Length}$$

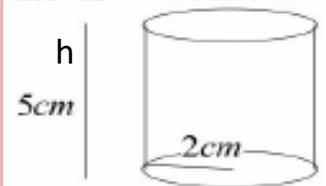
$$V = A \times L$$



Volume of Cylinder

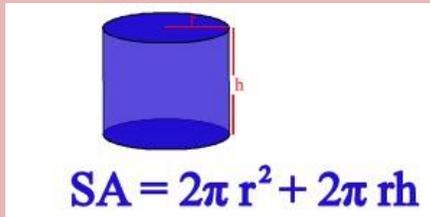
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$$V = \pi r^2 h$$



$$V = \pi(4)(5) = 62.8\text{cm}^3$$

Surface area of Cylinder

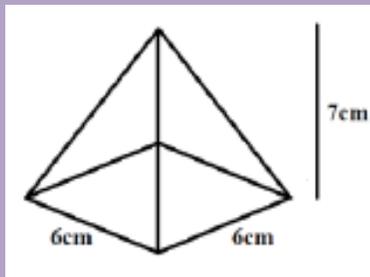


A cylinder is a prism with the cross section of a circle.

Volume of Pyramid

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

where B = **area** of the base

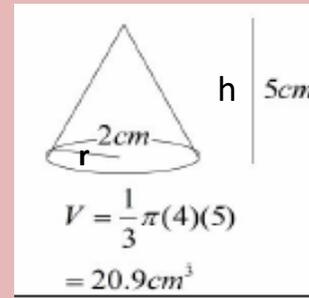


$$V = \frac{1}{3} \times 6 \times 6 \times 7 = 84\text{cm}^3$$

HegartyMaths clip 579

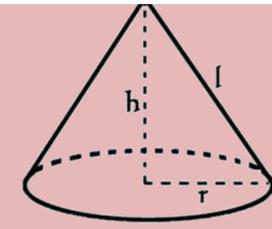
Volume of Cones

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



HegartyMaths clip 576 -577

Surface Area of Cones



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

l = length of the slope

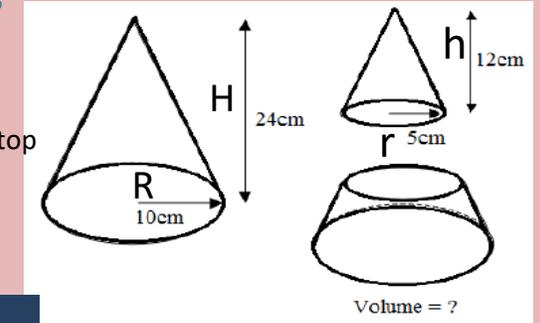
Frustrums

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

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

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

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

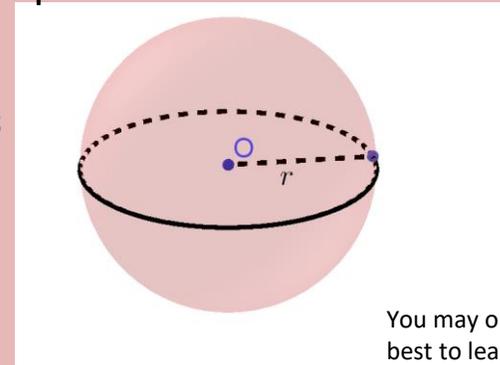


HegartyMaths clip 578

Volume of Sphere

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

r is radius



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

HegartyMaths clip 572 – 574, 586

Surface area of Sphere

$$SA = 4\pi r^2$$

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

HegartyMaths clip 580-581, 588

Multiples

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

Examples

- List the first 5 multiples of 4.
 Answer: 4, 8, 12, 16, 20
- What is the 7th multiple of 5? = 35

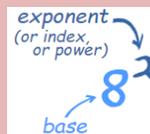
Common multiples of 2 or more numbers are multiples that appear in BOTH times tables.

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

Example	Multiples of 3	Multiples of 4
What is the Lowest Common Multiple of 3 and 4? = 12	3	4
	6	8
	9	12
HegartyMaths clip 35	12	16

Exponent or Power or Index Number

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

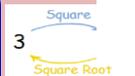


Examples

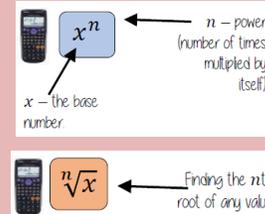
- $5^2 = 5 \times 5 = 25$
- $4^3 = 4 \times 4 \times 4 = 64$
- $2^4 = 2 \times 2 \times 2 \times 2 = 16$

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

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



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

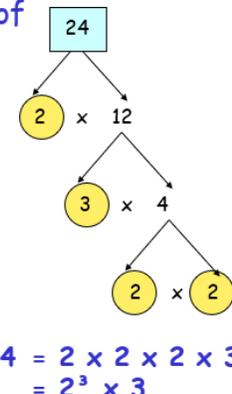


Squares		
$1^2 = 1 \times 1 = 1$	$5^2 = 5 \times 5 = 25$	$9^2 = 9 \times 9 = 81$
$2^2 = 2 \times 2 = 4$	$6^2 = 6 \times 6 = 36$	$10^2 = 10 \times 10 = 100$
$3^2 = 3 \times 3 = 9$	$7^2 = 7 \times 7 = 49$	$11^2 = 11 \times 11 = 121$
$4^2 = 4 \times 4 = 16$	$8^2 = 8 \times 8 = 64$	$12^2 = 12 \times 12 =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

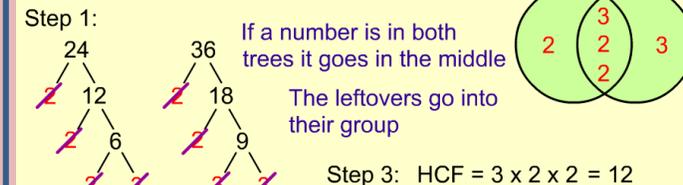
Square Roots		
$\sqrt{1} = \pm 1$	$\sqrt{25} = \pm 5$	$\sqrt{81} = \pm 9$
$\sqrt{4} = \pm 2$	$\sqrt{36} = \pm 6$	$\sqrt{100} = \pm 10$
$\sqrt{9} = \pm 3$	$\sqrt{49} = \pm 7$	$\sqrt{121} = \pm 11$
$\sqrt{16} = \pm 4$	$\sqrt{64} = \pm 8$	$\sqrt{144} = \pm 12$

Write 24 as the product of its prime factors

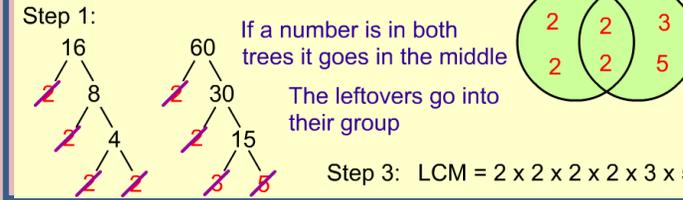
- Find two numbers which multiply together to make the number
- Circle any prime factors
- Continue to break down any factors until they are prime factors.
- Write the original number as the product of its prime factors
- Can you simplify using index notation?



Example: Find the HCF of 24 and 36



Example: Find the LCM of 16 and 60



Standard Form multiplying and dividing

Multiply: Multiply the numbers and add the powers.
 $(1.2 \times 10^3) \times (4 \times 10^6) = 8.8 \times 10^9$

Divide: Divide the numbers and subtract the powers.
 $(4.5 \times 10^5) \div (3 \times 10^2) = 1.5 \times 10^3$

Keywords:

- Standard (index) Form:** A system of writing very big or very small numbers
- Commutative:** an operation is commutative if changing the order does not change the result.
- Base:** The number that gets multiplied by a power
- Power/exponent:** – or the number that tells you how many times to use the number in multiplication
- Indices:** The power or the exponent.
- Negative:** A value below zero..
- Coefficient:** The number used to multiply a variable

Standard form

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

HegartyMaths clips 122 to 127

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

Example

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

24 and 30

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

HegartyMaths clip 31-32

Adding and subtracting Standard form

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

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

HegartyMaths clip 122 to 127

Year 11 Term 2 Indices and Surds

Key Words

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

Skills required

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

Index Laws

$$a^n \times a^m = a^{n+m}$$

$$a^n \div a^m = a^{n-m}$$

$$(a^n)^m = a^{nm}$$

$$a^0 = 1$$

$$a^{-n} = \frac{1}{a^n}$$

$$a^{\frac{n}{m}} = \sqrt[m]{a^n}$$

HegartyMaths
clips 173 to 175

Remember
 $a = a^1$

Surds

Examples and Non-Examples

$\sqrt{5}$ ✓ $\sqrt{4}$ ✗ (this can be simplified to 2, which is a rational number)
 $\sqrt{2}$ $5\sqrt{6}$ $3\sqrt{2}$ (this can be simplified to 3, which is a rational number) $3\sqrt{27}$
 $\sqrt{3}$ $(\sqrt{5})^2$ (this can be simplified to 5, which is a rational number)
 $\sqrt{11}$ $\sqrt{197}$

Multiplying & Dividing Surds

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

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

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

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

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

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

Dividing Surds

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

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

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

HegartyMaths clips
111 to 119

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

Example 1

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

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

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

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

Example 2

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

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

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

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

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

Simplifying Surds

Method 1

Simplify $\sqrt{24}$

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

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

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

Simplify $\sqrt{96}$

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

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

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

Method 2

Simplify $\sqrt{24}$

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

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

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

Simplify $\sqrt{96}$

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

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

What do I need to be able to do?

- Use fractions and percentages to describe a proportion of an amount
- Calculate percentage increases and decreases using multiplication
- Solve problems involving percentage change including repeated proportional change
- Find the original value of a quantity after a percentage increase or decrease
- Set up solve and interpret growth and decay problems including compound interest

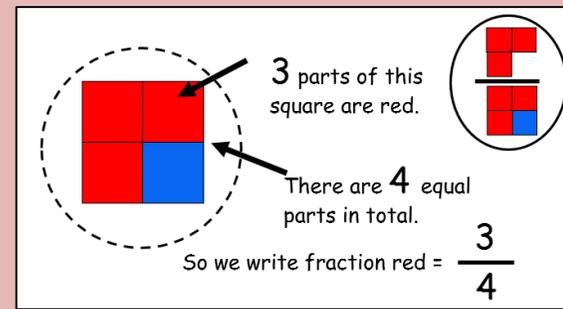
- Divide a quantity in a given ratio and reduce a ratio to its simplest form
- Calculate unit ratios and recognise scale factors and maps scales as a unit ratio

- Understand direct proportion in “real life” scenarios such as recipes, best buys, maps scales and compound measures and use proportionality to solve problems
- Use scale factor to convert between lengths on maps and scale diagrams and distances they represent
- Use, calculate convert between standard units of measure and compound units
- Solve direct and indirect proportion problems
- Describe direct and indirect proportion relationships using equations
- Recognise graphs showing direct and indirect proportion

Ratio, Proportion and Proportionality

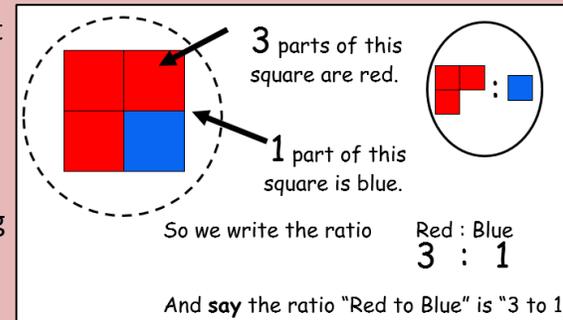
Key terms:

Proportion: a proportion of an amount can be expressed as a **fraction, decimal** or **percentage**. A proportion compares the parts into which an object is divided with total parts i.e. the whole

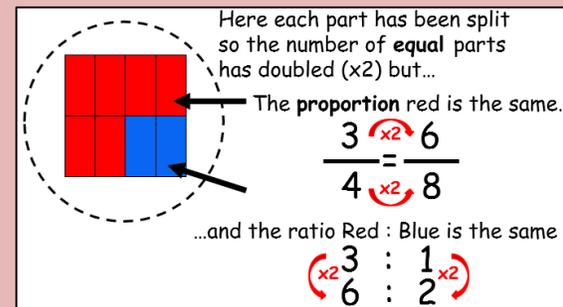


Previous learning: Year 9 KO Term 1&2 Fractions decimals and percentages (Hegarty maths Lesson 52-87)

Ratio: a ratio shows the relationship between the **parts** into which an object has been divided.
A ratio compares **part to part** (note: ratios are written with a colon (part : part) which is said as the “to”)
Since the ratio only gives information about the relationship between the parts, the total number of equal parts can be calculated by adding these parts together.



Proportionality – pairs of values are **in proportion** if the **multiplicative relationship** between them is the same.
Multiplicative relationships are only the same if **all elements have been multiplied by the same factor**.
(Scale factors are most correctly given as a **multiplier** but as multiplying and dividing are inverse operations, dividing by the same number will also mean values are in proportion)
Equivalent fractions and ratios can be calculated like this.



Direct Proportion Two sets of values are in direct proportion when they **increase (or decrease) by the same ratio (multiplier)**. Direct proportion relationships are commonly used in every day life – for instance calculating the cost of buying multiple single items; scaling up a recipe, calculating distances from maps scales; and using compound measures

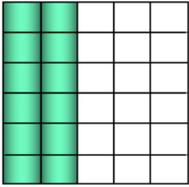
Indirect or Inverse Proportion Two sets of values are in indirect proportion if as **one increases, the other decreases** by the opposite proportion so if 2 people build a wall in 5 days, it will take 4 people 2½ days (double workers half the time) but 1 person 10 days (half workers double time)

Express a quantity as a proportion of another

Hegarty : 97, 759-64

Key fact: fractions show part "out of" a whole – so start by rewriting any quantity comparison as a fraction...

Example 1: What proportion of this diagram is shaded?



Answer
 $\frac{12}{30} = 40\%$

Give your answer as a percentage

Step 1 : Consider proportion: 12 parts out of 30 total

Step 2 : Write as a fraction: $\frac{12}{30}$ and simplify $\frac{12^{(+3)}}{30^{(+3)}} = \frac{4}{10}$

Step 3 : Calculate as a percentage

either rewrite "out of 100" $\Rightarrow \frac{4}{10} \times 10 = \frac{40}{100}$

or find proportion of 100% $\Rightarrow \frac{4}{10} \times 100\%$

Remember: Units of measure **must be the same** when writing one quantity as a proportion of another

Example 2: What proportion of 12metres is 150cm?

Step 1 : write as values **with the same units**

so use values either in metres: 12m and 1.5m
 or in centimetres: 1200cm and 150cm

Step 2: Write as a fraction and simplify (to correct form)

either $\frac{1.5}{12} \times 100 = \frac{150}{1200} = \frac{15}{120} = \frac{1}{8}$

Check: You have the values correctly written in the fraction: (numerator) compared to or as a proportion of (denominator)

Example 3: Chris earns £320 per week. Rudy earns £400

What proportion of Rudy's wages does Chris earn?

"of Rudy's" means Rudy is denominator: $\frac{320}{400} = \frac{80}{100} = 80\%$

What proportion of Chris's wages does Rudy earn?

"of Chris's" means Chris is denominator: $\frac{400}{320} = \frac{5}{4} = 125\%$

(When comparing quantities percentages can be more than 100% - it just shows that a quantity is bigger than the original)

Finding the change in proportion – finding profit or loss

Key fact: this is in effect the same as expressing a value as a proportion of another. Most care needs to be taken over what value is to be written as a proportion of what.

$$\frac{\text{Change in value}}{\text{Original value}} \times 100\% \quad \text{or simply} \quad \frac{\text{NEW}}{\text{OLD}} \times 100\%$$

Example 1: Sam buys a picture for £1300 and sells it the following year for £1650.

What is his percentage profit (to 2 sig fig)?

Change in value $1650 - 1300 = \pounds 350$;

ORIGINAL value $\pounds 1300$

Percentage change = $\frac{350}{1300} \times 100\% = 27\%$ (2sf)

Example 2: Sam buys a car for £15750 and sells it five years later £10000. What is the percentage change in value of the car?

Change in value $15750 - 10000 = \pounds 5750$;

ORIGINAL value $\pounds 15750$

Percentage change = $\frac{5750}{15750} \times 100\% = 38\%$ (2sf)

Finding a proportion of an amount

Remember: "finding a proportion of" = multiply by proportion

See Previous learning: Year 9 KO Term 1&2
 Fractions decimals & percentages

Example 1: Find $\frac{3}{4}$ of £320

Method 1 - find $\frac{1}{4}$ of amount then scale up ($\times 3$)

$$\frac{1}{4} \Rightarrow \div 4 \quad \rightarrow 320 \div 4 = \pounds 80$$

$$\frac{3}{4} \Rightarrow 3 \times \frac{1}{4} \quad \rightarrow 80 \times 3 = \pounds 240$$

Method 2 - (cancel and) multiply fraction

$$\frac{3}{4} \times \frac{320}{1} = \pounds 240$$

Method 3 - Calculator: find and use the fraction button and multiply

Example 2: Find 60% of £320

Method 1 - **Non-calculator**

combine values for "easy" percentages

$$10\% = \frac{1}{10} \Rightarrow \div 10 \quad \rightarrow 10\% \equiv \pounds 32$$

$$50\% = \frac{1}{2} \Rightarrow \div 2 \quad \rightarrow 50\% \equiv \pounds 160$$

$$60\% = 50\% + 10\% \quad \rightarrow 60\% \equiv \pounds 192$$

Method 2 - **Calculator**

Convert to a decimal and multiply

$$60\% = 0.6 \quad \rightarrow 0.6 \times \pounds 320 = \pounds 192$$

Increase or decrease an amount by a proportion

Hegarty : 89-90

Non-calculator method - find the required proportion then add or subtract from original

Calculator method (%) - convert to a **decimal multiplier** and multiply by the original amount

- **to increase:** decimal multiplier will be > 1 ($100\% + \% \text{increase}$) / 100

- **to decrease:** decimal multiplier will be < 1 ($100\% - \% \text{decrease}$) / 100

Example 1: Increase £450 by 20%

Answer will be $100 + 20\% = 120\%$ of original

Decimal multiplier $\Rightarrow 120/100 = 1.2$

Calculation: $\pounds 450 \times 1.2 = \pounds 540$

Example 2: Decrease £450 by 20%

Answer will be $100 - 20\% = 80\%$ of original

Decimal multiplier $\Rightarrow 80/100 = 0.8$

Calculation: $\pounds 450 \times 0.8 = \pounds 360$

Repeated proportional change

Key fact: This means you need to find a proportion of a proportion of a proportion (of an amount) etc. As “of” means multiply, you will need to multiply all proportions (and the amount) together:

Example 1: There are 800 pupils in the school.
 $\frac{3}{8}$ of pupils are girls. $\frac{1}{2}$ of girls study Spanish.

i) How many girls study Spanish?

Need to find: $\frac{1}{2}$ of $\frac{3}{8}$ of 800 pupils

Calculation: $\frac{1}{2} \times \frac{3}{8} \times 800 = 250$ girls study Spanish

ii) What proportion of pupils are girls who study Spanish?

Either: express as a fraction of an amount: $\frac{250}{800} = \frac{5}{16}$

Or find $\frac{1}{2}$ of $\frac{3}{8} \Rightarrow \frac{1}{2} \times \frac{3}{8} = \frac{3}{16}$

Hegarty : 92

For **repeated percentage change** use decimal multipliers:

Example 2: Sam earns £1500 per month
 Sam spends 85% of this paying bills. His rent bill makes up 70% of all money paid on bills.

i) How much does he pay in rent each month?

Need to find: 70% of 85% of £1500

For percentages - use decimal multiplier

Calculation: $0.7 \times 0.85 \times 1500 = \text{£}892.50$

ii) What proportion of his income goes on rent?

Calculation: $0.7 \times 0.85 = 0.595 = 59.5\%$

Remember: fraction decimal & percentages can be equivalent – so chose “easiest” format:

Example 3: Sam pays £175 in utility bills each month. 80% of this is his gas and electricity of which $\frac{1}{4}$ is for the gas.

i) How much is his **electricity** bill each month?

Need to find: $\frac{3}{4}$ of 80% of £175

Either as fraction: $\frac{3}{4} \times \frac{4}{5} \times \text{£}175 = \text{£}105$

Or % (as multiplier): $0.75 \times 0.8 \times \text{£}175$

ii) What proportion of his bills is for electricity?

Calculation: $0.75 \times 0.8 = 0.6 = 60\%$

Simple Interest and Compound interest

Simple Interest is paid JUST on the original value. The amount received will be the SAME each year.

Example 1: A bank offers simple interest at 3% per annum [means 3% each year]
 Charley invests £500 for 5 years.

i) How much interest does she get in total?

Need to find: 5 x value for 1yr (3% of £500)

Calculation: $5 \times 0.03 \times 500 = \text{£}75$

ii) How much is in her bank account?

Need to find: Add interest to original amount

Calculation: $75 + 500 = \text{£}575$

Compound interest is paid on the original amount AND any interest already received. The amount will increase each year. This is the form of interest most commonly given by banks.

Non Calculator Method

Example 2: A bank offers compound interest at 5% per annum. Charley invests £500.

i) Calculate the value of the investment after 2 years?

Year 1 Need to find: 5% of £500 and add onto £500

Calculation: $\text{Original} + 5\% = \text{£}500 + \text{£}25 = \text{£}525$

Year 2 Need to find: 5% of £525 and add onto £525

Calculation: $5\% \text{ of } \text{£}525 = \text{£}26.25$

Total investment = £525 + £26.25 = £551.25

ii) How much more does she get from compound interest than if simple interest of 5% had been given?

Need to find: 2 x (value of interest for 1 year)

Calculation: $2 \times \text{£}25 = \text{£}50$ interest accrued in 2

years so Charley has **£1.25 more with compound interest than with simple interest only.**

[Exponential Growth and Decay]

Compound interest is normally a calculator paper topic.

Formula for compound interest:

£Original x decimal multiplier^(time)

Example 3: A bank offers compound interest at 3% per annum. Charley invests £500 for 5 years.
 i) How much is Charley's investment after 5 years?

Investment will be worth 103% after 1 year

Need to find: repeated percentage increase of 103%

Calculation: $1.03 \times 1.03 \times 1.03 \times 1.03 \times 1.03 \times 500$

or: $1.03^5 \times 500 = \text{£}579.64$ (2dp)

ii) How much interest did she get?

Need to find: **Subtract** original from total investment

Calculation: $579.64 - 500 = \text{£}79.64$

Note: Compound interest and depreciation (growth and decay) is a form of geometric sequence (General rule : $ar^{(n-1)}$)

Depreciation occurs when a value decreases by given proportion each year – so is calculated like compound interest but percentage decimal multiplier will be less than 1

Example 4: Sam buys a car for £15000.

The car depreciates by 15% each year.

What is the value of the car after 3 years?

Car will be worth 100%–15% = 85% after 1 year

Need to find: repeated percentage decrease of 85%

Calculation: $0.85 \times 0.85 \times 0.85 \times 15\ 000$

or: $0.85^3 \times 15000 = \text{£}9211.88$ (2dp)

Reverse proportions :

Hegarty : 79, 96

Finding the original amount after a proportional change

Key fact: this is the inverse process of finding a proportional increase or decrease.

Original \Rightarrow multiply by proportional change \Rightarrow New value

Original \Leftarrow DIVIDE by proportional change \Leftarrow New value

Eg "Increase £100 by 10%" problem: $\text{£100} \Rightarrow \times 110\% \Rightarrow \text{£110}$

"Find original amount" problem: $\text{£110} \Leftarrow \div 110\% \Leftarrow \text{£100}$

DO NOT just find the same proportion of the new value :-

Increase £100 by 10%: $\text{£100} \Rightarrow \times 110\% \Rightarrow \text{£110}$

but decreasing £110 by 10% $\text{£110} \Rightarrow \times 90\% \Rightarrow \text{£99}$

... does not get back to the same value. Remember proportion is relative to the "total" ... and this is different in both cases!

Fractions:

Example 1: In May, a shop decreased the price of a certain brand of t-shirt by $\frac{1}{4}$ to £15. What was the price of the t-shirts before the decrease?

A decrease by $\frac{1}{4}$ means £16 is $\frac{3}{4}$ of the original

Process to decrease: Original $\Rightarrow \times \frac{3}{4} \Rightarrow \text{£15}$

So reverse to find Original $\Leftarrow \div \frac{3}{4} \Leftarrow \text{£15}$

Calculation: $\text{£15} \div \frac{3}{4} = \text{£15} \times \frac{4}{3} = \text{£20}$

See Year 9 KO

Term 1&2

Divide fractions

= multiply by

reciprocal: KFC"

Percentages:

(Calculator

Method)

Example 2: In May, a shop increased its sales income by 15% to £1840 per month. What was its monthly sales before the increase?

An increase of 15% means £1840 is 115% of original

Process to increase: Original $\Rightarrow \times 1.15 \Rightarrow \text{£1840}$

So reverse to find Original $\Leftarrow \div 1.15 \Leftarrow \text{£1840}$

Calculation: $\text{£1840} \div 1.15 = \text{£1600}$

Non-calculator: The amount after an increase or decrease in value

is in direct proportion to the proportional change applied to the

original... so use ratio techniques to scale up or down as required.

So see using ratios to solve real life problems....

Ratio

Hegarty : 328-331

A ratio can be used to compare two quantities: **part to part**.

Once the quantities have been linked, equivalent ratios can be found by scaling up both parts by a common multiple or simplified by dividing by common factors (much like equivalent and simplified fractions).

Example 1: Harry is 120cm tall; George is 140cm. Express Harry's height to George's as a ratio in its simplest form

Harry : George $\Rightarrow \div 20 \left(\begin{array}{l} 120 : 140 \\ 6 : 7 \end{array} \right) \div 20$
Simplify ($\div 20$)

Example 2: This year the ratio between Tom and Henry's age will be 2 : 7. If Tom is 10, how old is Henry?

Tom : Henry $\Rightarrow \times 5 \left(\begin{array}{l} 2 : 7 \\ 10 : 35 \end{array} \right) \times 5$
Scale up ($\times 5$)
If Tom is 10, then Henry is 35 years old.

- Make sure the ratio is written in the correct order for the question:

Harry : George
6 : 7

George : Harry
7 : 6

These are actually different ratios.

- Quantities must be in the same units when put into ratio form
- In ratio form, quantities do not contain any units... but units may need to be used when interpreting the ratio in context.

Ratios in Simplest form

Like fraction, simplify by dividing by the **highest common factor**. Simplest form ratios only include integer values.

Example: Simplify $\left(\begin{array}{l} 50 : 75 \\ 2 : 3 \end{array} \right) \div 25$

Unit Ratios

A unit ratio is one in the form **1 : n**. This is often called a **scale**. Note: as the first value must be 1, unit ratios can include decimals.

Example: Write $\left(\begin{array}{l} 30 : 90 \\ 1 : 3 \end{array} \right) \div 30$ as a unit ratio: $\div 30$

Scale diagrams and Maps are the most common form of unit ratios.

Map scales give the scale factor between lengths linked on the map and in real life

Remember – map scales are:

- always written **Map : Real** distance
- always given in the **same units (cm)**

Convert the scale or answer to useable units

Example : On a map the distance two points is 4.5cm. What is the actual distance if the map's scale is 1 : 100000 ?

Scale means: 1 cm = 100000 cm
= 1000m

so $\times 4.5 \left(\begin{array}{l} 4.5\text{cm} = 4.5\text{ km} \end{array} \right) \times 4.5$

Dividing in a given ratio

Hegarty : 332-338

The TOTAL number of parts a quantity is divided into can be found by adding the elements of a ratio. This total will scaled up in the same way as the parts – and this can be used to see how a quantity may be divided in a given ratio:

...but be careful to check what information you have been given...

It may be about one of the ratio parts:

Or about the difference between the ratio parts rather than the total!:

Example : Jon and Pat share £350 in the ratio 2 : 5. How much will Jon receive?

$$\begin{array}{l} \text{Jon : Pat} \Rightarrow \text{Total} \\ 2 : 5 \Rightarrow 7 \text{ parts} \\ \text{£100 : £250} \Rightarrow \text{£350} \\ \text{Jon receives £100} \end{array} \quad \begin{array}{l} 350 \div 7 = 50 \\ 1 \text{ part} = \text{£50} \end{array}$$

Example : Yellow and blue paint is mixed in the ratio 3:4. Stan has 20 litres of blue paint and more than enough yellow. How much green paint can he make?

$$\begin{array}{l} \text{Yellow : Blue} \Rightarrow \text{Total Green} \\ 3 : 4 \Rightarrow 7 \\ (15\text{L}) : 20\text{L} \Rightarrow 35\text{L} \end{array}$$

Example : Jon and Karl share some money in the ratio 3 : 7. Karl receives £140 than Jon. How much money did they share?

$$\begin{array}{l} \text{Jon : Karl} \Rightarrow \text{Difference} \Rightarrow \text{Total} \\ 3 : 7 \Rightarrow 4 \text{ parts} \Rightarrow 10 \text{ parts} \\ 140 \div 4 = 35 \Rightarrow \text{£140} \Rightarrow \text{£350} \\ 1 \text{ part} = \text{£35} \quad \text{They share £350} \end{array}$$

What proportion of the money does Karl receive? Give your answer as a percentage

	Jon : Karl	⇒ Total
Ratio	3 : 7	⇒ 10 parts
Proportion	$\frac{3}{10} : \frac{7}{10}$	
Karl receives	70%	$\frac{7}{10} = 70\%$

Combining ratios and harder ratio problems

Two or more ratios may be combined if they share a common term. Find the lowest common multiple of that common term and scale each ratio up by that factor. Now combine the ratios around the common value

Example : A racecourse has 4 sections A, B, C and D. The distances of each section are in the following ratios

$$\begin{array}{l} A : B : C \qquad C : D \\ 2 : 3 : 4 \qquad 6 : 5 \end{array}$$

Calculate the ratio A : B : C : D

Common section C : common multiple of 4 and 6 = 12

$$\begin{array}{l} A : B : C \qquad C : D \Rightarrow A : B : C : D \\ \text{x3} \left(\begin{array}{l} 2 : 3 : 4 \\ 6 : 9 : 12 \end{array} \right) \text{x3} \quad \text{x2} \left(\begin{array}{l} 6 : 5 \\ 12 : 10 \end{array} \right) \text{x2} \Rightarrow 6 : 9 : 12 : 10 \end{array}$$

Example: Given that $3x : 4 = 7 : 2$

Calculate the value of x

Link the terms and combine around a common value

$$4 \text{ and } 2 \text{ in the same position so } 3x : 4 = \frac{7 : 2}{2} \Rightarrow 3x : 4 = 14 : 4 \quad \text{x2}$$

As ratios are equal then

$$\begin{array}{l} 3x = 14 \\ x = \frac{14}{3} \end{array}$$

Example : What number needs to be added to 5 and 3 so that the ratio of the 1st number to the 2nd becomes 4 : 3

$$\text{Unknown number added to both} \Rightarrow \left(\begin{array}{l} 5 + n : 3 + n \\ 4 : 3 \end{array} \right)$$

The scale factor between needs to be the same so create equivalent scale factors and solve as a linear equation:

$$\begin{array}{l} \frac{5+n}{4} = \frac{3+n}{3} \\ 3(5+n) = 4(3+n) \\ 15 + 3n = 12 + 4n \\ 15 = 12 + n \\ n = 3 \end{array}$$

$$\text{Check: } \begin{array}{l} 5 + 3 = 8 \Rightarrow \text{x2} \left(\begin{array}{l} 8 : 6 \\ 4 : 3 \end{array} \right) \text{x2} \\ 3 + 3 = 6 \end{array}$$

Writing a ratio as a proportion

As TOTAL number of parts can be found by adding the elements of a ratio, information given as a ratio can easily be converted to a proportion:

Remember fractions show **part** **whole**

And a fraction can then be converted to decimals or percentages as required

Ratio and Direct Proportion – Problem solving

Ratio which can be used to solve many different types of real life problem when two quantities that are in **direct Proportion** – as one increases the other will also increase in the same proportion:

Scaling up recipes

Example 1: Nadia wants to make soup for 10. How much of each ingredient will she need?

4 people → 10 people
Either: (÷2) 2 people + (x2) 8 people
Or 10 ÷ 4 = 2.5 (multiply everything by 2.5)
People : Onion : Carrot : Oil : Tomatoes : Stock
$$\begin{array}{r} 4 : 160 : 80 : 1 : 500 : 840 \\ \times 2.5 \quad 2 : 80 : 40 : \frac{1}{2} : 250 : 420 \\ + 8 : 320 : 160 : 2 : 1000 : 1680 \\ \hline 10 \quad 400g \quad 320g \quad 2\frac{1}{2} \quad 1250g \quad 2100ml \end{array}$$

Finding "best buys"

Example 2: Two shops have a special on for toilet rolls. Which is the best value for money?

Quik Shop **Bargain Mart**
9 rolls for £5.22 8 rolls for £4.72

Calculate a common ratio for both either unit ratios or a common multiple - here 72 (9x8 rolls)

$$\begin{array}{r} \times 9 \quad (9 : \pounds 5.22) \div 9 \\ 1 : \pounds 0.58 \end{array} \quad \begin{array}{r} \times 8 \quad (8 : \pounds 4.72) \div 8 \\ 1 : \pounds 0.59 \end{array}$$

Quik shop is better value (58p per roll) as the price per roll is 1p cheaper than Bargain Mart.

Creating scale diagrams

Example 3: Ian is creating a scale diagram of his house. His living room is 3.8m wide. On the scale drawing the living room is 16mm wide. His living room is 4.4m long, how long is it on the drawing?

Link two known variables Width : Length
Real life $(3.8 : 4.4) \times 5$
Scale drawing $(16 : 22) \times 5$

Scale factor
"New" = $\frac{16}{3.8} \rightarrow 5$
"Old"

Hegarty : 739-742

Soup Recipe: (Serves 4)
160g onions
80g carrots
1 tablespoon of oil
500g of tomatoes
840 ml vegetable stock

Finding Scale factor
"New" = $\frac{10}{4} \rightarrow 2.5$
"Old"

Hegarty : 763-772

Careful you know what your ratio represents – the cost of 1 item or a quantity obtained for £1?

Hegarty : 864-871

Understanding and calculating with compound measures

Compound measures involve two different units of measure linked in a proportional relationship e.g. Speed (miles per hour) or density (grams per cm²)
The compound unit can be seen and treated as a ratio – for instance Speed: "70 miles per hour" means 70 miles travelled in 1 hour
so travelling at this average speed for 3.5 hours you go 245 miles

$$\times 3.5 \quad \left(\begin{array}{l} 70 : 1 \\ 245 : 3.5 \end{array} \right) \times 3.5$$

Example 1: Gail drives 20 minutes at 48 mph
How far does she travel?

Speed: 48 miles per 1 hour
20 minutes = $\frac{1}{3}$ of an hour
$$\begin{array}{r} 48 \text{ miles} : 1 \text{ hour} \\ \div 3 \quad \left(\begin{array}{l} 16 \text{ miles} : 20 \text{ mins} \end{array} \right) \div 3 \end{array}$$

Example 2: Gail drives 40 minutes and travels 30 miles. What is her average speed?

Link information then scale
Up the time again to 1 hour:
$$\begin{array}{r} 30 \text{ miles} : 40 \text{ mins} \\ \times 1.5 \quad \left(\begin{array}{l} 45 \text{ miles} : 1 \text{ hour} \end{array} \right) \times 1.5 \end{array}$$

Best Practise : Work in the same units as needed for the compound measure

Calculating percentages including reverse percentages

Percentage of amounts are in proportion: 10% of an amount will be double 5% of the same amount and half 20%! If you are given information linking a percentage of an amount with a value, scale up or down as required.

Hegarty : 84-92, 96

Example 1: The cost of a train fare increased by 5%
A ticket now costs £3.40 extra. How much was the ticket before the increase?

Linked information
$$\begin{array}{r} 5\% : \pounds 3.40 \\ \times 20 \quad \left(\begin{array}{l} 100\% : \pounds 68.00 \end{array} \right) \times 20 \end{array}$$

Require 100%
The ticket was £68.00 before the increase

Example 2: The cost of a bus fare increased by 20%
A ticket now costs £15.60 extra. How much was the ticket before the increase?

Ticket is currently 100% + 20% = 120% of original
Linked information
$$\begin{array}{r} 120\% : \pounds 15.60 \\ \div 6 \quad \left(\begin{array}{l} 20\% : \pounds 2.60 \end{array} \right) \div 6 \\ \times 5 \quad \left(\begin{array}{l} 100\% : \pounds 13.00 \end{array} \right) \times 5 \end{array}$$

Require 100%
The ticket was £13.00 before the increase

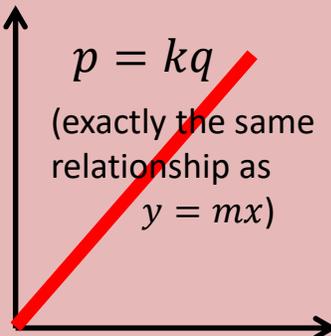
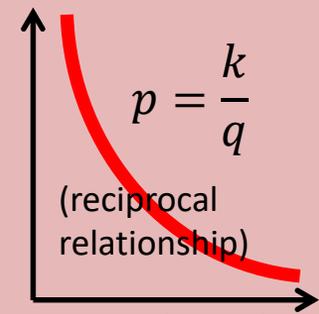
Example 3: In a sale the price of a coat was reduced by 40%
The cost now costs £54. What was the price before the sale?
Coat is currently at (100%-40%) 60% of its original price

Linked information
$$\begin{array}{r} 60\% : \pounds 54.00 \\ \div 6 \quad \left(\begin{array}{l} 10\% : \pounds 9.00 \end{array} \right) \div 6 \\ \times 10 \quad \left(\begin{array}{l} 100\% : \pounds 90.00 \end{array} \right) \times 10 \end{array}$$

Require
The price of the coat was £90.00 before the sale

Solving direct proportion problems algebraically

Solving indirect proportion problems



Variables are in direct proportion if their graph is a straight line cutting through the origin.
 Rather than using " $y = mx + c$ " to describe the relationship shown by the line a slightly different notation is used **but the principles are the same...**
 The symbol \propto means "is in proportion to" and if variable p is in proportion to q ($p \propto q$) then you can describe the relationship as $p = kq$ where k is a scalar

Variables are inversely (or indirectly) proportional when the **PRODUCT** of the variables is constant

Example: Indirect proportion in "real life"
 If it takes 8 workers 6 days to build a bridge how many days will it take 12 workers?

The more workers used the shorter the time taken to complete the work... but the total work days will remain the same.

Total work days = 8 workers \times 6 days = 48 work days
If 12 workers were employed: 48 work days \div 12 workers = 4 days
 (The change is inversely proportional: the number of workers has been multiplied by 1.5... the number of days has been divided by 1.5)

Example 1:
 p is in direct proportion to q .
 When p is 15, q is 6
 a) Find a formula for p in terms of q
 b) Use your formula to find
 i) p when $q = 10$
 ii) q when $p = 23$

Process: state relationship \rightarrow use framework formula \rightarrow substitution of known values \rightarrow specific formula \rightarrow substitution for required values

If $p \propto q$
 then $p = kq$
 so $15 = k \times 6$ ($p=15$ and $q=6$)
 $k = \frac{15}{6} = \frac{5}{2}$
 a) formula $\rightarrow p = \frac{5}{2}q$
 b) i) If $q=10$ then $p = \frac{5}{2} \times 10 = 25$
 ii) If $p=23$ then $23 = \frac{5}{2}q$
 $q = \frac{23 \times 2}{5} = 9.2$

Solving indirect proportion problems algebraically

Use the same process as for direct proportion – the only change is the initial relationship: the inversely proportional relationship is a reciprocal:

if p is inversely proportional to q then: $p \propto \frac{1}{q}$ and $p = \frac{k}{q}$

Make sure that you check what the key relationship in the question is:

Example 2:
 t is in direct proportion to the square of v .
 When t is 5, v is 3
 a) Find a formula for t in terms of v
 b) Use your formula to find
 i) t when $v = 1.8$
 ii) v when $t = 1.25$

Note the process is the same in both examples... what is different is the complexity of the initial relationship

If $t \propto v^2$
 then $t = kv^2$
 so $5 = k \times 3^2$ ($t=5$ and $v=3$)
 $k = \frac{5}{9}$
 a) formula $\rightarrow t = \frac{5}{9}v^2$
 b) i) If $v=1.8$ then $t = \frac{5}{9} \times 1.8^2 = 9$
 ii) If $t=1.25$ then $1.25 = \frac{5}{9}v^2$
 $v^2 = \frac{9 \times 1.25}{5} = \frac{9}{4}$
 $v = \sqrt{\frac{9}{4}} = \frac{3}{2} = 1.5$

Example 3:
 F is inversely proportional to d .
 When F is 7, d is 8
 a) Find a formula for F in terms of d
 b) Use your formula to find
 i) F when $d = 0.4$
 ii) d when $F = 448$

Again take care to check the key relationship. If the question had said " F is inversely proportion to d^2 " then the set up would be: $F \propto \frac{1}{d^2}$

If $F \propto \frac{1}{d}$
 then $F = \frac{k}{d} \rightarrow k = F \times d$
 so $k = 7 \times 8$ ($F=7$ and $d=8$)
 $k = 56$
 a) formula $\rightarrow F = \frac{56}{d}$
 b) i) If $d = 0.4$ then $F = \frac{56}{0.4} = 140$
 ii) If $F = 448$ then $448 = \frac{56}{d}$
 $d = \frac{56}{448} = \frac{1}{8}$

Quadratic Equations and Graphs

What do I need to be able to do?

(*Foundation crossover)

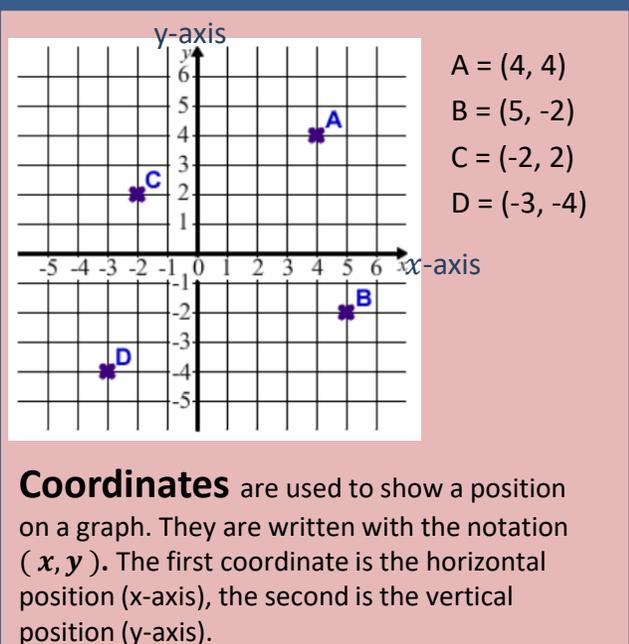
- *Plot and read Cartesian Co-ordinates
- *Recognise quadratic equations and plot quadratic functions
- *Understand properties of quadratic functions including
 - Shape (Parabola)
 - Turning points
 - Solutions and discriminant
- Solve quadratic equations by
 - *Factorisation
 - Completing the square
 - 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:

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



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 $x = 0, y = -2$

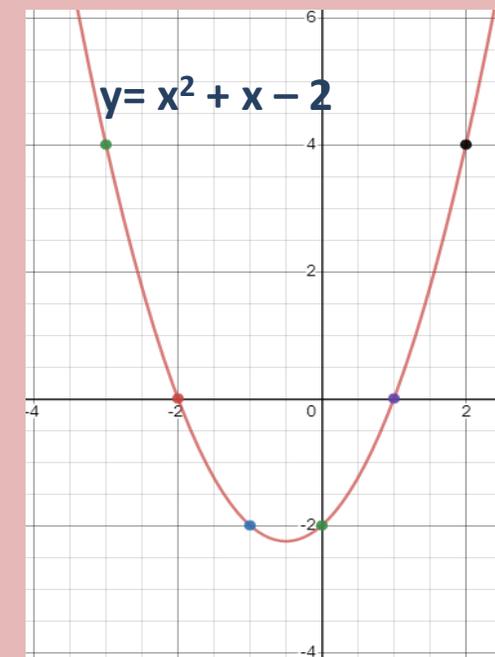
$$\rightarrow \text{Plot: } (0, -2)$$

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 $x^2 - 3x - 4$

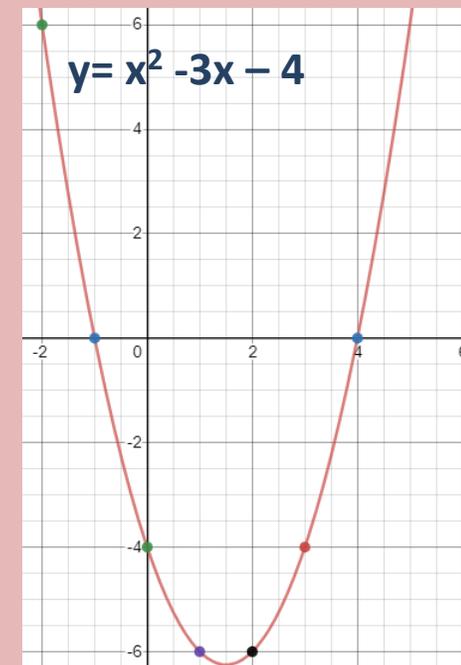
x	-3	-2	-1	0	1	2	3
x^2	9	4	1	0	1	4	9
$-3x$	9	6	3	0	-3	-6	-9
-4	-4	-4	-4	-4	-4	-4	-4
y	14	6	0	-4	-6	-6	-4

$x^2 \rightarrow$ All positive values

Sequence is square numbers

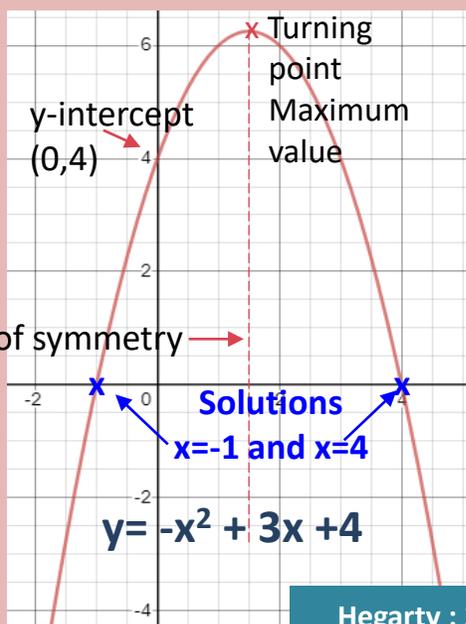
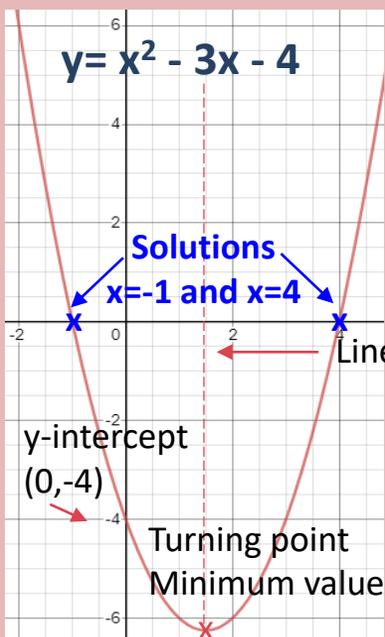
$-3x \rightarrow$ Sequence is multiples of (-3)

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



Key Properties of Quadratic graphs

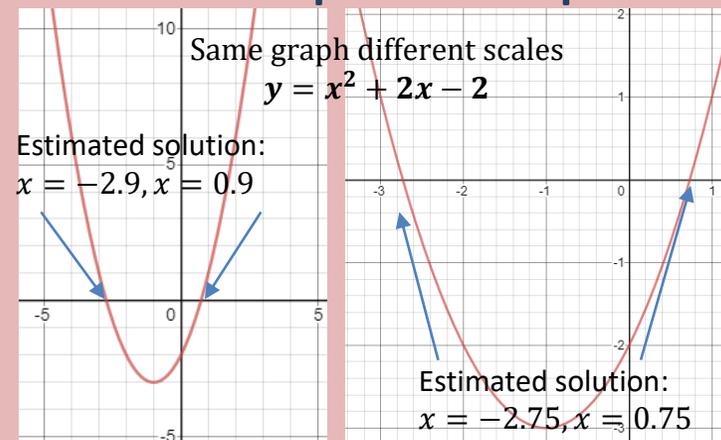
- Always a **u shape smooth curve** (called a parabola). Negative ($-x^2$) functions are flipped from a u-shape to n- shape
- Always **symmetrical** about a vertical line ($x=.....$)
- Always cross the y-axis (y-intercept) at the constant value (0, c) given in the equation
- Always have a **turning point** 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**



Hegarty : 251

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

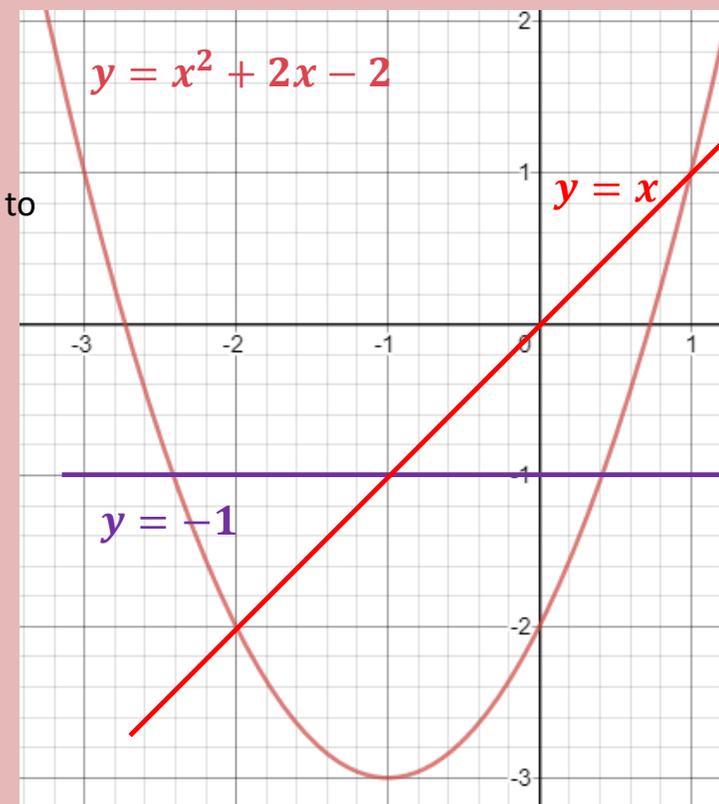
$$x^2 + 2x - 2 = -1$$

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 $x = 1$



Circles and Constructions

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:

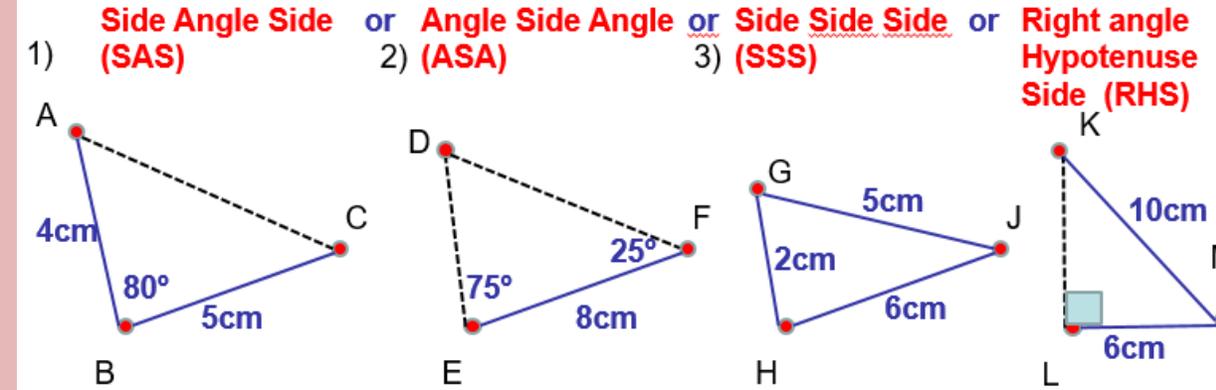
$$\text{Circumference} = \pi \times \text{diameter}$$

$$\text{Area} = \pi \times \text{radius}^2$$

Constructing Unique Triangles

Hegarty : 683

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

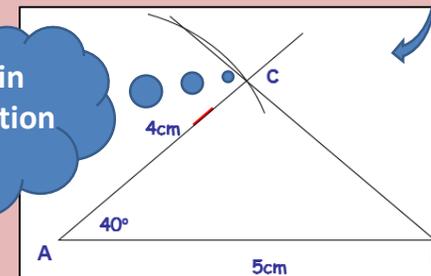
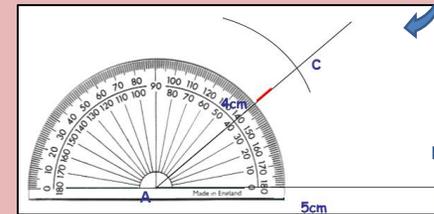
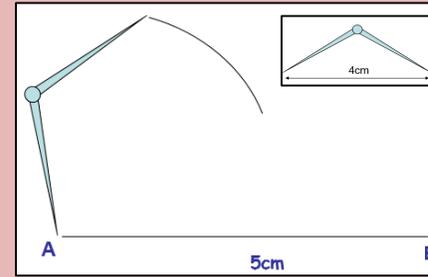


We are given: the length of two sides and the angle between

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)

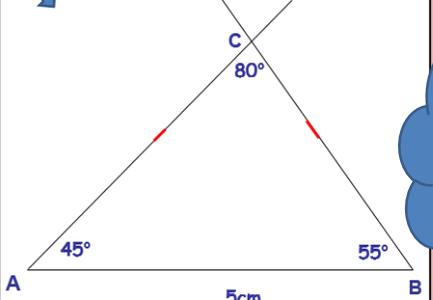
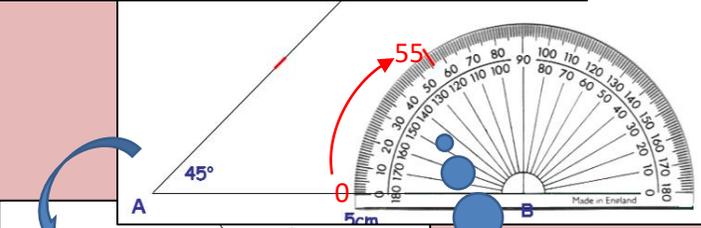
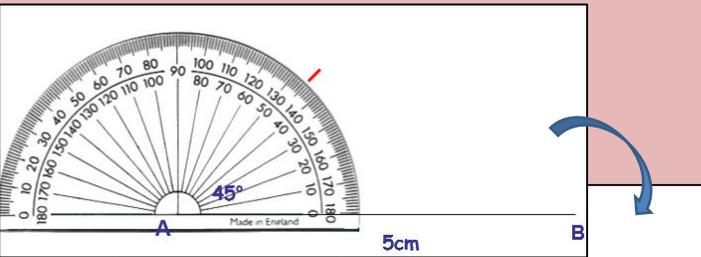
Example 1: Construct triangle ABC with AB = 5cm, angle A=40° and AC = 4cm

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

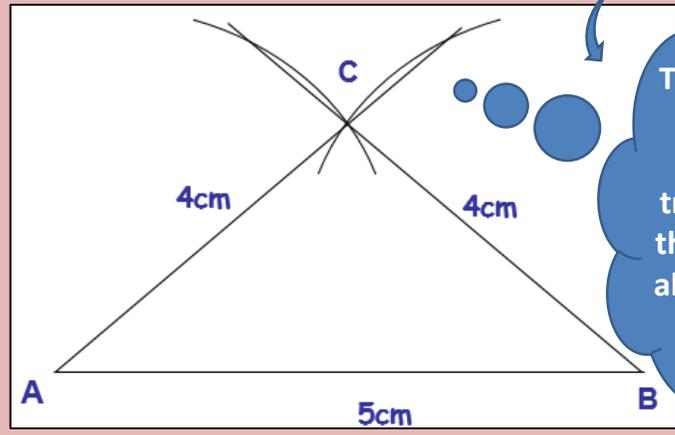
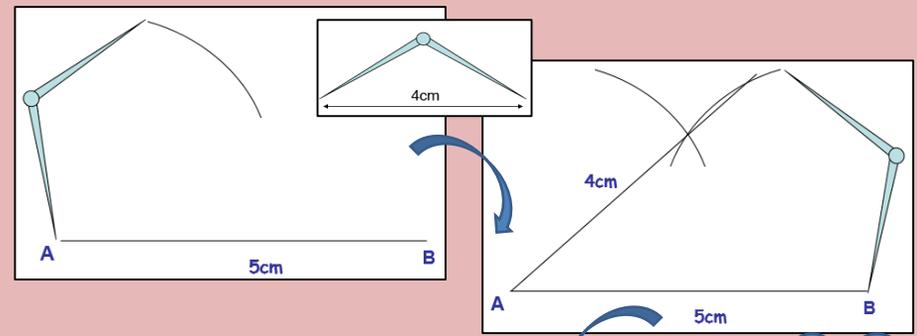


Take care measuring the angle along the correct scale

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



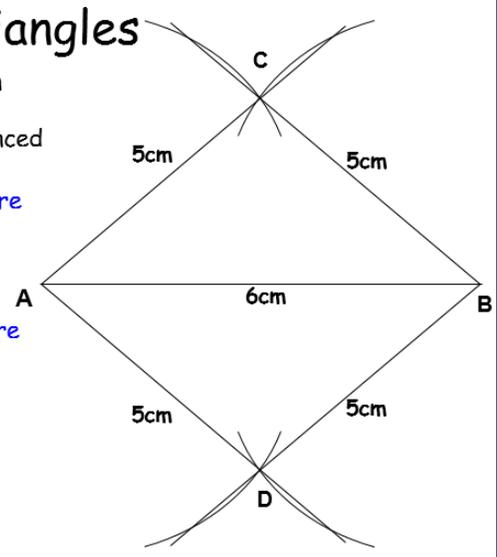
This construction was of an ISOSCELES triangle which is the foundation of all other standard constructions.

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

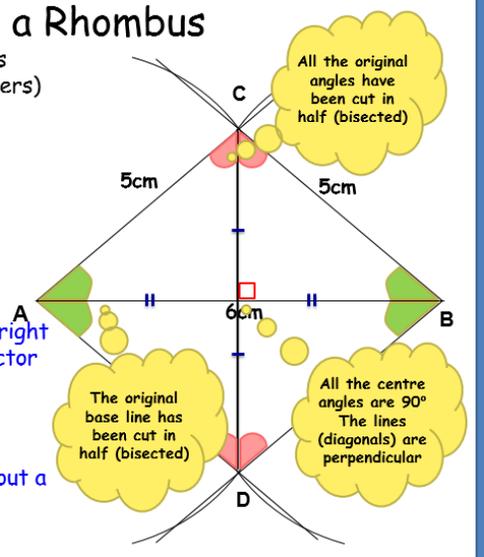
What shape is ACBD?
Rhombus



Importance of a Rhombus

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

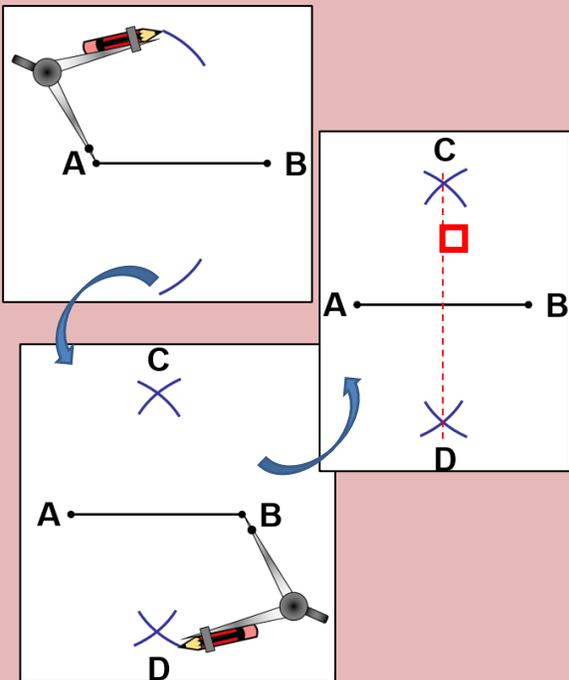
- They are
- perpendicular
 - bisect each other
 - bisect each angle
- So constructing a rhombus Means you can construct...
- Perpendicular lines and right angles without a protractor
 - Perpendicular bisectors of a line
 - Angle bisectors
 - 45° and 30° angles without a protractor.



Perpendicular Bisector

Example 1: Construct a perpendicular bisector of line AB

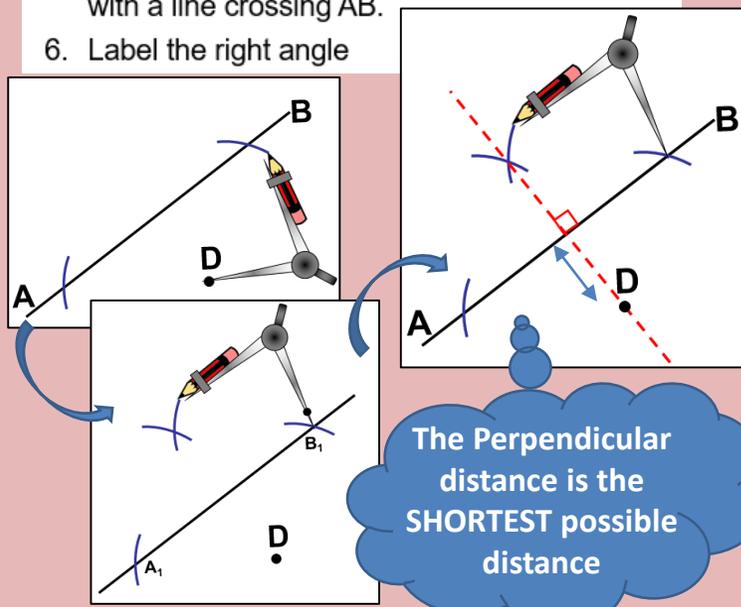
1. Stretch your compass out more than half the distance of AB
(it is a good idea to measure what distance you use to ensure that you can keep it the same throughout)
2. Place the point on A and make a long arc above and below the line AB
3. Without changing the stretch of your compass, place the point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

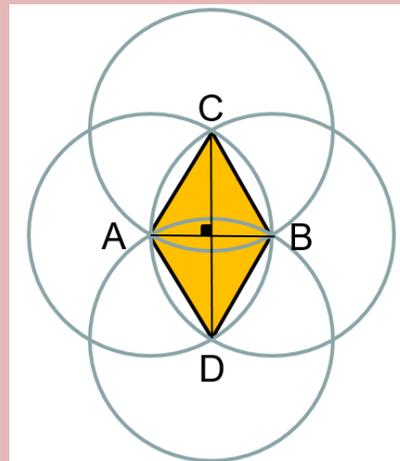


The Perpendicular distance is the **SHORTEST** possible distance

Angle Bisector

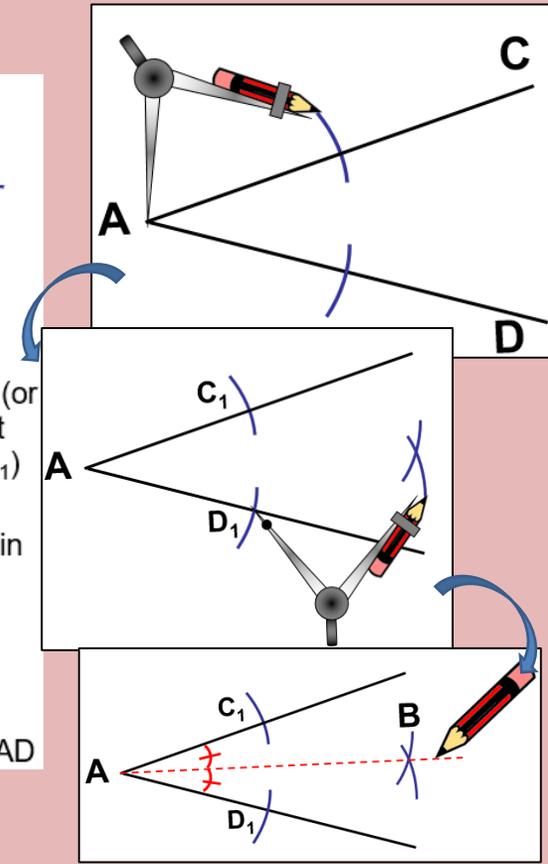
Example 3: Construct an angle bisector of the angle CAD

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



Loci Problems

Hegarty : 674- 679

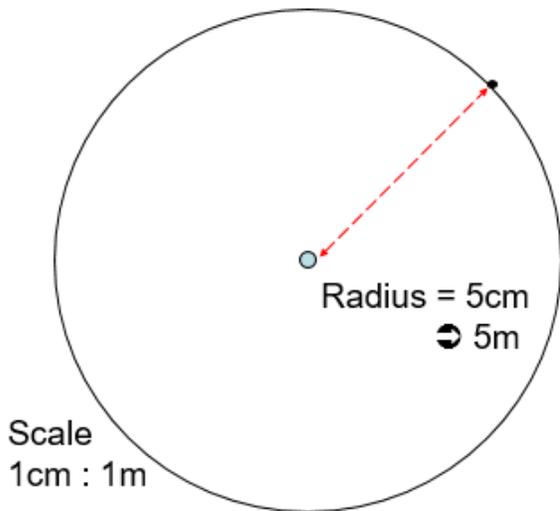
“Locus” is Latin for “place” or “position”
Its plural is “LOCI”

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

Example 1:

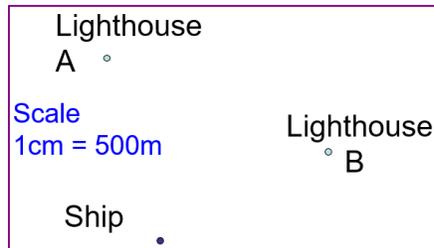
A goat is tethered by a 5m long rope. Show the area in which the goat can move.

Construction Solution :
Construct a circle of given radius



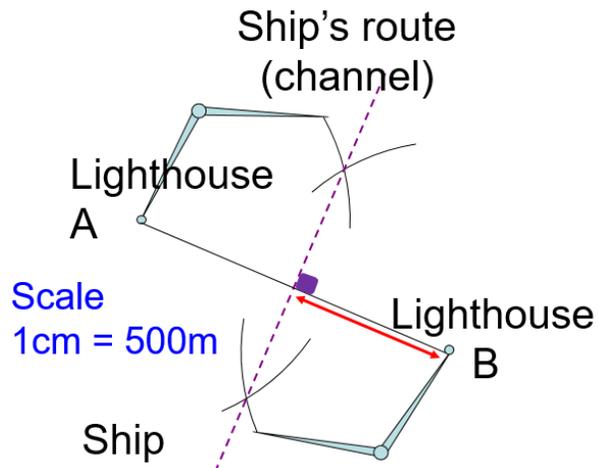
Example 2:

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 :

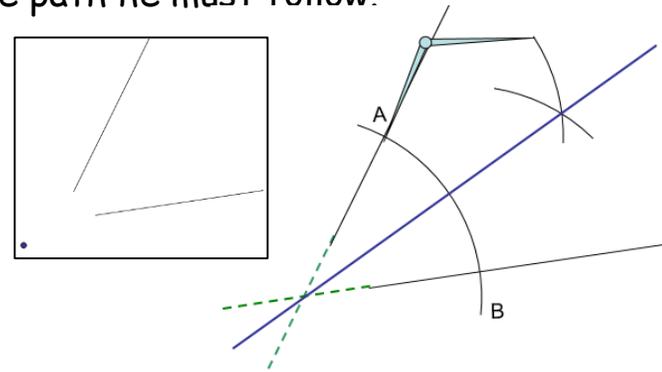
- Perpendicular Bisector of a line between two points
- Perpendicular distance from a point to a line



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

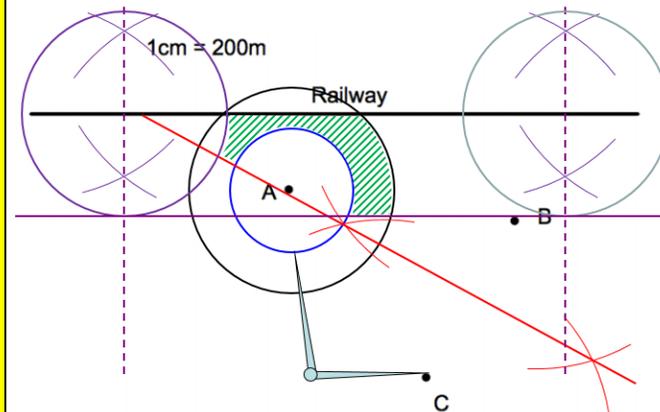


Example 5:

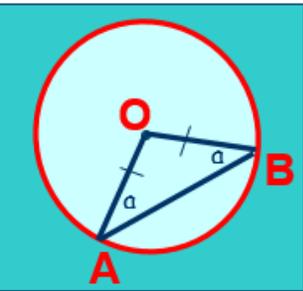
A phone box is located near 3 houses, A B and C.
i) The phone box is less than 500m from the railway track
ii) The phone box is between 300m and 500m from House A
iii) The phone box is closer to house C than house B
Shade the region on the map where the phone box could be.

Construction Solution

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



Angle facts and Circles



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

ΔAOB 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 $\Delta = 180^\circ$)

Geometric Reasoning Problems

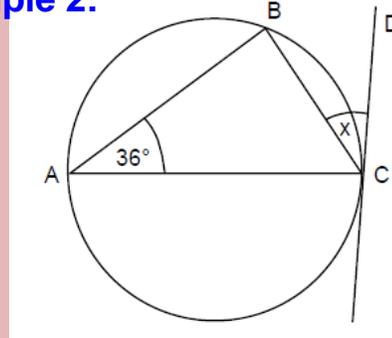
- Always: Show your workings
- State the "angle fact" that you are relying on to make a calculation
 - Check the question for additional information – if a shape is named you can rely on its properties
 - Try to use the diagram effectively – draw in given lengths and angles to help you work out other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

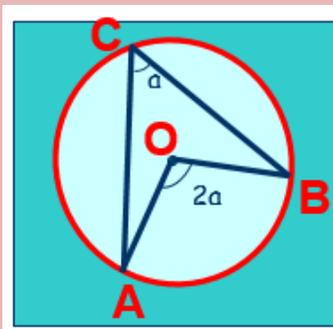
Circle theorems are just circle "angle facts"
Whenever they are applied to solve a problem you **MUST** state the circle theorem using key words:

Example 2:

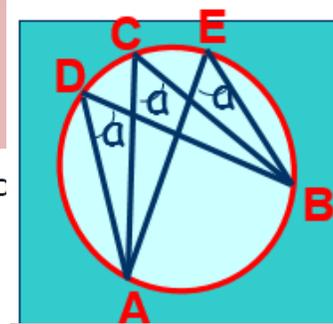


The diagram shows a circle. AC is a diameter of the circle and CD is a tangent. Work out the size of x.

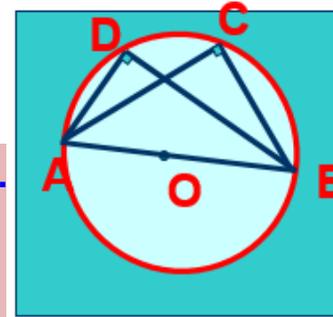
$\angle ABC = 90^\circ$ (the angle created in a semi circle is a right angle)
 $\angle BCA = 180 - (90 + 36) = 54^\circ$
(angles in a Δ sum to 180°)
 $\angle ACD = 90^\circ$ (a radius is 90° to a tangent at that point)
Therefore $X = 90 - 54 = 36^\circ$



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

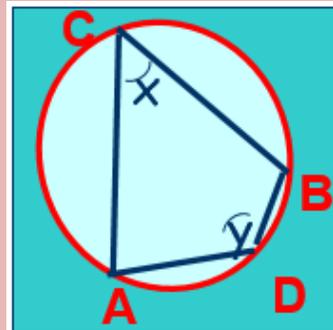


The angles drawn in the same segment from the same arc are equal



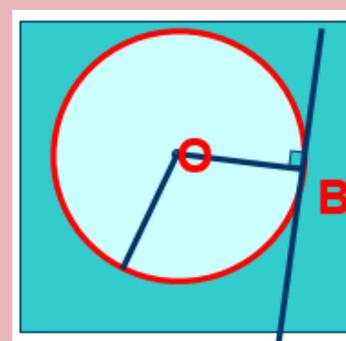
The angle in a semi-circle is a right angle

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

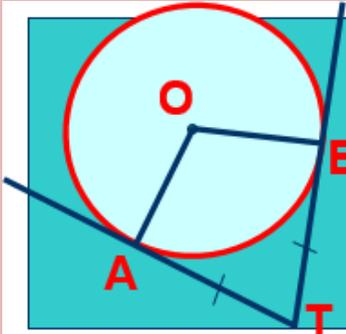


Opposite angles of cyclic quadrilaterals add up to 180

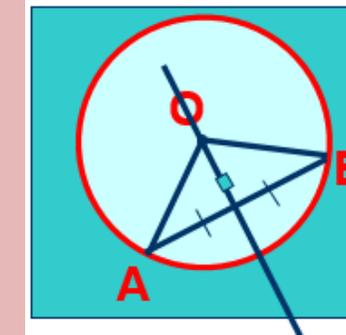
Cyclic Quadrilaterals MUST have all 4 vertices on the circumference



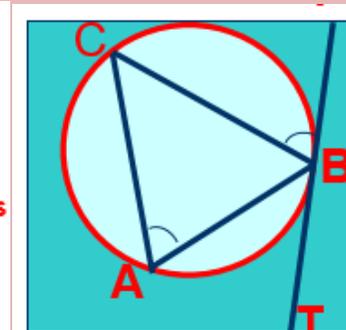
The radius and a tangent at that point are perpendicular (at 90°)



Tangents drawn from the same point are equal



The perpendicular bisector of a chord passes through the origin



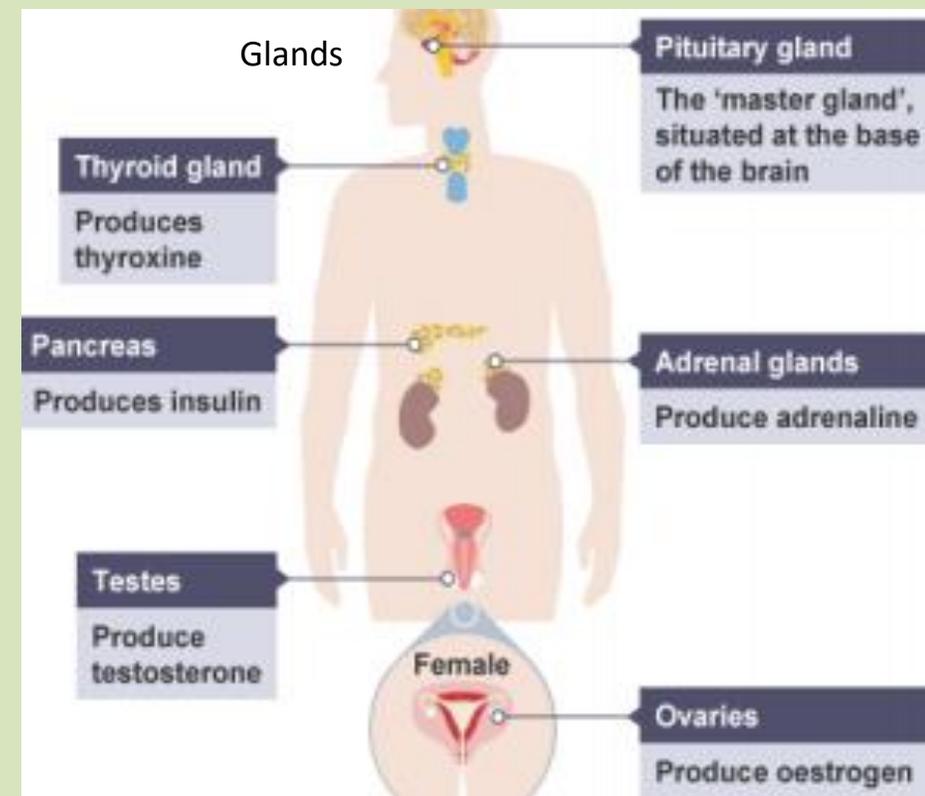
Alternate Angle theorem

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

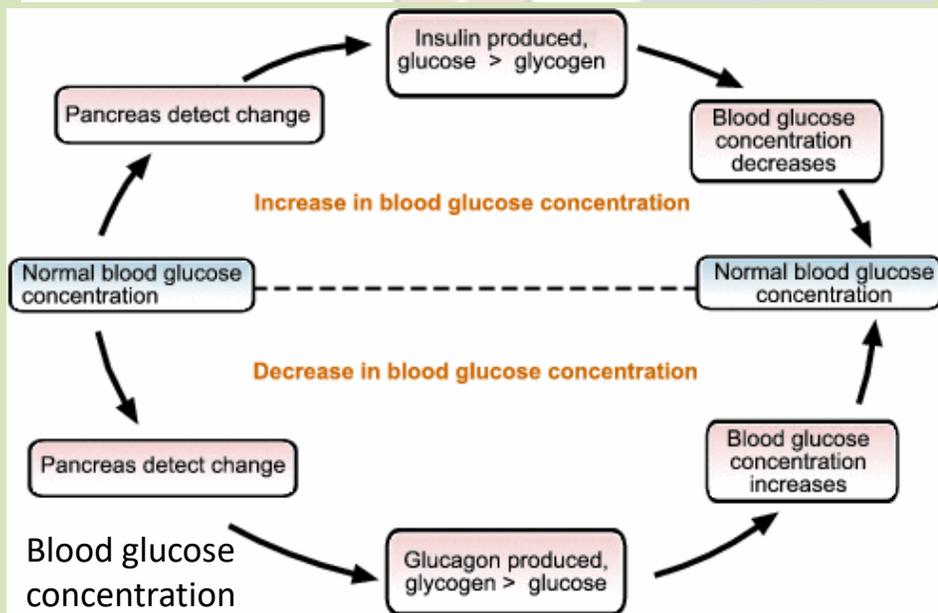
Reverse logic can be applied: If not equal then TB not a tangent

KS4 Biology: B11 Hormonal Coordination

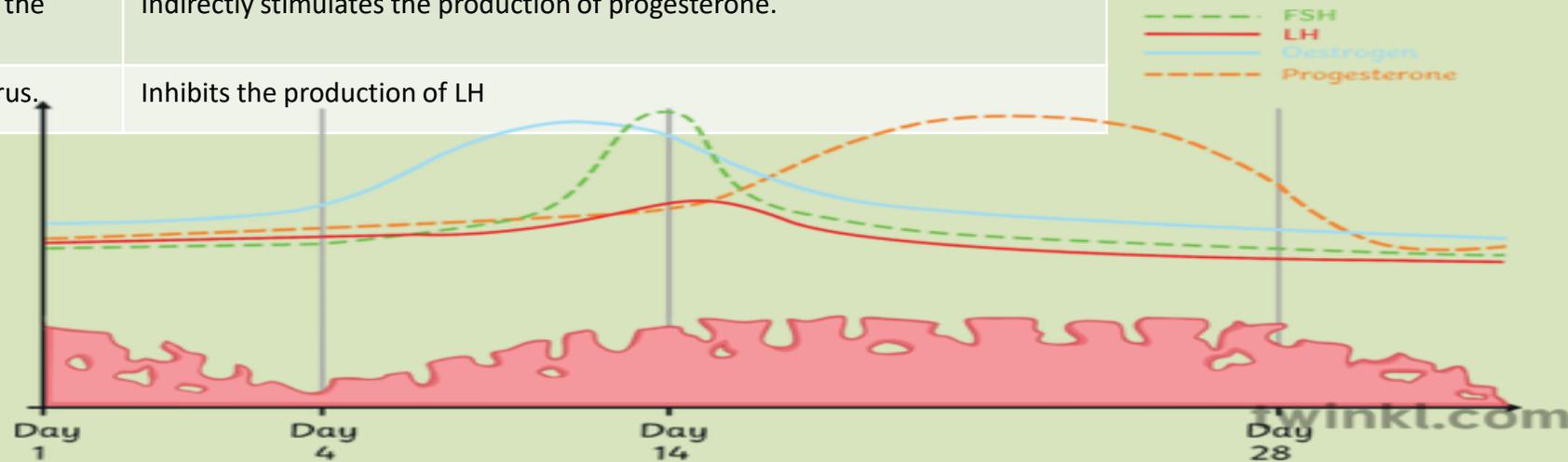
Key word	Definition
Homeostasis	Maintaining the body's conditions within narrow physical and chemical limits so enzymes and cell functions can work. E.g. blood glucose levels, temperature, water levels.
Endocrine system	The glands that produce hormones.
Hormones	Chemicals made in glands that travel through 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!

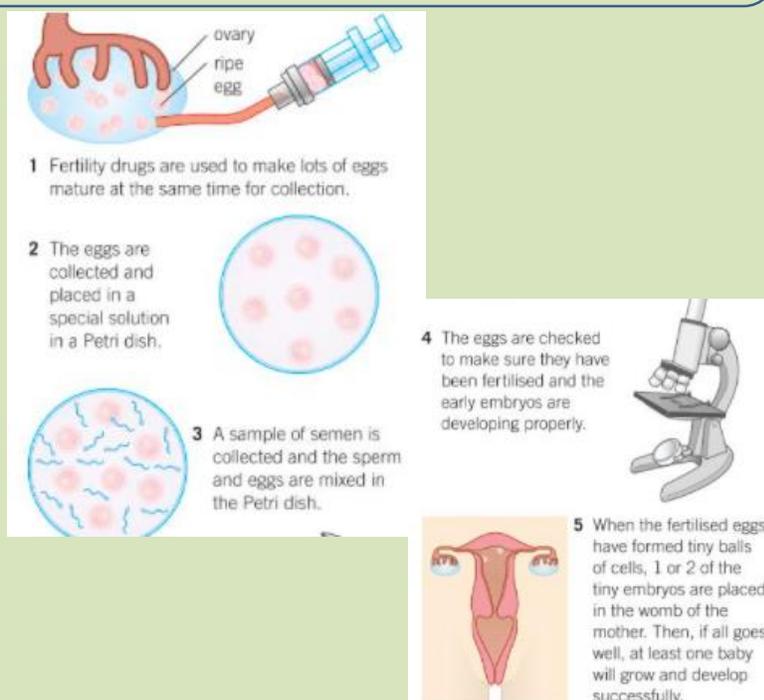
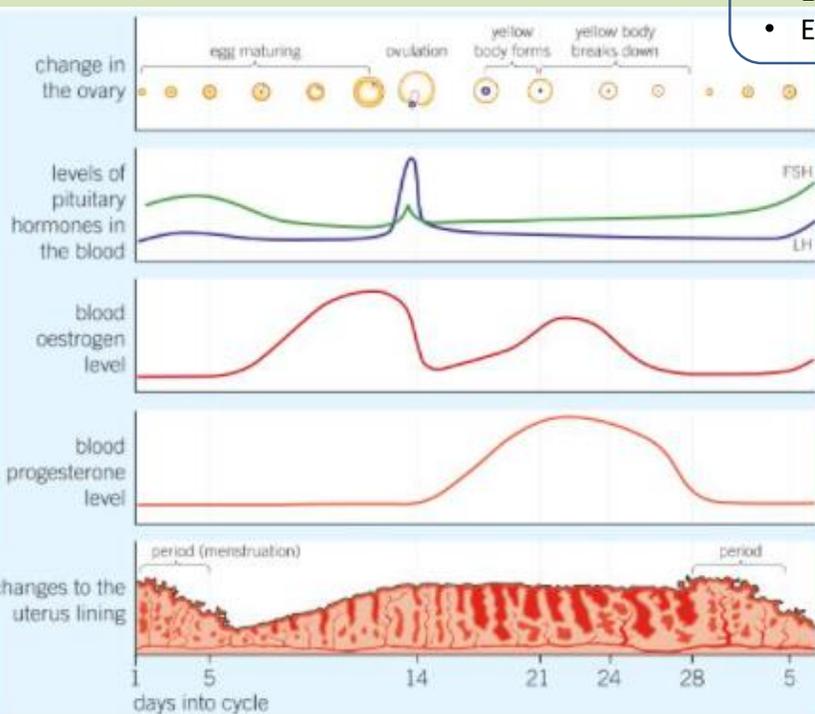
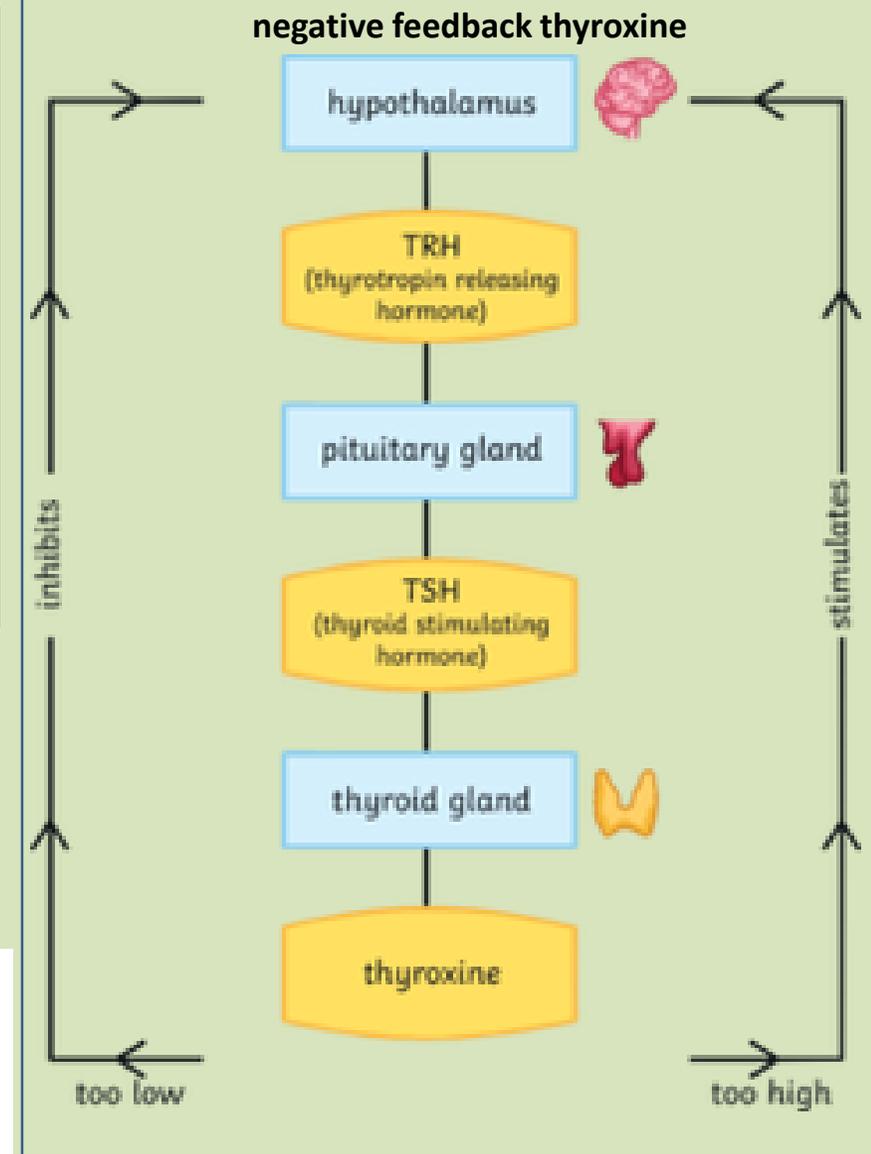
IVF:

Advantages

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

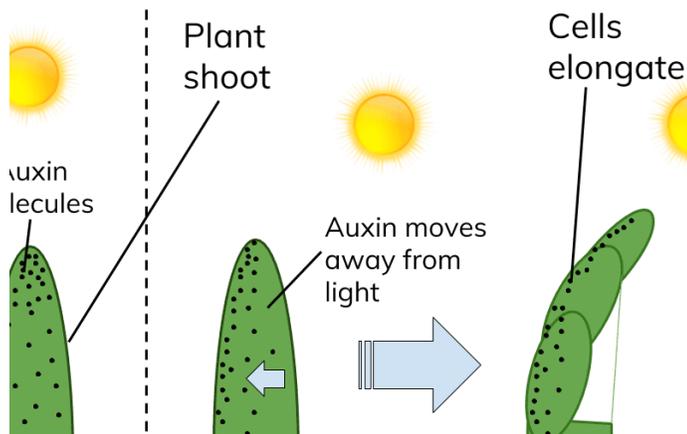
Disadvantages

- 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



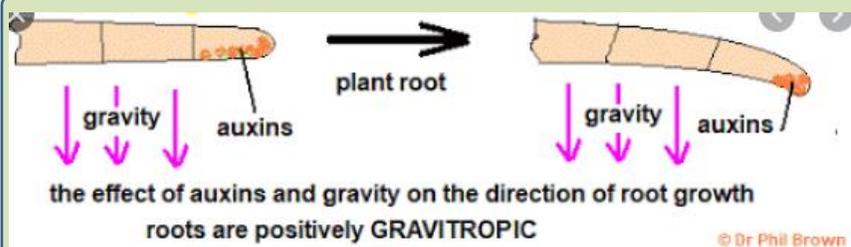
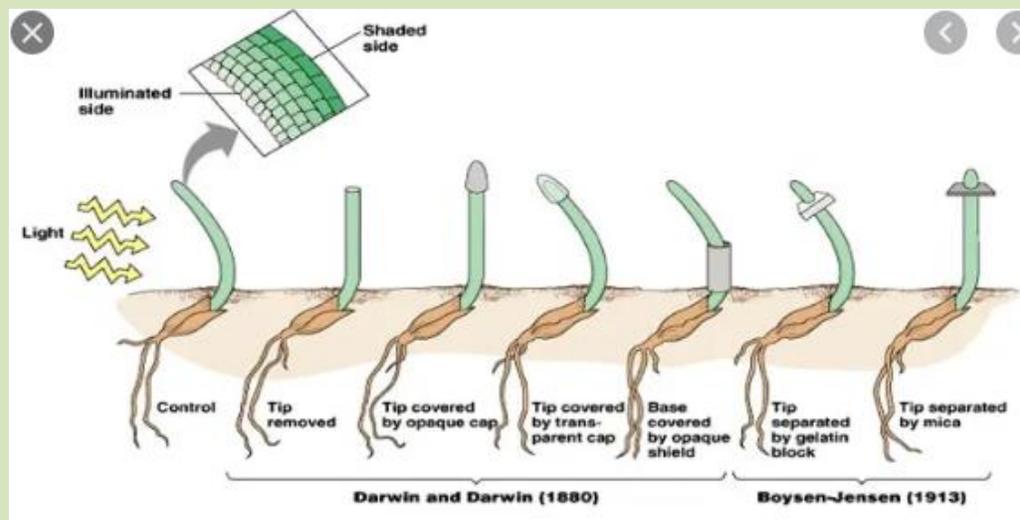
Adrenaline is a hormone produced by the adrenal gland, released in response to stress or fear. Acts on lungs and heart and vasodilation to increase oxygen supply for respiration in muscles – fight or run away.

Figure 3 The main events of the menstrual cycle



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.

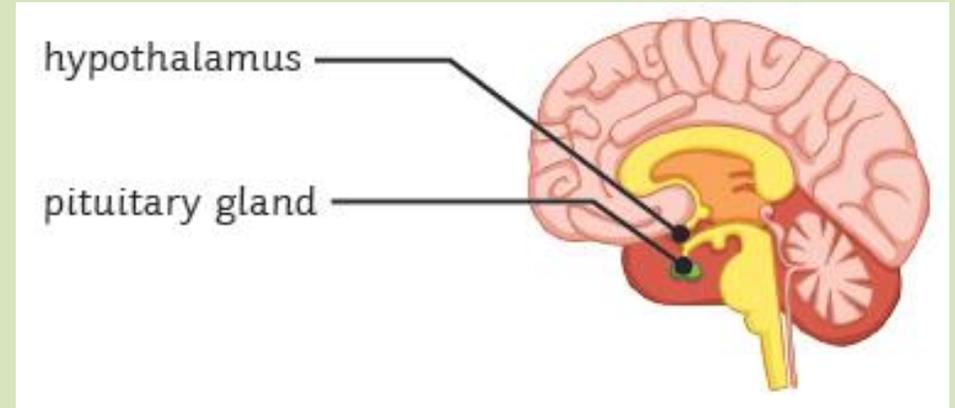
Method – germination of seedlings.

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.



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).

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.

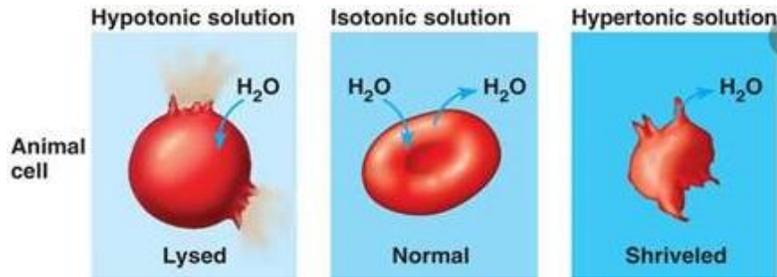
Homeostasis of water:

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.

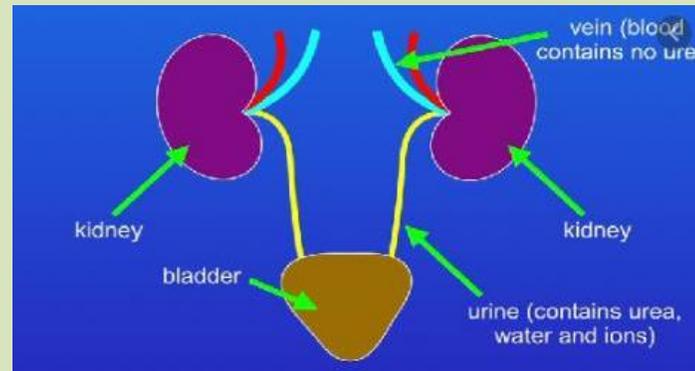
This is controlled by negative feedback.

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.



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.

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.

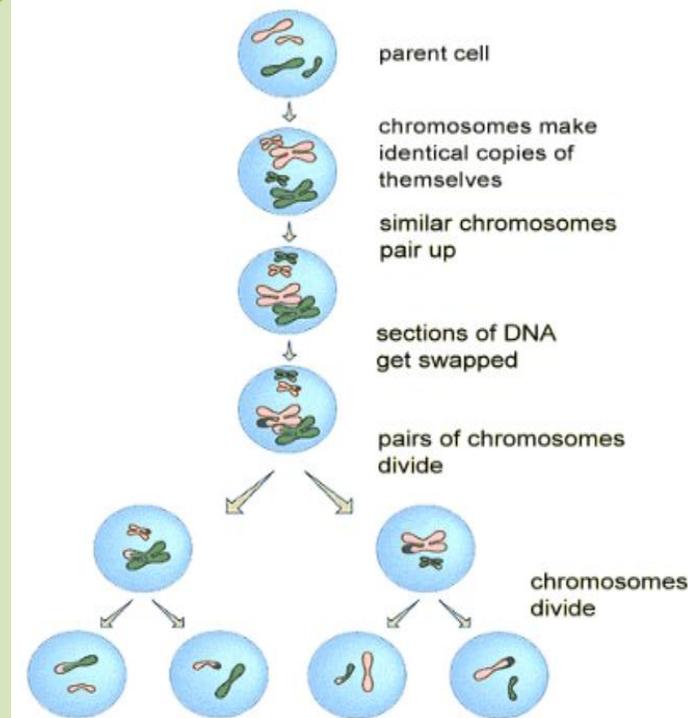
- All of the glucose by diffusion and active transport.
- Some of the water as needed by the body by osmosis.
- Some of the ions as needed by the body by active transport.

Further Reading

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

KS4 Biology: B13 Reproduction

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



Meiosis

1. Copies of genetic information are made.

2. The cell divides **twice** to form four gametes each with a single set of chromosomes.

All gametes are different to each other – variety in offspring.

Eg. A body cell has 46 chromosomes, the gamete has 23 chromosomes.

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



Twinkl

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



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

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



Advantages of sexual reproduction

Produces variation in offspring.

If the environment changes, variation gives survival advantage by natural selection.

Natural selection can be speeded up by humans in **selective breeding** to increase food production. (See topic B14 KO).

Advantages of asexual reproduction

Only one parent needed.

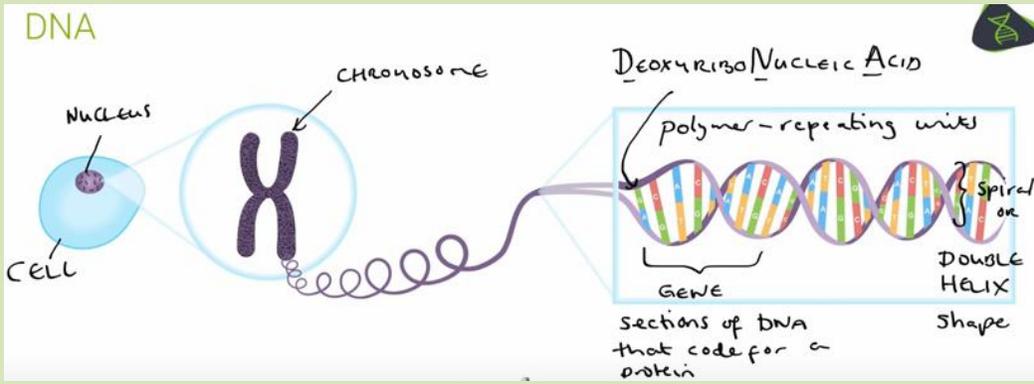
More time and energy efficient as do not need to find a mate.

Many identical offspring can be produced when conditions are favourable.

Faster than sexual reproduction.

KS4 Biology: B13 Reproduction

DNA

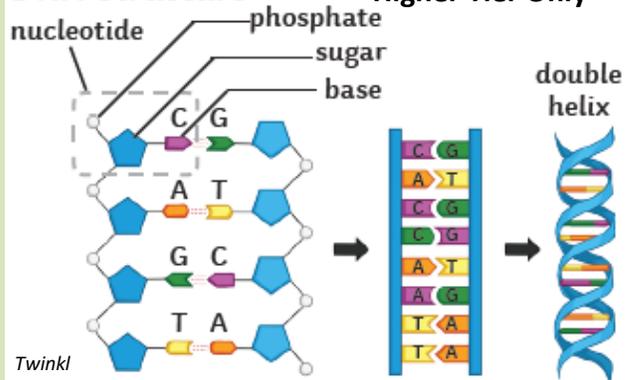


Key word	Definition
DNA	The molecule of inheritance. A polymer made up of two strands forming a double helix. DNA is contained in structures called chromosomes .
Gene	A small section of DNA on a chromosome . Each gene codes for a particular sequence of amino acids to make a specific protein .
Chromosome	Found in pairs, one inherited from your father and one from your mother. Humans should have 46 chromosomes in each body cell.
Genome	The entire genetic material of that organism.
Nucleotide	A molecule made up a sugar, a phosphate group and one of four different bases .
Bases	Bases make up part of a nucleotide which make up DNA and RNA . They are represented by the letters A, T, G and C.
Amino acid	The monomers for proteins. Three bases code for one amino acid.
Protein	Molecules that contain carbon, hydrogen, oxygen and nitrogen and are made of long chains of amino acids . They are used for building cells and tissues of the body eg collagen and to form enzymes.

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

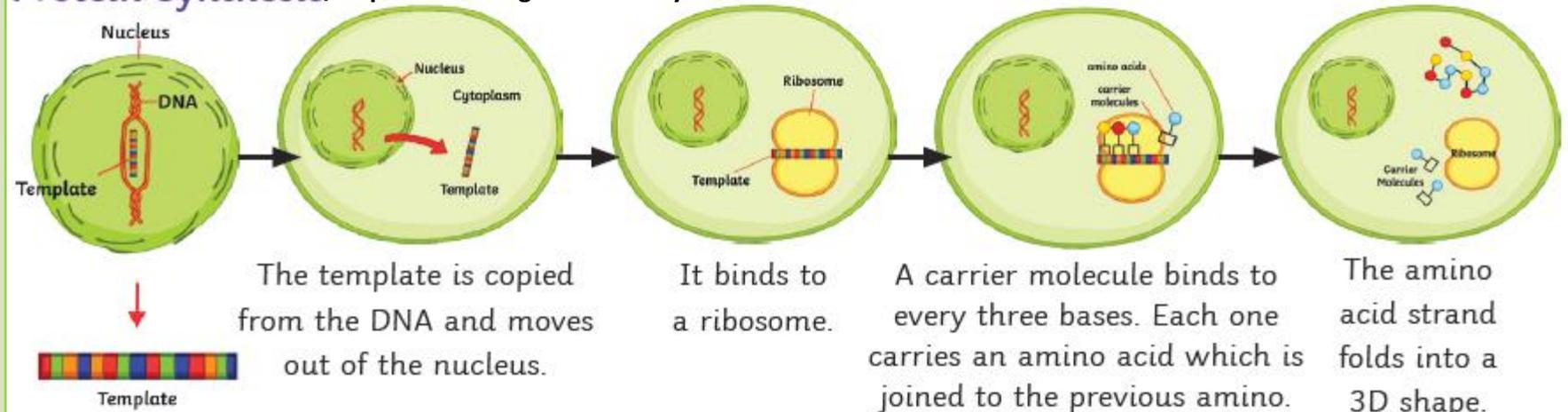
- The genes linked to different types of disease
- Understanding the treatment of inherited disorders
- Use in tracing human migration patterns from the past

DNA Structure Higher Tier Only



In the complementary strands a C is always linked to a G on the opposite strand and a T to an A. A change in coding DNA can alter the activity of a protein and in non-coding DNA by altering how genes are expressed.

Protein Synthesis/ Expression Higher Tier Only

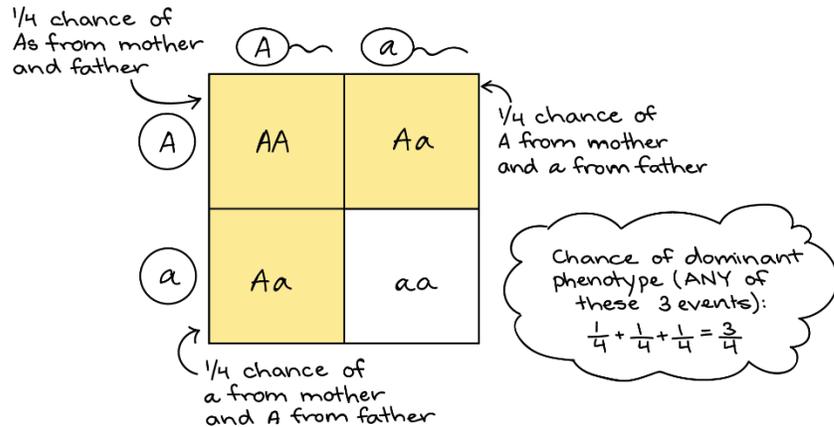


KS4 Biology: B13 Reproduction

Higher Tier Only

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

Most characteristics are controlled by more than one gene, you only need to know about single gene inheritance.



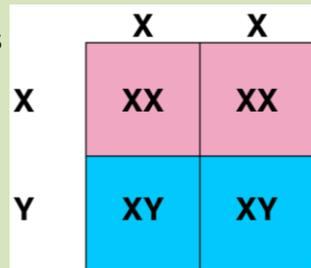
You must also write the **phenotypes** in each box

Sex determination: Male or female?

Ordinary human body cells contain 46 chromosomes (23 pairs).

22 pairs control characteristics only, but one pair carries the genes that determine sex.

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



Key word	Definition
Mutation	A change in the genetic material of an organism.
Enzyme	A biological catalysts which speed up chemical reactions.
Allele	Different forms of the same gene, can be dominant eg A or recessive eg a
Dominant allele	The phenotype will be apparent in the offspring even if only one copy is inherited. Eg AA or Aa
Recessive allele	A phenotype that will only show up in the offspring if both alleles coding for that characteristic are inherited eg aa
Homozygous	Two identical alleles for a characteristic eg AA or aa
Heterozygous	Two different alleles for a characteristic eg Aa
Genotype	The genetic makeup of an individual for a particular characteristic, eg eye colour alleles Bb or BB
Phenotype	The physical appearance/biochemistry of an individual for a particular characteristic eg eye colour brown eyes

Inherited disorders

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

Embryo screening – cells are harvested from the embryo and screened for genetic diseases.

PROS:

Parents are informed of any diseases so can make a choice to terminate.

Costly to society to support a disabled person so screening may help prevent these costs.

CONS:

The harvesting risks miscarriage, so in some rare cases a healthy fetus can be terminated.

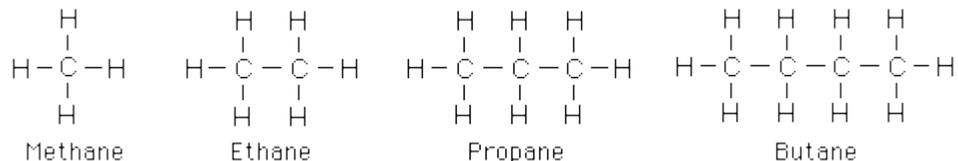
Screening is expensive.

Difficult emotional/religious choices to terminate.

KS4 Science – C9 Crude Oil and Fuels

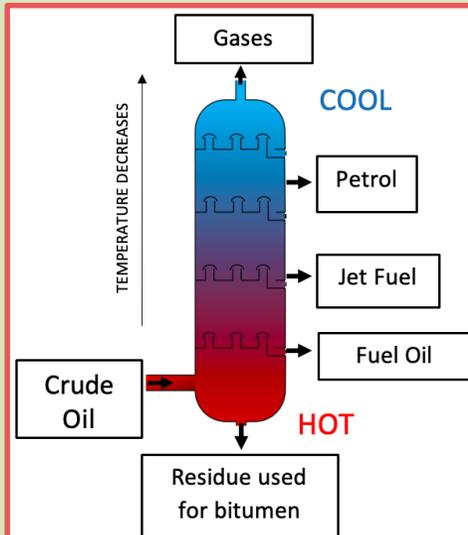
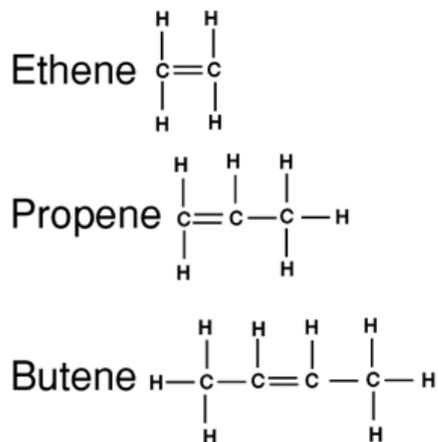
Crude oil is a mixture of hydrocarbon fractions with different boiling points.

The first 4 alkanes look like this:



You need to learn their names..

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



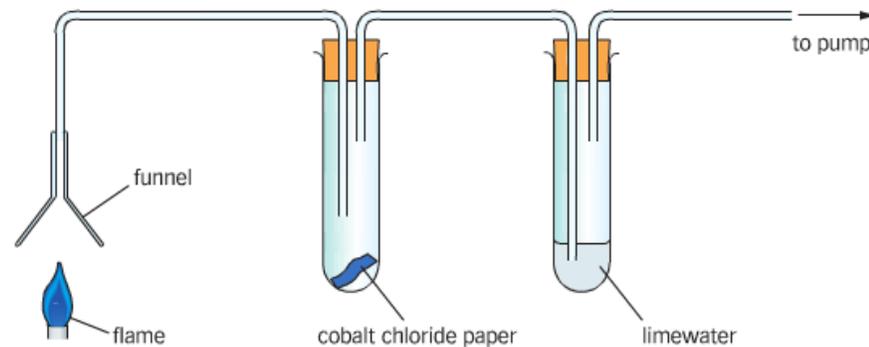
The fractions are separated using the process of FRACTIONAL DISTILLATION. Each fraction has a different boiling point. The crude oil is HEATED until all the fractions are vaporised. Then each fraction CONDENSES at its boiling point. It is cooler at the top of the column.

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

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

Fraction	BOILING POINT	VISCOSITY	FLAMMABILITY	CHAIN LENGTH
Refinery Gas	I N C R E A S E	I N C R E A S E	D E C R E A S E	I N C R E A S E
Petrol				
Naphtha				
Kerosine				
Diesel				
Lubricating Oil				
Fuel Oil				
Residue				

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

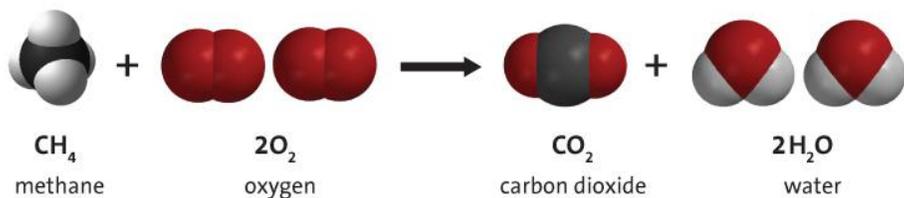


Limewater changes colour from colourless to milky in the presence of carbon dioxide. Blue cobalt chloride paper turns pink in the presence of water. You can also use white anhydrous copper sulphate powder to test for water; it turns bright blue when it is hydrated.

Other Useful Links:
<https://www.youtube.com/watch?v=CX21YVggEBc>
<https://www.bbc.co.uk/bitesize/guides/zshw6f/test>
<https://www.bbc.co.uk/bitesize/guides/zvvc6fr/revision/1>

Complete Combustion

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

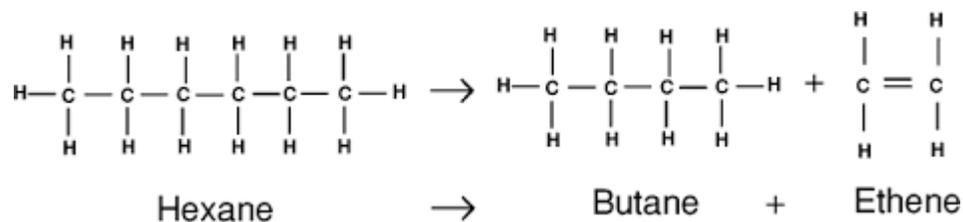


Cracking

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

Cracking produces saturated hydrocarbons, used as fuels, and unsaturated hydrocarbons (alkenes)

For example hexane could be cracked to produce butane and ethene.
 TIP: The total number of Carbon and Hydrogen atoms on each side of the arrow must be the same!



An orange liquid called bromine water turns colourless in the presence of ALKENES



Incomplete Combustion

When there is not enough oxygen, carbon monoxide (CO) is produced instead of CO₂. CO is a toxic, colourless and odourless gas. This is the balanced equation for the incomplete combustion of methane



KS4 Chemistry: Separate Science C10 organic reactions

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

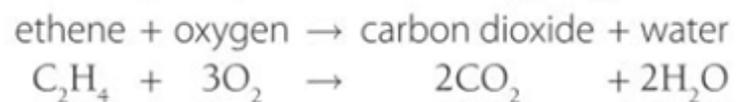
Reactions of alkenes

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



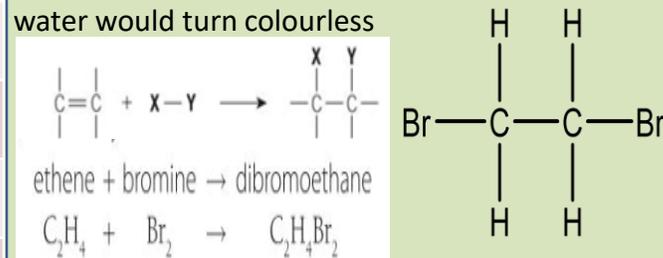
Combustion of alkenes

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



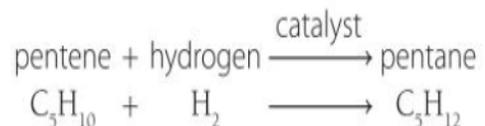
Reaction with halogens

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



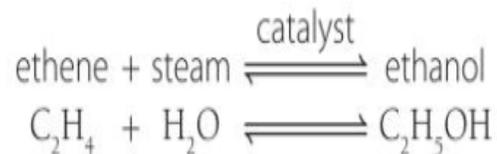
Reaction with hydrogen

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



Reaction with water (steam)

Alcohols such as ethanol can be made from ethene gas when reacted with steam. This is known as an hydration reaction. The reaction requires energy to heat the gases and a high pressure (hence why steam is used instead of liquid water)



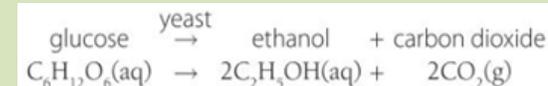
Functional groups

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

Alcohols and their reactions

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

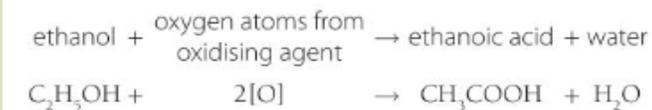
Ethanol can be made by the fermentation of glucose with yeast:



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

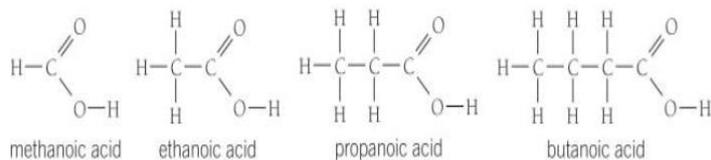


Alcohols can be oxidised to a carboxylic acid when boiled with an acidified oxidising agent which is shown in reactions as [O], for instance ethanol will oxidise to ethanoic acid (which is the main component in vinegar)

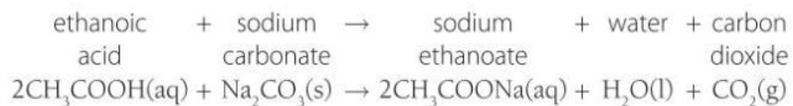


Carboxylic acids

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

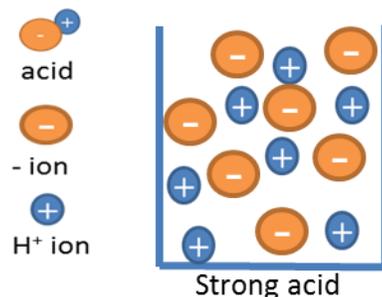
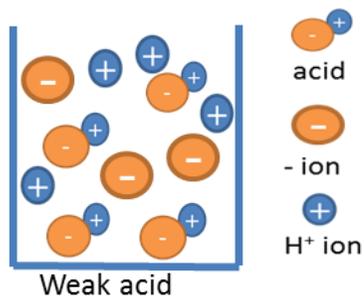
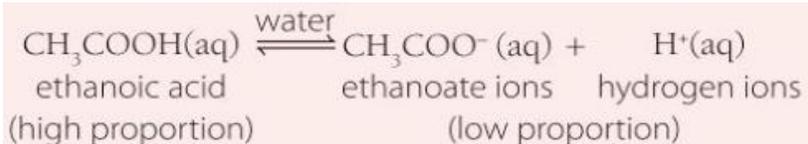


All carboxylic acids are weak acids and will react with carbonates and bases in a similar manner producing carbon dioxide, a salt and water.



HT only

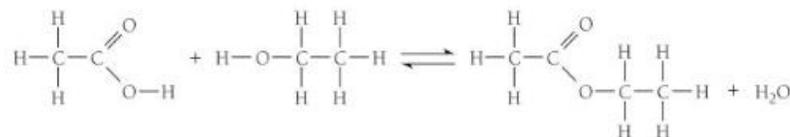
Carboxylic acids are weak acids as they do not fully ionise (split into its constituent positive H^+ and negative ions), as pH is a measure of the concentration of H^+ ions a low concentration of these would equate to an acidic pH closer to 7



Esters

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

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



In general:



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

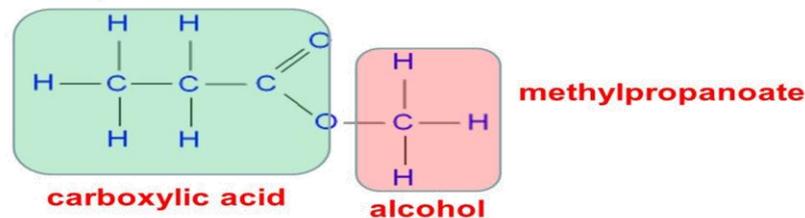
The first part of the ester name comes from the alcohol (ethyl) and the second part from the carboxylic acid (ethanoate)

(alcohol) (acid-anoate)

Drop -anol, replace with "yl"

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

Example:



Further reading

<https://www.bbc.co.uk/bitesize/guides/z3v4xfr/revision/1>

<http://ahammondbiology.weebly.com/c10---organic-reactions.html>

<https://www.youtube.com/watch?v=dUsv-k0Xvac&safe=active>

KS4 Chemistry: C13 The Earth's Atmosphere

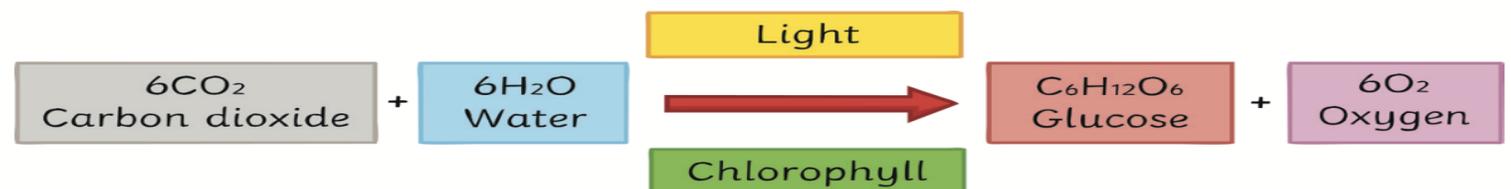
Keyword	Definition
Atmosphere	The relatively thin layer of gases that surround planet Earth
Carbon capture and storage	A technique that involves capturing carbon dioxide produced by burning fossil fuels and pumping it underground to be absorbed by porous rocks so that it is not released into the atmosphere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

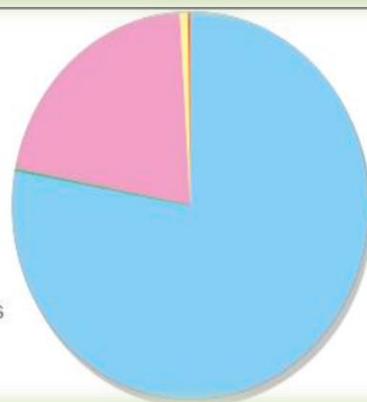
The carbon footprint is the **total amount of carbon dioxide and other greenhouse gases emitted over the full life cycle** of a product, service or event. The carbon footprint can be reduced by **reducing emissions of carbon dioxide and methane.**



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.

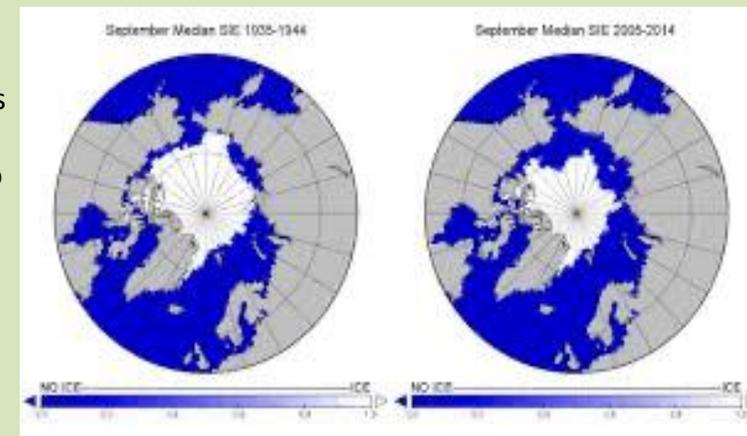
4. The atmosphere warms up



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**.

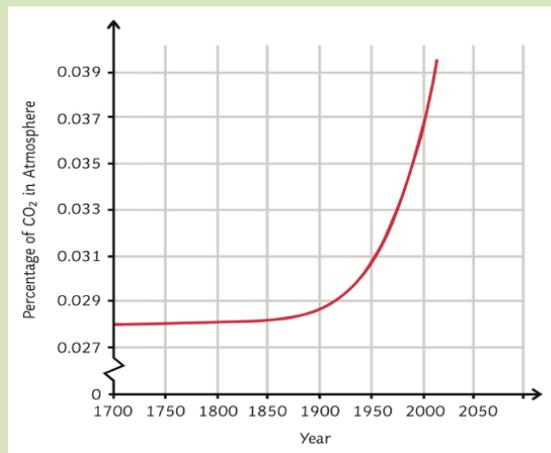
Scientists believe that human activities have resulted in the increased amount of greenhouse gases in the atmosphere. Activities such as farming cattle and farming rice release huge amounts of methane into the atmosphere. Burning fossil fuels in cars and power stations releases large amounts of carbon 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.

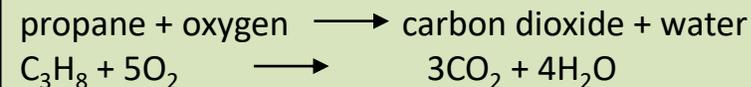
Compounds of nitrogen oxides react in the atmosphere with ultraviolet light from the sun to produce photochemical smog. The smog is most noticeable during the morning and afternoon and occurs mainly in densely populated cities.

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

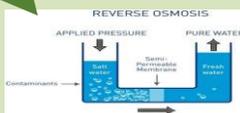
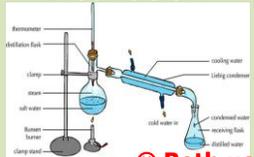
Why? To kill microbes

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

Salt water

Desalination

Distillation



Using membranes e.g. Reverse osmosis

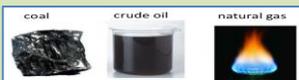
⊗ Both use a lot of energy

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

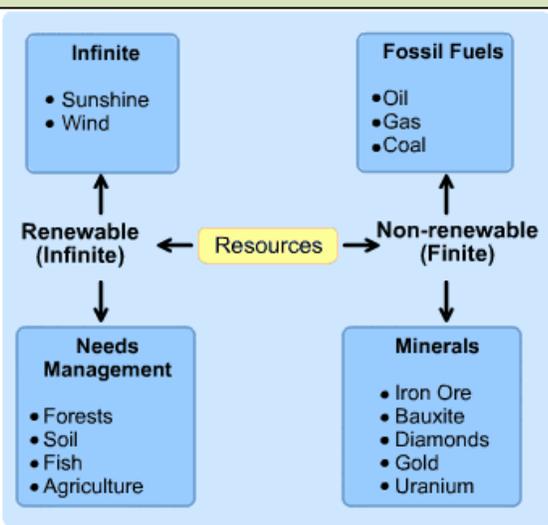


e.g. Coal, oil and gas are used for energy.
e.g. metal ores are mined to get metals.

'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

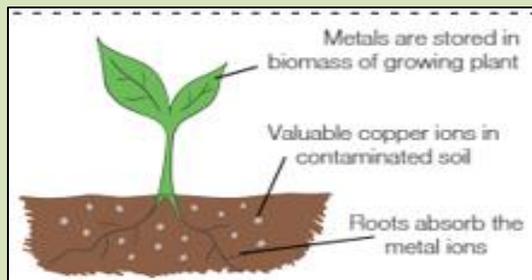
Finite	Will run out eventually
Renewable	We can replace them as we use them
Sustainable	meets the needs of the current generation without compromising the ability of future generations to meet their needs.
Potable	Safe to drink, Drinkable
Pure	a pure substance consists of only one element or one compound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



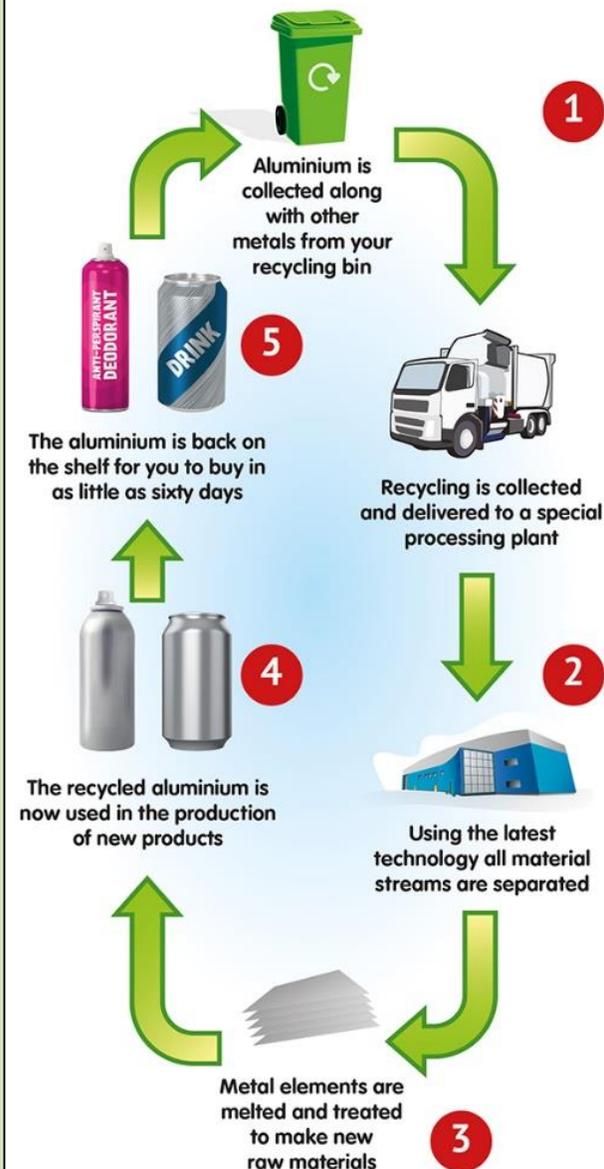
Links to Further Reading:

<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?



Equations

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

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

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

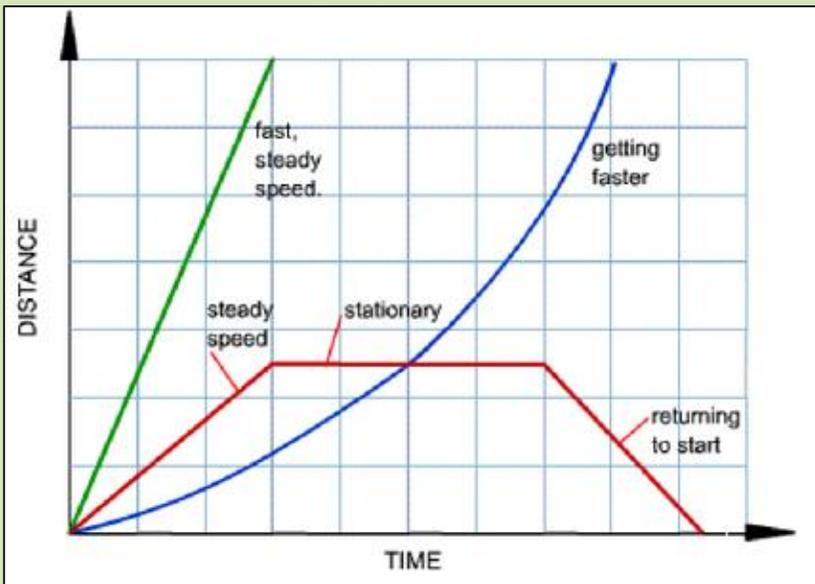
$$s = \frac{d}{t}$$

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)

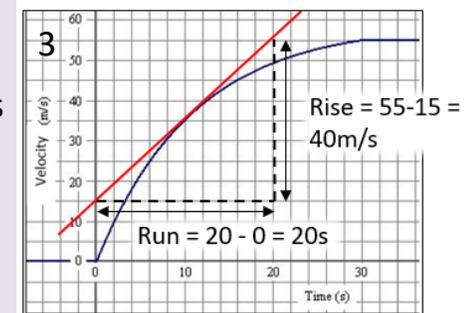
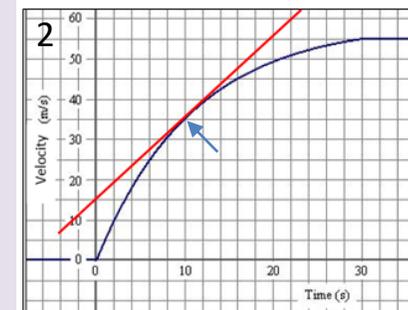
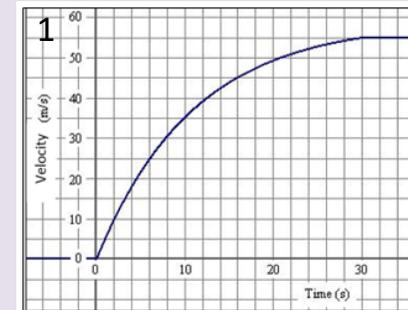
$$\text{gradient} = \frac{\text{change in } y}{\text{change in } x}$$

or

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

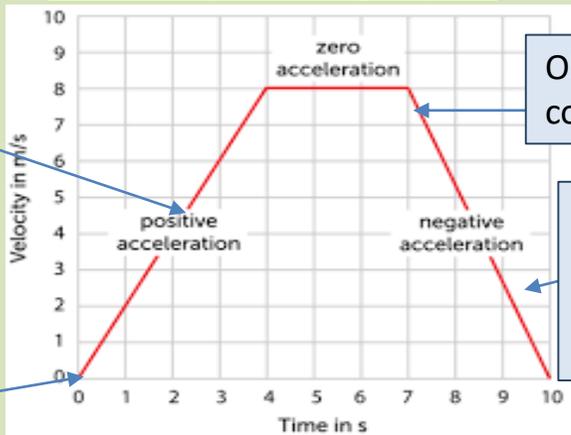
Calculate the gradient of the tangent, draw vertical and horizontal lines to the tangent. Measure rise and run.

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



Velocity time graphs

constant acceleration / speeding up

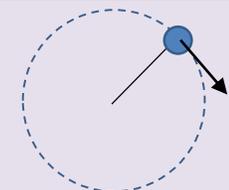


Object at a constant velocity

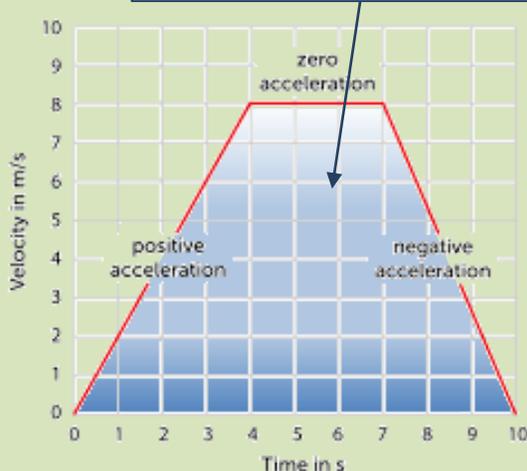
Constant deceleration / slowing down

Object stationary

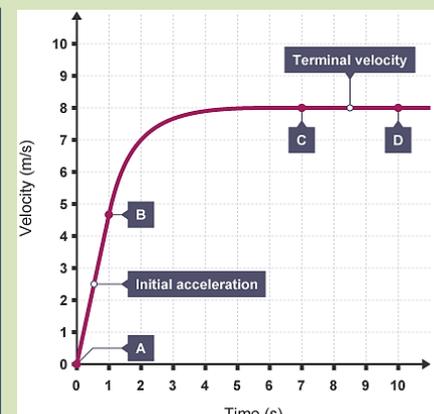
HT: Circular motion – an object moving in a circular motion can have a constant speed but its velocity is constantly changing as it changes direction (remember velocity is a vector quantity with a magnitude and direction)



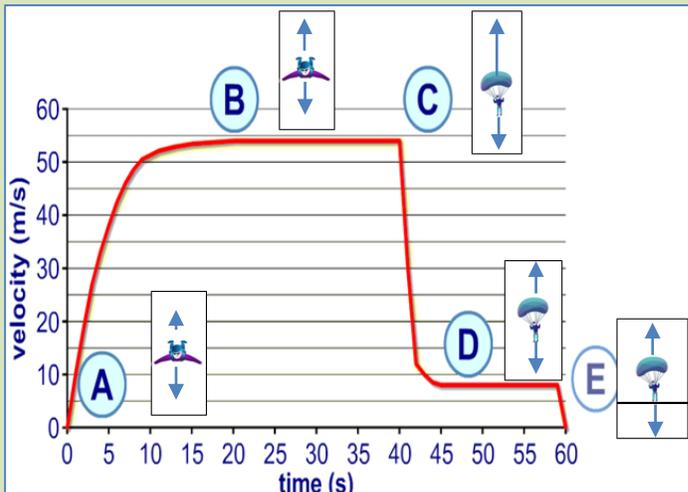
HT: The area under a velocity time graph = displacement



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.

KS4 Science – P10 Force and Motion

Newtons Second Law states that the acceleration of an object is:

- Proportional to the resultant force on the object
- Inversely proportional to the mass of the object

The formula $F = ma$ gives the resultant force on an object

Inertia is the tendency of an object to stay at rest or continue moving at the same speed and direction.

$$\text{Inertial mass} = \frac{\text{Force}}{\text{Acceleration}}$$

If you know the mass of an object in kg, you can calculate the force due to gravity that acts on it (i.e. its weight) using the equation:

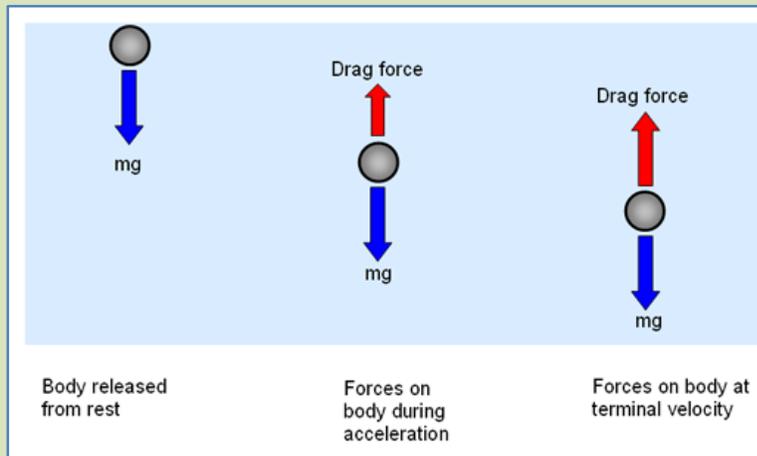
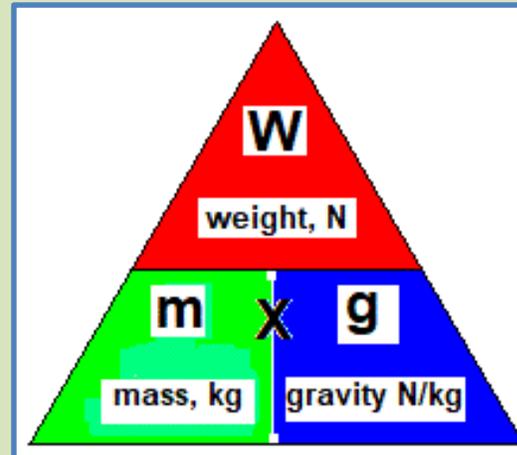
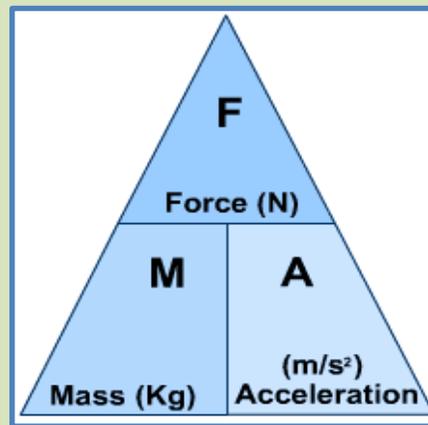
Weight, $W = \text{mass, } m \times \text{gravitational field strength, } g$

The weight of an object is the force on it due to gravity. The mass of an object depends on the amount of matter in it.

The acceleration due to gravity on Earth is 10 m/s^2

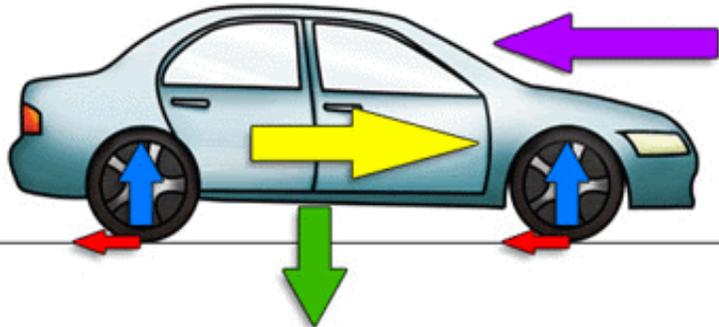
Terminal Velocity is eventually reached by a falling object when the weight of the object (acting down) is equal to the frictional force acting on an object.

When an object is moving at terminal velocity, the resultant force on it is zero.



Key Word	Definition
Force (F)	A force can change the motion of an object Units are Newtons, N
Weight	The force of gravity pulling on an object. The units are Newtons, N
Mass	The quantity of matter in an object – a measure of the difficulty of changing the motion of an object. Units are kilograms, kg
Inertia	The tendency of an object to stay at rest or in uniform motion
Gravitational Field Strength (g)	The force of gravity on an object of mass 1kg. Units are N/kg
Terminal Velocity	The velocity reached by an object when the drag force on it is equal and opposite to the force making it move
Stopping distance	The distance travelled by a vehicle in the time it takes the driver to think and brake
Thinking distance	The distance travelled by the vehicle in the time it takes the driver to react
Braking distance	The distance travelled by the a vehicle during the time it takes for the brakes to act
Momentum	This equals mass (in kg) x Velocity (in m/s)
Elastic	Elastic materials regain their shape after being squashed or stretched
Extension	The increase in the length of a spring (or strip of material) from its original material
Directly proportional	A graph will show this if the line of best fit is a straight line through the origin

Friction and air resistance oppose the driving force of a vehicle



- █ weight
- █ reaction force
- █ driving force
- █ friction
- █ air resistance

The stopping distance depends on the thinking distance and the braking distance.
 Braking distance is increased by high speed, poor weather and poor vehicle maintenance
 Thinking distance is increased by poor reaction time (due to tiredness, drug, alcohol or using a mobile phone) and high speed

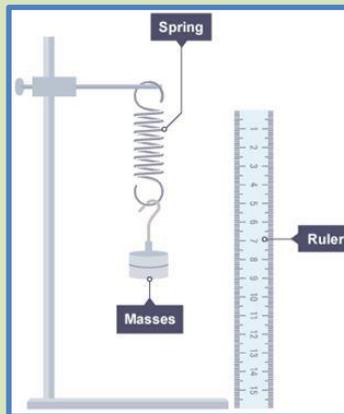
Deceleration can be calculated using $v^2 = us + 2as$
 Where s = distance travelled
 U = initial speed
 V = final speed

When vehicles collide, the force of the impact depends on the mass, change of velocity, and the length of the impact time.
 The longer the impact time, the more the impact force is reduced.

$$\text{Impact Force, } F = \frac{\text{mass, } m \text{ (kg)} \times \text{change in velocity, } \Delta v \left(\frac{m}{s}\right)}{\text{time taken, } t \text{ (s)}}$$

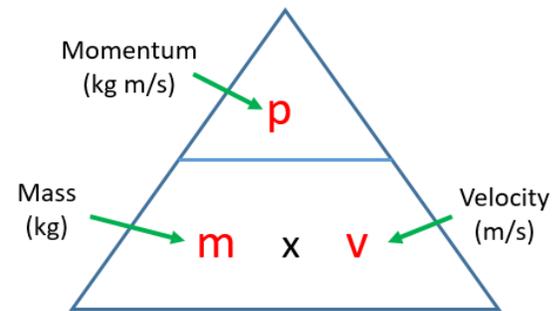
The time of impact is important; to create a large force the time of impact should be as short as possible.

Impact forces are reduced by cycle helmets and cushioned surfaces which increase impact time. Seat belts and side impact bars also increase impact time.



However if you stretch the object too far you will reach its ELASTIC limit, and the object won't return to its original shape. You will have reached the LIMIT OF PROPORTIONALITY.

Momentum



$$\text{Momentum (kg m/s)} = \text{Mass (kg)} \times \text{Velocity (m/s)}$$

Because momentum = mass x velocity it has both SIZE AND DIRECTION

The momentum of a moving object makes it harder to stop that body from moving or change its direction

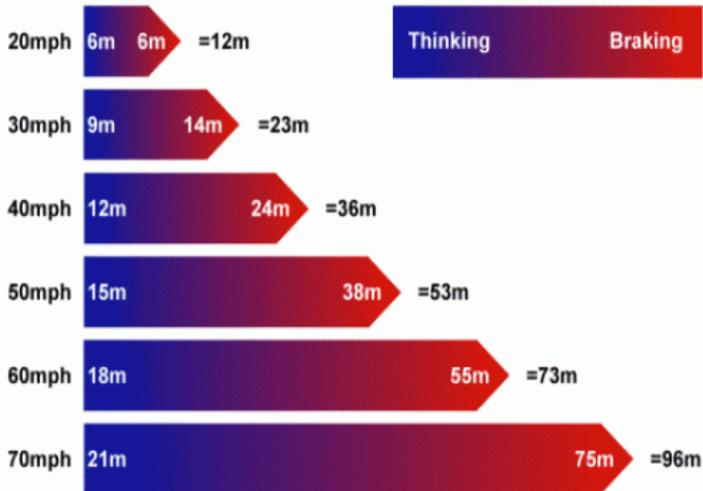
A closed system is a system where the total momentum before an event (e.g. collision) is the same as the total momentum after the event. This is called **conservation of momentum**.

The idea of conservation of momentum can be used to find the velocity of an object after a collision with another object. If no other external forces apply you can use this equation:
 $m_A v_A + m_B v_B = 0$

Hooke's Law states that if you stretch an elastic object (e.g. spring), the extension is proportional to the force applied. Force applied, F = spring constant, k x extension, e (newtons, N) (newtons per metre, N/m) (metres, m)

Other Useful Links
<https://www.bbc.co.uk/bitesize/topics/zgtrmw6f>
<https://www.bbc.co.uk/bitesize/topics/zcw22nb>
<https://www.youtube.com/watch?v=W3VbonFNcw>

Stopping distance = thinking distance + braking distance



Pressure = Force / Area

For example if a vehicle of weight 12,000 N is fitted with tyres that have an area of 3 m² in contact with the ground, the pressure of the vehicle on the ground

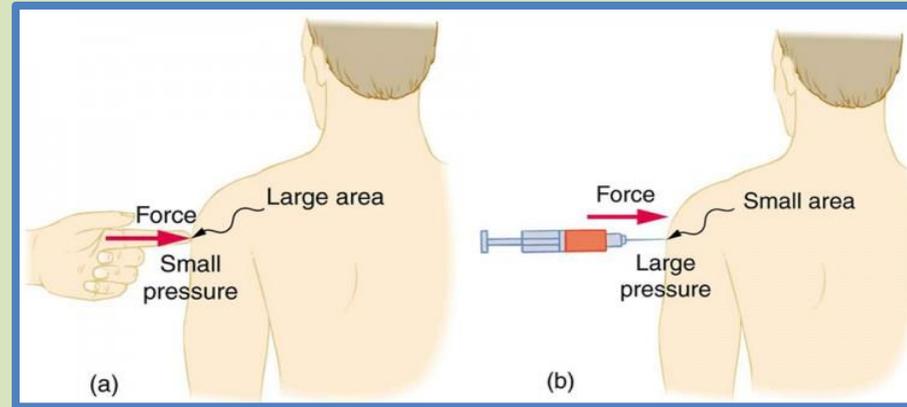
$$= \text{Force} / \text{Area}$$

$$= 12,000/3$$

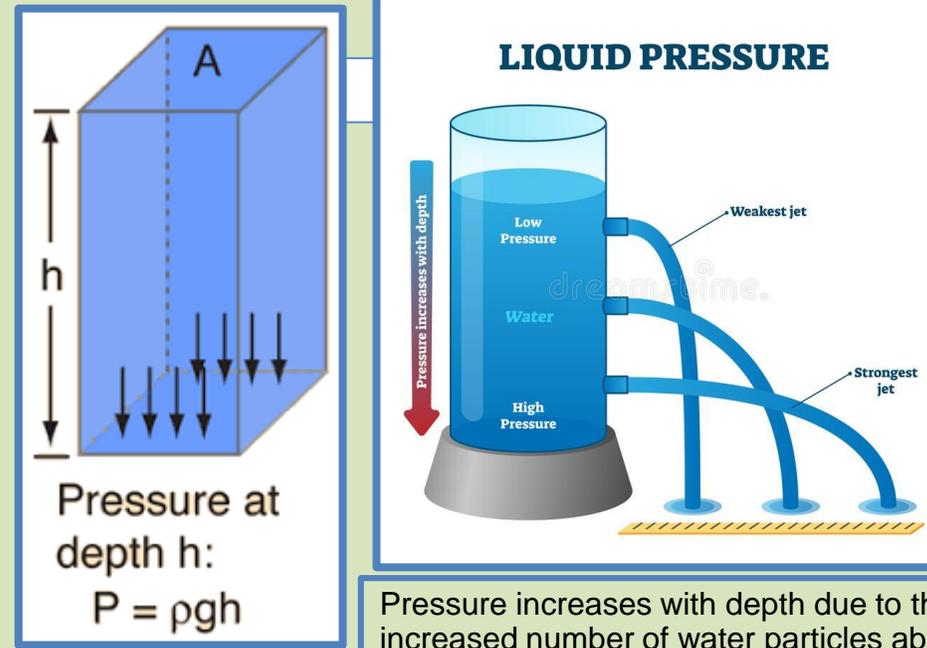
$$= 4000 \text{ N/m}^2 \text{ or Pa}$$

KS4 Science – P11 Force and Pressure

Separate science only



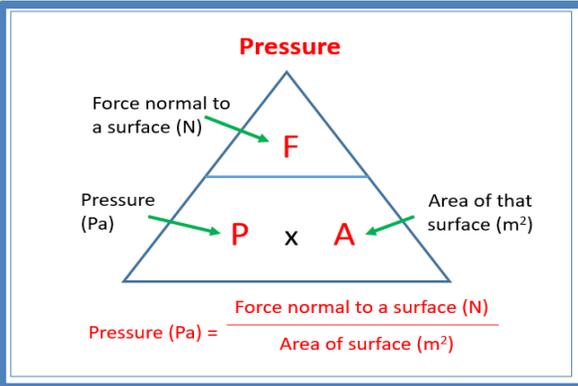
A sharp object like a knife or needle exerts more pressure than a blunt object because the force is concentrated over a much smaller area



Pressure increases with depth due to the increased number of water particles above

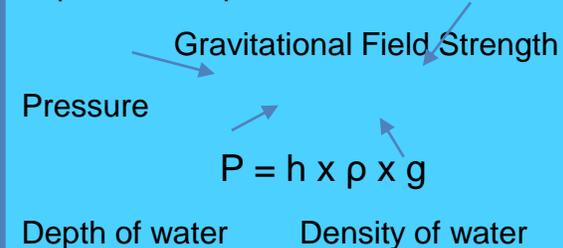
Key Word	Definition
Pressure (p)	The Force per unit area. Units are pascals, Pa
Force (F)	A force can change the motion of an object Units are Newtons, N
Weight	The force of gravity pulling on an object. The units are Newtons, N
Density (ρ)	The mass per unit volumes of a substance. Units are kg/m ³ The symbol for density is ρ, rho
Atmospheric Pressure	The pressure that Earth's atmosphere exerts on the surface of the Earth at Sea Level
Altitude	the height of an object or point in relation to sea level or ground level
Gravitational Field Strength (g)	The force of gravity on an object of mass 1kg. Units are N/kg
Upthrust	The upwards force that acts on a body partly or completely submerged in a fluid
Immersed	Put into or underneath water
Displace	Move an object out of its normal position or place

The greater the density of a liquid, the greater the pressure in a liquid. This is because particles of denser fluids are closer together, so there are more collisions of particles in a given area.

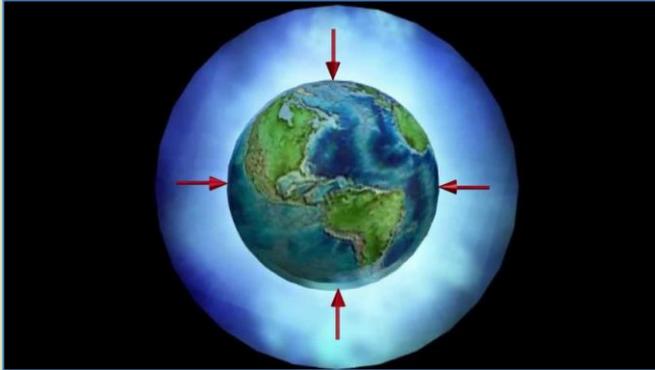


You need to be able to REARRANGE and USE the formula $F = p \times A$ i.e. $p = F/A$. You must also be able to calculate cross-sectional areas

The pressure of a liquid increases with the depth of the liquid.



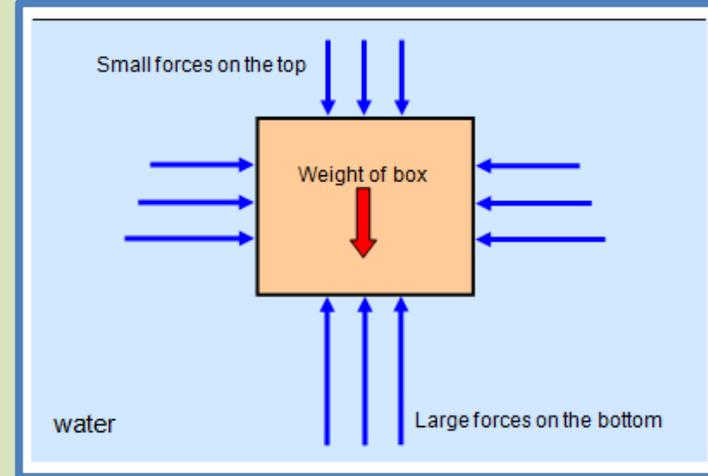
Air molecules create atmospheric pressure by colliding with surfaces and creating pressure on them



The pressure in Earth's atmosphere depends on altitude (height above sea level) and air density

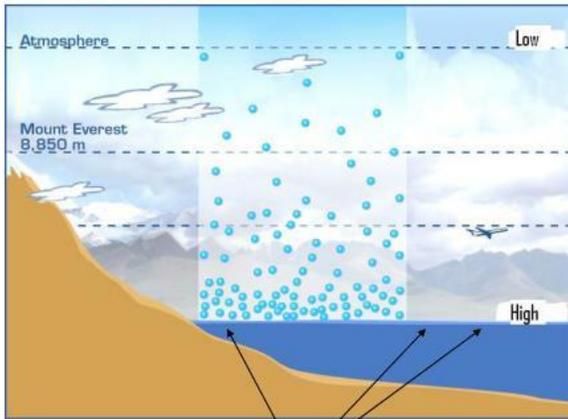
$$P = h \times \rho \times g$$

Pressure, P is in Pascals (Pa)
 Height, h is in meters (m)
 Density, ρ is in kilograms per meter cubed (kg/m^3)
 Gravitational field strength, g is in Newtons per kilogram (N/kg)



As you go higher in the Earth's atmosphere there are less particles of air, so the atmospheric pressure decreases.

Atmospheric Pressure



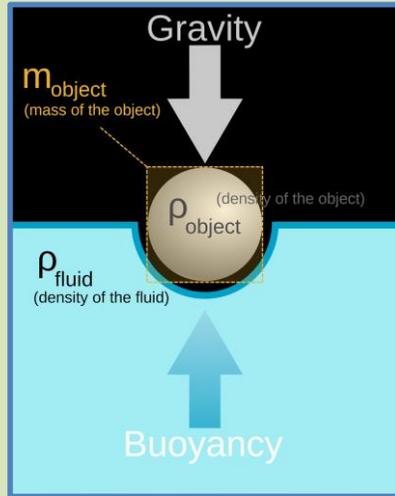
Higher altitudes have a lower pressure.

There is less air above you.

Lower altitudes have a higher pressure.

There is more air above you.

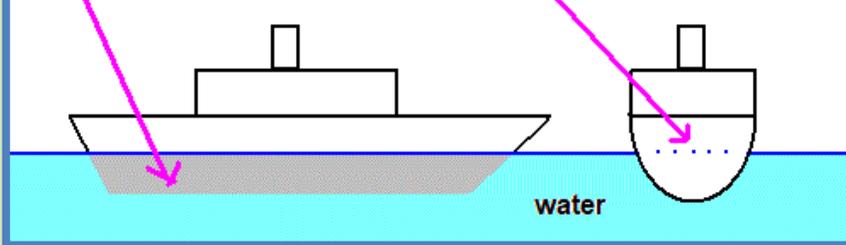
Sea level = 1 ATM of pressure (14.7 lbs/in²)



Why a steel ship floats on water

weight of water displaced = weight of ship

the average density of the boat, contents and air is less than the gravity of water



Upthrust on an object in a fluid is an upward force on the object. Upthrust provides buoyancy.

Upthrust is caused by the pressure of the fluid.

The pressure in a fluid depends on the density of the fluid and the depth of the fluid at that point.

Objects in water displace some of the water.

The more the object is lowered into the water, the bigger the volume of water displaced and the bigger the upthrust.

When the object is fully immersed the volume of water displaced is equal to the volume of the object.

An object sinks if its weight is greater than the upthrust on it when it is fully immersed.

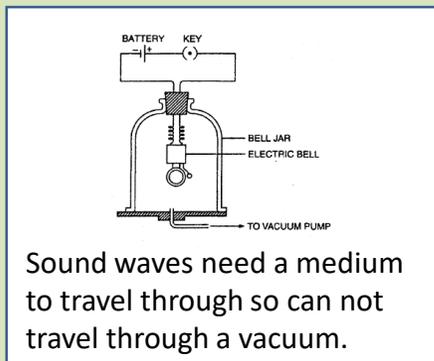
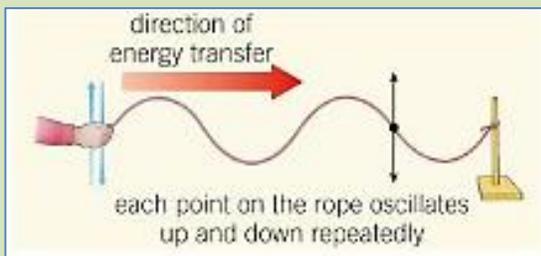
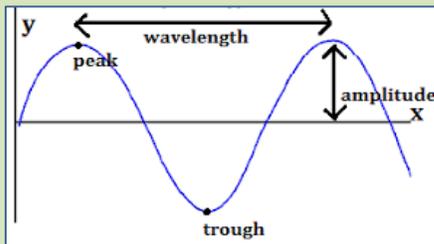
Other Useful Links

- <https://www.bbc.co.uk/bitesize/guides/zrcm39/revision/1>
- <https://www.bbc.co.uk/bitesize/guides/z9ykmsg/revision/1>
- <https://quizlet.com/gb/410612406/aga-gcse-physics-p11-force-and-pressure-flash-cards/>
- <https://www.youtube.com/watch?v=P08-1PY1hl>

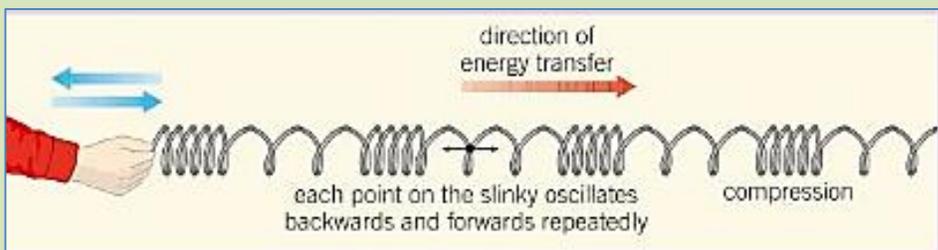
KS4 Physics: P12 Waves

Waves transfer **energy** (and sometimes information). They do not transfer **matter**.

Transverse - A wave in which the vibrations (oscillations) are at right angles to the direction of energy transfer. **E.g. water waves, waves on a rope, electromagnetic waves (light etc)**



Longitudinal - A wave in which the vibrations (oscillations) are parallel to the direction of energy transfer **E.g. sound waves**



Equations to Learn

wave speed = frequency \times wavelength

$$v = f \lambda$$

$$\frac{v}{f \times \lambda}$$

Equations given in the exam

time period = $\frac{1}{\text{frequency}}$

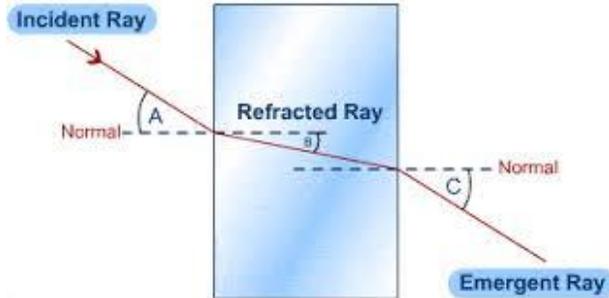
$$T = \frac{1}{f}$$

$$\frac{1}{T \times f}$$

Word	Definition
mechanical waves	Waves which require a medium (substance) to travel through
medium	The substance that a wave is travelling through e.g. air, water
matter	Material, anything that is made of atoms
oscillation	vibration
transverse wave	A wave in which the vibrations (oscillations) are at right angles to the direction of energy transfer
longitudinal wave	A wave in which the vibrations (oscillations) are parallel to the direction of energy transfer
compression	Area in a longitudinal wave where particles are close together
rarefaction	Area in a longitudinal wave where particles are far apart
amplitude	The maximum displacement of a point on a wave away from its undisturbed position
wavelength	Distance from a point on one wave to the equivalent point on the adjacent wave
frequency	Number of waves passing a point each second
hertz (Hz)	Unit for measuring frequency. 1 Hz = 1 wave per second
period	Time taken (in seconds) for one wave to pass
reflection	When a wave 'bounces back' after hitting a surface e.g. a mirror
refraction	When a wave changes direction at a boundary between two different materials because the wave speed changes
transmission	When a wave travels through a material
normal	Line at right angles to a surface
ultrasound	Sound waves with frequency higher than 20,000Hz, too high for humans to hear
Seismic waves	Waves produced by earthquakes
P wave	Longitudinal seismic wave
S wave	Transverse seismic wave

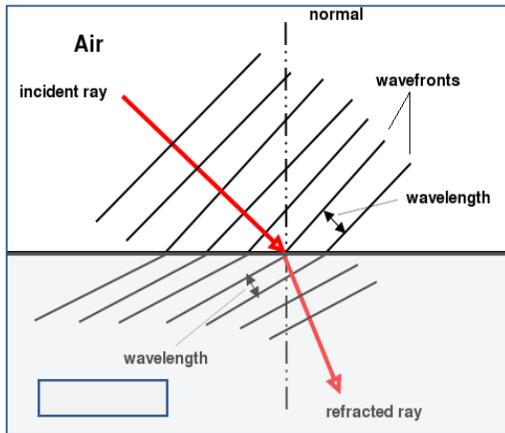
Refraction

- Waves change direction when they travel into a different medium e.g. air to glass
- Refraction happens because the wave speed changes.
- The ray is refracted towards the normal, when it travels into a more 'dense' material e.g. glass
- away from the normal when it travels into a less 'dense' material e.g. air
- When waves travel into a more dense material the **speed** and **wavelength decrease**, but **frequency stays the same**
- If the incident wave is perpendicular to the surface it does **not** change direction



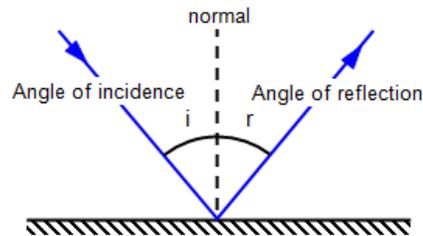
Wave front diagrams

The wave fronts (tops of the waves) are perpendicular to the rays.



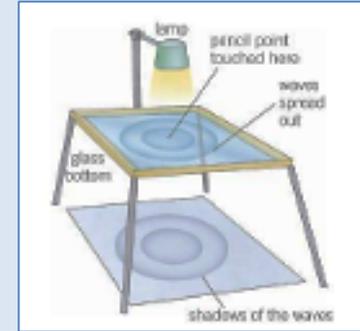
Reflection

Reflected waves from a straight surface (like light waves on a plane mirror) reflect at the same angle as the incident waves. We say the **angle of incidence = the angle of reflection**



Always draw ray diagrams with a ruler and include an arrow to show the direction of travel. The normal line is a line at 90° to the block or mirror

Required practical - Measure speed of water waves using a ripple tank



The equation **Speed = distance / time** can be used to measure the wave speed of a water in a ripple tank.

- Time how long one wave to travel from one end of the tank to the other
- Measure the distance travelled with a ruler
- Use **Speed = distance / time** to calculate the wave speed

Required practical - Measure speed of waves in a string

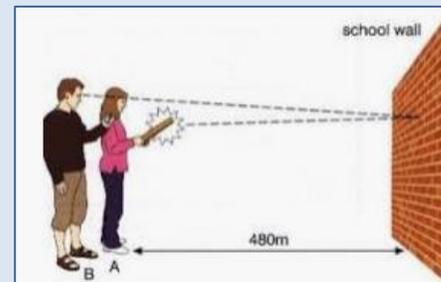


Set up a frequency generator, vibrator and pulley. Attach string to the vibrator and suspend masses on the other end

Record the frequency of the frequency generator that creates a wave form. Measure the wave length (each loop = half the wave length)

Use **$v = f\lambda$** to calculate the wave speed

Measure speed of sound using an echo



You can measure the speed of sound using an echo from a distant wall using **Speed = distance / time**

The distance is 2 x the distance to the wall as the wave travels to the wall and back.

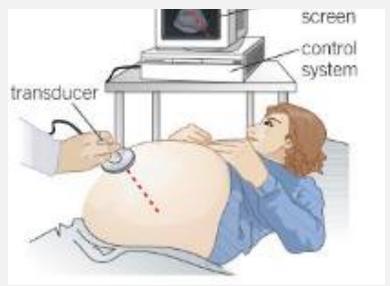
Time from when you clap the blocks together to when you hear the echo.

Ultrasound

- Ultrasound waves have a **frequency greater than 20kHz**, so cannot be heard by humans
- Ultrasound waves are partially reflected when they meet a boundary between two different media.
- The time taken for the reflections to reach a detector can be used to determine how far away the boundary is.
- This allows ultrasound waves to be used for **medical and industrial imaging**.

Ultrasound scan of baby in the womb

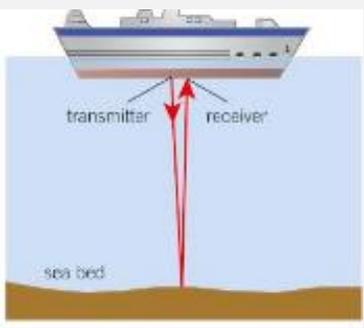
Ultrasound waves are partially reflected at boundaries between tissue and bone etc. these reflections will arrive back at the transducer at different times, enabling an image of the foetus to be build up



Echolocation to determine depth of sea

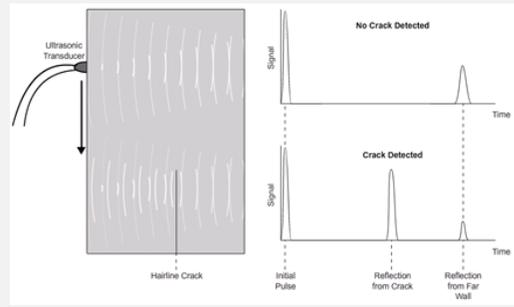
Distance = speed x time
If you know the wave speed and you measure the time taken to detect a reflection.

The depth will be half the distance as the wave has travelled to the sea bed and back.



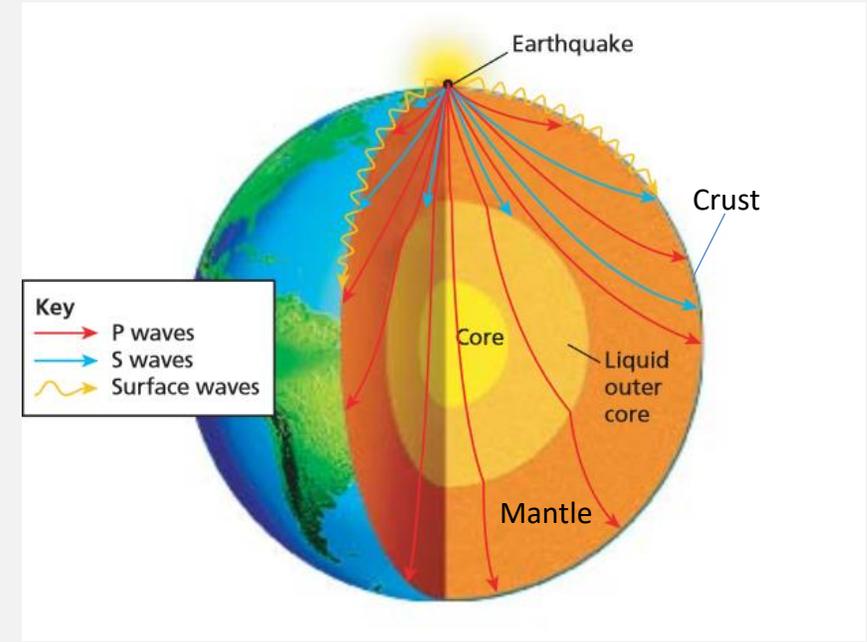
Detecting flaws in metals

Ultrasound can be used to detect imperfections in metals as the flaws/cracks in the metal will partially reflect the waves



Seismic waves

- produced by earthquakes
- **P waves** are longitudinal & travel at different speeds through solids and liquids
- **S waves** are transverse & **cannot travel through liquids**
- We cannot directly observe the internal structure of the Earth, but study of P waves and S waves provide evidence that the outer core is a **liquid** and enables us to determine the sizes of the inner and outer core



Computer Science– Programs and Data – Term 1

Programs and Data

The main purpose of computer programs is to collect and process data. A computer can change what it does depending on the data that it has to work with.

The data that is used in a program is referred to as the data values. These influence the sequence of instructions and the program outputs.

The data values collected and used by a program control:

- **what is done**
- **what is stored**
- **what is transmitted to other devices**
- **what is output to the user (visually, audibly)**

Basic Programming Constructs

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

There are three basic constructs to consider:

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

There are two types of iteration:

- **count-controlled iteration** - repeatedly executes a section of code a fixed number of predetermined times
- **condition-controlled iteration** - repeatedly executes a section of code until a condition is met or no longer met

Subroutines

Subroutines are small blocks of code in a modular program designed to perform a particular task. Since a subroutine is in itself a small program, it can contain any of the **sequence**, **selection** and **iteration** constructs.

Sequence

Sequence is the most common programming construct. In programming, **statements** are **executed** one after another. Sequence is the order in which the statements are executed.

The sequence of a program is extremely important. Carrying out **instructions** in the wrong order leads to a program performing incorrectly.

Selection

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 **algorithm** will take next.

For example, an algorithm 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 **instructions**. Otherwise, it would follow a different path and execute a different set of instructions.

Iteration

Iteration is the final programming construct. 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.

Sections of code that are iterated are called loops. Iteration enables programmers to greatly simplify a program. 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 it again and again until no longer needed.

Count-Controlled Iteration

Count-controlled iteration repeatedly executes a section of code a fixed number of predetermined times. It uses the **statements** for and next to determine what code is repeatedly executed and how many times. This program would also print out a message six times:

```
for count = 1 to 6
  print "Coding is cool"
next count
```

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Condition-controlled iteration

Condition-controlled iteration repeatedly executes a section of code until a **condition** is met - or no longer met. There are three types of condition-controlled iteration:

- **while loop** - uses the **statements** while repeat
- **repeat loop** - uses the statements repeat until
- **do loop** – uses the statements do loop or do while

While Loops

While loops test the condition at the beginning of the loop. If the condition is met, the code within the loop is executed before the **program** loops back to test the condition again. This program would print out a message six times:

```
set count = 0
while count < 6
    print "Coding is cool"
    count = count + 1
repeat
```

The while statement defines the start of the loop. The repeat statement declares the end of the loop. A **variable**, in this case count, is used for the condition. The while statement also tests the condition, in this case to see if the value of count is less than 6. If the result is TRUE, the code within the loop is executed then the program loops back to the condition, which is tested again.

Repeat Loops

Repeat loops function in the same way as while loops, with one major difference - the condition is tested at the end of the loop:

```
set count = 0
repeat
    print "Coding is cool"
    count = count + 1
until count = 10
```

The repeat statement defines the start of the loop. The until statement tests the condition. Because the condition is tested at the end, the code within the loop is always executed at least once, even if the result of the test is FALSE.

Do Loops

A do while construct works in the same way as a repeat until construct and a do loop construct works in the same way as a while repeat construct.

The condition for a do construct is placed at the end of the construct, for example do ... until x > 6 or do ... while x < 6.

Boolean Operators

Boolean operators are used to combine relational operators to give more complex decisions.

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

The code below uses two conditions to check if the password entered is both the correct length of six or more characters and is not a number:

```
password ← USERINPUT
IF LEN(password) >= 6 AND IS_NUMERIC(password)
= False THEN
    OUTPUT "Good Password!"
ELSE
    OUTPUT "Password too short"
ENDIF
```

Arrays

An **array** is a data structure that holds similar, related data. An **array** is like a collection of boxes, each of which is called an **element**. Each element has a position in the array, and can hold a value. The data in an array must all be of the same **data type**.

This way, all data is stored under one identifier. For example, the array called "score" could contain the following ten scores for a player:

0	1	2	3	4	5	6	7	8	9
100	110	85	80	92	72	66	98	100	120

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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**, i.e. 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
```

String Manipulation

A string is a variable that holds a sequence of one or more alphanumeric characters. It is usually possible to manipulate a string to provide information or to alter the contents of a string.

The following examples use strings:

```
wordOne = "Computer"  
wordTwo = "Science"
```

Length

The length of a string can usually be determined using the **len** statement. This gives the length as an integer.

`len(wordOne)` - would give the answer eight, as there are eight characters in the word "Computer"

Character Position

It is possible to determine which character features at a position within a string:

`wordOne[2]` - would give the answer "m", as "m" is the third character in the word "Computer" (remember computers start counting at zero)

`wordOne[0,3]` - would give "Com", the first three characters in the string

`wordOne[3,3]` - would give "put", the three characters starting from position three

Upper and Lowercase

It is possible to change all letters in a string to either lowercase or uppercase. This can be very useful, for example when checking possible inputs:

- `topic = "Computer Science"`
- `topic = topic.lower` - would give a value for the topic of "computer science"
- `topic = topic.upper` - would give a value for the topic of "COMPUTER SCIENCE"

Concatenation

To concatenate strings means to join them to form another string. For example:
`sentence = wordOne + " " + wordTwo` - would give "Computer Science"

Alternatively, a string can be lengthened by adding more characters. For example:
`wordOne = wordOne + " Science"` - would result in the value of wordOne becoming "Computer Science"

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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.

Opening and closing files

A file must be open before a record can be read from or written to it. To open a file, it must be referred to by its identifier, for example:

```
file = openRead("scores.txt")
```

This would open the file *scores.txt* and allow its contents to be read.

```
file = openWrite("scores.txt")
```

This would open the file *scores.txt* and allow it to have data written to it.

```
file.close()
```

Reading from a file

Once a file has been opened, the records are read from it one line at a time. The data held in this record can be read into a variable, or, more commonly, an array, for example:

```
file = openRead("scores.txt")
score = myFile.readLine()
file.close()
```

An array example is shown below.

```
file = openWrite("scores.txt")
for x = 0 to 9
    scores[x]=myFile.readLine()
next x
file.close()
```

End of file

When reading a file that has more than one record, the computer needs to know what to do when there are no more records to read. The `endOfFile()` statement checks to see if the last record has already been read, for example:

```
file = openRead("scores.txt")
while NOT file.endOfFile()
    scores[x]=myFile.readLine()
    x = x + 1
endwhile
file.close()
```

The above code would read each record and place it into an array *scores*. The operation ceases when there are no more files to read.

Writing to file

Data is written to a file one line at a time, using the `writeLine` statement, for example:

```
file = openWrite("scores.txt")
for x = 0 to 9
    file.writeLine(scores[x])
next x
file.close()
```

The above code would write the contents of an array *scores* to the file *scores.txt*.

Use of records to store data

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**

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[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".

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

[Creating a table](#)

A table can be created in SQL code using the following template:

```
CREATE TABLE tablename  
(column1 datatype,  
column2 datatype,  
column3 datatype);
```

The creator of the table has to decide:

- **The name of the table - "tablename"**
- **The title of each field - "column"**
- **The data type that is required for each field - "datatype" (I.E. character strings - 'varchar' or numbers - 'int')**

In the TV programmes example the table can be created using the following SQL code:

```
CREATE TABLE Programmes  
(ID int(2),  
Title varchar(20),  
Genre varchar(20),  
Duration int(3));
```

The data type varchar indicates that only character strings are allowed, and the number in brackets indicates the maximum number of digits for each data type.

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[Adding and editing data with SQL](#)

SQL can also be used to add and edit the data stored on an SQL server.

[Adding records](#)

To add new data you use the function **INSERT INTO**.

If a new BBC programme is created and you want to add it to the **database**, then you would need to use the **INSERT INTO** function followed by the VALUES separated by a comma:

```
INSERT INTO Programmes  
VALUES (07, "Top Gas", "Entertainment", 60);
```

After inputting that code the table would change to look like this

ID	Title	Genre	Duration
01	EastEnders	Drama	30
02	Newsnight	Current affairs	50
03	The Voice	Entertainment	75
04	Blue Peter	Children's	25
05	Wild Brazil	Nature	60
06	Sherlock	Drama	90
07	Top Gas	Entertainment	60

[Editing records](#)

SQL also has the **UPDATE** function for editing data.

In this example, there was an error with the previous entry and you need to change the name from "Top Gas" to "Top Gear". You need to:

1. Identify the table to be updated using **UPDATE - UPDATE Programmes**
2. Identify what the field needs to be changed to using **SET - SET Programmes.Title = "Top Gear"**
3. Identify which record needs to be updated using **WHERE - WHERE Programmes.ID = 07**

In full, this is:

```
UPDATE Programmes  
SET Programmes.Title = "Top Gear"  
WHERE Programmes.ID = 07;
```

[Deleting records](#)

The **DELETE** statement is used to delete existing records in a table.

```
DELETE FROM Programmes  
WHERE Programmes.Title = "Top Gear"
```

This will delete all the details of the record where the title is Top Gear.

This will go to the **Programmes** table, find the programme with an **ID** of 07 and change the **Title** field to **Top Gear**. The amended table will look like this:

ID	Title	Genre	Duration
01	EastEnders	Drama	30
02	Newsnight	Current affairs	50
03	The Voice	Entertainment	75
04	Blue Peter	Children's	25
05	Wild Brazil	Nature	60
06	Sherlock	Drama	90
07	Top Gear	Entertainment	60

Computer Science– Programs and Data – Term 2

Subroutines Expanded

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.

A procedure is created using the following **syntax**:

```
procedure identifier (value to be passed)
    procedure code
endprocedure
```

This following procedure would clear the screen by printing x blank lines:

```
procedure clear_screen(x)
    for i = 1 to x:
        print(" ")
endprocedure
```

A procedure is run by calling it. To call it, a programmer uses the procedure name and includes any values that the procedure needs, for example:

```
clear_screen(5)
```

This would print the five blank lines on the 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
```

A function is run by calling it. To call it, a programmer uses the function's **identifier**, the value to be passed into the function, and a variable for the function to return a value into, for example:

```
celsius = f_to_c(32)
```

This would result in the value of Celsius being zero.

Built in Functions

Many languages include built-in, ready-made functions:

- **int** - converts strings or floats into integers
- **str** - converts a number into a string
- **asc** - finds the ASCII number of a character

Additionally, some languages allow functions to be added in from external files called **libraries**. Libraries contain pre-written, tested functions that extend the functionality of a language.

Random Number Generation

Sometimes a programmer needs the **program** to generate a number or letter within a specific range. This requires the program to create a random number. Programming games that involve chance, such as dice, require random numbers as do many types of program that need to be unpredictable.

```
dice ← RANDOM_INT(1,6)
OUTPUT "you rolled a " + INT_TO_STRING(dice) + "!"
```

Random numbers are not just used for rolling dice and games of chance. When sending **data** across a **network**, a wireless **router** waits for a random amount of time before transmitting the data to avoid collisions. Random numbers are often used to generate secure passwords that are difficult to crack.

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Computer Science– Programs and Data – Term 2

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.

A programmer can build various types of validation into a program:

- **Range check** - the input must fall within a specified range. This is usually applied to numbers and dates, but can apply to characters. For example, when making a payment to someone, the amount to be entered might be set to be greater than zero and not greater than the funds available.
- **Length check** - the input must not be too long or too short. For example, a surname will require at least one letter, but is unlikely to require more than 40.
- **Presence check** - a data value must be entered. For example, entering a quantity when placing an order.
- **Format check** - the data must be in the correct format, such as entering a date in the format DD/MM/YYYY.
- **Type check** - the data must be of a specified data type, such as an integer when specifying a quantity.

Many programs use one or more of these validation checks. For example, when signing up for a user account on a website, the validation might include:

- **Presence check** - a username must be entered
- **Length check** - a password must be at least eight characters long
- **Range check** - age restrictions may require the user's date of birth to be before a certain date
- **Format check** - the user's date of birth must be entered in the specified format
- **Type check** - the password may need to have a mixture of upper and lower case letters, a number and a special character

Validation does not ensure that the data entered is correct, just that it is possible and sensible. A user may accidentally enter a date of birth that is possible and sensible, but incorrect. The program has no way of knowing that the date has been entered incorrectly.

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.

- **Something you are** - username, bank account number, or anything that identifies the user uniquely
- **Something you know** - password, pin, secret answer to a question
- **Something you have** - swipe card, biometrics, any other physical identifying device

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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. This includes using:

- **Comments**
- **Sensible variable names**
- **Indentation**

Comments

Comments are lines in programs that provide information about what the different parts of the program do. They serve no other purpose, and are not executed when the program is run - the program simply ignores them and moves on to the next line of code.

Different languages implement comments in different ways. In Python, for example, a comment begins with a hash symbol, and is coloured red:

`#ensures the input is restricted to a y or an n`

Sensible variable names

Many programmers choose meaningless variable names such as x or y. While a program will run with such names, it makes understanding the purpose of the variable much more difficult. Programmers should choose a variable name that reflects the purpose of the variable and the data it is intended to hold:

H - poor choice. What does it mean?

height - better choice. The value to be inputted will be a number.

Syntax Errors

A syntax error occurs when code written does not follow the rules of the programming language.

Examples include:

- **Misspelling a statement, i.e. writing `pint` instead of `print`**
- **Using a variable before it has been declared**
- **Missing brackets, i.e. 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.

Indentation

Code within selections or iterations should be indented. This allows the programmer to easily see which code falls within the selection or iteration, and where it ends.

Some programming languages, such as Python, indent such code automatically.

```
do
  for count = 1 to 10
    print("Hey!")
  next count
  again = input("Enter y to go again")
  again.lower
until again != "y"
```

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, i.e. 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.**

iMedia – Video Editing– Key Terms

Key Term	Explanation
Codec	Codec is short for "coder-decoder." It is an algorithm used to encode data, such as an audio or video clip. The encoded data must be decoded when played back.
Resolution	The physical size of an image usually stated as image length (in pixels) times image height (in pixels) e.g. 1280x720
Transition	Method of changing from one shot or scene to another using a specific effect (e.g. wipe, fade through black, cut, cross-fade).
Camcorder	Device allowing the capture of footage, with the facility to alter settings according to the user's requirements. As distinct from capturing video using a mobile phone.
Footage	Digital video capturing moving images as opposed to single 'still' frame
Static Frame	One single image of video, which could be replicated across many frames, to produce a still (non-moving) image like a photograph
Motion Graphic	This term includes the use of animations, gifs, animated clipart and so on, inserted into a video.
Video Sequence	A combination of video clips which could include footage, static frames, motion graphics, effects and text such as titles and credits, to create a single video file
Splitting	This technique is used to break video clips into sections, for example so that other footage can be inserted in between shots, or so that the shots can be placed in a different order.
Trimming	This technique is used to remove parts of a video clip which are not required in the final edited video sequence. The original asset or source video remains intact
Optimisation	This process prepares the final video sequence so that it streams and loads as smoothly as possible on a range of devices. Several techniques and technologies for optimisation are available, and depending on the video editing software chosen, options to select the quality or size of final video may be available.

Examples of uses of Pre-Production documents

Mood boards are used by newspapers and magazines to create their image; they will choose their colour scheme, fonts, examples of items to be included, etc. This all creates an overall picture of the finished project and is useful to keep everyone focused on the brand.

Mind maps could be used by radio stations to highlight the different topics that the presenters will talk about on their show. It will highlight current affairs in the music industry and go into more depth, possibly about how it affects others in the industry or what it means for parties involved. It will about the presenter to have a brief understanding of each topic before they talk about it live on air.

Story boards will be used by television production companies to plan out exact scenes, before shooting. For example, if they are filming a new advert, to save time, and essentially money, they will know exactly what will happen in each scene before they arrive as they would have already drawn up a story board, however a storyboard is not always 100% accurate and small changes are usually made when filming the final production.

Scripts will be used by television production companies and are written by the writers to ensure the actors understand not only what they need to say in a given scene but also understand if and where they have to move to ensure the flow of the scene is captured.

Visualisation Diagrams: used in almost all sections of the media industry. Visualisation Diagrams are used to design what your final product will be, this could take the form of a prop to be used in a movie or TV show or a front cover of a fantasy novel. These diagrams will always change during production as new ideas and tweaks will be made to ensure the product is created at its best.

Client and Client Requirements

Your client is the person you will be working for. They will tell you what they want you to plan, design or create for them.

The client will set out **requirements** that they want you to follow when you plan the project on thing like:

- Purpose of the project
- The projects theme
- The projects style
- The genre of the project
- What content needs to be in the project

Requirements can be defined in four key ways:

- Discussion: Talking to your client, asking them questions to find out what they want you to do.
- Written Brief: Reading information from your client on the things they want you to plan or create for them. (**Key Term**)
- Script: Reading the script to help you understand the storyline and characters in the project.
- Specification: A precise definition, often a list of things that must be done for the project to meet requirements.

Work Plans

Provide timescales so you don't spend too long on one thing. Allow projects to meet deadlines using checkpoints to stay on track with the project

This is a very important document as it helps you understand how to track and deal with the work you have to do for you project.

Target Audience

The target audience of a product is who the product is aimed at.

Note: This is not always the same as who it is being produced for!

You will need to consider the following when creating a product for your target audience:

- Age group
- Gender
- Location
- Ethnicity / culture
- Income

Digitising

Digitising is where a pre-production document is created by hand and then convert into a digital format, usually by a scanner. These are then saved as an appropriate file format and size.

A good way of keeping all your documents secure is making sure you don't have lots of loose paper!



Please scan this QR code to find the iMedia website section on Pre-Production documentation

iMedia – Creating a Digital Video Sequence - Term 1

What is a Shooting Script?

A shooting script is the version of a screenplay used during the production of a motion picture, a television show or a video game.

Shooting scripts are different from normal scripts/screenplays. They incorporate scene numbers and follow a well-defined set of procedure that specify how revision to the screenplay are implemented and circulated among cast and crew.

The shooting script is usually created by the director and cinematographer. But on smaller productions or television shows the screenwriter might be involved as well, especially if they are generating new pages during production.

Video File Formats

There are many video based file formats you can use when creating your videos. These below are the most common ones used:

.MP4: MP4 (MPEG-4 Part 14) is the most common type of video file format. Apple's preferred format, MP4 can play on most other devices as well. It uses the MPEG-4 encoding algorithm to store video and audio files and text, but it offers lower definition than some others. MP4 works well for videos posted on YouTube, Facebook, Twitter and Instagram.

.MOV: MOV (QuickTime Film) stores high-quality video, audio and effects, but these files tend to be quite large. Developed for QuickTime Player by Apple, MOV files use MPEG-4 encoding to play in QuickTime for Windows. MOV is supported by Facebook and YouTube and it works well for TV viewing.

.WMV: WMV (Windows Media Viewer) files offer good video quality and large file size like MOV. Microsoft developed WMV for Windows Media Player. YouTube supports WMV and Apple users can view these videos, but they must download Windows Media Player for Apple. Keep in mind you can't select your own aspect ratio in WMV.

.AVI: AVI (Audio Video Interleave) works with nearly every web browser on Windows, Mac and Linux machines. Developed by Microsoft, AVI offers the highest quality but also large file sizes. It is supported by YouTube and works well for TV viewing.

.FLV: Flash video formats FLV, F4V and SWF (Shockwave Flash) are designed for Flash Player, but they're commonly used to stream video on YouTube. Flash is not supported by iOS devices.

Appropriate Equipment

There is plenty of equipment out in the world which can capture footage for editing and release, but only a number of these are appropriate for use.

Video cameras: A camera that captures moving images and converts them into electronic signals so that they can be saved on a storage device, such as videotape or a hard drive, or viewed on a monitor.

Camcorders: A lightweight, handheld video camera, especially one that records data in digital form onto a storage device such as a videotape, DVD, or hard disk.

Monopod: Can also called a unipod, is a single staff or pole used to help support cameras or other precision instruments in the field.

Tripod: A tripod is a portable three-legged frame or stand, used as a platform for supporting the weight and maintaining the stability of cameras or other precision instruments.

Dollies: A camera dolly is a wheeled cart or similar device used to create smooth horizontal camera movements. The camera is mounted to the dolly and the camera operator and focus puller or camera assistant usually ride on the dolly to push the dolly back and forth.

Steadycam device: Steadicam is a brand of camera stabilizer mounts for motion picture cameras. It mechanically isolates the camera from the operator's movement, allowing for a smooth shot, even when the operator moves over an irregular surface.

SHOOTING SCRIPT SAMPLE 1

PICTURE	AUDIO
Begin in black - fade in first testimonial white script on black - Acadia has transformed itself... Cutting edge but human...high-tech, high-touch. Matthew Barrett, Chairman, CEO, Bank of Montreal Fade out white script	No sound
Cut to edited intro similar to Connect Acadia intro but with big , energy shots of students in the fall at, for example, Homecoming weekend.	Futuristic pop or light rock. Can't be heavy but has to be fast.
Cross dissolve to Jill dressed casually in the Sub. Start with an extreme closeup of her face as she moves the cup away from her face. Pull back to a medium shot. She is standing and holding papers. Her laptop and work are visible on the table. There should be students moving in the background. Her full name (Jill Baruse) and home community appear as a subtitle. Everytime we see Jill in the video, she should be moving about with energy but also be extremely gregarious.	Hi, I'm Jill. I'm a student at Acadia University.
She puts the papers on the table and "talks with her hands". The shot should be tight yet include her hands which can sometimes go out of frame.	In the next ten minutes I'm going to give you my ten reasons why Acadia is the university.

SHOOTING SCRIPT SAMPLE 2

FAMILY LAND	SOUND
PICTURE FAMILY LAND, MAPS & RUINED HOMES--duration: 5:00	PTVO: Don Chabo dictates the history of the family land.
DC EXPLAINS HISTORY OF FAMILY LAND TO LEYTE DC EXPLAINS FAMILY LAND TO LEYTE (WHITNEY) LEYTE DRAWS TREES FULL MAP OF FIRST FAMILY LAND SECOND FULL MAP OF FAMILY LAND	He speaks little Spanish, and his granddaughter speaks little Mayan.

iMedia – Creating a Digital Video Sequence - Term 2

What are the different Camera Shot Types

Basic camera shots are those that refer to the indication of subject size within the frame. There are three different types of basic camera shots which include: **the Close-up, Medium Shot, and the Long Shot or Wide Shot.**

There are two additional shot types used, known as **Extreme Close-up and Extreme Long Shot**

Close-up

A close-up shot is a shot taken of a person or object at a close range, in order to capture the minute details of the subject. This shot is tightly framed and takes up most of the screen, as it is usually used to frame a character's face in order for the audience to see what type of emotion is being conveyed. In addition to serving as a tool used to evoke a character's emotional state of mind, the close up shot is also used to reveal details or information about objects or the setting the film is set in. For example, close-up shots are often used to indicate to the audience that they should pay attention to a certain motif or symbol that is being carried throughout the film.



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Medium Shot

A medium shot, or waist shot, indicates that it was captured at a medium distance from the subject. It is often used for back and forth dialogue within a scene as it allows the viewer to have a solid view of each character within a film. This shot is known as the 'sweet spot' shot, as it allows for both the details of your subject to be seen in addition to the surrounding setting the scene is taking place in. As a result, using a medium shot can help the viewer depict the body language of the characters in the film and how they are interacting with the environment around them.

Long Shot/Wide Shot

The long shot, also known as the wide shot, is often times used as an establishing shot in a film, as it normally sets the scene and the character's place within it. This type of camera shot, shows the full length of the subject while also including a large amount of the surrounding area of the film setting. Some of the most recognizable and iconic scenes in movies, are those that were shot as a long shot. Furthermore, when filming a movie solely from a distance that includes only long shots, it can give a sense of separation between the film itself and the audience. For example the 2019 Oscar winning film, Roma, was solely filmed in a series of long shots. This film technique causes the audience to feel isolated and like they are only allowed to be on-lookers into the story being presented to them, rather than being immersed in the narrative being told.

Extreme Close-Up

An extreme close-up shot, is when the surface area of the frame is filled by a subject's face. In other words, the subject is tightly framed, or shown in a relatively large scale, causing their face to be cropped within the frame. This type of shot is often referred to a choker as well, which is when a shot is framed just above the eyes and right below the mouth. Extreme close-ups are a powerful way to convey the emotion that your subject is feeling, without the need of the character saying much. Much like the use of a regular close-up shot, an extreme close-up can be used to guide the viewer's eyeline and show them an object or motif that is pivotal to the narrative of the film.

Extreme Long Shot

Taking the long shot one step further, the extreme long shot, or extreme wide shot, is when the view is so far from the subject that he/ she isn't necessarily the focus anymore, but rather the surrounding area is. Also used as an establishing shot within a film, the extreme long shot, is designed to show the audience where the action is taking place. Furthermore, an extreme long shot can also be used to demonstrate the scale of what is going on in a scene. This type of shot is often used in war-type films, as they allow for a lot of the setting to be seen at once.

iMedia – Creating a Digital Video Sequence - Term 2

What are the different Angle Shot types

Advanced camera shots, are those that indicate camera angle and placement, and are often used to affect the mood or narrative of the film, rather than indicate size and spatial awareness.

High-Angle

A high-angle shot is a cinematography technique where the camera points down on the subject from above. This type of shot is used to make the subject or object below seem vulnerable, powerless, or weak. This camera angle is most commonly used in horror movies to indicate a sense of entitlement the camera has over the subject below. Other messages a high angle can convey include: danger, depression, and shock. When using a high angle shot this causes the audience to have a subjective camera view by asserting themselves to have the viewpoint of the person in 'power'. Additionally, a high camera angle shot can also provide an overview of the scene itself, which allows the viewer to get a better understanding of where the setting of the film is taking place-- possibly giving them a new perspective of how they view it.

Low-Angle

A low-angle shot is when the camera is positioned low on the vertical axis, below the level of the eyeline, and looks up at an object or subject above. This camera angle evokes a psychological effect by making the subject above, which the camera is angled at, look strong and powerful. In addition, the use of a low angle shot can make the 'hero' of your film seem vulnerable and cause the viewer to have a relatable feeling to a character that usually seems unstoppable. Another common way this angle is used, is to increase the perceived height of an object-- as when something is filmed from a low angle it causes it to appear quite larger than it actually is.

Over the Shoulder

The over the shoulder shot, is most commonly used in film when two or more characters are talking to each other in conversation. This type of shot is used to establish eyeline of where each character in the scene is looking, and is most commonly framed through a medium or close-up shot. This type of shot can also be used to indicate to the viewer that a specific character in the film sees something that the other characters might not yet see. For example by playing with the depth of field in your scene, you can draw the attention of your viewer to look at something in the distance that a character is witnessing first hand. In this case, a great depth of field would be used by causing the foreground to be blurry, and the background to be in focus.

Dutch Angle/Tilt

The Dutch angle/tilt is more of a stylistic approach to cinematography. In order to execute this, you must tilt your camera to one side, which results in a frame that is not level. This type of camera angle is used mostly to create a dramatic effect within a film and can evoke a series of different emotions. The Dutch angle can heighten psychological distress and tension, which in turn, creates a cinematic environment that creates suspense and a sense of thrill. Additionally, filming a scene in this angle can make your audience feel disoriented, uneasy, and sometimes even a sense of drunkenness.

Bird's Eye View

The bird's eye view shot, or an aerial view shot, is when the camera is located up above, overhead, capturing the action going on below. In today's day and age, these types of shots are most commonly captured with a drone in order to be able to get the full view of what is happening down below. In various different types of cinematic works, bird's eye shots are used as establishing shots to give context of where the setting of the film is, in addition to being used as transition shots to show what exactly is going on in a setting from an aerial view. These types of shots are commonly used in films where the location each scene plays a pivotal role in the narrative. However, despite being able to capture this type of shot on a drone, it is also possible to capture a bird's eye shot from the top of a structure or building, such as a bridge or skyscraper.



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iMedia – Legislation – Important to Know!

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.

Medieval Medicine 1250-1500

Medieval Britain

Medieval Britain is the period between **1250-1500** also known as the **13th-16th century**. It is also known as the **Middle Ages**.

Key Events

1123 – Britain's first hospital, St. Bartholomew's was set up in London

1348-49 – The Black Death (Bubonic Plague) hits England, killing 40% of population.

1350 – Average life expectancy is 35 years of age

1370 – 12 rakers (cleaners) are employed to clean the streets of London

1388 – The government passes the first law requiring streets and rivers to be cleaned

1400 – There were 500 hospitals in Britain

Key Concepts

The Medieval Church
Britain was Christian (Roman Catholic) with all the population being religious. Ideas and power was dominated by the Church, they controlled education and the church played a central part in daily life.

Medieval Power
The emphasis in Medieval Britain was on authority, the King had absolute power but the Church has considerable control. People followed authority and would not question the views of King/Church at risk to their own lives.

The Four Humours
First suggested by Greek doctor Hippocrates. He believed the body was made up of Four Humours, Black Bile, Yellow Bile, Blood and Phlegm. These humours linked to the four elements/ seasons.

Hippocrates believed if your humours became unbalanced you would get ill, so you would need to rebalance the four by removing the excess humour.

Galen, another Greek doctor, used the Four Humours Theory to create the 'Theory of Opposites'. Galen said that to heal illness, you should use the opposites to cure the unbalanced humour, e.g. using heat (like spices) to cure a cold (Phlegm).



Public Health
The health of the population as a whole and the efforts made by the King or Government to improve this e.g. cleaning streets

Ideas on the Cause of Disease

Superstition	Beliefs based on the supernatural like witchcraft or astrology.
Sins	Idea that God caused to punish for peoples sins
Miasma	'Bad air' which was blamed for spreading disease
Astrology	Study of the planets/stars and its affect on humans
Urine Chart	A chart used by physicians to help diagnose an illness using urine
Amulet	A charm that brought 'protection' from disease
Purging	To rid the body of a 'excess' humours like blood or phlegm
Leeching	The use of leeches for drawing 'bad blood' from patients
Cupping	Using glass cups to draw blood to the surface, removing the humour (bad blood)
Herbal Remedy	Medicine made from plants with natural cures e.g. honey/mint
Trepanning	Cutting hole in the skull to release 'bad spirits' causing pain
Pilgrimage	A journey to a religious shrine and relics to show your love of God and to cure an illness
Fasting	Going without food, as a punishment to please God
Regimin Sanitatis	Idea promoted by physicians to the rich. Encouraged to eat healthy, exercise, bath and relax to avoid getting ill
Apothecary	A medieval pharmacists or chemist
Monastery	A building where monks live, eat and pray
Physician	A doctor, completed 7 years of university training, expensive
Vademecum	A medieval 'medical' book carried by doctors
Barber Surgeon	Untrained surgeon, who practiced basic cheap surgery
Wound Man	Visual guide to help surgeons treat injuries
Wise woman	A female healer and midwife, who used herbal remedies as cure
Epidemic	A widespread outbreak of a disease
Flagellant	People who whipped themselves to show god they repented their sins and wanted mercy. They hoped to avoid getting sick

Medieval Medicine 1250-1500: The Essentials

Impact of Medieval Society on Medicine

Church: Church controlled everything and people afraid of God, they limited change as no one challenged. They controlled education and training of doctors, they support Hippocrates/Galen's ideas so no one dared or wanted to challenge ideas as if you challenged Church, you were challenging God.

Tradition: Many simply respected traditional ideas, e.g. Hippocrates/Galen and saw ideas as rational and respected. Galen wrote over 300 books, so why bother looking for change?

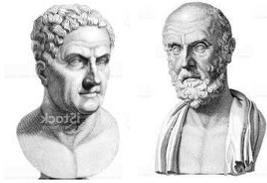
Government: King and government most powerful but spent nothing on improving public health, it was only during the Black Death of 1348/9 that King Edward did something.

As a result, there was little progress (continuity) in medicine in the Middle Ages



Hippocrates and Galen

The ideas of Galen and Hippocrates were well respected as they were over 1000 years old, and the four humors made sense to people at the time. Galen had written over 300 medical books, it was assumed he was right. All medieval training (from the church) focused on the work of Hippocrates and Galen, it was never challenged.



	Description	Was there progress?
Ideas on cause of disease	<p>Four Humours: Idea that body contained 4 humours (blood, black bile, yellow bile, phlegm) that when imbalanced, made you ill, for example nosebleed = too much blood, that needed to be got rid of. Physicians also used Urine Charts, linked to humours to diagnose illness</p> <p>Miasma: Bad air called Miasma causes disease, caused by dirt/waste</p> <p>God: Church taught God caused disease to test faith or for punishment, most popular idea</p> <p>Supernatural: Astrologists blamed stars & planets for illness for example the movement of Mars/Jupiter caused Black Death. People also superstitious e.g. believed in black magic, and Jews also blamed for the Black Death</p>	There was no progress in ideas on what caused disease during the Middle Ages.
Treatment of Disease	<p>Four Humours: Galen's '<i>Theory of Opposites</i>' used to treat humour with opposite, cold/phlegm= have hot/spicy food to remove the humours. Also physicians encouraged the use of Leeching, Cupping, to remove bad blood and purging with herbs, draw out humours like yellow bile.</p> <p>Herbal Remedies: Wise women gave homemade remedies that did work e.g. honey for infection, mint for stomach.</p> <p>Religious: Prayers, pilgrimage to shrine</p> <p>Surgery: Barber surgeons used trepanning to remove demons from skulls, basic antiseptic like wine, experienced in times but high chance of death due to dirty tools, high risk of infection and no anatomical knowledge</p> <p>Supernatural: e.g. wearing crushed magpie beak for toothache, trepanning to remove 'bad spirits' or rubbing chickens on plague buboes</p>	<p>The majorities of treatments did not work so there was mostly no progress.</p> <p>Surgery did improve in times of war, but it was VERY basic</p>
Prevention of disease	<p>Religious: Most people thought ONLY god could prevent disease, so they focussed on prayer, fasting, pilgrimages to religious sites/shrines. During the Black Death, flagellants publically whipped themselves to avoid getting sick by punishing for their own sins</p> <p>Regimin sanitis: Rich encouraged to eat and live healthy to avoid sickness</p> <p>Wearing amulets/charms for protection, this linked to supernatural/superstitious ideas. This was common during the Black Death</p> <p>Miasma: Fresh Herbs and ringing bells were to remove miasma from the air, again this was common during the Black Death</p>	No progress in preventing disease as they did not understand the cause. Regimin Santitis was sensible advice but only for the rich
Care & Hospitals	<p>Physicians: trained by church at university, no anatomical knowledge as dissection was banned. Took observation and diagnosed the rich</p> <p>Apothecaries: Chemists who made herbal remedies, experienced but no training</p> <p>Wise Woman: Local woman with medical skills such as midwifery & making remedies</p> <p>Hospitals: First was St Bartholomews in 1123. All hospitals ran by the church in places like monasteries with monks offering 'care not cure', as they believed only God would do it. Rooms were cleaned and patients well fed. Mostly for the old/poor patients, they turned away infectious.</p>	Some progress with development of hospitals, but the care given remained stuck in old ways
Public Health	<p>Poor public health, dirty towns with few fresh water supplies and a lack of waste cleaning. Blamed for Miasma and help spread Black Death</p> <p>No government spending but some cities employed rakers (12 in London) and installed cesspits and water supply (York).</p> <p>Only in Black Death did King Edward order cleaning of streets,</p>	There was very little progress in public health during the Middle Ages.

Renaissance Medicine 1500-1700

Renaissance Britain

The Renaissance is the period between 1500-1700 also known as the **16th-18th century**. **Renaissance means 'rebirth'**, it was a period when old ideas were questioned and new ideas/discovered, but there was little medical improvement.

Key Events

<u>1440</u> – The printing press is invented, increased books and knowledge spreading
<u>1536-40</u> – The Dissolution of the Monasteries – Henry VIII shuts down monasteries across England, this includes the closing of church hospitals
1543 – Vesalius releases influential book 'Fabric of the Human Body'
1628 – William Harvey scientifically proves the circulation of blood through the body, his book marks the end of Galen's influence on the anatomy
1660 – Royal Society is set up, aiming to share scientific ideas/knowledge
1665 – The Royal society releases its first journal, Philosophical Transactions
1665 – First use of the microscope.
1665-66 – The Great Plague in London, kills 25% of London's population
1676 – Thomas Sydenham publishes 'Observations Medicae'
1683 - Van Leeuwenhoek discovers bacteria but does not link it to disease

Key Individuals

William Harvey	An English doctor, who also challenged Galen on his views about blood. He proved for the first time, blood circulation and the flow of arteries/veins by using dissection and experimentation. Helped improve knowledge and long term impact, but at the time doctors were resistant and slow to follow him.
Thomas Sydenham	A physician, called the 'English Hippocrates'. Released a famous book called 'Observationes Medicae' where he argued that doctors should visit patients and observe them rather than just reading books. He believed in a scientific method to medicine, by encouraging science and experimentation. He also openly said God or the Four Humours did not cause disease, but did believe disease was caused by 'atmospheres'.
Vesalius	An anatomist who proved Galen wrong in his ideas on the human jaw. Importantly, he said that medical students should perform dissections themselves and he released his book the 'Fabric of the Human Body' with highly detailed anatomical illustrations, this improving medical knowledge.

Key Terms

Dissection	The cutting open of a human body to study its anatomy for medical training/research. More common in the Renaissance.
Anatomy	The science of understanding of the human body
Syphilis	A sexually transmitted disease, often caught in bathhouses
Transference	New idea that that an illness could be transferred to an object, like onion or chicken, to treat yourself.
Pox/Plague House	A specialist hospital to focused on one disease such as the plague. These were new in the Renaissance.
Plague Pits	Mass graves where victims of the plague were buried
Direct Observation	The observation of the human body through dissection to improve knowledge and understanding.
Circulation	The movement of blood around the body
Quack Doctors	A doctor who pretends to have medical knowledge or skills, They sold medicine which supposedly cured all illnesses
Alchemy	'Medical Chemistry' A new type of treatment, using minerals and metals to cure illness, such as mercury. They didn't work
Moderation	Idea to prevent illness by avoiding exhaustion, fatty foods, drinking too much or being too lazy.
Quarantined	To separate people from others if they have an illness
Scientific Method	A new process of conducting an experiment, collecting observations, then coming to a conclusion

Key Changes

Scientific Revolution	The Renaissance became an age of challenge and experimentation which has a significant impact on medical thinking, which developed with the invention of printing press which helped knowledge spread. However, at the time, it had LITTLE impact on ideas on the cause of disease/treatment
The Church in the Renaissance	The Reformation led to changes in religion, especially a decline in the Church's authority (power). As a result, the church had less control, there was freedom of education, challenging of God's teaching, increase in dissection but a decline in the number of hospitals. Majority of people remained religious, and still blamed god for illness and treatment

Industrial Revolution Medicine 1700-1900

Summary

The Industrial Revolution period was the period between **1750-1900** also known as the **18th and 19th centuries**. It was an **age of breakthroughs**

Key Events

1796-98 – Jenner develops the Smallpox vaccination

1847 – James Simpson discovers chloroform as an anaesthetic

1854 - John Snow's discovers the link between the 1854 cholera outbreak and the Broad Street pump.

1854 - Florence Nightingale treats wounded solders in the Crimean War

1859 – Nightingale publishes her 'Notes on Nursing'

1860 – The 'Florence Nightingale School of Nursing' opens

1861 – Pasteur discovers the Germ Theory

1866 – Joseph Lister begins to use carbolic acid as antiseptic in surgery

1875 – The Second Public Health Act

1881 – Pasteur develops a vaccination for anthrax

1882 – Robert Koch publishes his four hypotheses and discovers bacteria causes tuberculosis

1895 - William Rontgen discovers x-rays

Key Words

Enlightenment	Idea in the 18 th century that people should think for themselves and authorities like the church and nobility should not control everyday life
Bacteria	A tiny living organism, only seen by microscope, which causes disease
Antibodies	Parties inside the body that fight and remove germs.
Antiseptics	Chemicals uses to destroy bacteria & prevent infections

Key Words

Aseptic Surgery	Surgery where microbes are kept out of the wound in the first place, rather than being killed by antiseptic.
Anaesthetics	Drugs given to unconsciousness before and during surgery
Surgery 'Black Period'	Period when anaesthetics were used and the death rate in surgery went up as doctors attempted complex surgery.
Chloroform	A liquid whose vapour is used as an anaesthetic
Germ Theory	The theory that germs cause disease, often by infection through air
Infection	The formation of disease causing germs or bacteria
Inoculation	Infecting the body with a disease in order to help it fight a more serious attack of the disease later
Vaccinations	Injection into the body of weak organisms to give the body resistance against disease
Anthrax	An infectious disease
Smallpox	A dangerous disease, which was a major cause of disease until beaten by vaccination.
Patent Medicines	Medicine sold for profit. In the Industrial Revolution many of these medicines had no medical benefit at all.
Dispensary	Where medicines are given out.
Public Health	The well-being of the whole population
Poor Law Unions	Local organisations set up to take care of the poor and unemployed
Privies	Public toilets outside houses
Cesspit	A pit for storing sewage or waste
Workhouses	Accommodation for the poorest people, they had to work there for rent.. Families were also split up.

Modern Medicine 1900-present

The modern period refers to **1900 onwards to the present day.**

Key Events

Key Words & People

1902	Archibald Garrod, an English doctor theorises that hereditary diseases are caused by missing information in the body's chemical pathways.
1911	National Insurance Act – workers under a certain wage were entitled to free medical care.
1928	Penicillin identified by Alexander Fleming
1940	Florey and chain successfully treat mice with Penicillin
1942	Diphtheria vaccination introduced
1948	The National Health Service is established
1950	Whooping Cough vaccination introduced
1951	Rosalind Franklin and Maurice Wilkins create images of DNA using X-rays
1953	DNA discovered
1956	First successful kidney transplant carried out between identical twins in the USA
1956	First Clean Air Act introduced to deal with increasing smog and pollution in cities.
1961	Tetanus vaccination introduced
1963	First successful lung transplant
1967	First successful liver and heart transplants
1968	Measles vaccination introduced
1968	Second Clean Air Act introduced
1970	Rubella Vaccination introduced
1990	Human Genome Project Launched
2007	Smoking Ban. It became illegal to smoke in any pub, restaurant, nightclub, and most workplaces and work vehicles, anywhere in the UK

Genome	The complete set of DNA containing all the information needed to build a particular organism. .
Compound	A mixture of two or more elements
Penicillin	The first true antibiotic.
Antibiotic	A treatment that destroys or limits the growth of bacteria in the human body.
Hereditary disease	Diseases which are caused by genetics so can be passed on from parents to children or other descendants.
DNA	DNA carries genetic information from one living thing to another. It determines characteristics like hair and eye colour.
Hemophilia	A genetic disease passed from parent to child that stops blood clotting
Fundamental laws of Inheritance	The theory that genes come in pairs and one is inherited from each parent.
Alexander Fleming	Fleming studied soldiers wounds on the WW1 battlefields and then tried to find a way to heal bacterial infection. He discovered that a penicilium mold produced an excellent antibiotic.
Howard Florey & Ernst Chain	They continued Fleming's research on penicillin and won a Nobel prize for medicine in 1945. .

The British Sector on the Western Front, 1914-18

Timelin

Oct – Nov 1914	First Battle of Ypres – the British stopped the Germans from capturing the port of Calais.
Apr – May 1915	Second Battle of Ypres – A German attack using Chlorine gas for the first time.
July – Nov 1916	Battle of the Somme – Major attack led French and British to move German troops from Verdun.
Apr – May 1916	Battle of Arras – large scale Allied attack. Very high casualties.
Jul – Nov 1917	Third Battle of Ypres – Aim to capture Passchendaele ridge near Ypres. The ground turned to mud.
Nov-Dec 1917	Battle of Cambrai – first use of a large number of tanks by the British. 40,000 British casualties.
Spring 1918	The German Spring Offensive – Large scale German attack to bring the war to an end before the Americans arrived.
Summer – Autumn 1918	The final months – the Allied army, reinforced by the fresh US troops broke through German lines.
11 Nov 1918	Germany surrendered and the war ended.

Types of Sources

National Army records for individual soldiers	Photographs
National newspaper reports	Hospital records
Government reports on aspects of war	Army statistics
Medical articles by doctors or nurses who worked in the war	Personal accounts of medical treatments by soldiers, doctors, nurses or others involved.

Key Words/Terms

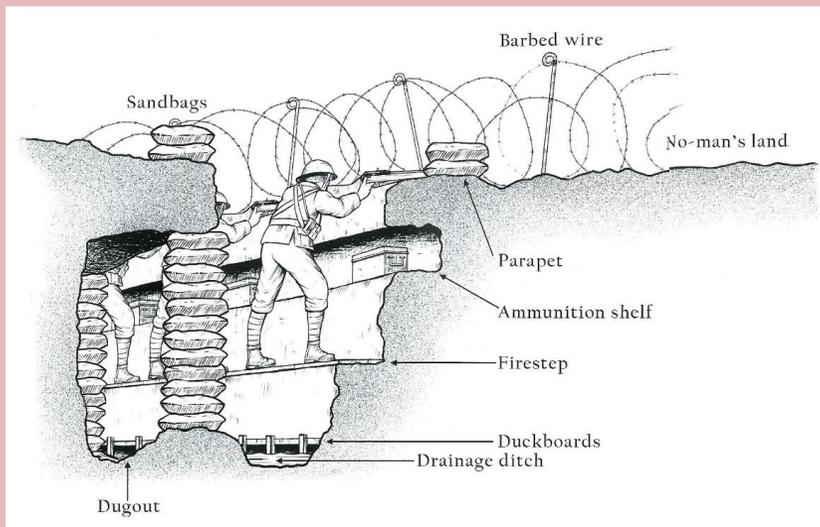
Terrain	The type of ground – was it hilly, muddy, flat, easy to walk and run on?
Front line Trench	The firing line – the trench nearest the enemy.
Communication Trench	Linked the firing line with the command support and reserve trench.
No Man's Land	Area between the enemy front line trenches where the fighting took place.
Trench Fever	Spread by lice and caused headaches, shivering and pain in joints. Lasted 5 days.
Trench Foot	From standing in waterlogged trenches, feet became numb and swollen. Some cases became gangrenous and needed amputation.
NYD.N.	Army code for shell shock.
Shrapnel	Fragments of metal or lead designed to cause maximum injuries.
Artillery	Heavy fire causing half of all casualties.
Steel Helmets	Introduced to British troops by autumn 1915 & widely available by Summer 1916 to reduce head wounds.
Gas	Weapon causing blindness, loss of taste and smell and coughing.
Evacuation Route	How injured soldiers accessed medical treatment from front line fighting. Stretcher bearers, Regimental Aid Post (RAP), Field Ambulance and Dressing Station, Casualty Clearing Station (CCS) and Base Hospital.
Thomas Splint	A splint to help fractured bones heal in the leg - 1916
Plastic Surgery	Improved during WW1, led by Harold Gillies, who opened a specialist hospital in Kent in 1917.

British Soldiers Equipment



The British Expeditionary Force that went to war in 1914 was arguably the best equipped and trained force in Europe. The khaki serge uniforms adopted in 1902 and worn by officers and men were the first real example of camouflaged combat clothing. Men wore a soft peaked cap with the regimental cap badge. This was replaced by the end of 1915 with a steel helmet.

Cross-section of a typical frontline trench



Trench Warfare

Trench warfare is a type of fighting where both sides build deep trenches as a defence against the enemy. These trenches can stretch for many miles and make it nearly impossible for one side to advance.

Western Front

The area of fighting in western Europe in the First World War. A majority of fighting was done in North-Eastern France and Belgium in trenches

Alliance

An agreement between countries to protect each other in war. This was major cause of WW1, there were two main alliance in 1914. The Triple Entente (France, Britain and Russia) and the Triple Alliance (Germany, Austria-Hungary and Italy)

War of Attrition

A war based on winning by wearing down the enemies armies, economy and morale. This happened in the First World War

Key Concepts

Timeline 1914 -1918



Sept 1914: WW1 Begins

Oct 1914 Motor Ambulances sent to the front.

1915 Lawrence Robertson pioneers use of blood transfusions



1915 First gas masks introduced

1915 L. Robertson pioneers use of blood transfusions

1915 Richard Lewisohn stops blood clotting

1915 Richard Weil discovers how to store blood for 2 days

1916 Francis Rous and James Turner discover how to store blood for 4 weeks



Jul 1916 Battle of the Somme

Jul 1917 3rd Battle of Ypres

Oct 1917 Battle of Cambrai



1917 Transfusions widely used in CCS's

1918 Delousing Stations set up

Nov 1918: WW1 Ends



Oct 1914 1st Battle of Ypres

Apr 1915 2nd Battle of Ypres – 1st use of gas

Apr 1915 Battle of Hill 60

1915 Brodie Helmets introduced



Dec 1915 Thomas Splint taught to medical practitioners

Jan 1916 FANYs allowed to drive ambulances

1916 Tunnels dug at Arras

1917 Battle of Arras



1917 Carrel-Dakin method agreed as best method to stop infection

Aug 1917 Gillies opens Queen's Hospital for plastic surgery



Key Events of the Western Front



YouTube

Check out an overview of First World War trench warfare here:



SCAN ME

By the end of 1914, the trench system in Western Europe ran from the Belgian coast to the Swiss border over 480 miles away!



Medical Problems on the Western Front.

Trench Foot

Trench foot was a major problem caused by standing in waterlogged trenches with no change of boots or socks. In the first stage, the feet would swell, go numb and the skin would turn red or blue. The condition could get worse quickly, leading to gangrene and amputation of limbs!

In the cold, wet winter of 1914-15 cases of Trench Foot were serious. The 27th Division of the British army experienced 12,000 cases of trench foot.

Attempted Solutions

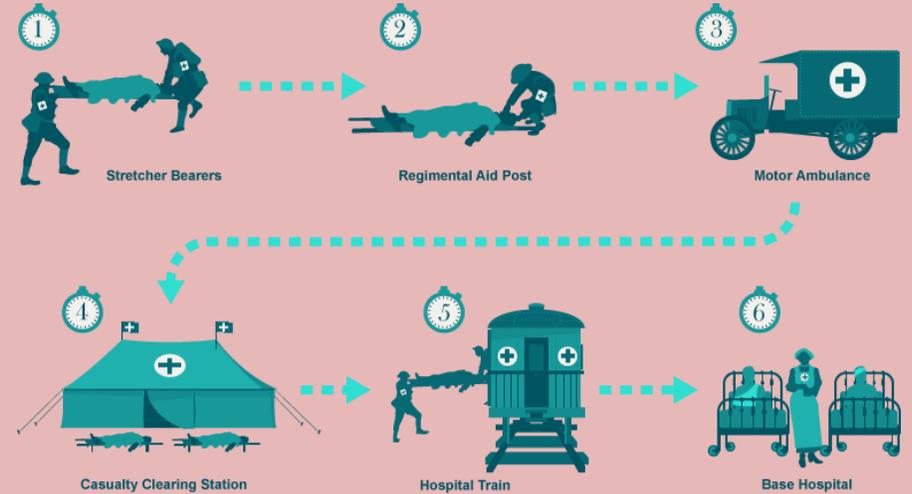
To prevent the impact of trench foot, medical officers ordered soldiers should carry 3 pairs of socks and change them twice a day. They were also encouraged to rub whale oil into their feet.



Attempts were made to pump out trenches to reduce waterlogging and add duckboards, but constantly bombing made this hard



Evacuation Route for Wounded Men



Trench Fever (PLO)

Flu like symptoms with high temperature, headache and aching muscles which was spread by lice. Men could be ill for up to a month

Estimated half a million men on the Western front were affected by Trench Fever.

Attempted Solutions

Delousing stations were set up on the front; clothes were disinfected, men were bathed and sprayed with chemicals to prevent lice.

As a result of this, there was a decline in the numbers experiencing the condition.

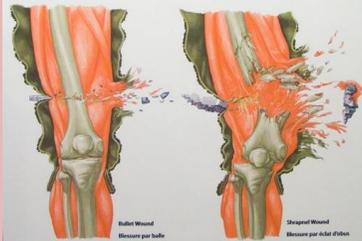


Shell Shock

Symptoms included tiredness, headaches, nightmares, loss of speech, uncontrollable shaking and complete mental breakdown. It is estimated 80,000 British troops experienced shellshock

Called NYD,N (Not Yet Diagnosed, Nervous) as a code by the army for shellshock.

Attempted Solutions This condition was not understood at the time, some soldiers who experienced shell shock were accused of cowardice and any were punished, some even shot.



Wounds were nearly always infected by the time soldiers reached aid stations, so new methods of treatment had to be introduced

New Wounds

The First World War introduced a wide range of wounds for medical staff to attend to. For example, high explosive shells and shrapnel (fragments of metal) were responsible for 58% of wounds whilst bullets were responsible for another 39%

The high number of head wounds led to the steel Brodie Helmet being introduced, it reduced fatal head wounds by 80%. All soldiers were given it.

Most injuries often got infected due to the bacteria in the soil, causing gangrene. The impact of gangrene was reduced by tetanus injections from end of 1914.

60% of shrapnel wounds were to the arms and legs, a common treatment was amputation. Over 41,000 had their limbs amputated.



Gas gangrene could not be cured, it could often kill in a day.

Artillery, gun fire and bombs could break bones, pierce vital organs and destroy tissue. Many never made it to hospital

Gas Attacks

Gas caused great panic as soldiers were unprepared for it. It wasn't a major cause of death, only 6000 soldiers died during WW1.

There were 3 types used in the war:

Chlorine: Ypres 1915

Caused death by suffocation. Before gas masks, soldiers soak cotton pads in urine and pressed them to their faces



Phosgene 1915

Used Ypres. Faster acting than chlorine, killing an exposed person within 2 days.



Mustard Gas 1917

Odourless gas that worked within 12 hours. Caused internal and external blisters and could pass through clothing to burn skin.

Solution

British soldiers were given Gas masks from July 1915, which became more sophisticated over time



The Big Picture of 'Western Front Medicine'

WW1 & Conditions	Injuries	Care	Treatments
<p>Key Battles Ypres, Hill 60, 1914: First use of mines dug under German positions to blow them up Second Battle of Ypres, 1915 First use of Chlorine Gas by Germans. British unprepared, cotton pads until gas masks Battle of the Somme, 1916 Largest British battle in WW1, 400,000 casualties for British First tanks & creeping barrage Battle of Arras, 1917 British build tunnels for bases and also Arras Underground Hospital, with 700 beds. Battle of Cambrai, 1918 First tank battle, 450 used</p>	<p>Trench Foot Major problem caused by standing in water logged trenches with no change of boots/socks. Feet would swell, go numb, quickly led to gangrene and amputation In winter of 1914-15, the 27th Division of the British army experienced 12,000 cases Solution: Soldiers ordered to carry 3 pairs of socks and change them twice a day and rub whale oil into their feet. Efforts made to pump out trenches</p>	<p>Royal Army Medical Core (RAMC) Responsible for medical care, it organised and provided medical treatment. In 1914, there were 9000 men, by 1918 113,000 who were doctors, stretcher bearers etc.</p>	<p>Mobile X Ray Units 6 Mobile vans were used throughout the British sector of the Western Front to identify bullets/shrapnel There were a number of weaknesses such as timing, poor quality, overheating, could only be used 3 times an hour</p>
	<p>Gas Gas caused great panic, but only killed 6000 soldiers Chlorine: Ypres 1915 Caused death by suffocation. Before gas masks, so soldiers soak cotton pads in urine and put to their faces. Led to introduction of gas masks Phosgene 1915 Used at Ypres. Faster acting than chlorine, killed exposed person in 2 days. Mustard Gas 1917 Odourless gas. Caused internal and external blisters/burns through clothes</p>	<p>First Aid Nursing Yeomanry (FANY) Women's voluntary organisation to go front. First 6 women went in 1914, eventually 500 . FANY help by driving ambulances, delivering supplies to the frontline and setting up a mobile bath units (Bathed 40 men an hour)</p>	<p>Blood Transfusions 1915, first blood transfusions at base hospital, human to human 1915, Lewisohn added Sodium Citrate so blood could be stored Keynes created a portable blood transfusion kit that could store blood and be used on the front line, helped reduce shock By 1917 blood transfusion stations at CCS, massively helped 1917, first blood bank at Cambrai, 22 units of blood saved 11 lives – blood transfusions began to have a huge impact.</p>
	<p>Shell Shock Symptoms included tiredness, nightmares, loss of speech, uncontrollable shaking and complete mental breakdown. It is estimated 80,000 British troops experienced shellshock. Condition not understood, some accused of cowardice, others treated in Britain</p>	<p>The Chain of Evacuation Regimental Aid Post :Within 300m of front line, gave immediate first aid but basic Aim to send men back to front line, or onto the ADS Advanced Dressing Station: Within 400m of RAP, in a tent or shelter, could deal with 150 men. Medical officers but no surgery, overwhelmed at Ypres Causality Clearing Station 7 miles from the front on railway line, contained doctors and operating theatres, x ray machines and could deal with 1000 men Treated critical injuries and assess wounded; send back to front or to base hospital Base Hospitals Near ports in France/Belgium, large hospitals with all equipment and some specialist ones for gas/head injuries Could treat 2500 Arras: Underground hospital built 1916 700 beds, operating theatre, water supply. Dressing station close to fighting</p>	<p>Thomas Splint In 1914 men with thigh wound, small chance of survival (20%)., the existing splint made things worse, due to terrain and type In 1915 Thomas split invented, kept the leg straight so the bone healed in the correct position, survival rates increased 20-80%.</p>
	<p>Trench Fever Flu-like symptoms with high temperature, headache and aching muscles. It affected 500,000 men on Western Front. Only by 1918 had its cause been tracked down to lice (a parasitic insect). After this delousing stations were set up and cases declined.</p>		<p>Brain Surgery Injuries to the brain were almost always fatal in WW1 due to a lack of experience/infection. Harvey Cushing pioneer new ideas • Development of magnets to withdraw metal fragments • Local Anaesthetic to avoid brain swelling in surgery • Chain of Evacuation sent on head injuries to CCS quickly • Specialist base hospitals such as Mendingham for brain injury</p>
<p>New Injuries Artillery shells and shrapnel caused 58% of wounds with 60% of these injuries were to arms and legs Bullets were responsible for 39% of wounds. Gas Gangrene from bacteria in soil, could not be cured, spread rapidly and led to amputations. Tetanus vaccines Brodie Helmet (1915) = 80% reduction in deaths by head injury. 20% of injuries to head and face.</p>	<p>Plastic Surgery Harold Giles pioneered plastic surgery in WW1 •Set up specialist Queens Hospital in Kent, 1917 •Using skin grafts (taking skin from to graft to another area) •Using jaw splints, wiring and metal replacement cheeks •By 1915, 7 specialist hospitals in France 12,000 operations done</p>		
<p>Trenches Not all trenches same across front Frontline: Where attacks were made from, most dangerous area Support: 80m behind, to retreat Reserve: 100m back, counterattacks Communications: Linked trenches Duckboard: to prevent trench foot Parapet: low protective wall Dugout: Hole in trench for cover</p>	<p>Progress up to 1914 X-rays: Discovered by Wilhelm Roentgen in 1901, but not portable yet and slow. Blood Transfusions: Blood groups discovered in 1901, couldn't store blood Aseptic Surgery: Germs Theory led to more hygienic surgery, hard on frontline</p>	<p>Gas Gangrene Infections caused by gas gangrene & no aseptic surgery on front Amputation: If antibiotics/excisions failed to stop the spread of infection, amputation only way. By 1918 over 240,000 men Wound excision or debridement :This was cutting away the dead, damaged and infected tissue from around the wound to reduce infection. The Carrel-Dakin method: Sterilised salt solution pumped into wound through a tube. Only lasted 6 hours, not enough of it and had to be ready made, by 1917 was the most effective method.</p>	

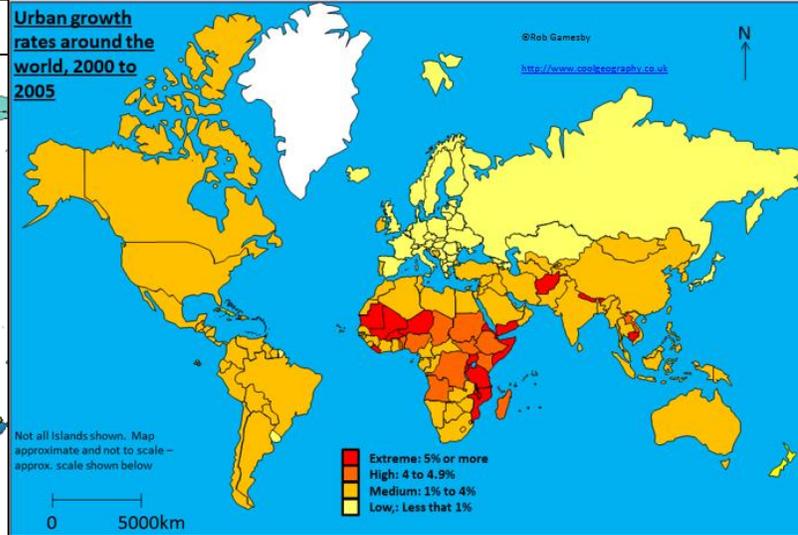
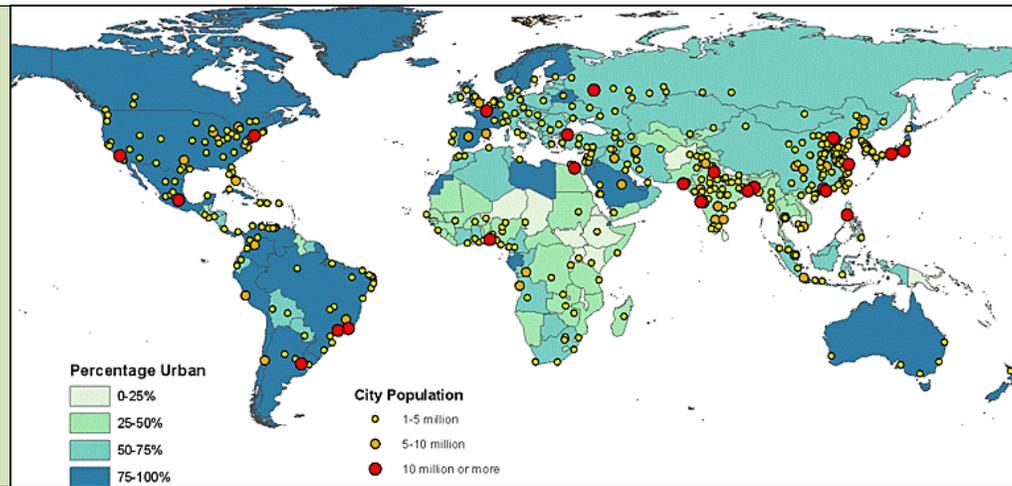
The global pattern of urban change

Urbanisation is defined as the "increasing percentage of people living in built environments such as towns and cities".

The word percentage in this definition is very important, because it indicates that we must judge urbanisation by looking at both the numbers of people living in both rural AND urban areas. For the first time ever in the history of mankind, more people now live in towns and cities than in rural areas.

Patterns in urbanisation:

1. **HICs** were the first to urbanise, and generally have the largest proportion of their population living in towns and cities.
2. **LICs** currently have lower amounts of urbanisation, but are urbanising rapidly. Megacities, cities with over 10 million people, are almost exclusively in poorer nations.
3. Cities of World importance for **commerce** and trade are predominantly in HICs, regardless of size. World cities include Tokyo, London and New York.
4. Many old colonies (e.g. in South America) have high percentages of urbanisation as the colonising countries such as France and the UK favoured city growth to help administration.
5. Asia has the highest number of Megacities.



Urbanisation levels are affected by 2 things – Migration and Natural Increase:

Migration is the movement of population from one area to another. Some migrations are forced, voluntary, permanent and temporary, International and regional. The type of migration that we are principally interested in is **rural to urban migration**, which is the movement of people from countryside to city areas. This type of migration happened in HICs from the 18th Century onwards on a large scale, and has gradually slowed down. In fact in many HICs the movement of people has reversed, and people are moving from urban areas back into the countryside as they search for the quiet life (this is known as **counter-urbanisation**). However, many LICs are experiencing massive rural to urban migration, mainly of young males, into the major cities. The major reasons for this movement can be classified into push and pull factors.

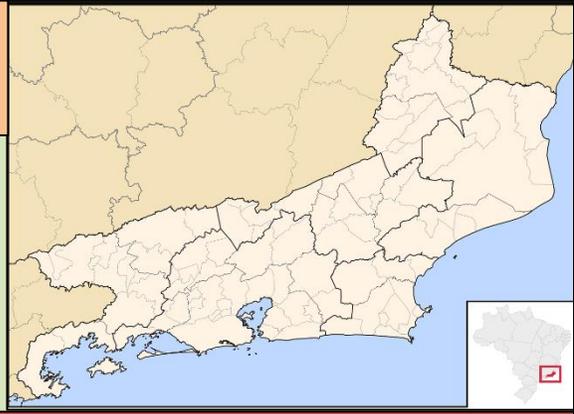
A **Push factor** is something that can force or encourage people to move away from an area. Push factors can include famine (as in Ethiopia in the 1980s), drought, flooding (as in Bangladesh, where people are becoming climate change refugees and having to move to Dhaka), a lack of employment opportunities, population growth and over population, and civil war (as in Darfur at the moment). A **Pull factor** is one in which encourages people to move to an area. Pull factors include the chance of a better job, better access to education and services, and a higher standard of living. These factors have contributed to millions of people in LICs moving to cities, creating mass urbanisation.

Natural Increase also has a major effect on rates of urbanisation. During the initial urbanisation phase natural increase in poorer parts of the world can increase, as death rates fall in cities because there is better access to medical care, improved water supplies, improved sanitary conditions and improved wealth so improved food supply. However, it is important to note this isn't always the case – see urban challenges. Whilst birth rates take longer to fall and indeed more babies survive as infant mortality falls in cities. Also, young people move to towns and cities, which also boosts the birth rate. These combined factors can fuel the rate of urbanisation.

These 2 factors have pushed world urbanisation above 50% and have led to the emergence of hundreds of Megacities. Megacities are those cities that have a population above 10 million. Most megacities can currently be found in Asia, for example Mumbai.

Urban growth creates opportunities and challenges for cities in LICs and NEEs. CASE STUDY: Rio de Janeiro, Brazil

Rio de Janeiro (Rio) is the second most populated city in Brazil after Sao Paulo. Rio is located in the southeast of Brazil on the Atlantic coast.



Importance of Rio de Janeiro

Rio de Janeiro is the second most populated city in Brazil, South America. Recently millions of people from rural areas have migrated to major cities such as Rio de Janeiro to seek better opportunities. The city holds much regional and international significance:

- It provides schools, hospitals and universities as well as opportunities for employment, leisure and recreation.
- It is an important centre for research due to universities and research labs locating in the city.
- Rio is important for its art and culture scene. The Statue of Christ the Redeemer is one of the Seven New Wonders of the World.
- It is an important transport hub, with its three airports and five ports which enable trade. The ports are very important for the export of iron ore, sugar and coffee. The city is the second most important area for industry in the country. Some 5% of the country's GDP is produced here.
- Many of Brazil's largest companies have their headquarters located there. These include mining, oil and telecommunications companies. Rio is a major centre specialising in clothing, processed food, chemicals and **pharmaceuticals**.
- Tourism: The city is one of the most visited places in the Southern Hemisphere. The city hosted the 2016 Olympic and Paralympic games and in 2014 was a host city for the World Cup. It is also renowned for its beaches, architecture and tours of the **favelas**.

How has Rio de Janeiro grown?

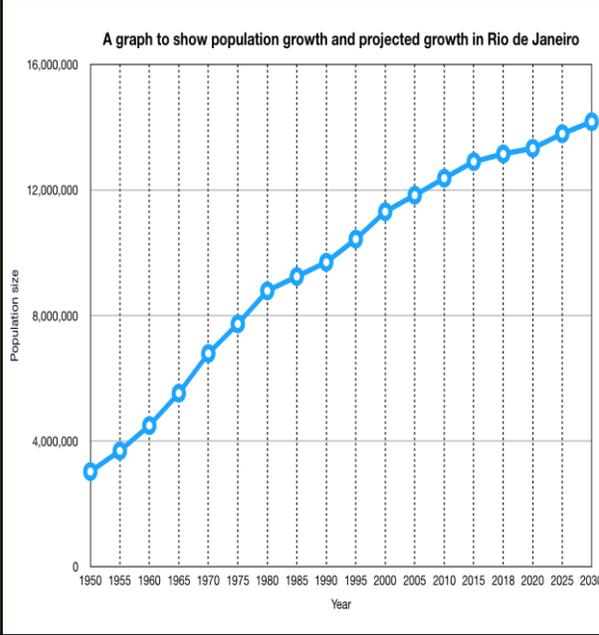
Rio's population is growing rapidly. Since the 1950s the population of the city has trebled. Rio de Janeiro had over 12 million residents in 2016.

As Rio has developed it has attracted migrants from within Brazil and from abroad. One of the largest groups of migrants is Portuguese people. This is likely because of the cultural connections following years of Portuguese rule (16th to the early 19th century). In fact, Rio has the largest Portuguese population outside of Portugal. More recently Rio has attracted migrants from South Korea and China who seek business opportunities.

Rural to urban migration has also been a major cause of population growth. Migrants are pulled to the city because of better education and employment opportunities along with improved living conditions. Migrants have been pushed from rural areas due to factors such as **mechanisation** on farms, poor living conditions and the lack of employment opportunities.

The high rate of migration into Rio has led to a **youthful population** in the city. As the result of this, the city has a high rate of natural increase due to the high birth rate and relatively low death rate.

The rapid growth of Rio de Janeiro's population has led to a severe shortage of housing. Millions of people have been forced to construct their own homes from scrap materials such as wood, corrugated iron and metals. These areas of temporary accommodation are known as favelas in Brazil. Favelas are located on the edge of most major Brazilian cities. They are located here for a number of reasons. Firstly, this is the only available land to build on within the city limits. Secondly, industry is located on the edge of the cities. Many people need jobs, therefore, they locate close to factories. Some of these settlements may be 40 or 50 km from the city centre (on the edge of the city), along main roads and up very steep hillsides.



The growth and development of Rio de Janeiro have led to a number of social and economic opportunities to improve the quality of life of its residents.

Social:

Health Care – Healthcare provisions, such as health care centres and hospitals, is significantly better in Rio than in rural areas. Compared to living in the countryside, vulnerable people such as children and the elderly have better access to emergency care and **vaccinations** in Rio.

Education – There are many primary and secondary schools in Rio which have enabled 95% of children aged 10 and above in the city to be **literate**. This is considerably higher than the national average. The city also has several universities providing higher education opportunities.

Water supply – Access to clean water has increased considerably in Rio since the city hosted major sporting events such as the 2014 World Cup and the 2016 Olympics. Over 90% of the population of Rio have access to mains water supply. However – most of the 10% who do not, live in the favelas.

Energy – Although the city is subject to power cuts, the energy supply is more reliable than in rural areas where lighting and power are not always available. In poor areas, some residents tap into the power supply illegally. This has led to fires.

Economic:

As Rio is one of Brazil's most important industrial cities considerable economic growth has occurred. Employment opportunities are available in Rio's five ports through the **export** of coffee, sugar and iron ore. The largest steelworks in South America is located in Sepetiba Bay in Rio. This has led to new construction and supply industries being attracted to the area further encouraging economic growth and job opportunities. This is known as the **multiplier effect**. As the population has grown and industry has developed so too has the service sector (e.g. retail and finance) to meet the demands of the area. **Migrant labour** and economic investment are also attracted to Rio due to the growth in manufacturing industries such as furniture, clothing, pharmaceuticals and food processing.

- Rio has one of the highest incomes per person in the country.
- The city provides 6% of the country's total employment.
- The growth of urban industrial areas can increase economic development.
- As the city becomes more industrialised, the city will become wealthier.

The growth and development of Rio de Janeiro have led to a number of challenges

Millions of people have been forced to build their own homes due to the lack of affordable housing. Migrants to the city often have to build homes on land that they do not own. Large squatter settlements are known as favelas appear on wasteland on very steep hillsides around the edges of the bay. Over time residents seek to improve these properties however due to them not owning the land, there is always a risk of them being demolished by the authorities. They are also at risk from landslides. Following heavy rain in 2010 one such slide destroyed thousands of homes and 200 people were killed.

Providing clean water, sanitation systems and energy

- In the poorest areas, 10% of people do not have access to fresh piped water and 50% lack proper sanitation, which means human waste can follow through the streets. Illegal tapping and leaks lead to one-third of fresh piped water being lost.
- 30% of people have no electricity. In some areas where there is a lack of electricity residents tap into mains electricity illegally which causes frequent power cuts.
- An estimated 200 tons of raw sewage pour into Guanabara Bay EVERY day.

Providing access to services – health and education

- Due to the very high population density in favelas, disease can spread very quickly. Infant mortality rates are very high at 50 per 1000. Often there is limited waste collection which increases the risk of disease
- Half of the population doesn't have a local health clinic.
- Only half of children continue education beyond 14 due to a lack of schools and a need to work.

Reducing unemployment and crime

- The city suffers from high crime rates.
- There is high unemployment in the favelas.
- Most people who live in favelas work in the informal sector, with no job security or support systems.

Environmental issues – waste disposal, air and water pollution, traffic congestion.

- Heavy pollution due to industrialization and poor sanitation.
- 3.1 million tons of waste is generated in Rio every year. Most of this is taken to landfill. In favelas there is often no bin collection at all, as they are illegal dwellings and the streets so narrow and steep, bin lorries cannot get there.
- Due to its physical geography with steep slopes and mountains, Rio is one of the most congested locations in South America. This has led to high levels of air pollution and commuters spending a lot of time travelling, which also costs businesses money through delays and fuel expense!

How is urban planning improving the **quality of life** for the urban poor?

Transport

The metro system is being extended to address the problem of congestion and sprawling development. Also, road tolls in the city centre are being introduced to encourage people to use public transport.

Tunnels through mountains have also been constructed to improve transport links across the city.

Waste disposal

Recycling is big business in Rio. Pickers collect recyclable Materials from landfill sites. As materials decompose in landfill sites they release gas which is harnessed to fuel vehicles and provide a source of energy for electricity.

Healthcare and education

In Rocinha favela a new University has opened.

Infant mortality has fallen significantly in some favelas as health kits have been used to detect and treat diseases.

Self-help schemes – Rocinha, Bairro Project

The authorities in Rio de Janeiro have taken a number of steps to reduce problems in favelas. They have set up self-help schemes. This is when the local authority provide local residents with the materials needed to construct permanent accommodation. This includes breeze blocks and cement. The local residents provide the labour. The money saved can be spent on providing basic amenities such as electricity and water.

Today, almost all the houses in Rocinha are made of concrete and brick. Some buildings are three and four stories tall and almost all houses have basic sanitation, plumbing, and electricity. Compared to simple shanty towns or slums, Rocinha has a better-developed infrastructure and hundreds of businesses such as banks, drug stores, bus lines, cable television, including locally based channel TV ROC, and, at one time, even a McDonalds franchise, though it has since closed. These factors help classify Rocinha as a Favela Bairro, or Favela Neighbourhood.

Key terms and definitions for this topic

Low income country (LIC) and high income country (HIC) - this subdivision of countries is based on the World Bank income classifications (GNI per capita), which in 2013 were Low Income \$1,045 or below, and High Income \$12,746 or above.

Newly emerging economies (NEEs) - countries that have begun to experience high rates of economic development, usually with rapid industrialisation.

Urbanisation - the process by which an increasing percentage of a country's population comes to live in towns and cities. Rapid urbanisation is a feature of many LICs and NEEs.

Mega-cities - an urban area with a total population in excess of ten million people.

Migration - when people move from one area to another.

Rural-urban migration - in many LICs people move from rural to urban areas.

Natural increase – when birth rates are above death rates and the population increases.

Commerce – the activity of buying and selling, especially on a large scale.

Counter-urbanisation - large numbers of people move from urban areas into surrounding rural areas.

Push factor – negative things that make people want to move away from an area.

Pull factor – positive things that make people want to move in to an area.

Natural increase – Birth rate - death rate = natural increase.

Pharmaceuticals – companies manufacturing medicinal drugs.

Favelas – Brazilian word for a slum or shanty town.

Mechanisation – the introduction of machines or automatic devices into a process, replacing human labour.

Youthful population – A large proportion of the population are aged below 35 years old.

Vaccinations – treatment with a vaccine to produce immunity against a disease.

Literate – an ability to read and write.

Export – goods shipped to other countries.

Multiplier effect – one change leads to another positive change.

Migrant labour – people who move to a place in search of work.

Freiburg, Germany

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

WASTE

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

WATER CONSERVATION

- Rainwater is retained and reused to reduce the amount of water used. Houses have ‘green roofs’ which aid rainwater collection.
- Residents are given financial incentives for using less water pumped from the **reservoir** (to their tap – ‘mains’ water).
- Wetland areas near the river reduce flood risk.

ENERGY CONSERVATION

- Local people are encouraged to **invest** in **renewable energy**. Investors get financial returns on their investments and even free season tickets at the football club!
- A solar factory making solar panels, employs over 250 people.
- More than 10000 people are employed in over 1500 renewable energy companies within the city, with many companies having their HQ in the city.
- The city regularly hosts renewable energy conferences.
- Solar panels are regularly incorporated as unusual design features in buildings, such as vertical cladding.
- One community has invested over £5 million in 8 renewable energy schemes, including a **micro HEP** scheme, solar energy systems at the football stadium, and wind turbines.

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

SUSTAINABLE TRAFFIC MANAGEMENT STRATEGIES

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

CREATING GREEN SPACES

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

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

SOCIAL SUSTAINABILITY

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

Key terms and definitions for this topic

Sustainability - is the practice of using natural resources responsibly, so they can support both present and future generations.

Biogas digester – biogas is a naturally occurring gas that is generated by the breakdown of organic matter by anaerobic bacteria and is used in energy production. Biogas can also be produced in anaerobic digesters from plant or animal waste or collected from landfills.

Landfill – a system of rubbish disposal in which the waste is buried between layers of earth to build up low-lying land.

Reservoir – an artificial lake where water is stored. Most reservoirs are formed by constructing dams across rivers. A reservoir can also be formed from a natural lake whose outlet has been dammed to control the water level. The dam controls the amount of water that flows out of the reservoir.

Invest - to commit (money or capital) in order to gain a financial return.

Renewable energy - is energy that is collected from renewable resources, which are naturally replenished on a human timescale, such as sunlight, wind, rain, tides, waves, and geothermal heat.

Micro HEP – a small scale Hydro Electricity Power generation scheme.

Integrated transport system- Integrated transport system refers to a multi-modal transport system where different modes of transport are efficiently linked with each other. This translates into the smooth movement of freight and people over various modes of transport like roads, railways, ports, coastal shipping, inland water and civil aviation.

Restrictions- certain rules are put in place.

Affordable housing- is housing which is deemed affordable to those with a median household income or below as rated by the national government or a local government by a recognised housing affordability index.

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. Describe how urban populations have changed over time (**Describe**)

Globally, urban populations have.....

2. Outline two factors that affect the rate of urbanisation (**Outline**)

One factor that increases rate of urbanisation is....

Also....

3. State what a megacity is (**State**)

A megacity is....

4. Suggest why more megacities are appearing in continents such as Africa (**Suggest**)

Continents such as Africa have experience rapid urban expansion in recent years, one reason for this is....

Also....

5. Outline the location of Rio De Janeiro and why it is an important city (**Outline**)

Rio De Janeiro is in... Which is in..... . It is of global importance because....

6. Explain why Rio De Janeiro has experienced rapid population growth (**Explain**)

One reason Rio has experienced rapid growth is...

Also....

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.

7. Discuss the social and economic benefits of urban growth (**Discuss**)

One social benefit that comes with urban growth is...

Whereas, one economic growth is....

8. To what extent has urban growth created challenges for the urban poor (**To what extent**)

Rapid population growth in LIC urban areas can create problems, including....

Socially....

Economically....

9. Assess the effectiveness of strategies used to improve quality of life in Rio De Janeiro (**Assess**)

Strategies used to improve the standard of living in Rio include...

This has been successful because...

However.....

10. Assess the extent to which strategies in an urban area you have studied have made urban living more sustainable (**Assess**)

In Freiburg....

Distribution of population and the major cities in the UK

The United Kingdom is a country with a high level of **urbanisation** and number of large cities. 82% of the UK population live in urban areas. It has no megacities with a population over 10 million but London, the capital, has the biggest population with over 8.5 million inhabitants.

The relief (shape of the land) has a significant impact on the **distribution** of the population in the UK. The population and cities of the UK are not evenly distributed, nor is the **population density**.

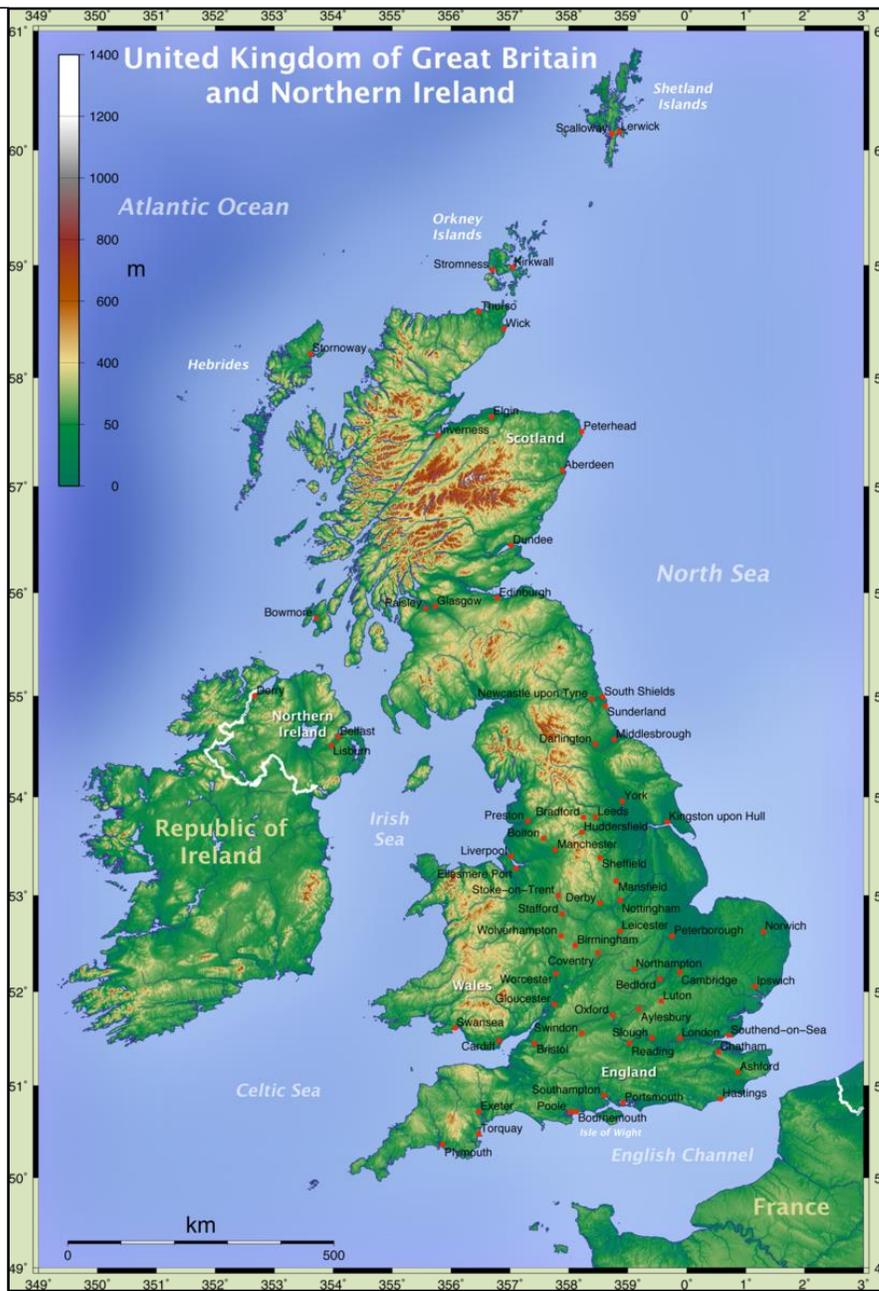
Lowland areas tend to be **densely populated** whereas upland areas are **sparsely populated**. Most urban areas have developed in low land areas because they are easier to build on and have favourable climates e.g. Birmingham.

Upland areas, such as northern Scotland, tend to be sparsely populated because they are difficult to build on and the climate is often cold and wet. Also, these areas are difficult to farm and often lack natural resources.

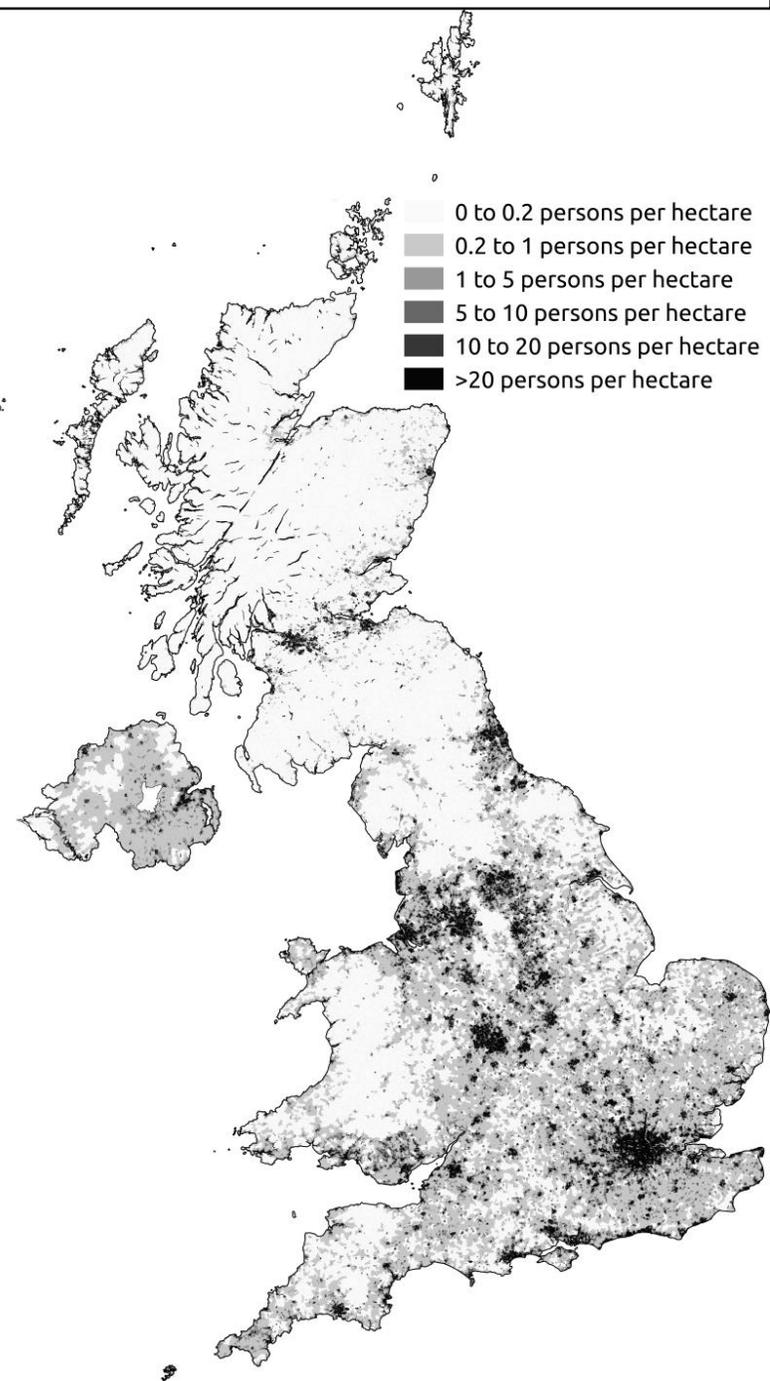
Some coastal locations have a high population density. This is particularly the case close to estuaries because harbours can be constructed. In the past, this enabled the fishing industry to develop along with ports being established to enable trading to occur.

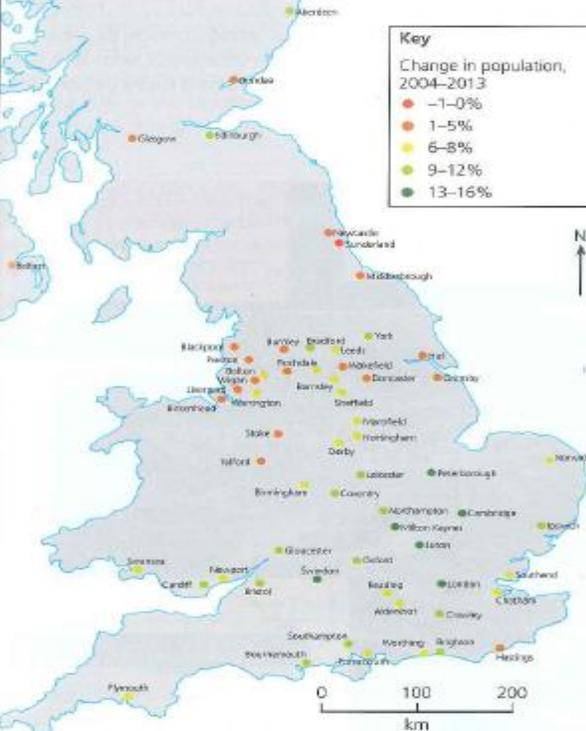
Urban areas have also developed where there are large reserves of natural resources. This includes iron ore and coal e.g. Newcastle and Leeds.

Population density is high in the south-east of England, due to the favourable climate and proximity to the capital city of the UK, London. The city has many industries and is a global financial centre.



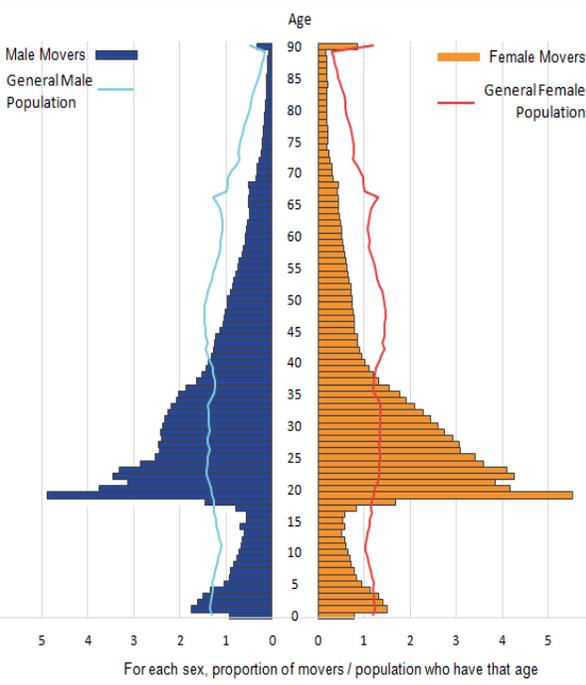
Above: map showing upland and lowland areas in the UK
Right: map showing population densities in the UK





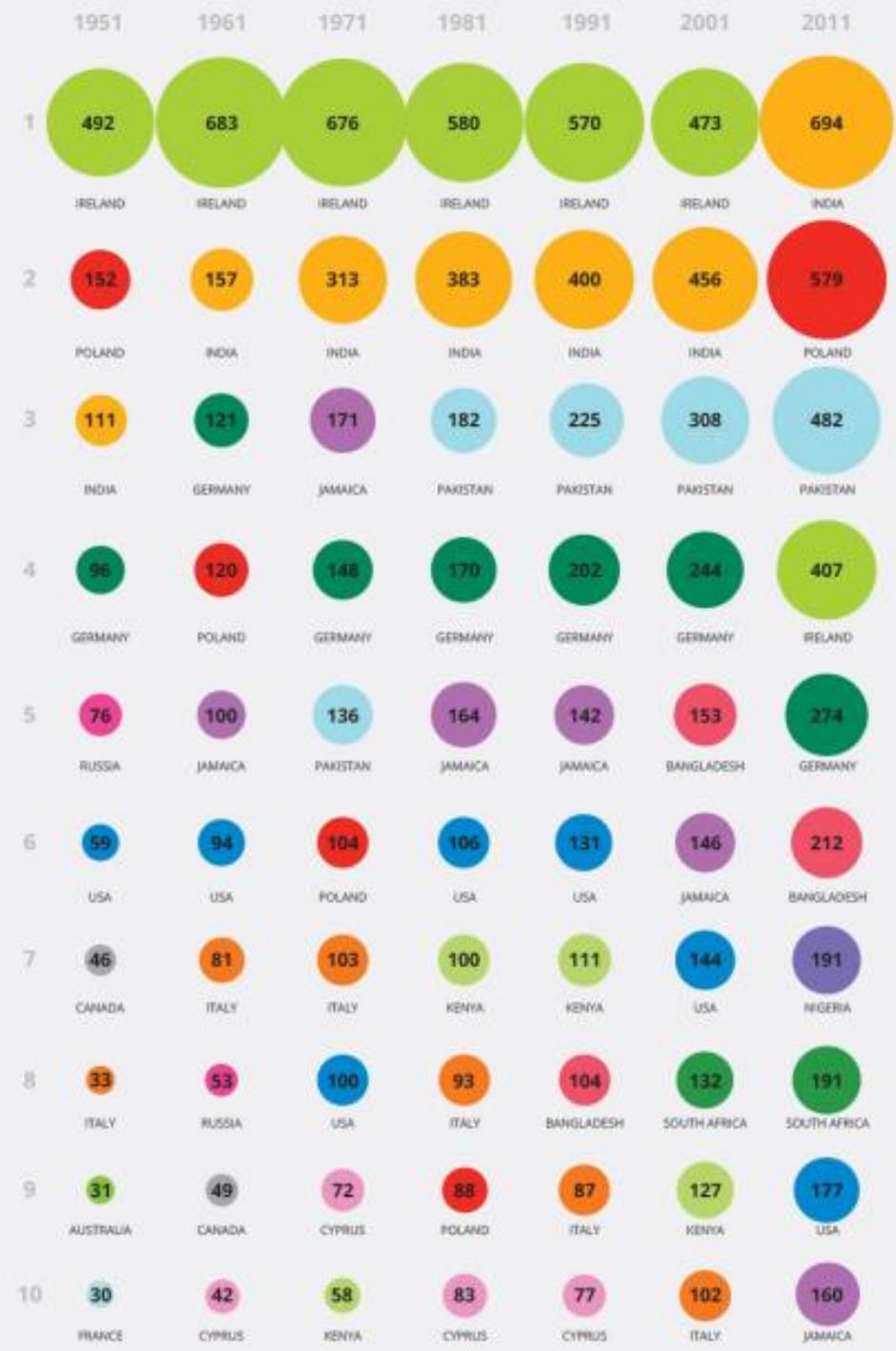
Currently, the fastest growing cities are in South East England, which is also the region with the fastest growing economy. Over one million more people live in London now than in 2000. At the other end of the scale, there are now fewer people living in Sunderland than in 2000, as a result of declining industry and a loss of jobs, forcing people to move elsewhere to find work.

Portsmouth is the most densely populated city outside of London. It has always been a key settlement, due to its coastal location and sheltered waters (the Solent is sheltered from the English Channel by the Isle of Wight, which also made it easier to defend). It became a town in 1180, and grew rapidly after 1495 when Henry VII founded Portsmouth Dockyard. It has had a strong association with the **British Navy** and **sailing** expertise ever since, and in more recent times this has led to a development in the **tourism industry** too, with the historic dockyard, Spinnaker Tower and Gun Wharf Quay shopping centre at the heart of this and ferries to France, Spain and the Isle of Wight also being integral.



Importantly, Portsmouth is on a mainline railway to London, and motorway links are good to – so lots of people live in the Portsmouth area and commute in to London because it is cheaper than living in London.

These transport, defence and tourism industries, along with education (University of Portsmouth) offer a wide variety of employment opportunities. Given its international transport connections and proximity to London, it has become home to lots of migrants from elsewhere in the UK, Europe and the rest of the world. The graphic (right) shows the numbers of people arriving to Portsmouth from different countries. As can be seen from the population pyramid, these migrants are often aged between 18-40, while the total population remains fairly even in structure – indicating that they come for work and often later leave Portsmouth again. People may also move here for an improved quality of life (usually overseas migrants), or facilities and attractions (often wealthy migrants becoming involved in the sailing industry or to gain access to the sailing industries).



Migration in Portsmouth can create opportunities and challenges:

Opportunities:

- Enriching the city's cultural life by creating different, interesting buildings, events, social spaces and ideas.
- Filling 'skill shortages' within the workforce after skilled workers move elsewhere.
- A hard working and motivated workforce as the vast majority of these people have chosen to come here and work, knowing it will get them a better wage and better quality of life.
- Greater variety of shops, cuisine (food) and entertainments.

Challenges:

- Integration of different cultures and ideologies into the community - this can often create tension and conflict within a community.
- Language barriers in schools – additional workload for staff (and lack of training) as well as frustration amongst native speakers.
- Pressure of housing and employment – there isn't enough houses or jobs for everyone within the area and this can cause conflict.

Urban sprawl is the result of inward migration and so increased urbanisation occurs: as more and more people move into cities, so the population density rises and it becomes a less appealing place to live (overcrowded, traffic issues, pollution, housing prices) and so the city spreads outwards into more rural areas. Other associated issues include:

Lower Land Rates: Lower cost land and houses in the outer suburbs of the cities, because land in the centre is very expensive.

Improved Infrastructure: There is increased spending on certain types of infrastructures, including roads and electricity. This is something that hasn't always been available, and there are still some areas that don't have these luxuries.

Rise in Standard of Living: There are also increases in standards of living and average family incomes, which means that people have the ability to pay more to travel and commute longer distances to work and back home.

Lack of Urban Planning: People love to find areas that are less trafficked and more calm, which leads them to sprawl out to other sections of the town. Unprecedented development, cutting of trees, loss of green cover, long traffic jams and poor infrastructure in the city centre force people to move out to new areas.

Lower House Tax Rates: Cities will usually have high property taxes, and you can usually avoid these taxes by living in the outer suburbs because the taxes are usually lower than they would be in other situations.

Rise in Population Growth: Another factor that contributes towards urban sprawl is rise in population growth. As number of people in a city grows beyond capacity, the local communities continues to spread farther and farther from city centres.

Consumer Preferences: People in high income groups have stronger preferences towards larger homes, more bedrooms, bigger balconies and bigger lawns. This also causes urban sprawl as this option is not usually available in crowded cities. People generally look out for low-density residential areas where they can get home according to their preference.

The UK is short of suitable housing. Approximately 3 million new homes are needed by 2030. They need to be built somewhere. The options are using Brownfield sites or Greenfield sites.

Brownfield sites are often on disused or derelict land.

- There are more available in the North and Midlands (but most housing demand is in the south east).
- They are valuable as existing buildings can be split up into smaller apartments.
- The site has already been developed so reduces urban sprawl.
- Use unsightly areas for building developments, so improves the urban environment.
- Are found in urban areas, so building housing there reduces demand on car use.
- Are more expensive to build on as often the land needs to be cleared first (especially if land is contaminated from previous industrial use).

Greenfield sites

- Are sites which have not previously been built on. This includes the greenbelt land around cities.
 - Are cheaper to build on.
 - Are not favoured by environmentalists, as it encourages urban sprawl.
- will mean that countryside is built on.
- Encourage commuting and traffic congestion as people travel into urban areas from the countryside.
 - Often leaves derelict sites in city centres looking run down – doesn't solve this issue.



Social challenges of urban sprawl

Some issues are obvious:

- With an ever growing city, there is an ever growing problem with waste! While recycling centres typically recycle 70-85% of the material taken to them, the council has had to start introducing charges on items such as rubble simply to manage spiralling costs. This has led to an increase in fly-tipping. What goes in the general waste bin, goes to landfill. In many ways this is an environmental catastrophe, but especially in terms of potential water pollution – and therefore is a social issue too!
- Increased vehicle use is also fuelling the obesity crisis and causing other health problems.

Some issues are not so obvious, but are REALLY important to understand:

- While old industrial areas (such as Gun Wharf) which are derelict can be knocked down and the **brownfield site** reused (Gun Wharf Quays as it is today), the older, less desirable “working class housing” nearby often remains, slowly falling into disrepair and making the housing cheaper, relative to other houses in and around the city.
- Suburbs built on greenfield sites are built to modern standards, demand drives prices up further, and so the houses are much more expensive.
- Those on lower incomes, often with poorer education, generally end up in the cheaper housing – and in turn this creates issues with crime, radicalisation and unemployment.

Integrated transport system

Traffic issues are a big problem in Portsmouth and in the larger Portsmouth-Southampton area, along the M27 corridor. It can often take 5 times longer to complete a journey during rush hour than it does during off-peak times. As a result of this, there are two key transport schemes you should be aware of. One has been completed; the second is in the planning phase.

Portsmouth Transport Hub (built): On the seafront, between the major attractions of the Historic Dockyards and Gun Wharf Quays, and next to the Portsmouth Harbour railway station, a new transport hub has been built. An information centre is provided, here tickets for buses, coaches, the railway and ferries can be booked. As well as being next to the railway station, it is the bus/coach station and taxi rank, and is less than 1 minute walk to the Isle of Wight Ferry terminal and 2 minute walk to the Gosport ferry (used by large numbers of commuters). This makes transfer between different modes of transport much easier and quicker, and is further encouraged by bus lanes around the city centre (making it quicker on bus than in a car), therefore more people use public transport, helping to reduce traffic congestion in the city.

Transport chiefs want to build a multi-million-pound hi tech tram system to link Southampton and Portsmouth (proposed):

Several schemes to improve transport in the South have been suggested, with one such project being a new tram line operating between Southampton and Portsmouth and serving communities between the two cities. The line could see a tram service operating throughout Southampton, connecting St Mary's, the civic centre, West Quay, Ocean Village and Woolston, as well as other places. It would then head down the coast to Portsmouth city centre. Labour Southampton City Council leader Simon Letts says “the South could take inspiration from the likes of Nottingham, which has had a tram since 2004. If you have a tram line that is segregated from traffic it gives you a much more reliable and faster service which is key to getting people out of their cars. Southampton and Portsmouth would definitely benefit from a modern tram system that was properly integrated. Tram services in other parts of the country have reduced car traffic, increased property values and generally improved people's quality of life, there is no question about it.”





Gun Wharf Quays regeneration

Why was it regenerated?

- The area was a disused, derelict part of the naval dockyard, close to the historic dockyards, ferry/rail terminals and historic areas of Portsmouth such as Spice Island, Old Portsmouth and Southsea Common.
- The shopping areas in the city centre (NOT at Gun Wharf) were not attracting 'high-end' brands, and one of the shopping centre buildings was condemned and knocked down.
- The city wanted to improve its 'offer' for tourists – and increase the number of tourists who wanted to visit the city, to attract further inward investment.
- The council wanted to open up the waterfront for public use (previously inaccessible due to Navy use) and to create jobs.

What are the main features of the regeneration scheme?

- Gun Wharf Quays shopping centre – 90+ designer shops
- Cinema, state of the art bowling alley, art gallery, casino
- Spinnaker tower – 170m tall viewing tower with fantastic panoramic views across Portsmouth and the Solent
- Marina, harbour water tours and rib boat rides
- Gunwharf Quays has its own on-site recycling centre, and over the last three years has increased its combined recycling and reuse performance from 48% to 80%.
- Gunwharf Quays has one of the largest arrays of solar panels on a shopping centre in Europe, which are used to power the car park.

Key terms and definitions for this topic

Urbanisation – is the increase in the proportion of people living in towns and cities.

Distribution – the way in which something is spread over an area.

Population Density – is the number of people per unit of area, usually quoted per square kilometre.

Densely populated – high number of people per km²

Sparsely populated – low number of people per km²

Skills shortages – Not enough people with the appropriate skills to do the jobs required.

Urban sprawl – the rapid expansion of cities and towns.

Infrastructure – the basic physical and organizational structures and facilities (e.g. buildings, roads, power supplies) needed for the operation of a society or enterprise.

Brownfield sites – is an area that has been used before and tends to be disused or derelict land. Such sites are usually abandoned areas in towns and cities which have been used previously for industrial and commercial purposes.

Greenfield sites – are areas of land, usually agricultural land, which are being considered for urban development.

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. Describe the distribution of the urban population in the UK (**Describe**)

In the south of the UK...

Whereas in the North and West...

2. Describe the location of Portsmouth (**Describe**)

Portsmouth is in.....

...in the _____ of the UK.

3. Outline how Portsmouth is both historically important and of importance today (**Outline**)

Historically Portsmouth has been important because....

Whereas, in modern times...

4. Explain how both national and international migration have had effects on Portsmouth growth and character (**Explain**)

Both national and international migration have resulted in Portsmouth...

This has meant that....

5. To what extent has urban change created social and economic opportunities in a UK city you have studied (**To what extent**)

On one hand....

Whereas...

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. Suggest ways in which urban change has created environmental challenges. **(Suggest)**

In Portsmouth, environmental challenges have resulted from...

7. Discuss the ways in which social and economic issues have created challenges in an urban environment **(Discuss)**

Firstly, social issues such as....

Secondly, economic issues such as....

Have resulted from....

8. Assess the success of an urban regeneration project, in a UK city that you have studied **(Assess)**

On one hand, the redevelopment of Gunwharf Quays has provided the following benefits...

However...

In conclusion..

Why do Christians help? What inspires Christians?

Parables:

- **Good Samaritan:** To help strangers in need. To not discriminate against others and to help all groups of people.
- The **Widows Offering:** To give all you can to help others i.e. Charity
- **Lazarus and the Rich Man OR The Sheep and the Goats:** These are about judgment day. Therefore, Christians help others so they will be rewarded in Heaven

Quotes:

- *"let's not love with words or thoughts but with actions"* Bible
- *"For I was hungry, and you gave me something to eat. I was thirsty and you gave me something to drink. I was a stranger and you invited me in"* Bible
- *"Love your enemies and pray for those who persecute you"* Jesus
- *"Go make disciples of all nations"* Jesus

Christian Help in the Local Community: UK based

Street pastors

- These are Christian groups who go out Friday and Saturday nights into town / city centres to **support the police** in giving people support late at night with drink and drug problems.
- They work in **270** towns/cities in the UK.
- They can: Give basic medical help; Provide foil blankets, lolly pops, flip flops; Call ambulances or police if needed

Trussell Trust

- Set up by Paddy Henderson in Salisbury a food bank for the needy.
- Professionals such as police, social services, doctors **recommend** people in need.
- People are given **vouchers** to spend at food banks
- Food is donated by supermarkets and the public

BVT

Christian Church

Key vocabulary

Parables
Street Pastors
Trussell Trust
Evangelism
Missionaries
Christian Army
SIM (Serving in Mission)



Evangelism: UK and World based

- Evangelism is the **spread of the Christian faith**. Many Christians want to spread Christianity so more people find God which they believe can help them in their lives in many ways.
- These people that spread the Christian faith are called **missionaries**. Missionaries want to spread the word of God so they can embrace God into their lives. They believe this spirituality can give them support, hope and guidance in their lives. It can also bring people together in a community.

These 2 groups are evangelism groups that have spread the word of God by helping communities:

Christian Army: in the UK

- Run clubs for Children, provide opportunity for troubled / vulnerable teenagers to go on adventure activities
- Work with drug addicts
- Provide lunch clubs for the elderly and lonely
- Provide chaplains in Hospitals and prisons

SIM: Abroad

- Send mission workers into **70** countries around the world
- SIM have helped in **West Africa** with children suffering from malnutrition
- In **Nigeria** SIM Christians have helped Christians who have faced discrimination and violence.



Christian Charity against Poverty: World based

Christian Aid

- Holds Christian Aid week around the UK for fund raising.
- Responds in short term aid for natural disasters around the world.
- Long term projects to give poor countries their independence.
- Working in Burma – helping fight against Malaria.

Cafod

- Provides aid after natural disasters – short term, but also long term by putting disaster risk reduction strategies in place.
- Long term projects are to develop sustainability and confidence in the people for their future.
- In Zambia they have helped provide clean water pumps and schools.



Christian support against Discrimination / persecution: World based

Brother Andrew

- Lived in Poland while Christians were being persecuted.
- He smuggled in bibles for them.
- After Poland he worked with 125 other countries helping persecuted Christians.

James and Stephen Smith

- Opened a memorial centre in Rwanda which helped victims of the genocide there.
- They provided medical, counselling, financial and education support to widows and orphans .

BVT

Christian Church

Key vocabulary

Christian Aid
Cafod

Discrimination
Persecution

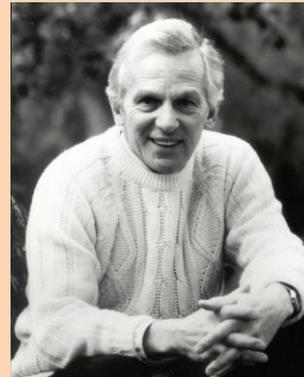
Brother Andrew

James and Stephen Smith

Interfaith Dialogue

Corrymeela

Andrew Smith Vicar of Baghdad



Brother Andrew

Christian work to bring peace and reconciliation: UK and World based

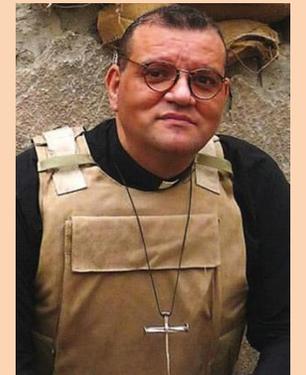
Both these people / groups below encourage **interfaith dialogue** which means bringing people of 2 faiths together and talking / getting along

Corrymeela: UK (Northern Ireland)

- Christian group that works to get Protestants and Catholics in Ireland talking and building reconciliation, during the Irish troubles.
- It focuses on working with families and children and those that were affected by the troubles/violence in Ireland.
- It was awarded the Noble Peace Prize in 1997 for work towards world peace.

Andrew White - Vicar of Baghdad

- The Vicar works in the Middle East working for peace between religious groups.
- He has worked in Israel between Jews and Muslims, in Iraq with Sunni and Shi'a Muslims to bring reconciliation during wars.
- He has also worked with leaders to try to bring peace, risking his life in war zone areas.



Andrew White - Vicar of Baghdad

Forgiveness and Reconciliation

Forgiveness:

All religions encourage forgiveness.

Sometimes there are some actions that are very difficult to forgive.

Here are 2 examples of people who suffered greatly that have still managed to forgive those that had done them wrong....

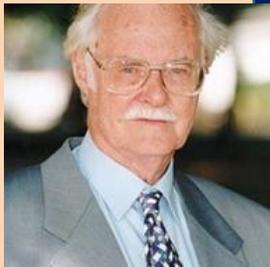
Corrie Ten Boon

Corrie helped Jews in Holland during the Holocaust/WW2. She was caught and she was sent to a concentration camp. Her father and sister were shot, but by some chance she was realised. Years later when giving a talk about the Holocaust in Munich she met a guard that had been at her concentration camp. He held out his hand to shake hers, but all she felt was anger. She prayed so she could forgive him, and thought about the teachings and actions of Jesus. When she shook the guard's hand, she felt love and was able to forgive him.



Eric Lomax

Eric was taken a prisoner by the Japanese during WW2 and forced to build the Burma railway. During his time his captors treated him poorly, he was tortured and the prisoners faced starvation. At the end of the war Eric was so angry at these captors he said "I would have been happy to murder him" (about one particular guard). Years later Eric decided to meet this man who had tortured him and Eric was able to forgive Nagase who told Eric how sorry he was.



BVT

Conflict

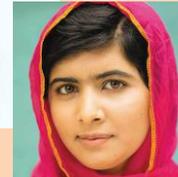
Key vocabulary

Forgiveness

Justice

Protest

Reconciliation



Justice and Protest

Reconciliation is when someone is able to *make up* with someone they have had conflict with.

This is *only possible once forgiveness* been accepted.

Justice is *making things right*.

Many people believe getting justice can be *revenge* – but it can also be making things *fair* for example someone being sentenced by a judge to a crime they have committed.

Other **examples of justice** could be:
Protesting, voting to make a change, getting a law passed



Is protest a good way to achieve Justice?

Is violent protest more effective? Some would agree because it gains **media attention** more. Think about historical active protests such as the **suffragettes** who campaigned violently, by burning down buildings, putting bombs in letter boxes. What about the recent **pulling down of the statue of Edward Colston in Bristol**, protesting to anti slavery and supporting the **Black Lives Matter** campaign?

However some would argue that **violence only encourages more violence**. **That when trying to make a change it is better to win hearts and minds** and take the morale high ground. This is something that **Martin Luther King Jr** believed.

Religious Beliefs about forgiveness, Justice, and protest

Christianity	Islam	Buddhism
<p>Encourages forgiveness, taught by: parable Prodigal Son and Lord's prayer "We forgive those that trespass (sin) against us."</p> <p>Believe justice is gained from forgiveness and reconciliation. Christians fight and speak up for injustices in the world. However, some Christians may follow "an eye for an eye a tooth for a tooth" from the Old testament, representing revenge as justice.</p> <p>Believe that Protest can make a change and bring justice.</p> <p>Believe violent protest is acceptable WHEN peaceful protest has failed and if it achieves a change for the common good.</p>	<p>Encourages forgiveness, taught by: "Those who pardon and maintain righteousness are rewarded by God" Qur'an.</p> <p>Muhammad and the old lady: Muhammad helped an old lady who had regularly mistreated him</p> <p>Believe justice should be sort by punishment. Some extreme examples are Shari'ah law that punishes adultery by stoning to death.</p>	<p>Buddhism encourages forgiveness, HOWEVER recognises that sometimes it is too difficult to forgive.</p> <p>Believe in non-violent protest speaking out against injustice is important as it follows the Right Action of the Eightfold Path</p>



Conflict

Key vocabulary

Forgiveness
Justice
Protest
Reconciliation
Terrorism
Jihad
Radicalisation



What causes conflict?

- Greed
- Defence
- Retaliation (revenge)
- To stop aggression / terrorism
- To stop injustice / protect other

Investigating Terrorism

Google definition of terrorism is "the unlawful use of violence and intimidation, especially against civilians, in the pursuit of political aims."

Terrorism is to create fear. It does this through types of violence that are difficult to prepare and control. **At no point does it mention the word religion.**

Why do some people get involved in terrorism? Is terrorism linked to Islam?

This is not a straight forward answer. Read the following viewpoints about terrorism and think about your opinion on this matter:

Terrorism is when extreme people do extreme things. There have been many extreme acts of violence by different groups of people (religious and non religious) in the past to gain political gain. E.g. ISIS, suffragettes. This extreme behaviour is **NOT subject to being religious.**

Some people may argue that if you take part in extreme violence you are **not truly religious**, as all religions try to **preserve PEACE.**

Some may argue that when looking at Islam, a minority of Muslims are following a religious idea called **Jihad** or **Holy War**. Muslims involved in terrorist acts may believe this and feel a need to attack those that are against Islam "Fight in the cause of Allah, those that fight you" (Qur'an). **However**, 2 things:

- 1) This quote is taken out of context of modern times. It is also linked to rules of Holy War (see next slide) that terrorism **does not follow.**
- 2) These minorities of Muslims believe this because they have been **radicalised.** The people at the top of terrorist organisations are NOT truly religious, they are organising terrorist acts for political reasons – to gain power, assert dominance etc.



Weapons of Mass Destruction



Weapons of mass Destruction or WMD are weapons used in modern day conflict. These include:
Nuclear, biological, radioactive and chemical.



Conflict

Key vocabulary

WMD
Nuclear
Radioactive
Biological
Chemical

Religious groups / people that work towards peace

A religious example of someone who has campaigned for peace is **Andrew White, known as the Vicar of Baghdad:**

Andrew Smith founded the Foundation for Relief and Reconciliation in the Middle East.

His main aim in the Middle East has been to try to maintain communication between Shia and Sunni leaders. He sees his role as trying to mediate and re-establish the dialogue between conflicting groups.

He also helped the victims of war, by supporting ordinary people in war zones. He remained as the only Anglican Church in Iraq, until his departure, ordered in November 2014 by the Archbishop of Canterbury due to security concerns.

Christians

CATHOLICS

believe having them can be **acceptable** in maintaining peace. They believe they are a **deterrent** as other countries will not attack a country with weapons, therefore preserving peace.

Other Christians:

"Those that live by the sword die by the sword" Jesus

CCND (Christian Campaign for Nuclear Disarmament) group encourages disarmament of WMD

Buddhism

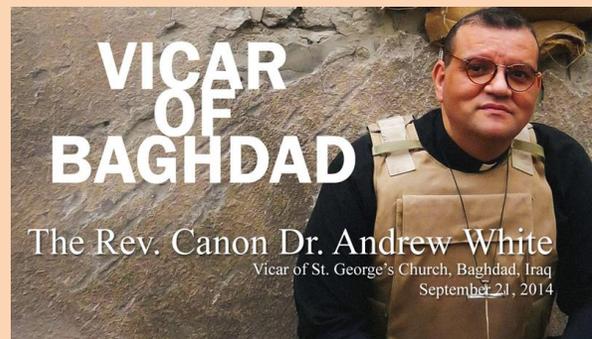
They create suffering Buddhist for the **4 Noble Truths** to avoid suffering. WMD are against the **5 Precept beliefs** – the 1st Precept of not harming any living thing.

Also goes against **Right Action in the Eightfold path**

Islam

Are against WMD as they do not serve peace. Also they destroy **Allah's creation**

"The world is green and beautiful and Allah appointed us stewards over it" Qur'an



Christian Peace making Teams

Send small teams out to areas of conflict to try to end the conflict by peaceful means They work in areas such as Palestine and Iraq talking to local people educating them in order to bring about peace They bring aid and support to victims of war

Violence and Peace

By nature religions are peaceful. However there are some times when some religions will justify violence for what they believe is a good reason.

Buddhism	Christianity	Islam
<p>Buddhists are pacifists – believe in peaceful methods and behaviour. Buddhism teaches that consequences will have consequences</p> <p>The Dali Lama said <i>“Hatred with not cease by hatred, but by love alone”</i></p> <p>Buddhism teaches doing the “Right Action” in the Eightfold Path principles. Also not to harm any living thing – 5 Precepts</p> 	<p>Jesus teaches peace <i>“Love your enemies and pray for those that persecute you”</i></p> <p>Jesus said <i>“Those that live by the sword, die by the sword”</i>.</p> <p>Jesus preached about love and kindness: Prodigal Son and the Good Samaritan</p> <p>HOWEVER: There are different quotes from the Old Testament that show conflict can be acceptable: <i>“An eye for an eye, a tooth for a tooth”</i></p> <p><i>“Declare a Holy War, call the troops to arms”</i></p>	<p>Islam means peace</p> <p>Muslims will greet each other by saying “salaam alaikum” meaning peace be upon you.</p> <p>HOWEVER: Those that die in the name of Allah will be rewarded in paradise. When Muhammad was alive the Muslim community had to fight to defend themselves or be killed. Allah ordered Muslims to fight when attacked, so Holy war became duty for Muslims</p> <p><i>“Fight in the cause of Allah those who fight you”</i> (Qur’an)</p>

Holy War – a justified war?

Conflict

Key vocabulary

Jihad
Pacifism
Just War

A Just war is a war that people will justify i.e. going to war for a good reason. Some may believe defending yourself may be a just reason to go to war or protecting innocent people from harm.

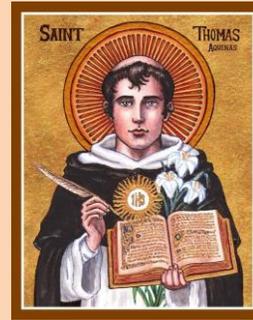
In religion, Christianity and Islam have terms for a just war, outlined below

Christianity:

In the 1200’s **St Thomas Aquinas** (a Italian Catholic Priest) declared the conditions for a just war, which Christians use today

The war MUST:

- Be for a just cause
- Have a good chance of success
- Be legally approved by a legitimate government
- Not harm innocent civilians
- Be a last resort – disputes should have tried to be sorted out peacefully



Islam:

Many Muslims relate just war with Jihad. Jihad means struggle. Greater Jihad is the spiritual struggle e.g. against sin. But **Lesser jihad is the physical struggle** e.g. to preserve Islam. Lesser Jihad is a belief to justify a Holy war...

BUT the war MUST:

- Be for a just cause e.g. Muslims are being oppressed / mistreated
- Not harm innocent civilians
- Treat prisoners well
- War can only be declared once the enemy has attacked



Beliefs about Evil and Sin

Christianity

The act is **evil not necessarily the person**. This way there is always room to repent (say sorry) and God to **grant forgiveness**.

God gave people **free will** so people can make their own mistakes and turn to evil

In order for there to be good there must be evil – **natural balance**

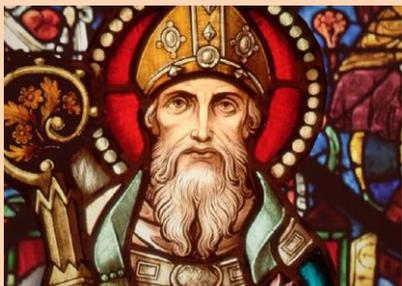
Some Christians believe that everyone was **born with sin** – from the **Original Sin**. This idea came from **St Augustine**. Therefore infant baptism is encouraged. Everyone must earn God's Grace.

Islam

Iblis (or the devil) will **tempt** Humans to be wicked.

Religious believers **use the story of Original Sin** to learn about evil – the devil tempted Adam and Eve and they were banished from Eden.

This is Christians too



IMPACTS

Forgiveness
Be aware of actions
Test from God

BVT – Crime and Punishment

Key Terms

- Sin
- Evil
- Hate crime
- Terrorism
- Reformation
- Deterrence
- Retribution
- Capital punishment
- Corporal Punishment
- Payback
- Victim Support



Crime is caused by many factors such as greed, poverty, environment, upbringing, friends etc.
Crime can be categorised into **3 groups**: Crime against a person, crime against property or crime against the state.

Hate crime is also on the **increase**. This includes showing hate / prejudice towards different groups. There are over **100 hate crimes reported every day** in England. Most common hate crime is **prejudice towards religious groups, sexual preference and race**. Most crime is shouting abuse but can often be physical attacks or attacks on people's property.

Terrorist acts: ISIS claiming responsibility to show discontent with the **nature and way we live our ideas** in the west. Recent examples include: Manchester Bombing and London bridge attacks both in 2017.

Christians, Buddhists and Muslims are against all crimes:

Against violent crimes e.g. Terrorism:

Religions are against crimes against a person as this **displays violence**, these religions are **pacifists**

Violence goes against Buddhist ideas of the **5 precepts**.

"Hatred will not cease by hatred, but by love alone" Dali Lama
"Blessed are the peacemakers" – Jesus, against war / violence

Crimes against individuals e.g. Hate crimes

All religions show **acceptance of equality and are against prejudice**

Christianity: The **Good Samaritan** and *"Neither Jew nor Greek, slave nor free, male nor female, for you are all one in Jesus Christ"* Bible

Muslim practices show equality among groups: 5 pillars show beliefs and actions are equal.

Types of crime



Types and Beliefs about Punishment

There are 3 aims or types of punishment:

Reformation - To help the criminal reform their behaviour so they do not commit crime again

Deterrence – to show / warn others not to commit crime otherwise they will be punished

Retaliation – in revenge or to seek justice for the behaviour of the criminal

Electronic tagging as a punishment

- This is used when inmates are released from prison and they can be tracked were they go
- It is used so the remainder of a sentence can be served at home
- The inmate can be monitored and they are not allowed out at night.
- This system can be used for between 1 month and 1 year of the last part of a sentence.
- Electronic tagging frees up space in prisons



Retribution Deterrence Reformation

Christianity	Buddhism	Islam
<p>For Reformation: Forgiveness of crimes – <i>“We forgive those that trespass against us”</i> Lord’s Prayer The law has the right to punish and care for a criminals while trying to reform them</p>	<p>For Reformation: Buddhists believe that criminals need to understand the impact of their crime on others and to help criminals to adjust their ways. Against Reformation: Buddhists encourage forgiveness, however understand that sometimes it can be too hard, in some circumstances. If suffering is too great, forgiveness can be hard.</p>	<p>For Reformation: Islam also talks about forgiveness. <i>“Those who pardon... are rewarded by Allah”</i> Qur’an</p> 
		<p>For Deterrence: Some Islamic countries use corporal punishment as part of Shari’ah law to deter others, such as lashings.</p>
<p>Against Retribution: Jesus taught to <i>“turn the other cheek”</i> to avoid revenge Christians are against corporal punishment. Jesus was flogged before going on the cross.</p> <p>For Retribution: However, some Christians may believe in retribution - the old testament <i>“An eye for an eye and tooth for a tooth”</i></p>	<p>Against Retribution: Buddhists are against corporal punishment as it goes against the 5 precepts (harming others)</p> 	<p>For Retribution: The Qur’an states a punishment for a thief is having their hands cut off. Islam teaches <i>“A life for a life”</i> In Iraq stoning to death is used as a capital punishment for adultery and homosexuality <i>“If your lusts on men in preference to women.... we rain down on them a shower of stones”</i> Qur’an</p>

Fais une description de ton collègè.. (*Describe your school*)

mon collègè est situè / se trouve (*my school is located*)

c'est un collègè mixte / c'est un petit collègè (*it's a mixed school / small school*)

il y a / nous avons (*there is, are / we have*)

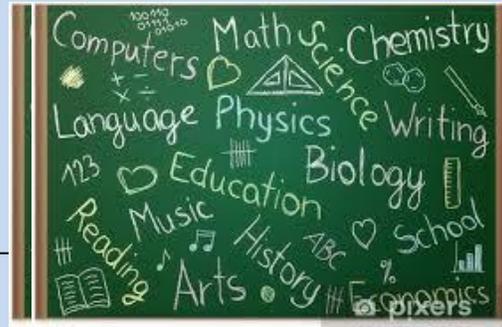
nous n'avons pas de... (*we don't have*)

la salle de classe (*classroom*)

le couloir (*corridor*)

le gymnase (*gym*)

le terrain de sport (*sports field*)



Quelles matières aimes-tu ? Tu as une matière préférée ? (*Do you have a favourite subject?*)

j'aime / je ne supporte pas (*I like / can't stand*)

ma matière préférée, c'est... (*my favourite subject is...*)

les maths / les sciences / l'EPS / l'anglais / le français (*maths, science, PE, English, French*)

c'est intéressant / amusant / barbant (*it's interesting / fun / boring*)



Comment etait ton école primaire? (*What was your primary school like?*)

elle était située (*it was situated*)

elle se trouvait (*it was located*)

les professeurs étaient (*the teachers were*)

il y avait / nous avions (*there was / were, we had*)

nous n'avions pas de... (*we didn't have*)

j'aimais beaucoup mon école primaire (*I really liked my primary school*)

je n'aimais pas ... (*I didn't like*)

c' était (*it was*)

j'avais beaucoup d'amis (*I had lots of friends*)

nous jouions beaucoup (*we played a lot*)



C'était comment hier au collège ?

(What was it like yesterday at school?)

je me suis réveillé(e) *(I woke up)*

je suis parti(e) *(I left)*

je suis arrivé *(I arrived)*

pendant la récré *(during break)*

mon premier cours *(my first lesson)*

après *(after/wards)*

j'ai joué *(I played)*

j'ai mangé *(I ate)*

j'ai travaillé *(I worked)*

c'était *(it was)*

Que penses-tu du système scolaire anglais ? Quelles sont les plus grandes différences entre lui et le système français ? *(What do you think of the English school system? What are the biggest differences between it and the French system?)*

je préfère / j'aime mieux *(I prefer)*

car / puisque / parce que *(because)*

c'est plus / moins ... que *(it's more / less... than)*

on peut *(one can / you can)*

on ne peut pas *(you can't)*

on doit *(you have to)*

on ne doit pas *(you don't have to)*

il faut *(one must)*

c'est interdit de *(it's forbidden to)*



Décris-moi une journée typique au collège... *(Describe a typical day at school...)*

normalement je me lève à... *(normally I get up at...)*

je vais au collège à pied / en bus / à vélo *(I go to school by foot / bus / bike)*

le premier cours commence à *(the first lesson starts at)*

le collège finit à *(school finishes at)*

avant de + infinitive *(before doing something)*

après avoir + past participle *(having done something)*



Qu'est-ce que tu feras dans le futur ? *(What will you do in the future?)*

je vais / j'espère / je voudrais + être, aller, travailler *(I'm going / hope / would like to be, go, work)*

je travaillerai *(I will work)*

j'aurai *(I will have)*

j'habiterai *(I will live)*

je serai *(I will be)*

j'étudierai *(I will study)*

**L'AVENIR EST
À NOUS!**

Key Grammar

Using 'on'

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

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

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

It can also mean 'we', so is a very useful word to know.

Normalement, on va en vacances en Allemagne = Normally, we go on holiday to Germany

Comparatives and superlatives

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

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

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

Note:

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

The imperfect tense

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

Note the **-ais, -ait** ending.

J'**étais** = I used to be / I was

Je jou**ais** = I used to play

J'all**ais** = I used to go / I was going

C'**était** = it was / it used to be

Il y av**ait** = there was / used to be

Nous étud**ions** = we used to study

Nous mang**eions** – we used to eat

Before and after

Avant de + **infinitive**

Après avoir + **past participle**

Avant de **quitter** mon collège, je vais passer mes examens
= **before leaving** school, I'm going to take my exams

Après avoir **passé** mes examens, j'ai quitté le collège
= **After sitting / taking** my exams, I left school

Note: Après **être** arrivé – After arriving / having arrived

The simple future

This is how we say that we **'will'** do something in the future.

Typically, take the **infinitive** of the verb and add on the following endings.

Notice that these endings come from the present tense of the verb **'avoir'** (to have).

There are some **exceptions**, usually with irregular verbs (to do , to be, to have, to go etc)

person	ending
je	-ai
tu	-as
il	-a
nous	-ons
vous	-ez
ils	-ont

je regarder**ai** – I will watch

nous manger**ons** – we will eat

ils travailler**ont** – they will work

tu écouter**as** – you will listen

Exceptions:

j'**aurai** – I will have

je **serai** – I will be

je **ferai** – I will do

j'**irai** – I will go

(and there are some others)

Adverbs of time for referring to the future

L'année prochaine – *next year*

Dans deux ans – *in two years (time)*

Après mes études – *after my studies*

Après avoir fini au lycée – *after finishing at college*

Avant de trouver un boulot – *before finding a job*

Quand j'aurai vingt ans – *when I'm twenty years old*

Dans le futur – *in the future*

Dans / à l'avenir – *in the future*

Examples:

Quand j'aurai vingt ans je travaillerai pour Google!
= *When I'm twenty years old I will work for Google!*

Après mes études j'irai en France pour trouver un boulot!
= *After my studies I will go to France to find a job!*

L'année prochaine j' étudierai les maths et l'anglais =
next year I will study maths and English

As-tu un petit boulot? / Reçois-tu de l'argent de poche? / Faut-il aider à la maison pour ton argent? (*Do you have a part-time job? Do you get pocket money? Do you have to help at home?*)

je reçois (*I get*)

mes parents me donnent (*my parents give me*)

quand / si (*when / if*)

cinq euros chaque semaine (*five Euros every week*)

je travaille (*I work*)

je dois aider à la maison (*I have to help at home*)

nettoyer (*to clean*)

laver (*to wash*)

ranger (*to tidy*)



Qu'est-ce que tu veux faire plus tard dans ta vie?

je veux être / devenir... (*I want to be / become*)

+ raisons:

parce que je m'intéresse beaucoup à (*because I'm very interested in*)

car c'est important d'aider les autres (*since it's important to help others*)

Que font tes parents comme métier? (*What do your parents do for a job?*)

mon père / ma mère travaille comme... (*my mum/ dad works as...*)

il / elle est ... (*s/he is...*)

docteur (*a doctor*)

professeur (*a teacher*)

homme / femme d'affaires (*businessman / businesswoman*)

dans une usine (*in a factory*)

dans un collège (*in a school*)



Le travail bénévole c'est important aujourd'hui? (*Is charity work / volunteering important these days?*)

une association caritative (*charity*)

aider les autres (*to help others*)

une année sabbatique (*gap-year*)

voyager (*to travel*)

aller à l'étranger (*to go abroad*)



Key Grammar

Talking about jobs / occupations

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

je veux devenir professeur = *I want to be a teacher*

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

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

Modal verbs

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

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

devoir – *to have to / to must*

pouvoir – *to be able to / to can*

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

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

Je dois – I must

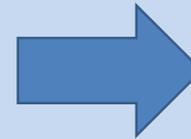
Tu dois – you must

Il / elle / on doit – he / she / one must

Nous devons – we must

Vous devez – you must

Ils doivent – they must



Je peux – I can

Tu peux – you can

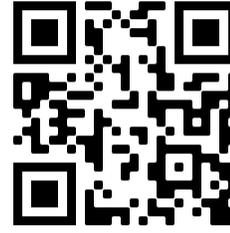
Il / elle / on peut – he / she / one can

Nous pouvons – we can

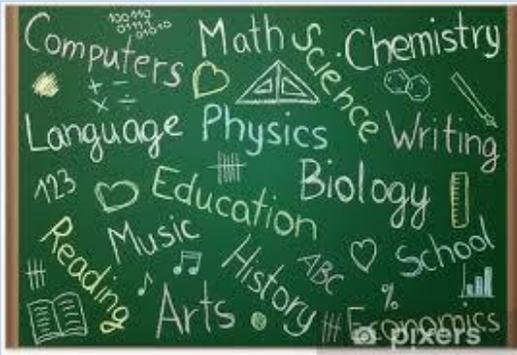
Vous pouvez – you can

Ils peuvent – they can

¿Cómo es tu colegio? (*What's your school like?*)
mi colegio / mi insti está (ubicado) (*my school is located*)
es un colegio mixto / pequeño (*it's a mixed school / small school*)
hay / tenemos (*there is, are / we have*)
no tenemos (*we don't have*)
una aula (*classroom*)
un paseo (*corridor*)
un gimnasio (*gym*)
un campo de deporte (*sports field*)



¿Tienes una asignatura favorita? (*Do you have a favourite subject?*)
me chifla / no soporto (*I like / can't stand*)
mi asignatura favorita es... (*my favourite subject is...*)
las matemáticas / las ciencias / la educación física / inglés / francés (*maths, science, PE, English, French*)
es interesante / divertido / aburrido (*it's interesting / fun / boring*)



¿Cómo era tu escuela primaria? (*What was your primary school like?*)
estaba ... (*it was ...*)
estaba ubicada (*it was located*)
los profesores eran (*the teachers were*)
había / teníamos (*there was / were, we had*)
no teníamos (*we didn't have*)
me gustaba mucho mi escuela primaria (*I really liked my primary school*)
no me gustaba... (*I didn't like*)
era ... (*it was*)
tenía muchos amigos (*I had lots of friends*)
jugabamos mucho (*we played a lot*)



¿Cómo fue ayer en el insti?

(What was it like yesterday at school?)

me despierté (I woke up)

salí (I left)

llegé (I arrived)

durante el recreo (during break)

mi primer clase (my first lesson)

después (after/wards)

jugué (I played)

comí (I ate)

trabajé (I worked)

fue (it was)

¿Qué piensas del sistema escolar inglés? Cuáles son las diferencias más grandes entre el y el sistema español? (What do you think of the English school system? What are the biggest differences between it and the Spanish system?)

prefiero (I prefer)

porque / ya que (because)

es más / menos... que (it's more / less... than)

se puede (one can / you can)

se debe (you have to)

no se debe (you don't have to)

se debería (one should)

es prohibido (it's forbidden to)



Describeme un día escolar típica... (Describe a typical day at school...)

normalmente me despierto a las... (normally I get up at...)

voy al insti a pie / en bus / en bici (I go to school by foot / bus / bike)

el primero clase empieza a las... (the first lesson starts at)

el insti termina a las... (school finishes at)

antes de... (before doing something)

después de... (after having done something)

¿Qué harás en el futuro? (What will you do in the future?)

Voy a / espero / me gustaría ser / ir / trabajar... (I'm going / hope / would like to be, go, work)

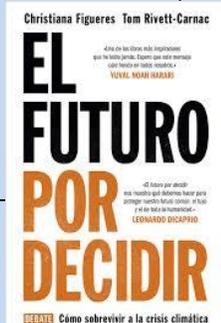
trabajaré (I will work)

tendré (I will have)

viviré (I will live)

seré (I will be)

estudiaré (I will study)



Key Grammar

Using 'se'

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

In Spain, they start school at 8 in the morning = **En España se empieza a las ocho por la mañana**

In Spain, they don't go to school on Wednesday = **En España no se va al insti los miércoles**

Comparatives and superlatives

Use 'más', 'menos' and 'que' to compare things.

España es más grande que Inglaterra = *Spain is bigger than England*

El deporte es menos interesante que la lectura = *sport is less interesting than reading*

Note:

Mi hermano es el más inteligente en su insti = *my brother is the most intelligent in his school*

The imperfect tense

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

Note the different endings on the verbs:

era = *I used to be / I was*

jugaba = *I used to play*

iba = *I used to go / I was going*

era = *it was / it used to be*

había = *there was / used to be*

estudiábamos = *we used to study*

comíamos – *we used to eat*



Before and after

Antes de + infinitive

Después de + infinitive

Antes de terminar al insti, voy a pasar mis exámenes = *before leaving school, I'm going to take my exams*

Después de pasar mis exámenes, dejé el insti = *After sitting / taking my exams, I left school*

The simple future

This is how we say that we **'will'** do something in the future.

Typically, take the **infinitive** of the verb and add on the following endings.

Add the endings **-é, -ás, á; -emos, -éis, án**

There are some **exceptions**, usually with irregular verbs (to do, to be, to have, to go etc)

Veré – I will watch

Escucharás – you will listen

Jugará – s/he will play

Comeremos – we will eat

Beberéis – you (pl) will drink

Trabajarán – they will work

Exceptions:

Tendrá – I will have

Hará – I will do

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



Adverbs of time for referring to the future

El año próximo – next year

En dos años – in two years (time)

Después mis estudios – after my studies

Después de terminar al insti – after finishing at college

Antes de encontrar un trabajo – before finding a job

Cuando tenga veinte años – when I'm twenty years old (NB note the use of 'tenga' here)

En el futuro – in the future

Examples:

Cuando tenga veinte años trabajaré para Google!

= When I'm twenty years old I will work for Google!

Después mis estudios iré a Francia para encontrar un trabajo

= After my studies I will go to France to find a job!

El año próximo estudiaré las matemáticas y el inglés = next year I will study maths and English

¿Tienes un trabajo a tiempo parcial? / Tus padres te dan dinero? / Debes ayudar en tu casa? (*Do you have a part-time job? Do you get pocket money? Do you have to help at home?*)

recibo (*I get*)

mis padres me dan (*my parents give me*)

cuando / si (*when / if*)

cinco euros cada semana (*five Euros every week*)

trabajo (*I work*)

debo ayudar en mi casa (*I have to help at home*)

limpiar (*to clean*)

lavar (*to wash*)

ordenar (*to tidy*)



¿Qué hacen tus padres en la vida? (*What do your parents do for a job?*)

Mi madre / padre trabaja como... (*my mum/dad works as...*)

es ... (*s/he is...*)

médico/a (*a doctor*)

profesor/a (*a teacher*)

hombre / mujer de negocios (*businessman / businesswoman*)

en una fábrica (*in a factory*)

en un colegio / insti (*in a school*)

ALBERT CAÑIGUERAL
**EL TRABAJO
YA NO ES
LO QUE ERA**

Nuevas formas
de trabajar,
otras maneras
de vivir



conecta

¿Qué quieres hacer más tarde en tu vida?

quiero ser / hacerme ... (*I want to be / become*)

+ raisons:

porque me interesa mucho en... (*because I'm very interested in*)

ya que es importante ayudar al demás (*since it's important to help others*)

¿El trabajo voluntario es importante en tu opinión? (*Is charity work / volunteering important these days?*)

la caridad (*charity*)

la organización benéfica (*charitable organization*)

ayudar al demás (*to help others*)

el año sabático (*gap-year*)

viajar (*to travel*)

viajar al extranjero (*to go abroad*)

Key Grammar



Talking about jobs / occupations

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

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

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

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

Modal verbs

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

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

deber – *to have to / to must*

poder – *to be able to / to can*

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

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

debo – I must

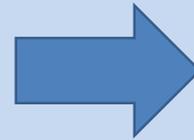
debes – you must

debe – he / she / one must

deberemos – we must

deberéis – you must

deberen – they must



puedo – I can

puedes – you can

puede – he / she / one can

podemos – we can

podéis – you can

poden – they can



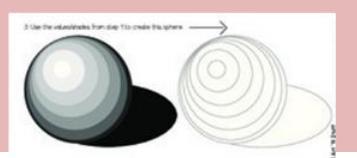
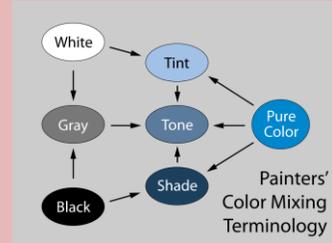
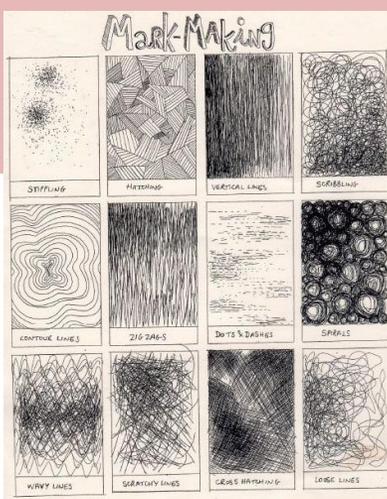
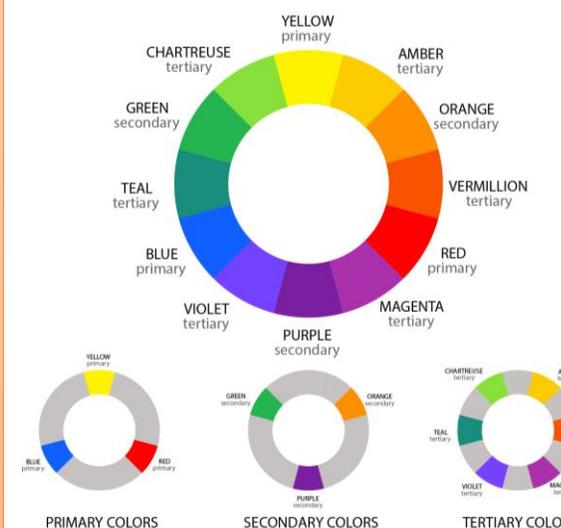
The Fundamentals of Art

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

TOPE

- 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, PHOTPGRAPHY...

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?



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.

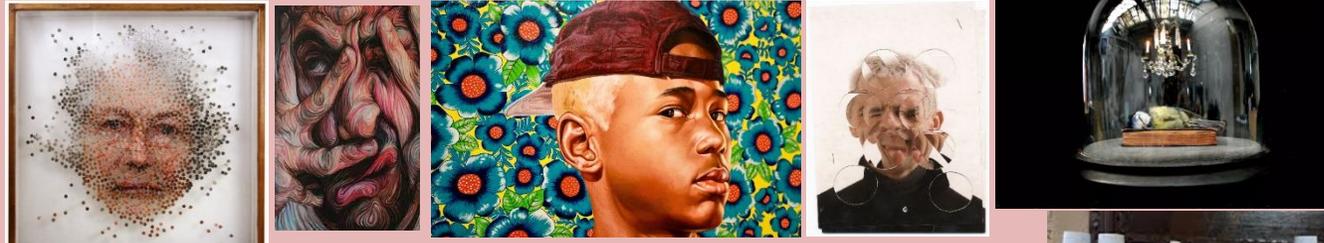
Artists you could research:
 Jon Measures
 John Piper
 Billy Kidd
 Elly Smallwood
 Georgia O'Keeffe
 Liz Orton
 David Hockney
 Yayoi Kusama
 Helen Ahpornisiri
 Mat Collishaw
 Micheal Brennand-Wood
 Angie Lewin
 Henry Moore
 Jean Faucheur
 Polly Morgan
 David Theron
 Kehinde Wiley
 Abigail Reynolds
 Alexander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

AO1
 Mood boards
 Mind maps
 Genre pages
 Initial ideas
 Artist analysis
 Contextual research
 Gallery visits

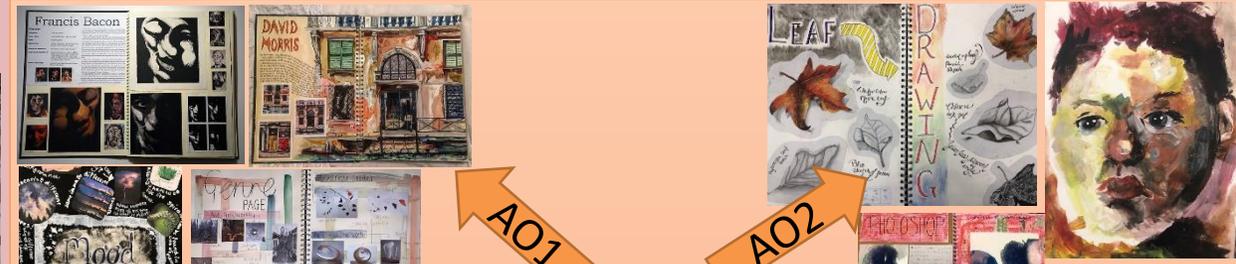
AO2
 Experimentation
 Different materials
 Different techniques
 2D and 3D
 Trials
 Photoshop

AO3
 Recording
 Drawing
 Photography
 Primary recording
 Recording from secondary resources

AO4
 Final outcome
 All planning
 Trials
 Test outcomes
 Colour theory
 Colour plans
 Annotations of ideas

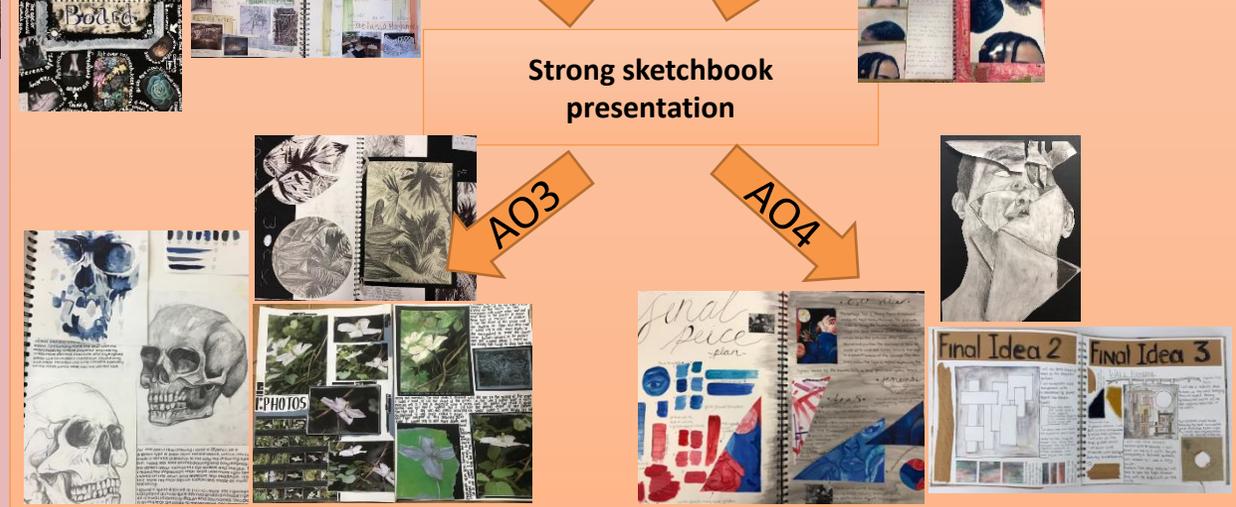


EXAMPLE OUTCOMES FOR COLLECTIONS AND CURIOSITIES



AO1 **AO2**

Strong sketchbook presentation



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.

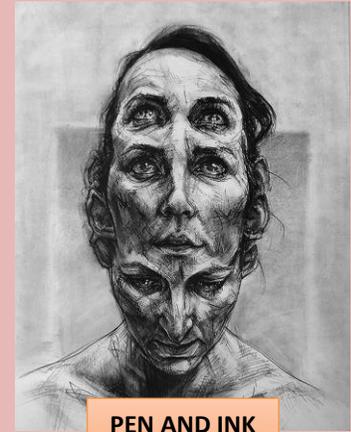
A03
 YOU NEED TO SHOW INITIAL DRAWINGS/STUDIES EXPLORING THE WORK OF YOUR ARTISTS. YOU MUST HAVE A PHOTOGRAPHY ELEMENT – PLEASE CONTINUE TO DEVELOP STUDIES FROM SHOTS.

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.

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

EXPERIMENTAL MARK MAKING – THIS CAN BE USED AS RESEARCH AND WITHIN YOUR STUDIES.



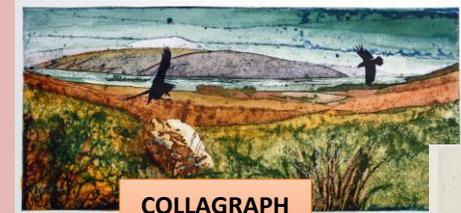
PEN AND INK



PHOTOGRAPHY



MONOPRINT



COLLAGRAPH

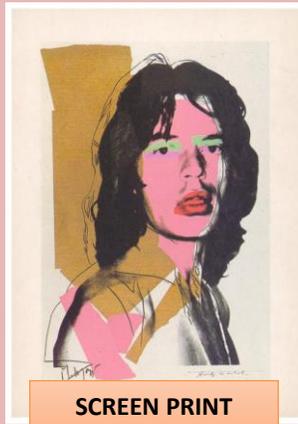
A RANGE OF WORKSHOP AND EXPERIMENTATION IDEAS



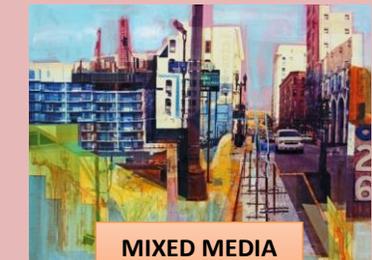
EXPERIMENTAL DRAWING



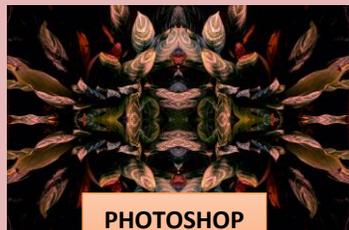
PAINTING



SCREEN PRINT



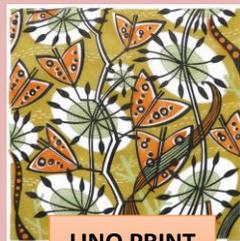
MIXED MEDIA



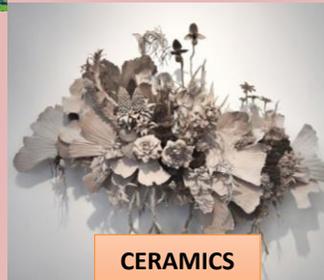
PHOTOSHOP



WIRE



LINO PRINT



CERAMICS



Terms 1 and 2 ... Component 1 ... **Devising** ... 40% of final grade

These are perhaps the 2 most critical terms in the whole of this GCSE course. By Christmas we will have completed 40% of the course. Students will have been assessed in 40 % of the total marks available. It is a hefty and challenging paper and it is in three parts

The 3 parts of Component 1

- 1) **Devise** a play in response to a stimulus in the style of your chosen practitioner.
- 2) **Document** your devising and rehearsal process in a written portfolio.
- 3) **Evaluate** your contribution to, and performance in, your final performance to audience.

What does this mean?

You will choose one of the four ideas supplied by the examination board and use it as a stimulus to **devise a piece of original theatre** (a posh way of saying, make your own play). Furthermore, you will devise your play in the style of a practitioner. You have studied, for example, **Brecht** or a theatre genre, for example, **TIE**.

Groups

Your teacher will choose your groups in the the best interests of everyone.

Assessment in Component 1

You are assessed on the performance of your play (10%) and an accompanying portfolio in three parts and 900 words documenting your creative journey (20 %). You are also sit a 90 minute written and invigilated evaluation examination in the hall where you evaluate your contribution IN THE PERFORMANCE (you must say nothing about rehearsal or what other people did in this written evaluation)..

This component assesses:

- Devising:** *create and develop ideas to communicate meaning for performance* (AO1, 30 marks). This is assessed through the portfolio of supporting evidence.
- Realising:** *apply theatrical skills to realise artistic intentions* (AO2, 15 marks). This is assessed through the performance (realised in performance).
- Evaluating:** *analyse and evaluate their own work* (AO4, 15 marks). This is assessed through a written evaluation completed under exam conditions.

Part I: Devising

You devise a piece of theatre **in response** to the stimulus which demonstrates the techniques of a theatre practitioner. You create and develop ideas to communicate meaning to an audience by:

- Researching** and developing ideas using the techniques or characteristics of the practitioner.
- Rehearsing, amending** and **refining** the work in progress.

You should consider the following when devising your piece of theatre:

- structure**
- theme/plot**
- form and style**
- language/dialogue**

You should consider how meaning is communicated through the following, as appropriate to the piece of theatre:

- Performance conventions**
- Use of space** and **spatial relationships** on stage, including the choice of stage (e.g., proscenium arch, theatre in round, traverse or thrust)
- Relationships between** performers and audience
- Design elements** including lighting, sound, set and costume
- The physical and vocal** interpretation of character.

You must produce a portfolio of supporting evidence which demonstrates the research, creation and development of ideas. This is a working record and therefore should be compiled **during** the process and edited to ensure a balanced composition.

Part 2: Realising

You realise your piece of theatre. The length of the piece will depend on the number of actors in the group and should be as follows:

Group of two actors: 5-10 minutes

Group of three actors: 7-12 minutes

Group of four actors: 9-14 minutes

Group of five actors: 11-16 minutes.

The Portfolio evidence should focus on **three stages** which are significant to the development of the devised piece of theatre. The three stages should demonstrate:

1. How ideas have been researched, created and developed in response to the chosen stimulus.

2. How ideas from the chosen practitioner/genre have been incorporated in the piece to communicate meaning.

3. How ideas have been developed, amended and refined during the development of the devised piece.

For each stage, candidates must provide **illustrative material** (as listed to the right) and a commentary, which may include annotations on the illustrative material.

The commentary for each stage should be approximately **250 words** and total to **900 words** for the complete portfolio.

Illustrative material

This may include any of the following:

- sketches
- photographs
- ground plans
- diagrams
- storyboards
- mood boards
- sections of script

The portfolio is intended to highlight the creative and developmental process of devising the piece of theatre.

It is not intended to be a full record of the rehearsal period, and you **should choose carefully** the evidence **which best supports** the **three significant stages** of development of your piece of theatre.

You must interact with other performers and/or the audience **for a minimum of five minutes.**

Part 3: Evaluating

You will evaluate the final performance under supervised conditions. You indicate your chosen stimulus and chosen practitioner. You evaluate in **3 sections**:

1. **Analyse and evaluate your** interpretation of character/role in the final performance.
2. **Analyse and evaluate** how **your own** performance skills contributed to the effectiveness of the final performance and the audience's interpretation of it.
3. **Analyse and evaluate your individual contribution** to the final performance, including how effectively you fulfilled your initial aims and objectives (referring back to stimulus and practitioner).

You will have **1 hour 30 minutes** to complete the evaluation. You may have access to two sides of A4 in bullet point notes when writing the evaluation. The notes must be handed in with the evaluation.

TOP TIPS:

- you should write many versions of your bullet points before the evaluation assignment. Really consider how your performance and overall contribution to the process shaped your final piece.
- Your final notes should be concise and relevant.
- Don't forget to analyse your performance in relation to the stimulus and your practitioner of study.

Homework Tasks

These will be tasks to come up with ideas, prepare your portfolio and later, your notes to take into the Evaluation examination.

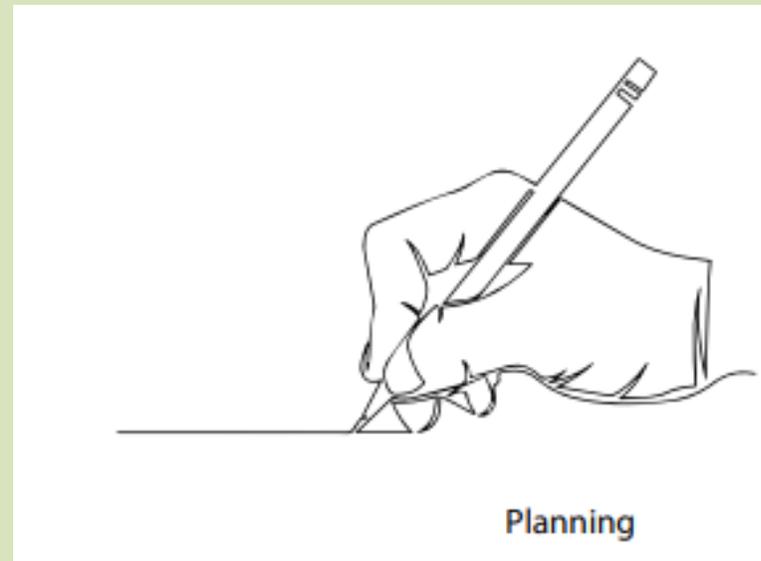
1. Writing up the research that you did each day
2. Writing up the ideas that you discussed in a rehearsal and tried out on the floor.
3. How you used your practitioners ideas in each rehearsal.
4. Collating and selecting your notes to prepare your Portfolio.
5. AFTER SCHOOL REHEARSALS- You must agree a rehearsal timetable with your group and turn up!
6. Preparing your 2 sides of A4 notes for the Evaluation examination.

Analyzing & evaluating your work and other people's work

Your ability to analyse and evaluate drama work is a major assessment skill in GCSE. To be clear, 70 % of your GCSE grade in drama will count on your ability to analyse how drama skills and techniques are used to create and communicate meaning and evaluate how effectively you and others have used these skills and techniques. This KO contains a reminder of the skills that you have already learned that are required as well as some new ones you will need.

Remember to use **Evaluative Vocabulary (EV)** when you are evaluating in class and when you are doing written evaluations at home. Here's the list again with a few additions now that you are more experienced.

These are a collection of words that enable you to evaluate drama work specifically instead of saying something is, 'good' or 'bad' which doesn't mean very much in drama.



Evaluative Vocabulary

Intelligent Imaginative Creative **Skilful** Exciting
g Informative Dull **Inspiring** Clear Unclear
Muddled Confused **Misguided** Shallow **Compelling**

Moving **Heart - Wrenching** Pedestrian
Emotionally -
Draining **Spirited** Believable Credible **Convincing**
Powerful **Entertaining** Riveting **Gripping**
Captivating Engaging vapid **vacuous**
Harrowing

Key knowledge & skills to use in this Component

Remember that everything you need to consider when making a play are exactly the same things as you need to write about in your **Portfolio** and **Evaluation**.

The Ingredients of a Play- (IOP)

Here they are once more with definitions. I include them because they are easy to overlook in the midst of all the other information you are being given but they remain the bedrock of all devising work and the main things to remember, particularly when you are stuck and struggling for ideas.... a play is always made from these:

- Characters**- the people in the play
- Plot**- The storyline- Your characters in this topic are all part of a family.
- Setting**- Where & when the scene is set. Your play story and play will change settings because the characters are going on a journey. Different scenes will have different settings.
- Speech** – The words that the characters say
- Theme** – What the play is about- its meaning- its message
- Genre** – The style of the play. You are writing in the comic genre in this topic.

Freeze Frame

A still image like a photograph. The actors must be perfectly still- even their eyes. Organiser. Freeze frames are an excellent way to get out of your head.

Personal & Interpersonal Skills (PIPS) discussions that seem to be going nowhere. They can be like a physical way of brainstorming ideas. I recommend them.

Remember the things that you need to consider in a Freezeframe.

Gesture.. Facial expression.. Posture.. Body Language.. Space.. Levels

Mime

Mime is the technique of creating an **illusion**, of making something appear to be there when it is not. To do this successfully, the actor needs to **picture** the object clearly in their mind's eye and then **show** its shape, weight, size etc. so that the spectators can also 'see' the object in their imagination.

Internal & External Character

Internal character

Personality

Feelings

Thoughts

Background

Attitude

Motivation

External character

Accent

Tone

Pitch

Volume

Facial Expression

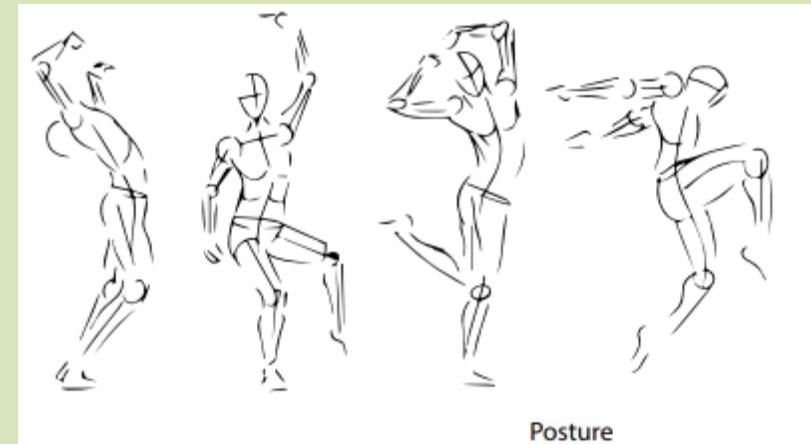
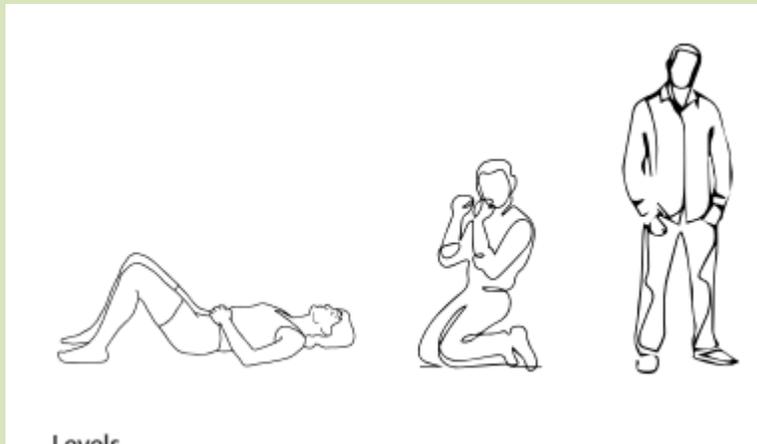
Gesture

Posture

Body Language

Costume

Make up



Bertolt Brecht: Epic Theatre

Epic Theatre style has many characters, many locations and the action takes place over many years. It is written in episodes- not acts and scenes. There is a singer narrator who addresses the audience. Characters often speak in the third person (he / she) which is strange and captures the audience's attention.

Brecht's staging ideas:

There would be few lighting changes to distract the audience, the lights would have been visible so the audience were reminded that it was a play, in a theatre, lit by artificial lights- often plain house lights.

There would only be a few essential, **representative** props and items of set – not a Naturalistic full-scale attempt to make a life like representation. Again, the audience are reminded that they are in a theatre **watching a play**. In your production you should bear this in mind.

The Episode titles or scene titles would have been announced or put on screens, banners, placards. You should do this. Placards and banners would also be displayed by the actors to highlight key social questions or the main political message of the play.

The costumes would also clearly show the social class of the character and what part of society they represented. Often sound effects are made by the actors in full view of the audience. This also makes it clear to the audience that they are watching a play.

Hair and make-up would also be used to show clearly defined individuals – like what Strata of society are they from... are they an **Exploiter or the Exploited?**

New skills. New ideas for this component... Practitioners

You have met the ideas of two practitioners before. You now need to choose which ones (very different) styles you want to devise your component 1 play in. You can also choose to do it as a piece of Theatre In Education (TIE) or Physical Theatre. I recommend that you choose Brecht. You should use all the information you gained from studying The Caucasian Chalk Circle.

Key Skills

Working with others can be difficult. They may have different ideas to you, they may not have any ideas, they might not listen to you etc. It can be tricky..

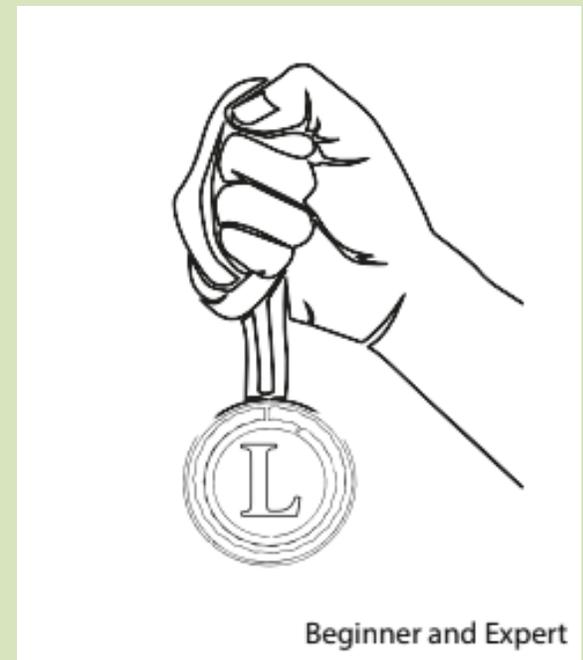
PIPS are the skills and qualities that you need to work effectively in a group, they include; **tolerance, courage, kindness, honesty and many more.**

Do you remember when you designed your PIPS poster for home work? What skills and qualities are you bringing to your group work? What skills and qualities are you still working on?

Students do not generally put their hands up in class unless they want to ask a specific question or have a request. Most class activities and discussions take place without raising hands. The teacher will invite different students to contribute at different times so that everyone participates in lessons. The teacher will always either, give you an opportunity to discuss and prepare a response first with other students or, frame the question in such a way as you cannot be wrong. We are not interested in being right or wrong- we are interested in learning. So, no hands, unless there is an emergency of course, otherwise, no hands. You will be reminded and have lots of time to practise so that it becomes a habit for you in drama.

Speaking in the first person singular – its importance in your written exams

Since your very first lesson in Y7, you have been encouraged to speak in the 1st person singular – that's; **I, me, my & mine**, in lessons when speaking about your own experience. This avoids confusion and allows you to begin to take responsibility for your ideas and what you are saying. This has been vital work. Your practise and persistence in this will be called upon here in your **Portfolio** and in your 90 minute written **Evaluation of your Performance.** These two parts of this examination are worth 30% of your final grade, and it is essential that you write about **your** contribution, **your** research, **your** views, **your** ideas, how your individual performance went and you use; **I, me, my & mine.**



KEY TERMINOLOGY	EXPLANATION
HOLLYWOOD	Hollywood is a neighborhood in the central region of Los Angeles, California. Its name has come to be a shorthand reference for the U.S. film industry and the people associated with it. Many of its studios such as Disney, Paramount Pictures, Warner Bros., and Universal Pictures were founded there; Paramount still has its studios there.
CINEMATOGRAPHY	Includes all on screen VISUAL elements, such as: lighting, framing, composition, camera movement, camera angles, depth of field/focus, zoom and colour palette
COMING OF AGE	Coming of age films portray the feeling of growing up and moving from one part of your life to the next that every audience can relate to . Even in the most obscure film set in another country or time in history, the audience can still reflect upon their own experiences in relation to the characters.
MISE-EN-SCENE	Mise en scène is the arrangement of scenery and stage properties in a play. Translated from French, it means "setting the stage" but, in film analysis, the term mise en scene refers to everything in front of the camera, including the set design, lighting, and actors. Mise en scene in film is the overall effect of how it all comes together for the audience.
MCCARTHYISM	a vociferous campaign against alleged communists in the US government and other institutions carried out under Senator Joseph McCarthy in the period 1950–4. Many of the accused were blacklisted or lost their jobs, though most did not in fact belong to the Communist Party. An era of Communist paranoia.
VERISIMILITUDE	A film has verisimilitude if it seems realistic and the story has details, subjects, and characters that seem similar or true to real life, or mime convincing aspects of life in important or fundamental ways. Basically, true to life/believable.
CONTINUITY	the principle of making sure that all details in a film or TV show are consistent from shot to shot and from scene to scene.
JUXTAPOSITION	Juxtaposition is a film editing technique that combines two or more shots to generate ideas or create thoughts. The intended impact of this is to create contrast for emphasis.
SOUND/SOUNDSCAPE	A soundscape is a sound or combination of sounds that forms or arises from an immersive environment. ... Crucially, the term soundscape also includes the listener's perception of sounds heard as an environment: "how that environment is understood by those living within it" and therefore mediates their relations.



FOR MORE INFORMATION ON ALL THINGS FILM, PLEASE VISIT
<https://www.filmsite.org/filmhistory-overview.html>



Institutional Information

1. **Director** – Nicholas Ray
2. **Year of release** – 1955
3. **Production company** – Warner Brothers
4. **Star marketing** – James Dean and Natalie Wood

Narrative

1. **Narrative** –the method and means by which you construct the events of a story into a plot
2. **Narrative structure** - Follows a five act structure
3. **Narrative viewpoint** – Teen POV. A mistrust of authority figures, parents are overtly criticized for being too weak, or too dominant, they can't win at all. But this message clearly appeals to the target audience.
4. **Binary Oppositions** – create conflict – key oppositions are children vs. their parents and teenagers vs. adults

Context

1. Set in a suburb of **Los Angeles** in the early **1950s**
2. **1950s** – Considered the birth of the teenager
3. Young people had more money (a disposable income); products such as music, film and fashion were targeted at this group. They were powerful consumers and therefore a powerful 'voice' in consumerist America.
4. Better education, which led them to question the world.
5. It was a time of peace, so young men were not at war, a confusing era for young men who could not identify with their war time fathers or have a war to fight and prove themselves.
6. This new social group was considered by some as **threatening, unruly** and **out of control**, the film reflected and responded to this concern.
7. This film offers a **sympathetic representation of teenagers**, blaming the parents for their delinquency.
8. More people were **speaking out against inequality** and **civil rights** in this time. The film demonstrated the **desire for young people to do the right thing**. Jim wants to confess and desires justice, it is **the older generation that get in the way** of this, and they do not listen.



Key Characters

Jim Stark	Protagonist. 'The Outsider'. Struggling with finding his place in the world. Wants to do what's right.
Judy	"He hates me." Craves love and affection from her father. "I'll never get close to anybody". Later falls in love with Jim.
John 'Plato' Crawford	Another 'outsider' character. Bullied and alone. His father is absent His mother leaves him for long periods of time. He too craves love and affection. The first gay teenager on film? Plato's sexuality is only ever inferred. Never commented on explicitly.
Buzz	The film's antagonist . The bully. A teen film genre character type. Provides an opposition to Jim for much of the film. Highlights Jim as the 'outsider'.
Frank Stark	Represented as unable to connect with his son. Unable to stand up for himself. Until the end: "I'll stand up with you."

COMPONENT 1 – COMPARATIVE US FILM

REBEL WITHOUT A CAUSE

Key Quotes	
“You’re tearing me apart” – Jim	Significant line in the film. Shows the impact that his relationship with his parents is having on him.
“How can a guy grow up in a circus like that?” - Jim	Jim talking to Ray (Police Officer) at the start of the film. Gives the audience an insight into his family life.
“What does he know about man alone?” - Plato	This line gives the audience an insight into how Plato feels. He too feels alone in the world, abandoned by his parents and craving love and affection.
“Don’t I buy you everything you want?” – Frank Stark (Jim’s Dad)	Shows that his father associates buying his son material possessions with being a good parent. He can’t understand why his son is misbehaving.
“If only you could’ve been my dad.” – Plato	Plato sees Jim as a replacement father figure. Someone who looks out for him and is kind to him. Further supports the film’s theme of parent/child relationships.
“You, you say one thing, he says another, and everybody changes back again.” – Jim	All Jim really wants—and he really demands—from his parents is that they communicate. Tell the truth. Allow him to understand what they mean and, perhaps, come to a more incisive understanding of themselves in the process.
She’ll outgrow it dear. It’s just the age...It’s the age when nothing fits.” – Judy’s mother	This is a close as any adult in the film comes to understanding the teenagers in the film and society in general.
“One thing I know is I never want to be like him.” – Jim	Jim is angry with his father. He doesn’t feel a connection with him and doesn’t look up to him as an example of how to live his life. His worst fear is turning into him.

Key Element of Film Form

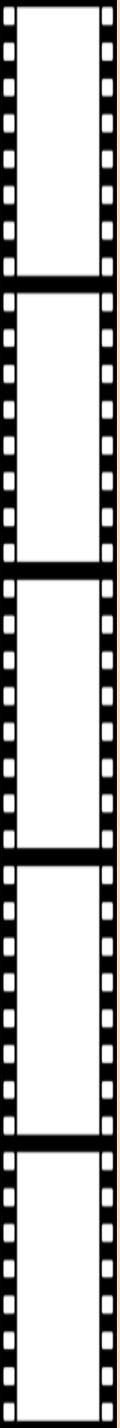
Mise-en-scene – Use of the colour red in costumes.	Judy’s dress and lipstick symbolise at the start her desire to stand out and be noticed. Jim’s red jacket creates a connection to this idea and also comes to symbolise danger. Plato later wears the red jacket. It foreshadows his death. All three central characters wear red. Teenagers standing out.
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Context

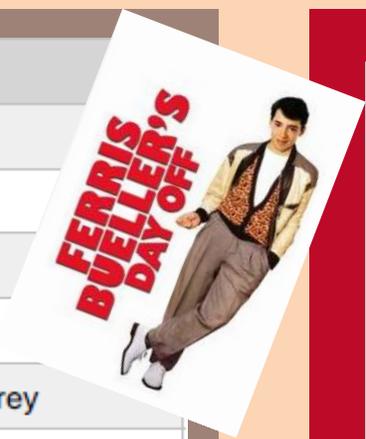
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COMPONENT 1 – COMPARATIVE US FILM

FERRIS BUELLER'S DAY OFF



Characters	
Ferris Bueller:	Protagonist: central to the film in so many ways. He's the physical embodiment of Generation X; entitled and materialistic but fortunately, charming, engaging and always entertaining. His use of monologue and direct address to camera is a direct manner of engaging the audience creating a direct relationship.
Cameron Frye:	In many respects the opposite of Ferris but a recognisable character from teen films; he is the dour conscience to Ferris' ambitious and risky personality.
Sloane Peterson:	Ferris' girlfriend and another recognisable teen movie character. She often acts as the slightly more rational and empathetic character who aims to temper Ferris but also encourage Cameron. Perhaps the most 'normal' of the main characters. Often shot in a sexualised manner however, unlike the male characters.
Ed Rooney:	Antagonist: he embodies the role of authority figure in a dramatic manner - a somewhat extreme version of this, especially compared to Ferris' parents.



Institutional information	
Director:	John Hughes
Release:	June 1986 (USA), February 1987 (UK)
Production company:	Paramount
Country of production:	USA
Starring:	Matthew Broderick, Mia Sara, Alan Ruck, Jennifer Grey
Genres:	Drama; comedy; teen drama; coming-of age.
Other information:	Matthew Broderick was 23 during filming. Directed by John Hughes who wrote SIXTEEN CANDLES, THE BREAKFAST CLUB, HOME ALONE and many more.

Context:
Like all John Hughes films, set in Chicago.
Gently mocks the materialistic values of white, middle class teenagers; the 80's economic boom meant that teens found it easier to afford cars and such, led to selfish teens.
Questions how we define education; depicts education as a boring ritual.
Explores the disparity between intelligent teenagers and ignorant adults.
MTV was launched in 1981 and became the voice of the teen generation.
Generation X, were called 'latchkey kids' due to changes in society these teens had less adult supervision than previous generations.
The US was the most powerful nation in the world, and was winning the Cold War. This feeling of invincibility can be seen in scenes like 'The Parade' where the whole country appears to be united.

COMPONENT 1 – COMPARATIVE US FILM

FERRIS BUELLER'S DAY OFF

Themes/issues.	
Conflict:	Seen both in the conflict between adults and teenagers and with authority figures and teenagers, conflict occurs throughout the film. The desire of teenagers to want to do some things with what they're allowed to do.
Education:	Depicted as being a boring ritual; Ferris learns more outside of the classroom.
Rebellion:	Throughout the film people rebel from their expected roles. Notice how some of the adults rebel too; consider why they do this and how rebellion is depicted.
Materialism:	The want and need for 'things' is key to Ferris, but does not dominate his desires.
Peer pressure:	We see many instances where peer pressure leads to decisions being made.
Fear:	Many characters experience fear, some are crippled by it. Consider who has fears and what people are fearful of; does it define them or their character type?

Key quotes:	
Life moves pretty fast. If you don't stop and look around once in a while, you could miss it. - Ferris	A classic quote from the film and one that outlines Ferris' outlook on life and helps to explain his somewhat selfish and apparently care-free nature. It also allows the audience an insight into his attitude towards the importance of experience.
I do have a test today, that wasn't bullshit. It's on European Socialism. I'm not European, nor do I plan on being European, so who gives a crap if they're socialists? It still wouldn't change the fact that I don't own a car!- Ferris	Another direct-to-camera monologue here from Ferris. He makes clear his attitude towards formal, school-based education here as well as his arrogant nature. As a character, as a person from Generation X, he's quite selfish and this quote provides the idea that he doesn't value a formal education as much as he values materialistic objects. He also broadly reflects the arguably ignorant approach that America in general had towards others in the 80s.
"I am not going to sit on my ass as the events that affect me unfold to determine the course of my life. I'm going to take a stand. I'm going to defend it. Right or wrong, I'm going to defend it." - Cameron	This quote shows Cameron's development through the film and shows how he's come to terms with the fact that his relationship with father has undermined his own destiny so far. It's a clear example of how the themes of fear, rebellion, conflict and peer pressure have affected Cameron and how they can be seen in his actions.
The question isn't 'what are we going to do', the question is 'what aren't we going to do?' - Ferris	A clear sense of Ferris' rebellion can be seen in this quote. He is carefree, unencumbered and wanting to experience things that he cannot do if 'imprisoned' in school.
"I weep for the future" - Restaurant Maitre'd	Here we get an adult, a person in power or responsibility outwardly expressing disdain for 'Generation X'.

Narrative (The method and means by which you construct the events of a story into a plot)	
Narrative structure:	Three act structure. Five act structure could be applied.
Narrative viewpoint:	Teen POV.
Binary oppositions:	Adults seen in direct opposition to adults in many ways, especially in adults aiming to 'restrict' teens. This helps to drive the narrative through conflict.
Narrative style:	Breaks the fourth wall.



Key Elements of Film Form (Micro elements)

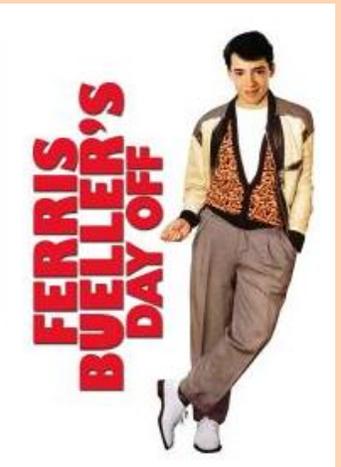
Mise-en-scene:	Establishing shot is of a classically suburban, upper middle class home, a 'white house'. This is iconographic of the American dream, complete with 3 new cars parked out front. Ferris' room is filled with the trappings of an 80's teen in consumerist America, a TV stereo, synthesizers and a computer. These were high value goods at the time and reinforce that Ferris is wealthy and this is an aspirational position for many.
Editing:	There are a few scenes in the film that adopt a MTV/Music Video style montage, this montage actually starts with the MTV ad. Characters also often shown in staggered, jump-cut montages. For example, introduction of Jeannie is staggered, with a CU of the foot tapping, then CU of hands on hips before the reveal of the face.
Blocking/camera angles:	Cinematography often shows off Chicago's landmarks and the architecture. Ferris is generally shot in medium close-ups. During the parade scene the camera is placed in the crowd looking up at Ferris; he is in an elevated position on the float and in society as a wealthy white male.
Soundtrack:	Music is used to appeal to the teen audience with contemporary music used to anchor the feeling of excitement and demonstrate how cool Ferris is.
POV (cinematography):	The first time we see the parents is in POV shot, positioning the audience as the 'child' in the scene. A POV rack focus is also used when Ferris looks at Jeannie. When Ferris opens the curtains there is a shot from the outside looking in, solidifying Ferris' position as a privileged prince in his tower.

**LEISURE RULES!
BUELLER...BUELLER...BUELLER**

COMPONENT 1 – COMPARATIVE US FILM

FERRIS BUELLER'S DAY OFF

Key scenes	
The Opening Monologue: (bit.ly/FBDOKS1)	This opening scene sets the tone for the film; humorous, rebellious and modern. Ferris breaking the fourth wall and use of text on screen suggests that Ferris knows that he's in a film. At the very least he knows the audience is there and this establishes a clear-sense of relationship between Ferris and ourselves and we immediately warm to his engaging personality. Editing and the use of music are especially important to this scene also.
Skipping school and calling Cameron: (bit.ly/FBDOKS2)	School & the register are presented as being dull and repetitive. Editing and the lack of soundtrack help emphasise this. Note how Cameron is introduced; the opposite of Ferris' introduction. The colours are muted, lighting and low key directly contrast with the warmth and vibrancy of Ferris's poolside-lounging.
At the museum & nearly being caught: (bit.ly/FBDOKS3)	Another scene which uses montage style editing. We also have a lot of 'static' shots where neither the camera or the characters move. This is done, in part, to reflect the nature of the art that the characters are looking at. Cameron's performance as the film cuts between his face and that of a painting ever closer with each cut, reflects his emotions. The second half of the clip reflects the vibrancy of the city and Ferris' energy and ambition. There is some very clever use of camera movement, editing and performance in the taxi when they see Ferris' father.
The Parade Scene (bit.ly/FBDOKS4)	The closest the film comes to creating a scene that looks like a music video, the style which it borrows ideas from throughout. This scene allows us to see how Cameron is both worried about the future but somewhat accepting of it and Ferris's much more impulsive nature. Use of cinematography here is key; lighting is high-key, the scene is colourful, busy and full of extras, props and bright clothing. The mood is joyous and united; everyone in the city joins in and we see an unshamed form of celebration. Whilst Sloane and Cameron are shot in medium and medium-close shots, broadly at eye-level, Ferris however, is often shot from below and at a distance creating the sense that we are looking up at him in admiration.
Ferris rushes home (bit.ly/FBDOKS5)	A classic scene which has been parodied many times. Interesting to see that initially, Ferris' mum is more concerned with her job and her success rather than the reasons for Jeannie's arrest. This helps to emphasise the themes of capitalism and materialism. This scene is especially noted for its great use of parallel editing; we see 3 different narratives happening at once as the scene cuts between all three. Some interesting sound effects; a 'cartoonish' skidding noise and slow-mo sound from Ferris creates an exaggerated, comedic tone.



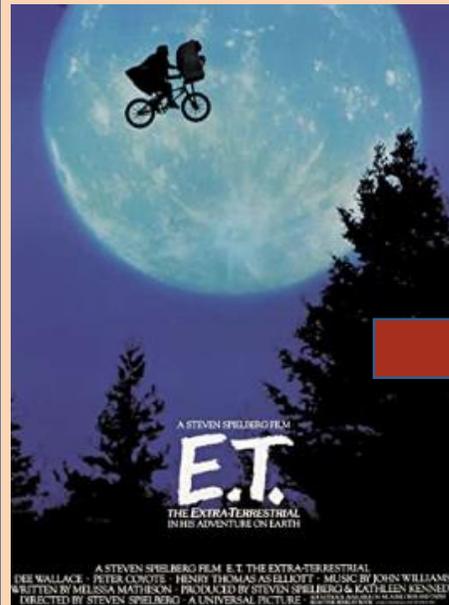
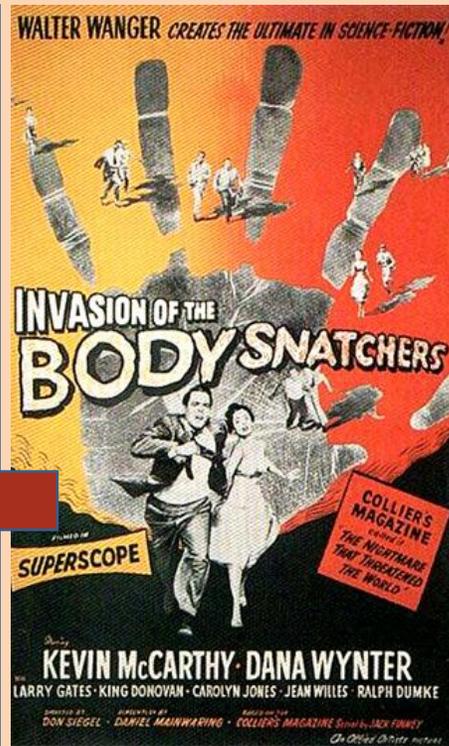
WATCH THE TRAILER.



Invasion of the Body Snatchers is a 1956 American science-fiction horror film produced by Walter Wanger, directed by Don Siegel, and starring Kevin McCarthy and Dana Wynter. The black-and-white film, shot in Superscope, was partially done in a film noir style. Daniel Mainwaring adapted the screenplay from Jack Finney's 1954 science-fiction novel *The Body Snatchers*. The film was released by Allied Artists Pictures as a double feature with the British science fiction film *The Atomic Man* (and in some markets with *Indestructible Man*).

The film's storyline concerns an extra-terrestrial invasion that begins in the fictional California town of Santa Mira. Alien plant spores have fallen from space and grown into large seed pods, each one capable of producing a visually identical replacement copy of a human. As each pod reaches full development, it assimilates the physical characteristics, memories, and personalities of each sleeping person placed near it; these duplicates, however, are devoid of all human emotion. Little by little, a local doctor uncovers this "quiet" invasion and attempts to stop it.

The slang expression "pod people" that arose in late 20th-century American culture references the emotionless duplicates seen in the film. *Invasion of the Body Snatchers* was selected in 1994 for preservation in the United States National Film Registry by the Library of Congress for being "culturally, historically, or aesthetically significant."



E.T. the Extra-Terrestrial (also known simply as **E.T.**) is a 1982 American science fiction film produced and directed by Steven Spielberg, and written by Melissa Mathison. It tells the story of Elliott, a boy who befriends an extra-terrestrial, dubbed E.T., who is stranded on Earth. The film stars Dee Wallace, Henry Thomas, Peter Coyote, Robert MacNaughton, and Drew Barrymore.

The concept was based on an imaginary friend Spielberg created after his parents' divorce. In 1980, Spielberg met Mathison and developed a new story from the failed project *Night Skies*. Filming took place from September to December 1981 on a budget of \$10.5 million. Unlike most films, it was shot in rough chronological order, to facilitate convincing emotional performances from the young cast. The animatronics of E.T. were designed by Carlo Rambaldi.

Released on June 11, 1982, by Universal Pictures, *E.T.* was an immediate blockbuster, surpassing *Star Wars* to become the highest-grossing film of all time—a record it held for eleven years until *Jurassic Park*, another Spielberg film, surpassed it. *E.T.* was widely acclaimed by critics and is regarded as one of the greatest films of all time, and it won four Oscars at the 55th Academy Awards: Best Original Score, Best Visual Effects, Best Sound and Best Sound Editing. It was re-released in 1985, and again in 2002, to celebrate its 20th anniversary, with altered shots, visual effects, and additional scenes. In 1994, the film was added to the National Film Registry of the Library of Congress, being designated as "culturally, historically, or aesthetically significant."

1950s AMERICA

The US became a world superpower after WW2. Before the war, the US was the biggest economic power, but the government concentrated on problems at home rather than get involved in problems overseas. After the war, however, the US became far more involved across the globe to stop the Soviet Union (Russia) spreading its influence and its communist ideals.

The fear of communism was strong in America as it has a long tradition of opposition to any form of collective ownership. In the 1950s, a suspected communist in the US was treated with a high level of suspicion and fear – they were seen as an ‘enemy of the state’.

At the end of WW2, another conflict began – The Cold War between Russia and America. This lasted for over 40 years. Each saw the other as an arch enemy and they built more and more nuclear weapons to defend themselves and deter the other from launching an attack. Young people growing up in the 1950s lived in fear of nuclear war.

Life in 1950s America was a paradox. The fear of the bomb, communism, invasion and the pleasures of prosperity all existed at the same time. Many Americans had more in terms of material wealth than they had ever had before; the more they had, the more frightened they were of losing it. These fears found their way into popular culture, especially in novels, TV programmes and films.

If the 1950s were the true beginning of the Cold War, then the 1980s was the last full decade of this superpower confrontation. Although the fear of ‘the bomb’ was still there, it had continued at a desensitised lower level. There was some relief in the late 1980s, when President Reagan (USA) and Gorbachev (Russia/USSR/Soviet Union) eventually began the process for arms reduction which was concluded in 1991.

The 1980s was the decade that seemed to be about rewarding success and allowing people with money to keep more of it. The reasoning was that the more money people had, the more they would spend – this investment would benefit businesses and, eventually their workers, meaning that everyone had a better deal in terms of economic growth. This did not happen – the gap between rich and poor grew. The symbol of this decade’s approach to wealth was the ‘yuppie’ – a baby boomer (born between 1946 and 1964) with a college education, well paying job and expensive tastes. This character trope can be seen in many films of this decade.

The 1980s was a time when family dynamics and societal views changed to allow men and women to share the financial and domestic responsibilities within their family. The number of families grew and the number of lone parent families grew by 74%. The 1980s saw a huge rise in divorce rates. The 1950s ‘culture of marriage’ had turned into the 1980s ‘culture of divorce’.

1980s AMERICA

Welcome Back to the GCSE Music Journey

AOS1 Musical Forms and Devices Revision

MUSIC
GCSE

Topic 1 – The Development of Music

The Baroque Era: 1600-1750

Main composers: Bach, Handel, Vivaldi, Purcell

Main features of the music:

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

The Classical Era: 1750-1810

Main composers: Mozart, Beethoven, Haydn

Main features of the music:

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

The Romantic Era: 1810-1910

Main composers: Chopin, Liszt, Wagner,

Tchaikovsky

Main features of the music:

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

Topic 2 – Musical Form and Structure

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

Binary form – A B

Ternary form – A B A

Rondo form – A B A C A

Minuet and Trio – Minuet Trio
Minuet

Variation form – Theme Variation 1,
2, 3 etc

Strophic form – A A A A

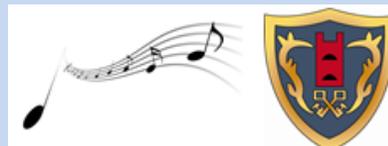
Other key terms

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

Topic 3 – Devices

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

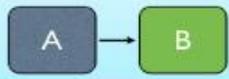
Essential Listening





STRUCTURE

BINARY FORM



Section A (repeated)	Section B (repeated)
Bars 0 ² – 16 ¹ (16 bars)	Bars 16 ² – 40 ¹ (24 bars)

TEXTURE

Homophonic



melody
and
accompaniment

SONORITY

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

BADINERIE

Knowledge Organizer



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

DYNAMICS

Mostly forte, including
terraced dynamics



TEMPO

Allegro

RHYTHM & METRE



2/4

Anacrusis

Ostinato rhythms

mainly

Quavers / semiquavers

MELODY

Flute range (2 octaves pitch range):



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



HARMONY & TONALITY

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



AOS2 Music for Ensembles Revision

Topic 1 – Timbre, Sonority and Texture

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

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

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

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

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

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

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

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

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

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

Topic 2 – Musical Ensembles

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

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

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

Topic 3 – Chamber Music

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

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

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

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

Topic 4 – Musical Theatre

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

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

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

Topic 5 – Jazz and Blues

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

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

Essential Viewing



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 Dynamics

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





AOS 3

Music for Film

MUSIC
GCSE

AOS3 Music for Film
Revision

A. The Purpose of Music in Film

Film Music is a type of **DESCRIPTIVE MUSIC** that represents a **MOOD, STORY, SCENE** or **CHARACTER** through music, it is designed to **SUPPORT THE ACTION AND EMOTIONS OF THE FILM ON SCREEN**. Film Music can be used to:

- Create or enhance a mood (though the **ELEMENTS OF MUSIC**) ->
- Function as a **LEITMOTIF** (see D)
- To emphasise a gesture (**MICKEY-MOUSING** – when the music fits precisely with a specific part of the action in a film e.g. cartoons)
- Provide unexpected juxtaposition/irony (using music the listener wouldn't expect to hear giving a sense of uneasiness or humour!)
- Link one scene to another providing continuity
- Influence the pacing of a scene making it appear faster/slower
- Give added commercial impetus (released as a **SOUNDTRACK**) – sometimes a song, usually a pop song is used as a **THEME SONG** for a film.
- Illustrate the geographic location (using instruments associated with a particular country) or historical period (using music 'of the time').

D. Leitmotifs

LEITMOTIF – A frequently recurring short melodic or harmonic idea which is associated with a character, event, concept, idea, object or situation which can be used directly or indirectly to remind us of one not actually present on screen. Leitmotifs can be changed through **SEQUENCING, REPETITION** or **MODULATION** giving a hint as to what may happen later in the film or may be heard in the background giving a “subtle hint” to the listener e.g. the “Jaws” Leitmotif



E. History of Film Music

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.

B. How the Elements of Music are used in Film Music

PITCH AND MELODY – **RISING MELODIES** are often used for increasing tension, **FALLING MELODIES** for defeat. Westerns often feature a **BIG THEME**. **Q&A PHRASES** can represent good versus evil. The **INTERVAL OF A FIFTH** is often used to represent outer space with its sparse sound. **DYNAMICS** – **FORTE (LOUD)** dynamics to represent power; **PIANO (SOFT)** dynamics to represent weakness/calm/resolve. **CRESCENDOS** used for increasing threat, triumph or proximity and **DECRESCENDOS** or **DIMINUENDOS** used for things going away into the distance. Horro Film soundtracks often use **EXTREME DYNAMICS** or **SUDDEN DYNAMIC CHANGES** to ‘shock the listener’.

HARMONY – **MAJOR** – happy; **MINOR** – sad. **CONSONANT HARMONY OR CHORDS** for “good” and **DISSONANT HARMONY OR CHORDS** for “evil”. **SEVENTH CHORDS** often used in Westerns soundtracks.

DURATION – **LONG** notes often used in Westerns to describe vast open spaces and in Sci-Fi soundtracks to depict outer space; **SHORT** notes often used to depict busy, chaotic or hectic scenes. **PEDAL NOTES** – long held notes in the **BASS LINE** used to create tension and suspense.

TEXTURE – **THIN/SPARE** textures used for bleak or lonely scenes; **THICK/FULL** textures used for active scenes or battles.

ARTICULATION – **LEGATO** for flowing or happy scenes, **STACCATO** for ‘frozen’ or ‘icy’ wintery scenes. **ACCENTS (>)** for violence or shock.

RHYTHM & METRE – 2/4 or 4/4 for Marches (battles), 3/4 for Waltzes, 4/4 for “Big Themes” in Westerns. **IRREGULAR TIME SIGNATURES** used for tension. **OSTINATO** rhythms for repeated sounds e.g. horses.

C. Film Music Key Words

SOUNDTRACK – The music and sound recorded on a motion-picture film. The word can also mean a commercial recording of a collection of music and songs from a film sold individually as a CD or collection for digital download.

MUSIC SPOTTING – A meeting/session where the composer meets with the director and decides when and where music and sound effects are to feature in the finished film.

STORYBOARD – A graphic organiser in the form of illustrations and images displayed in sequence to help the composer plan their soundtrack.

CUESHEET – A detailed listing of **MUSICAL CUES** matching the visual action of a film so that composers can time their music accurately.

CLICK TRACKS – An electronic **METRONOME** which helps film composers accurately time their music to on-screen action through a series of ‘clicks’ (often heard through headphones) – used extensively in cartoons and animated films.

DIEGETIC FILM MUSIC – Music within the film for both the characters and audience to hear e.g. a car radio, a band in a nightclub or sound effects.

NON-DIEGETIC FILM MUSIC – Music which is put “over the top” of the action of a film for the audience's benefit and which the characters within a film can't hear – also known as **UNDERScore** or **INCIDENTAL MUSIC**.

F. Film Music Composers and their Soundtracks



Jerry Goldsmith
Planet of the Apes
Star Trek: The Motion Picture
The Omen
Alien



John Williams
Star Wars
Jaws
Harry Potter
Indiana Jones
Superman, E.T.



James Horner
Titanic
Apollo 13
Braveheart
Star Trek II
Aliens



Ennio Morricone
The Good, The Bad and The Ugly
For a Few Dollars More
The Mission



Danny Elfman
Mission Impossible
Batman Returns
Men in Black
Spider Man



Hans Zimmer
The Lion King
Gladiator
Dunkirk
Blade Runner 2049
No Time to Die



Bernard Herrmann
Psycho
Vertigo
Taxi Driver





STRUCTURE

VERSE – CHORUS FORM



TEXTURE

Homophonic



melody
and
accompaniment

SONORITY

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

TOTO - AFRICA

Knowledge organizer

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

Written by David Paich & Jeff Porcaro

DYNAMICS
Mostly mezzo-forte but choruses forte

mf

f



TEMPO

Moderately fast

RHYTHM & METRE



2/2 (split common)

Syncopations

Ostinato rhythms

Mainly quavers

Anacrusis for riff B

MELODY

Vocal range (less than 2 octaves (printed))

Mainly conjunct

Use of pentatonic scale in places

Vocal improvisation at the end of the song

A

Use of riffs

B

HARMONY & TONALITY

B Major for the majority of the song

A Major for choruses

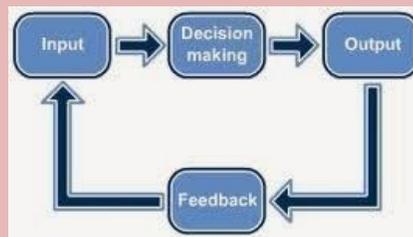
Diatonic throughout



4.1 Skill and ability

Skill	A learned action or behaviour, with the intention of bringing about pre-determined results, with maximum certainty and minimum outlay of time and energy
Ability	An inherited, stable trait that determines an individual's potential to learn or acquire a skill.
Trait	Distinguishing qualities or characteristics belonging to a person
Basic skill	A simple skill that does not require much concentration – throwing, running, catching
Complex skill	A skill that requires a great deal of concentration and coordination to perform.
Open Skill	A skill that is performed on a certain way to deal with a changing unstable environment.
Closed skill	A skill that is not affected by the environment or performers within it. The skill tends to be done the same way each time.
Self Paced skill	A skill that is started when the performer decides to start it. The speed, rate or pace of the skill is controlled by the performer.
Externally paced skill	A skill that is started because of an external factor. The speed, rate or pace of the skill is controlled by external factors, such as an opponent or the environment.
Gross movement skills	A skill that uses large muscle groups to perform big, strong, powerful movements.
Fine movement skills	A skill involving small, precise movements, showing high levels of accuracy and coordination. It involves the use of a small group of muscles.

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4.2 Goals Setting

When appropriate goals are set performers have something to focus on and work towards, and more likely to be motivated to succeed.

Performance Goals	These are focused on the end result, winning or coming second or third.
Outcome Goals	Personal goals that an individual wants to achieve.



4.2 SMART Targets

Specific:	The target must be specific to the demands of the sport, muscles used or movements used.
Measurable	It must be possible to measure whether the specific target set has been met.
Accepted:	The target must be accepted by the performer and others involved in training and competition, such as the performer's coach.
Realistic	The target must actually be possible to complete and attain.
Time-bound:	The target covers a set period of time so that the performer knows whether or not they have achieved it.

4.3 Information processing

Input	This is the data received from the display. IN the case of a performer, the information will be received via the senses. Lots of information is received so they must use selective attention and choose what to focus on.
Decision making	The selected data is analysed and an appropriate response is selected. In the case of a performer, this means they will access memories of similar experiences and will choose an appropriate response accordingly. (Short term/ Long term memory)
Output	The decision is acted on. Information is sent from the performer's brain to the working muscles to carry out the required response.
Feedback	Data is received in response to the output. This can become the input for future decisions. (Intrinsic/ Extrinsic feedback)

4.4 Guidance

Verbal guidance	When a coach describes how to perform a skill or tells a performer something.
Visual guidance	presented in a form that the performer can see it, demonstration, video
Manual guidance	Involves the coach physically moving a performer into the correct position or supporting them as they perform the skill.
Mechanical guidance	When objects or aids are used to assist in the coaching process.



4.4 Feedback

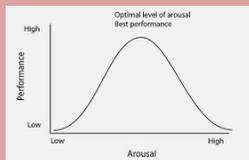
Positive Feedback	What was correct or good about the performance.
Negative Feedback	What was incorrect or bad about the performance
Knowledge of results	Provides the performer with information about their placing in a tournament or the time it took them to complete a race
Knowledge of Performance	Provides the performer with information about their performance generally and about their technique more specifically
Extrinsic Feedback	Feedback a performer receives about their performance from outside themselves, such as from their coach.
Intrinsic Feedback	Feedback a performer receives about their performance from within. Kinesthetic feedback is a form of intrinsic feedback.



4.5 Arousal

Arousal is a physical (or physiological) and mental (psychological) state of alertness or readiness.

The 'inverted u theory'
This states that an optimal performance occurs when a performer reaches an optimal level of arousal. You are more likely to perform at your best when you are in the best possible physical and mental state



4.6 Aggression

Direct Aggression	Indirect Aggression
<ul style="list-style-type: none"> Involves physical contact to cause physical harm Normally outside the rules of the sport Players do it in the hope they do not get caught 	<ul style="list-style-type: none"> Doesn't involve physical contact Could be a nasty remark Could be an act against an object to gain an advantage The intended harm is usually mental rather than physical to put them off their game



4.8 Motivation

Intrinsic Motivation	Extrinsic Motivation
<p>The drive comes from within you. It is driven by personal feeling e.g.</p> <ul style="list-style-type: none"> Pride Satisfaction Accomplishment Self-worth Achievement 	<p>The drive comes from external rewards such as:</p> <ul style="list-style-type: none"> Money/Prizes Trophies <p>Praise (feedback applause)</p> <p>Tangible rewards:</p> <ul style="list-style-type: none"> Those that you can touch <p>Intangible rewards</p> <ul style="list-style-type: none"> Those that you can't touch
<p>Evaluation</p> <ul style="list-style-type: none"> Any type of motivation is useful. Intrinsic is thought to be more effective as it doesn't rely on external rewards If you are only extrinsically motivated you may not try your best when no rewards are available Receiving extrinsic rewards may lead to feelings of self-satisfaction and pride that are associated with intrinsic motivation Overuse of extrinsic motivation can reduce intrinsic motivation as you can become reliant on receiving rewards 	



4.7 Personality Types

Introvert	Extrovert
<p>An introvert is:</p> <ul style="list-style-type: none"> Shy and quiet Reserved Thoughtful Enjoy being on their own Associated with individual sports which require concentration, precision and low arousal 	<p>An extrovert is:</p> <ul style="list-style-type: none"> Active, talkative and outgoing Sociable (aroused by others) Enthusiastic Prone to boredom (when on own) Associated with team sports which are fast paced (high arousal), concentration levels are low and gross skills are used



Chapter 5: Socio-cultural influences

5.1 Engagement Patterns

Engagement patterns are the general trend of different social groups participation in physical activity and sport.

M	Media	Lack of TV coverage of female role models
I	Inclusiveness	Facilities may not run sessions for people with disabilities
R	Role Models	Lack of female role models in many sports
A	Attitudes	You may not play a sport because your friends don't like it.
C	Culture/ Religion	Family/peer influence on whether you do something. Religious festivals take precedence over playing sport
L	Leisure time	Less time available owing to work commitments
E	Education	School may not offer or have the facilities to play some activities.
S	Sexism/ Stereotyping	Some girls do not want to play football as they may be thought of as masculine. Some men do not want to dance or play netball as they think these activities are for females only.
S	Socio-economic/ Disposable income	Some people in minority groups have less money, someone without a permanent job will have less money.
A	Accessibility	Lack of facilities or clubs as well as physical barriers, lack of ramps, pool hoists.
F	Family	Family commitments, looking after younger siblings.
F	Familiarity	You may do activities the same as other members of your family.

5.1 Social Groups

Social group	General Information	Reasons affecting engagement patterns/ Barriers to participation
Gender	Gender groups are determined by a person's sex – male or female.	Role models, Media coverage, Sexism/ stereotyping, Funding, Body Image, Attitudes, Family Commitments, Accessibility
Age	People are split into groups based on their age: Children, teenagers, adults, retirees	Accessibility, Education, Socio-economic/ disposable income, Leisure time, Sexism/stereotyping
Socio-economic	A group's place within society.	Occupation, education, income, where you live, income
Ethnicity	Race/Religion/ Culture – People are grouped on their culture or specific origin.	Cultural influences, Religious festivals, Stereotyping, Socio-economic/disposable income, Family Commitments, Accessibility
Disability	A physical or mental condition that limits a person's movements, sense or activities.	Adaptability, Inclusiveness, Accessibility, Socio-economic/disposable income, Stereotyping, Media coverage, Role models
Family/Friends	You can be grouped by those you spend time with the most: parents, relations, guardians, friends, siblings, classmates	Attitudes, Role models, Cultural influences,

Key Vocabulary

Barrier to participation	An obstacle that prevents a group within society from participating in sport or physical activity and therefore reduces overall levels of participation
Engagement patterns	Trends/ tendencies in involvement
Ethnic group	A group of people who share common origins – be they racial, religious or cultural
Social group	People who interact with one another, share similar characteristics, and have a sense of unity/ togetherness
Stereotyping	Widely held but fixed and over simplified idea of a particular type of person
Discrimination	The unjust or prejudicial treatment of different groups of people, especially on the grounds of race or gender

5.2 Commercialisation

Sponsorship



A sponsor is an individual or group that provides support in the form of sponsorship in return it is seen by millions, via advertising, sponsorship and endorsement
It can be for:

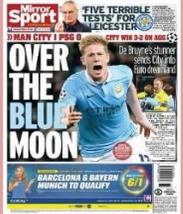
- An individual (Ronaldo sponsored by Nike)
- A team (Man City sponsored by Etihad)
- An event (Olympics sponsored by MacDonal'd's)

Different types of sponsorship include:

- Money
- Clothing and equipment
- Facilities



Media



The media are a broad range of technologies that act as the main means of communication. They include:

- Printed media (newspapers and magazines)
- Broadcast media (TV and radio)
- Internet and social media

Sponsorship and the media

- Sponsors want to promote their products via the media as they can reach millions of potential customers
- Media companies need high viewing figures to make them more attractive to sponsors
- Media companies therefore pay sports clubs to allow them to televise matches as this attracts lots of viewers, making it more likely that they will get funding from sponsors

Sport



The player/performer and the sport need funding for:

- Facilities
- Equipment
- Competitions

Both the media and commercialisation can help promote sports. The media can also provide opportunities for the spectator

The Advantages of Commercialisation

Sponsor or company



- Excellent and relatively inexpensive advertising of their products as:
- Media can show products during breaks in play
- Brand names can be seen around venues and on clothing
- Raised awareness of brands increase sales
- Products associated with high quality performance give it a high status
- Media hype gets more viewers which means more exposure of the brand

Sport



- Raised awareness = increase participation
- Higher profile = commercial interest
- Increases funding from sponsors
- Funding means that you can run events, develop the sport and facilities

Player Performer



- Paid millions to endorse products
- Train full time and focus on being the best in their sport
- Receive top quality products to use to improve performance

Spectator



- More coverage and top event
- Red button/Replays
- Player cam
- Buy the same clothes and equipment to their role models

Official



- Sponsors can provide kit
- Media can support correct decisions
- More likely to become role models

The Disadvantages of Commercialisation

Sponsor or company



The media may not get a high number of viewers
The company doesn't get the amount of exposure they wanted
The player/team doesn't perform well
The player who becomes a bad role model due to cheating, violence, infidelity, racism etc.... affects popularity and sales

Sport



Fixtures can be changed to maximise viewing opportunities
Breaks in play for advertising purposes
Minority sports not shown on TV which decreases sponsorship
Negative reporting can give a sport a bad name
Clothing and rule changes are more appealing to viewers

player performer



Event times make it less favourable for performers
Withdrawal of sponsorship could cause financial difficulties
Required appearances take time away from training
Pressure to win at all costs to keep a sponsor
No privacy and negative reporting can lose sponsorship

Spectator



High costs for subscription fees to sports channels
Pay per view for certain events
High cost of merchandise
Minority sports not shown
Sponsors keep best tickets for hospitality

Official



Under the spotlight for all decisions as they can be replayed, so poor decisions are highlighted undermining the official
They have to wear the sponsors logo

5.3 Impact of Technology

The Advantages of Technology		The Disadvantages of Technology	
To the sponsor	<ul style="list-style-type: none"> Easier to see logos due to enhanced viewing quality More coverage of sports provides more opportunities to see products Advertising opportunities during breaks on TV Better standard of play using improved equipment encourages more sales 	To the sponsor	<ul style="list-style-type: none"> They need to provide more funding to buy equipment for performers so they stay at the top of their game and give access to the best medical support to keep them fit such as ice baths and hypoxic tents Sponsored players may be found cheating which reflects badly on the sponsor
To the performer and sport	<ul style="list-style-type: none"> Improved equipment, clothing and footwear to improve performance such as running blades for disabled athlete Improved equipment, clothing and footwear to improve safety such as ski helmets and head guards in boxing Improved security at venues such as cameras and metal detectors Better facilities such as velodromes for cycling Better decisions by officials due to technology support such as VAR Better drug testing to prevent cheating 	To the performer and sport	<ul style="list-style-type: none"> The cost of equipment increases State of the art facilities cost more Technology can go wrong Repairs are expensive Technology can be inaccurate The human part of lucky decisions is lost People can watch at home rather than attend live games Players/performers unable to afford modern technology are at a disadvantage
To the spectator	<ul style="list-style-type: none"> Multiple viewing platforms such as TV tablet, mobile phone Better picture and sound creating a better viewing experience Interactive options such as player cam Increases enjoyment as a result of better performances due to technology Increased interaction at live games for decisions VAR and Hawkeye 	To the spectator	<ul style="list-style-type: none"> Breaks in play waiting for decisions is boring Technology changes the nature of the sport They have to pay to view some sports They have to pay for specialist sports channels Technology is expensive 3D and ultra HD TV's They don't experience the excitement of watching the match live
To the official	<ul style="list-style-type: none"> Technology support means less chance of errors as it provides additional help to reach the right decision (VAR, Hawkeye, Hot spot) Improved timing devices mean more accurate results Wifi allows for improved communication with officials and technicians 	To the official	<ul style="list-style-type: none"> They become reliant on the technology Technology can go wrong Technology highlights the official's errors Decisions are challenged more owing to loss of respect for officials and judgement

5.4 Ethical Conduct of performers

Etiquette	A convention or unwritten rule in an activity. It is not an enforceable rule but is usually observed.
Sportsmanship	Conforming to the rules, spirit and etiquette of a sport
Gamesmanship	Attempting to gain an advantage by stretching the rules to their limit.
Contract to compete	An unwritten agreement between opponents to follow and abide by the written and unwritten rules of the sport.

5.4 Ethical Conduct of performers – Performance Enhancing Drugs

Advantages to the performer from PED's

Level playing field	If every athlete were to take them it would make things equal when competing
Fame	The more successful you are the more famous you can become owing to more publicity
Wealth	If you are successful you are more likely to win more prize money and attract sponsorship deals
Increase chance of success	An archer taking beta blockers to reduce anxiety may be more accurate and have a greater chance of winning

Disadvantages to performer from taking PED's

Cheating/immoral	If caught everyone will know you cheated
Fines	If caught you may have to pay an expensive fine
Bans	If caught you will not be able to compete, when the ban is over you may be past your peak fitness
Associated health risks	Many performance enhancing drugs have health risks. Taking diuretics can cause kidney damage
Damage to reputation	If caught you will not be able to compete, when the ban is over you may be past your peak fitness

Disadvantages to the Sport when performers take PED's

A bad reputation	If a performer takes drugs the sport may not get the respect it deserves
Poor Credibility	If a performer takes drugs the sport may be seen as untrustworthy or unreliable

Drug	Effect on Performance		Health risks	Which Sports
Anabolic Agents	Allows performers to train longer and harder It increases protein synthesis helping develop lean muscle mass and speeds up recovery time		<ul style="list-style-type: none"> Liver damage/CHD Testicular atrophy Infertility Skin problems Mood swings Aggression Baldness 	Activities that require power: Sprinters Rugby players Weightlifting Boxers Baseball
Beta Blockers	Beta blockers improve fine motor control by slowing heart rate and reducing anxiety which allow the performer to remain calm and controlled		<ul style="list-style-type: none"> Nausea Sleep disturbance Tiredness/weakness Lower blood pressure Slow heart rate 	Activities that require precision: Archery/shooting Snooker Gymnastics
Diuretics	Diuretics achieve quick weight loss (fluids). They also mask other drugs making them harder to detect		<ul style="list-style-type: none"> Dehydration Nausea headaches Heart/kidney failure 	Drug cheats and sports with weight categories: <ul style="list-style-type: none"> Boxing Jockey
Narcotic Analgesics	Narcotic analgesics increases the performers pain threshold so can mask injuries, also give a feeling of invincibility		<ul style="list-style-type: none"> Nausea/vomiting Anxiety/depression Kidney/liver damage Addiction Risk further injury 	Any sport that a performer is injured: <ul style="list-style-type: none"> Boxers Sprinters Football
Peptide Hormones	EPO	Erythropoietin (EPO) Can increase red blood cell production increasing O ₂ deliver	<ul style="list-style-type: none"> Thickening of blood Blood clots Strokes Heart attack 	Aerobic events e.g. long distance: <ul style="list-style-type: none"> Running Cycling
	HGH	Human Growth Hormone Helps muscle mass and burns fat	<ul style="list-style-type: none"> Arthritis Heart failure Abnormal feet/hands 	Strength events: <ul style="list-style-type: none"> Weightlifting Sprinting Rugby
Stimulants	Stimulants increase alertness, reduce tiredness and increase heart rate (therefore oxygen delivery)		<ul style="list-style-type: none"> Insomnia Anxiety Aggression Irregular heart rate 	Alert/aggressive sports: <ul style="list-style-type: none"> Rugby Boxing Ice hockey
Blood Doping	Blood doping involves the removal of blood a few weeks prior to competition. The blood is frozen and re-injected just before competition. (increase red blood cells)		<ul style="list-style-type: none"> Infection Thickening of blood (viscosity) Heart attack Embolism (blockage of vessel) 	Aerobic events e.g. long distance: <ul style="list-style-type: none"> Running/cycling Cycling Swimming Games players

5.5 Spectator Behaviour

Advantages of spectators	Disadvantages of spectators
<p>Creation of atmosphere:</p> <ul style="list-style-type: none"> • A large crowd creates excitement interest and enjoyment • Player can be more motivated • Interaction for the fans • Positive experience leads to more fans who want to attend • Raises income and raises the profile of the sport, increasing participation <p>Home-field advantage:</p> <ul style="list-style-type: none"> • Teams and individual performers can gain an advantage from being in familiar surroundings, with fan support and referee bias. • You feel lifted with the majority of spectators cheering for you and so you play better 	<p>Increasing pressure:</p> <ul style="list-style-type: none"> • With spectators wanting you to win can lead to an increase in anxiety causing performance to drop <p>Safety costs/concerns:</p> <ul style="list-style-type: none"> • It is expensive to employ security staff and repair damage caused by spectator behaviour <p>Negative effect on participation numbers among young people:</p> <ul style="list-style-type: none"> • The reputation of a sport due to spectator behaviour can cause a drop in the number of young people interested and therefore a loss of potential elite performers <p>Potential for crowd trouble/hooliganism:</p> <ul style="list-style-type: none"> • Hooliganism can lead to fans not attending matches leading to a loss in ticket sales, support and sponsorship

5.5 Hooliganism

Reasons for	Strategies to prevent	Implications of preventing hooliganism
Rivalries (local derby)	Segregation All seater stadiums	Cost Groups of fans can still sit together People can buy tickets for known hooligans
Hype (from media)	Travel Restrictions Bans, fines, prison Educational Campaigns	Fans arrange fights elsewhere Cost Impact of educational campaigns – do they make a difference?
Fuelled by drugs/alcohol	Early kick-offs Alcohol restrictions	Loss of income for pubs Fans will drink at home before the match
Gang culture	Bans, fines, prison Increased security Travel restrictions	Cost and police time Fans arrange fights elsewhere
Frustration (official's decision)	Don't show controversial replays on the big screen	Media and social media highlight decisions, therefore causing unrest amongst fans
Displays of masculinity	Bans, fines, prison Alcohol restrictions	Loss of income for pubs Fans will drink at home before the match



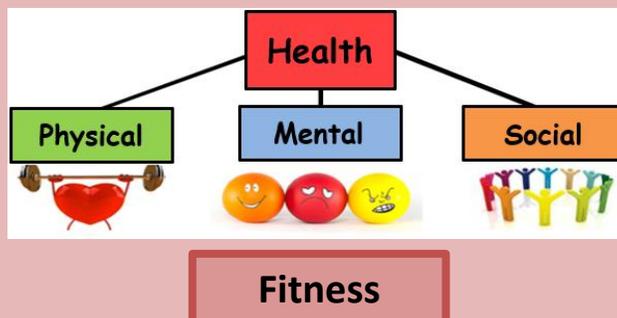
Chapter 6: Health, fitness and well-being

Physical health and well-being

Regular Exercise	Explanation of Health Benefit
Improved heart function	A stronger heart means that it pumps more efficiently so there is less strain on the heart reducing the chance of heart attacks
Improved efficiency of body systems	The musculoskeletal and cardiorespiratory systems are more efficient with regular exercise. Weight bearing exercise increases bone density reducing the chance of osteoporosis
Reduce the risk of some illness	Exercise reduces blood pressure so there is less chance of having a heart attack or stroke. Exercise also improves the immune system so you are less likely to get ill
Ability to do everyday tasks	Due to improved body systems you can function more easily. You can do everyday tasks without getting tired such as gardening, running up the stairs. You are not slowed down by excess weight
Avoid being obese	Exercise burns calories so you are less likely to be overweight or obese. Obesity is linked to several health problems such as heart attacks, stroke and diabetes



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



Regular Exercise	Explanation of Health Benefit
Improved fitness	All components of fitness can be improved through exercise. These improvements in fitness lead to better performance
Reduced chance of injury	Due to stronger bones and muscles and increased flexibility reduces the chance of injury, this means more time can be spent training or performing
Supporting physical ability to work	Due to improved fitness components such as muscular strength and muscular endurance will mean you can cope better with the physical demands of work, for example a bricklayer will have the fitness to cope with demands of carrying, mixing and laying bricks

Mental health and well-being

Regular exercise	Achieved Health benefits
Reduced stress/tension	Taking part in exercise can take your mind of your problems from work, home or school. This helps prevent stress related illness such as depression
An increase in serotonin levels	When you exercise you release a chemical called serotonin also known as the 'feel good hormone'. When serotonin is released it makes you feel good
Ability to control emotions	When playing sport, you need to be disciplined as you need to follow the rules and stick to tactics or roles. This can help you control your emotions, improve confidence and self-esteem
Increase in self-confidence & self-esteem	Exercise can make you feel part of something. Being part of a team can give you confidence. The more you exercise you do the better you perform this can also improve confidence

Social health and well-being

Social Health benefits from exercise
Regular exercise allows us to meet new people and make new friends
Regular exercise allows us to meet and socialise with our current friends
Regular exercise can improve our cooperation skills
Regular exercise can increase our social activities

More People leading a Sedentary Lifestyle

More people use cars and public transport than cycle or walk

Why?

Large amount of time at school or work is spent sitting

More jobs are computer based and are therefore sedentary

Large amount of time at home is spent sitting playing computer games and watching TV

6.2 Consequences of a Sedentary Lifestyle

A sedentary lifestyle is a lifestyle where there is little or no exercise



Obesity

Obesity is a term used to describe people with a large fat content, caused by an imbalance of calories consumed compared to energy expenditure

A person is considered obese if they have a body mass index (BMI) of over or over 20 % above standard weight to height ratio

If body fat gets to this level it can have serious health implications

Obesity can lead to ill-health:

Physical	Mental	Social
<p>It is linked to:</p> <ul style="list-style-type: none"> Types of cancer Heart disease Heart attacks Type 2 diabetes High cholesterol levels 	<p>It is linked to:</p> <ul style="list-style-type: none"> Depression Low self esteem Loss of confidence 	<p>It is linked to:</p> <ul style="list-style-type: none"> An inability to socialise (loss of confidence) Inability to leave home (due to mobility)

How Obesity can affect performance:

Limits cardiovascular endurance:

Unable to exercise without stopping repeatedly, due to the excess weight and the drop-in efficiency of the cardio-respiratory system

Limits flexibility: Excess fat around the joints restricts movement

Limits agility: Excess weight makes it harder to change direction quickly

Limits speeds/power: Excess weight makes it harder to move fast

Health risks due to a sedentary lifestyle	Explanation
Obesity/ excessive weight gain	Due to inactivity and a reduction in metabolic rate
Poor Self-esteem	Being over-weight or obese can lead to depression a lack of brain function and release of serotonin
Hypertension (High BP)	Lack of exercise and poor diet can lead to an inefficient heart and potentially damaged blood vessels
Poor Sleep	Lack of oxygen delivery to cells and excessive weight have been linked to snoring and restless legs. This disturbs sleep, as not doing enough to feel tired at night
Type 2 diabetes	Being overweight can increase the risk of developing type 2 diabetes
Heart disease and stroke	High Bp and cholesterol increase the risk of a heart attack and stroke
Lethargy (lacking energy)	Low oxygen levels can lead to a feeling of fatigue and tiredness

6.3 Somatotypes

A method of classifying body types

Ectomorph	Mesomorph	Endomorph
Characteristics: <ul style="list-style-type: none"> Tall and thin Narrow shoulders and hips 	Characteristics: <ul style="list-style-type: none"> Muscular appearance Wide shoulders Narrow hips 	Characteristics: <ul style="list-style-type: none"> Pear-shaped Tendency towards fatness Wide hips Narrow shoulders
		
Suited to endurance events:	Suited to strength agility and speed sports:	Suited to strength sports where their bulk is an advantage:
		

6.4 Energy Use

In order to maintain a healthy weight, the amount of energy taken into the body must be matched by the amount of energy expended.

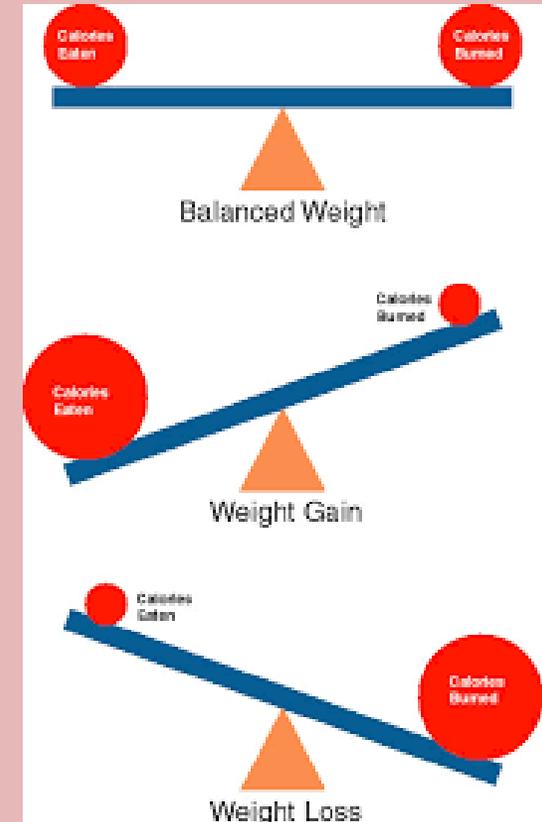
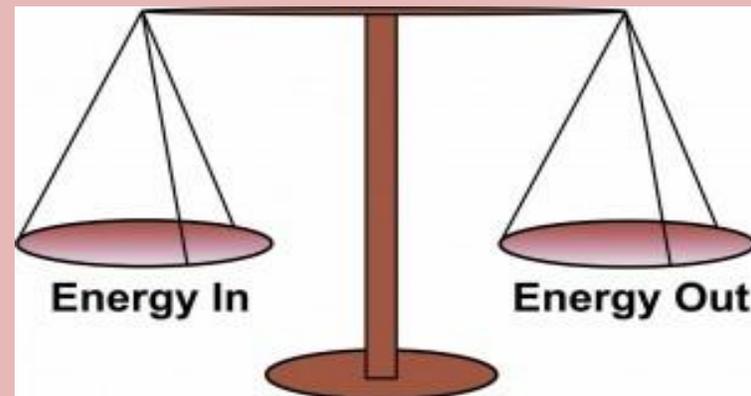
Energy is measured in **calories (KCAL)** and is obtained from the food we eat

Adult Male: 2500 Kcal per day

Adult Female 2000Kcal per day

Factors affecting calories required:

Age	Younger people (U25) need more calories because as you age the body replaces muscle with fat and fat burns fewer calories than muscle
Energy expenditure	The more you exercise, the more energy you need, the more calories you need to consume
Gender	Men tend to need more calories than women because: <ul style="list-style-type: none"> Men tend to have a larger skeleton Men tend to have a greater muscle mass
Height	Taller you are the more calories needed because of the larger skeleton



6.5 Balanced diet

Eating the right foods in the right amounts. This will allow us to exercise and work properly

Insufficient nutrients can cause ill health such as anaemia, rickets and scurvy

No single food contains all of the nutrients the body needs, so you need to eat a variety of foods in the correct proportions

Reasons for a balanced diet

- Any unused energy is stored as fat, which could cause obesity (particularly saturated fat)
- To provide suitable energy that can be used for activity
- To provide the nutrients needed for energy, growth and hydration

Nutrition	Explanation	Foods
<p>Carbohydrates</p> 	<p>Carbohydrates are the main preferred energy source for all types of exercise of all intensities (aerobic and anaerobic)</p> <p>A balanced diet should contain 55% - 60% carbohydrate</p>	<ul style="list-style-type: none"> • Bread • Pasta • Rice • Potatoes
<p>Fats</p> 	<p>Fats are an energy source; they provide more energy than carbohydrates but only at low intensity. It is easily stored in the body and can lead to weight gain</p> <p>A balanced diet should contain 25% - 30% fat</p>	<ul style="list-style-type: none"> • Butter • Oil • Fatty meats • Fried food
<p>Protein</p> 	<p>Protein are for growth and repair of muscle tissue. It is used by performers such as sprinters to aid muscle growth (hypertrophy)</p> <p>A balanced diet should contain 15% - 20 % protein</p>	<ul style="list-style-type: none"> • Cheese • Milk • Eggs • Fish • Meat
<p>Vitamins and minerals</p> 	<p>Vitamin and minerals are for maintaining the efficient working of the body systems and general health this includes keeping our bones strong and our immune system working</p>	<p>Vitamins</p> <ul style="list-style-type: none"> • Fresh fruit • Vegetables <p>Minerals</p> <ul style="list-style-type: none"> • Meat • Vegetables

6.6. Maintaining Water Balance - Hydration

Dehydration: excessive loss of body water, such that it interrupts the function of the body

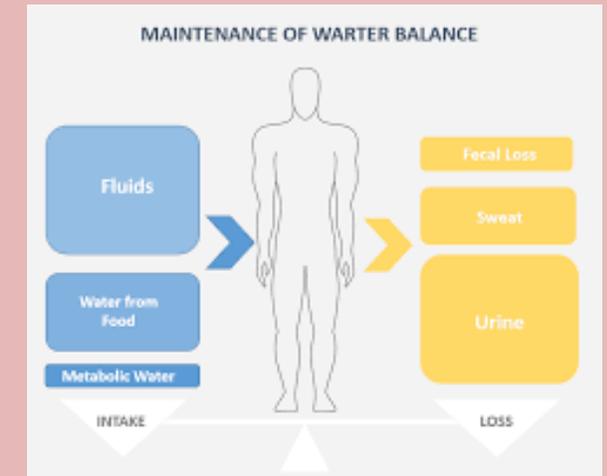
Hydration: having enough water to enable normal functioning of the body

Rehydration: Consuming water to restore hydration

Water balance: taking in water (hydrating) to prevent dehydration due to loss of fluids

Effects of dehydration

Blood thickening (increased viscosity)	Slows blood flow which preventing the delivery of oxygen
Increase in heart rate causing irregular rhythm	The heart has to work harder to deliver oxygen to the working muscles
Increase in body temperature	Causes overheating, leading to heat exhaustion
Slowing of reactions	Increases reaction time, which can slow the time to make important decisions
Muscle fatigue	Causes cramp in muscles



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. There are many factors that could affect a person's lifestyle choices:

- Disposable income
- Where you live
- Family, friends and their lifestyles
- Opportunities and facilities
- Education levels

If a person decides to adopt a lifestyle that involves little or no exercise, this is known as a '*sedentary lifestyle*'.

NHS guidelines state that '*to stay healthy or improve health, adults need to do two types of physical activity each week*':

- Moderate aerobic exercise or vigorous exercise
 - Brisk walking
 - Playing team sports recreationally
- Strength exercises
 - Lifting weights
 - Use of resistance bands

1.1.2 Diet

Nutrients:

A nutrient is a substance that is essential for our bodies to grow, repair and work properly.

Nutrients	Specific need
Carbohydrates	Main and preferred energy source for all types of activities Provided within bread pasta, potatoes
Fats	Also an energy source Comes in two forms; saturated fats (animal fats) and unsaturated fats (vegetable fats)
Protein	Required for tissue growth and repair
Minerals	Needed in small quantities.
Fibre	Adds bulk so food passes through the digestive system quickly.
Water	Keep hydrated and ensure body temperature doesn't rise too high due to sweating.

Recommended Daily Allowance

Guidelines that state the amount of each nutrient that is needed per day to meet the needs of nearly healthy people.



Dietary changes to support a healthy lifestyle:

- **Portion size** – what happens when these are too big?
- **Energy balance** – What happens if you consume too many or too little?
- **Eating habits** – NHS provides guidelines to support healthy eating habits.

1.1.3 Rest and Recovery



Active individuals need enough:

- **Sleep**
 - Lack of sleep can reduce energy levels or an individual's ability to concentrate.
 - Make you feel angry quicker
 - Speed and reaction times are affected
 - Quality and amount of sleep are important
 - Lack of sleep can cause depression
 - Enough sleep can help the body fight infections
- **Recovery from different health and fitness activity sessions**
 - Body needs time to recover
 - Need to replace fluids lost during the training session
 - When training small tears occur in the muscles and these need time to repair and grow stronger
 - Energy stores in muscles are used and time is needed to replenish
 - Decreases the risk of overtraining
 - Provides a good balance between work, rest and training demands
- **Rest between health and fitness activity repetitions.**
 - Muscles are too fatigued that technique deteriorates
 - Rest allows muscles to clear waste products such as lactic acid
 - Rest allows muscles to replenish their energy stores
 - Rest allows the body to repay 'oxygen debt'

1.1.4 Other factors

Factors that can negatively affect health and fitness:

Recreational Drugs:

These can negatively affect an individual's physical, social and mental health.

- Hallucinogens
- Relaxants
- Stimulants

Performance Enhancing Drugs:

Some individuals may choose to take performance enhancing drugs to improve their sporting performance, however the side effects can have a negative affect on health and fitness.

Performance Enhancing Drug	Improvement on performance	Negative affect on health
Stimulants	Increases alertness	Heart Failure Addictive
Anabolic agents	Increases muscle mass Can train harder	Kidney damage Aggression
Narcotic analgesics	Pain relief from injuries	Injury being made worse Addictive
Peptide hormones (EPO)	Increases the production of red blood cells and oxygen carrying capacity of the blood	Heart attack Stroke
Diuretics	Removes fluid body via urine production	Dehydration
Beta blockers	Decreased heart rate	Heart failure



Alcohol:

Consuming too much alcohol can affect the body in different ways:

1. Balance and coordination are reduced.
2. Blood vessels dilate at the surface of the skin.
3. Muscle glycogen levels are reduced
4. Alcoholism can lead to liver, bowel and mouth cancer, as well as increased risk of heart disease and stroke.

Stress:

Stress is felt in situations when we feel under pressure. We may feel anxious and not able to cope leading to:

- Feeling anxious
- Loss of sleep
- Lacking energy
- Muscular tension
- Depression
- Loss of appetite
- High blood pressure

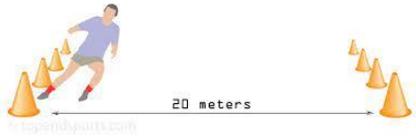
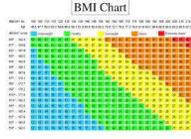
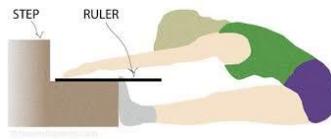
Smoking:

Half of smokers will die from smoking-related disease.

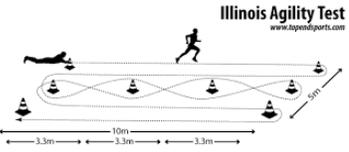
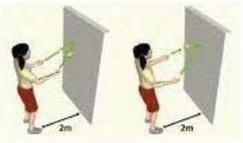
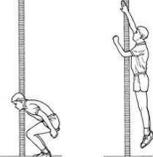
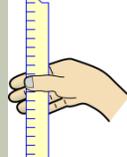
LO2: Understand how to test and develop components of fitness

2.1 Fitness Testing

2.1.1 Health-related fitness tests

Cardiovascular endurance test		Body Composition		Flexibility Fitness Test	
Fitness Test	Test Procedure	Fitness Test	Test Procedure	Fitness Test	Test Procedure
Multi stage fitness test	<ul style="list-style-type: none"> Measure out 20 metres Place cones to mark the distance Start the audio recording Run from one cone to the other until you cannot continue Record result and compare to a rating chart 		<ul style="list-style-type: none"> Warm up Lift the maximum weight you can in one attempt Record result and compare to a rating chart 	Sit and reach test	<ul style="list-style-type: none"> Sit with your legs straight and the soles of your feet flat against the box With palms face down, one hand on top of the other, stretch and reach as far as possible Record result and compare to a rating chart
Used by badminton and cricket players		Used by performers such as power lifters, rugby players and boxers		Used by performers such as gymnasts and divers	
					
Muscular endurance Fitness Test		Muscular endurance Fitness Test		Muscular Strength Fitness Test	
Fitness Test	Test Procedure	Fitness Test	Test Procedure	Fitness Test	Test Procedure
Sit-up bleep test	<ul style="list-style-type: none"> Lie on a mat, knees bent, feet on the floor. your hands across your chest on shoulders Start the audio recording Sit up until you can no longer continue Record results and compare to a rating chart 	Press up Test	<ul style="list-style-type: none"> Hands and toes touching the floor, body and legs in a straight line. Keep the back and knees straight, lower the body to a 90 degree angle at the elbow, then return to starting position. Continue the action until you can no longer continue. 	Hand grip dynamometer	<ul style="list-style-type: none"> Adjust the grip to your hand Keep your arm beside you at a right angle to your body Squeeze the handle as hard as you can Record result and compare to a rating chart
Used by tennis and football players		Used by performers such as climbers (to lift body weight)		Used by performers such as climbers (to lift body weight)	
					

2.1.2 Skill-related fitness tests

Agility Fitness Test		Balance Fitness Test		Coordination Fitness Test		
Fitness Test	Test Procedure	Fitness Test	Test Procedure	Fitness Test	Test Procedure	
Illinois run	<ul style="list-style-type: none"> Set up the course as shown in the picture Lie face down on the floor, by the first cone On 'Go' run around the course as fast as you can Record result and compare to a rating chart 	Stork test	<ul style="list-style-type: none"> Place hands on your hips & foot on your knee Raise your heel from the ground so you are balancing on your toes Time starts when you lift your heel Record result and compare to a rating chart 	Wall toss test	<ul style="list-style-type: none"> Stand 2 meters away from a wall Throw a tennis ball underarm against the wall Throw with the right hand and catch with the left hand; then alternate hands Record result and compare to a rating chart 	
Used by performers who change direction quickly		Used by gymnasts and games players		Used by badminton and cricket players		
						
Power Fitness Test		Reaction Time Fitness Test		Results:		
Fitness Test	Test Procedure	Fitness Test	Test Procedure	Fitness Component	Score 1	Score 2
Vertical jump	<ul style="list-style-type: none"> Stand side onto the wall, feet flat on the floor Mark the highest point that the tips of your fingertips can reach Holding a piece of chalk, jump as high as you can Mark on the wall the top of your jump Measure the distance between the 1st and 2nd 	Ruler Drop	<ul style="list-style-type: none"> Stand with your hand open around the ruler, with the 0 cm mark between thumb and forefinger The assistant holds and drops the ruler Catch the ruler as quick as possible Record results and compare to a rating chart 	CV Endurance		
Used by sprinters, rugby players and long jumpers		Used by basketball, rugby and badminton players		Body Composition		
				Flexibility		
				Muscular endurance		
				Muscular strength		
				Agility		
				Balance		
				Coordination		
				Power		
				Reaction		

LO2: Understand how to test and develop components of fitness

2.1.3 Using data

You need to know how to collect, use and analyse data to evaluate levels of fitness.

Normative data

- Normative data is usually taken from a large, randomly selected sample of people.
- Good way for individuals to compare themselves against national standards.
- A way to identify strengths and weakness in their fitness levels.

Test and re-test

- Testing is used to measure current fitness levels.
- After identifying strengths and weaknesses of the various fitness components, an athlete will often design a training programme to improve.
- It is important to complete a re-test in order to gauge whether the training has made an impact.
- Results can then determine future training.

Application to health and fitness activities

- A midfield football player could complete the 'bleep test' and identify that their level of cardiovascular endurance is only rated as average compared to normative data.
- They decide to design a six-week interval training programme to improve this.
- At the end of the programme they re-test to find they are now rated good. The training has had a positive effect.

2.2 Training Methods

Training Method	
Interval training	This involves alternating periods of high-intensity effort with periods of low intensity effort or rest, which is called recovery. This can improve both aerobic and anaerobic.
Circuit training	This involves a series of work stations where the performer works for a set period of time (for example, 60 seconds). Each station usually exercises different parts of the body and muscle groups. It also involves a rest period between each station (for example, 30 seconds). This can improve aerobic/muscular endurance or anaerobic/strength depending on the intensity and duration of work stations.
Fartlek training	Fartlek is the Swedish word for 'speed play'. It is a form of continuous training that involves changes of speed, incline and terrain to provide changes to the intensity of the exercise. This can be used to train both aerobic and anaerobic energy systems.
Continuous training	This is usually considered to be a minimum of 20 minutes sub-maximal work with no rest. It may consist of activities such as swimming, running or cycling, or a combination of them.
Resistance and body weight training	This is a form of interval training where the participant uses something to resist the contractions of muscles. The resistance can be in the form of body weight, such as press-ups, or free weights such as dumbbells. This form of training is used to improve muscular endurance and/or strength.
Cross training	This involves exercising using two or more different types of training that have been mentioned previously.

2.3 Optimising a Health and Fitness Programme

2.3.1 Heart rate training zones

Heart rate (HR) is the number of times the heart beats per minute and is measured in beats per minute (bpm). Maximal heart rate (MHR) is the maximum number of beats of the heart per minute. You can estimate MHR with the following equation:

$$\text{MHR} = 220 - \text{age}$$

You need to know and understand two heart-rate training zones:

- **Aerobic training zone**- between 60 and 80 per cent of MHR
- **Anaerobic training zone**- between 80 and 100 per cent of MHR

2.3.2 Repetitions and sets

You need to know and understand repetitions and sets, and be able to apply them to support individual goals through a health and fitness programme.

- **Repetitions (reps)**- this is one full completion of the exercise movement.
- **Sets**- are made up of repetitions of an exercise followed by a rest period before another set is completed.
- **1 rep max (1RM)**- 1RM is the maximum amount of weight that can be lifted when doing one repetition of an exercise.

LO3: Understand how to apply health and fitness analyses and set goals

3.1 Health and Fitness analysis and goal setting

3.1.1 Health and fitness analysis tools

You need to know and understand health and fitness analysis tools, what information they collect, how to administer them and why they are used. Before starting a fitness programme, it is important to collect a participant's medical history to make sure it is safe for them to exercise. There are a range of health and fitness tools that can be used and you need to know how to collect, use, analyse and evaluate data to suggest improvements.

	Food (type and amount)	Drink (type and amount)	Portion size
Breakfast			
Morning			
Lunch			
Afternoon			
Dinner			
Evening			

PAR-Q- The PAR-Q (physical activity readiness questionnaire) is a screening tool that is used by someone who is planning to start an exercise programme.

Lifestyle questionnaire- A lifestyle questionnaire is a list of questions about the health and lifestyle of a person.

Food diary- A food diary is a very effective tool for weight and diet management in health and fitness activities.

Client progress review- During any health and fitness programme it is important to review the progress of the participant regularly to see the impact it is making. This will help to inform any changes that may need to happen.

LO3: Understand how to apply health and fitness analyses and set goals

3.1.2 Goal setting

You need to know and understand the acronym SMART in relation to goal setting. Goal setting is important in order to maximise performance. The goal setting process helps sports people set future aims to increase their motivation and confidence. Goals should be challenging but attainable. Applying the SMART principle allows you to do this.

Principle	Explanation	Example
Specific	Detailed and precise	Run a half-marathon
Measurable	Quantifiable to track progress	Complete the distance in less than two hours
Achievable	Challenging but attainable	The last half-marathon took me two hours five minutes
Realistic	Within the availability of resources, knowledge and time	The next race is in six months time, allowing time to train
Time bound	Set period for completion	Six months

An effective way to achieve your ultimate goal is to break it up into smaller goals that are time-phased:

Long-term goal (six months plus)- this is your ultimate aim and is usually more difficult, for example scoring a set number of points in basketball by the end of the session.

Medium-term goal (one to six months)- this should be the result of achieving your short-term goals, for instance scoring a set number of points by the midseason break.

Short-term goal (one day to one month)- this should be completed over a shorter period of time, and is usually less difficult. These goals are important because they provide you with the motivation and confidence to aim for the medium-/long-term goals- for example, 'Score two points in the next game'.

Specific	
Measurable	
Achievable	
Realistic	
Time bound	

How can I use this in my project?

You need to be able to apply the SMART principles to set health and fitness goals based on the fitness test data that you have collected.

LO4: The structure of a Health and Fitness Programme

4.1 The structure of a Health and Fitness Programme

An overview of the whole training programme:

- What is going to be done during the training?
- What needs to be achieved? Linked to the performers own targets or goals
- Rest days – how many, when are they?

Session Cards:

Information given to the athlete with instructions about what activities to do in activity session and how hard to work .

A health and fitness programme should include:

Fitness test results (completed before training) to:

- Determine which components of fitness should be improved.
- Compare with fitness tests completed during training to see if the training is having the impact (changes to training could be made if fitness tests indicate the need to).
- Compare post-training fitness tests to see if training has been effective.

A lifestyle analysis and action plan to make sure it is safe for an individual to begin training and to identify changes that need to be made to benefit an individual's health and fitness. This could include a PAR-Q and the following questions:

- Are they active or sedentary?
- Do they smoke, take drugs or drink alcohol?
- What are their stress levels like?
- Do they eat a healthy, balanced diet?
- How much rest and sleep do they get?

4.1.1 The session card:

The session card is all the information given to the athlete telling them what activities to do in each session and how hard to work. .

- Activities for warm-up, main activity section and cool down.
- The training methods that will be used and will muscles will be targeted.
- Type of activity that will be done, for example, treadmill, running, etc.
- How to complete each activity:
 - How long to do the activity for
 - Number of sets and repetitions to be completed
 - Which weights to use
 - How hard to work
 - How long to rest between activities
 - Which heart rate zones to work in (Aerobic = 60-80% or Anaerobic 80-90%)

Example PAR-Q

	Yes	No	No contraindication according to physician
1. Has your doctor ever said that you have a heart condition and recommended physical activity only under medical supervision?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. In the past month, have you had pain in your chest when you were physically inactive or active?.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Do you have problems in breathing when you are physically inactive or active?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Did you ever fall down because of dizziness or have you ever lost consciousness?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Do you have bone or joint problems that could be made worse when being physically active?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Has a doctor ever prescribed you drugs for high blood pressure or heart or breathing problems?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Do you not feeling well because of a temporary illness such as cold or fever?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. Are you or may you be pregnant?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. Do you know of any other reason why you should not do physical activity?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

LO4: The structure of a Health and Fitness Programme

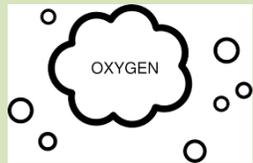
4.1.2 Warm-up

Warm-up:

A series of activities done to ensure an individual is ready to perform their main activity session safely. It is broken into four parts.

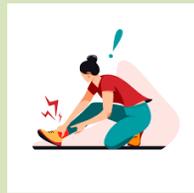
Benefits of a warm-up are:

- Gradual increase in heart rate increases body temperature
- Increased blood flow to the muscles
- Improved range of movement and mobilisation of joints
- A gradual increase of effort to full pace
- Psychological preparation to prepare for the activity
- Practice of movement skills
- Reduce the chance of injury.



TIMO:

Temperature increase
Injury chances reduced
Mental preparation
Oxygen (more) supplied to working muscles



1. Mobilisation:

In this phase, the joints and muscles that are going to be used in the main activity session are activated and moved. The aim is to lubricate the joints and increase the range of movement at the joints.

Examples: lunges, knee lifts.



Pulse raiser:

An activity designed to increase the heart rate and increase the supply of blood to the working muscles.

Examples: Jogging – different the speeds



Stretches:

Static stretching involves holding a muscle in a still, stretched position for a period of time (approx. 10 secs)

Dynamic stretching involves moving a joint slowly through its full range of motion. The muscle is being stretched while it is moving.

Examples: Lunge with twist



Practice movement:

In this phase involves rehearsing the skills that will be used during the main activity session.

Examples: Tennis player practicing forehands and backhands, Basketball player practicing chest passes and dribbling.



4.1.2 Cool down

Cool down:

A cool down is done after the main activity session and lasts around 10 minutes. It is used to gradually return the body to its pre-exercise state.

Benefits of a cool down are:

- Slowly enables the breathing rate
- Slowly decreases the heart rate
- Slowly reduces the temperature of the body
- Removal of waste products such as lactic acid from the muscles
- Prevents blood pooling/ DOMS
- Psychologically calms the performer down and enables them to reflect on their performance.

Cool down activities:

1. Reduced-intensity activity linked to the main activity session.
Example: jog or walk
2. Stretching to gently relax muscles and return them to their pre-exercise state.
3. Relaxation and breathing exercises.

4.1.3 Main activity section

Methods of training:

When undertaking a health and fitness programme, the methods of training selected must relate to the components of fitness that an individual is trying to improve.

This can be identified by:

- Completing fitness tests to assess individual weaknesses
- Identifying the components of fitness relevant to the participant's chosen sport.

Components of the main activity section:

1. Cardiovascular training

There are many different forms of cardiovascular training (rowing, cycling, jogging, swimming):

- Aerobic activity at around 60-80% of MHR
- Exercising the heart to increase the ability of the heart, blood and blood vessels to continually supply working muscles with oxygen.
- Exercising of large muscle groups
- Completed at least three times a week
- Completed for at least 20-30 minutes

2. Resistance Training

Resistance training is training the body against an external resistance to increase strength or endurance:

- Using any resistance, for example free weights (dumbbells or barbells), fixed weight machines, another individual, a resistance band or water
- Completing sets of repetitions of a specified exercise
- Rest periods between sets of repetitions
- Using alternate muscle groups to allow working muscles to rest and recover
- 'Balancing out' the training of paired muscles (biceps and triceps)

3. Core Training

- Exercising to strengthen the core muscles around the trunk and pelvis area, core training can involve static (still positions) or dynamic (moving) actions:
- Increase stability and balance when performing other activities and exercises
- A 'balancing out' of muscles on all sides of the body – abdominals and back muscles
- Better posture, reducing the chance of injury

Principles of Training:

Individuals need to apply the principles of training and principles of FITT to ensure training is effective and to reduce the chances of injury.

Principle of training	Application
Specificity	Making your training 'match' or 'suit' your sport to develop the components of fitness required for that sport.
Progressive	Increasing the amount of training you do gradually to prevent an injury, for example increasing the length of time a plank is performed as core training continues.
Overload	Making your body work harder than it normally does to improve certain components of fitness, for example increasing the percentage of MHR you are working at during a cardiovascular training session.
Reversibility	If you reduce training due to motivation levels or an injury or illness, the fitness gains that you have made will be reduced or lost; try to make sure all sessions planned are completed when possible.
Tedium	Make sure your training is interesting and motivates you; by including cardiovascular, resistance and core training within your programme, the chances of tedium occurring are reduced.

Principle	Application
Frequency	As training progresses, increasing the number of times per week that you train.
Intensity	As training progresses, increasing how hard you work in each session.
Time	As training progresses, increasing the amount of time you train for.
Type	Make sure the type of training you complete is linked to the components of fitness you wish to improve.

4.2 Health and Safety

Ensuring the activity environment is safe:

The individual's involved must check that the space, surfaces and conditions within the training environment are safe.

For example, water on a sports area floor could cause an individual completing circuit training exercises to slip and injure themselves.

Performing equipment:

The equipment being used during a health and fitness programme must be in good working order.

For example, a bike being used for continuous training must have fully functioning brakes, if they are not working correctly the cyclist could crash and sustain serious injuries.

Equipment set-up checks:

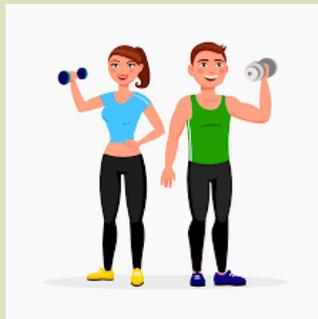
If equipment must be set up prior to the training, it is important to check that it has been set up correctly.

For example, ensure weights being used are secured to the bar correctly, if they were to fall off during the activity, they could cause an injury.

Appropriate clothing and footwear:

It is very important to make sure that appropriate footwear and clothing is worn during a health and fitness programme.

For example, individuals training on muddy terrain without studs could slip and break a wrist on landing. A skier training in cold conditions must ensure they have clothing that will provide suitable warmth.



Risk assessment:

A risk assessment is a series of checks done to identify hazards within an environment to reduce the chances of such hazards causing someone harm. A risk assessment aims to increase the safety of an environment by following a series of simple steps.

Risk Assessment

1. Identifying hazards:

Look for anything in the environment that might increase the chance of an accident or injury happening, for example glass on a Netball court.

2. Identifying who is at risk:

Identify who might be harmed by the hazard, for example a Netball player falling on broken glass on the court.

3. Assessing the likelihood of an injury and the severity, should one occur:

How likely is it that an accident or injury may actually happen?

If an accident did occur, how serious could the consequences be?

What would the outcome be?

A cut or a bruise?

Could it result in a more serious injury or death?

4. Inputting controls:

Steps that are taken to prevent an accident or injury happening, for example goalposts being secured to the wall or floor of a sports hall.

5. Review:

Once a risk assessment has been completed, regular checks must take place to ensure that the controls are being followed, for example, are staff ensuring that fixed-weight machines are working correctly?

Natural timbers: hardwoods

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

The types, properties, structure and uses of the main natural and manufactured timbers

Type	Description	Advantages	Disadvantages	Common uses
Oak		<ul style="list-style-type: none"> Strong and durable Has an attractive grain when well finished 	<ul style="list-style-type: none"> Expensive Becoming rarer Harder to work with than some woods Corrodes iron and steel 	<ul style="list-style-type: none"> Used a lot for building houses and boats in the past Now used for high-end furniture and wine and whisky barrels
Mahogany		<ul style="list-style-type: none"> Has a very attractive finish Quite easy to work 	<ul style="list-style-type: none"> Expensive Environmental problems with sourcing from tropical forests Oils in the wood can give some people a skin rash or breathing problems 	<ul style="list-style-type: none"> High-quality furniture, jewellery boxes, windows
Beech		<ul style="list-style-type: none"> A tough wood Does not crack or splinter easily Hard 	<ul style="list-style-type: none"> Expensive Not very resistant to moisture Not suitable for exterior use 	<ul style="list-style-type: none"> Toys, cooking implements, solid and laminated furniture
Balsa		<ul style="list-style-type: none"> Very lightweight Easy to cut 	<ul style="list-style-type: none"> Much too soft and weak for most products 	<ul style="list-style-type: none"> Model making, primary school projects, surf board cores Used for rafts in ancient times

Jelutong		Even, close grain is easy to cut and shape	Soft and not very strong, so not good for structural uses	Model making, moulds for casting or vacuum forming
Birch		Regular, even grain and easy to work	Low resistance to rot and insect attack	Veneers: to make plywood and to surface cheaper materials that are used for interior door and furniture
Ash		Strong, tough, flexible and finishes well	Low resistance to rot and insect attack	Handles for tools, sports equipment, ladders

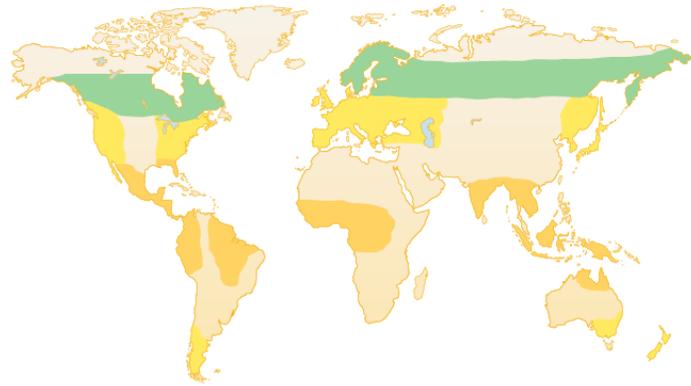
Natural timbers: softwoods

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

Type	Description	Advantages	Disadvantages	Common uses
Pine		<ul style="list-style-type: none"> Very durable Easy to work Quite cheap as it grows quickly enough to be forested Reasonably strong, lightweight and easy to work with 	<ul style="list-style-type: none"> Can warp, crack and splinter more than some other woods 	<ul style="list-style-type: none"> House construction, for roof joists and floorboards Furniture, doors, interior woodwork
Cedar		<ul style="list-style-type: none"> Natural oils make it resistant to water and fungal growth 	<ul style="list-style-type: none"> More expensive than pine and not as strong 	<ul style="list-style-type: none"> Outdoor furniture, fences, sheds, boats

Larch		<ul style="list-style-type: none"> Tough, durable and resistant to water It can be used outside untreated, and fades to a silvery grey 	Costs more than some other softwoods	Small boats, yachts, exterior cladding on buildings
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The types, properties, structure and uses of the main natural and manufactured timbers



- Cold climates (such as Alpine) with softwood forests, such as pine, cedar and larch.
- Temperate climates (such as European) with a mix of softwoods and temperate hardwoods, such as oak, beech, ash and birch.
- Tropical climates (such as Amazonian) with rainforests of tropical hardwoods, such as mahogany and jelutong.

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

Manufactured timbers

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

Key term

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

Type	Description	Advantages	Disadvantages	Common uses
Plywood	<ul style="list-style-type: none"> A tree trunk is sliced into thin layers called veneer These layers are glued together with the grain lines going in alternate directions 	<ul style="list-style-type: none"> Flat and structurally strong Surface looks like wood Resistant to warping, cracking and twisting 	<ul style="list-style-type: none"> Quite expensive Edges can look rather rough Susceptible to water damage if wrong grade is used 	<ul style="list-style-type: none"> Building and furniture panels that need some strength
Medium density fibreboard (MDF)	<ul style="list-style-type: none"> Wood dust and fibres are mixed with a glue and pressed into flat sheets under extreme heat and pressure 	<ul style="list-style-type: none"> Cheap (made from waste wood) Smooth ungrained surface is good for painting or staining Easy to machine 	<ul style="list-style-type: none"> Does not look good, so needs coating Weak compared to real wood or plywood Tools blunt quickly due to the glue 	<ul style="list-style-type: none"> Cheap flat-pack furniture, wall panels, display cabinets, storage units
Chipboard	Wood chips are mixed with glue and pressed into flat sheets	Uses waste materials so is cheap to produce	<ul style="list-style-type: none"> Not much structural strength, especially in damp conditions Surface is very rough, so usually plastic coated 	Desktops, kitchen worktops, cheap flatpack furniture

The Physical characteristics of timber

- Knots
- Colour
- Grain structure and density
- Working properties
- Elasticity
- Tensile strength
- Compressive strength

Social Footprint

- Trend forecasting
- Impact of logging on communities
- Recycling and disposal

Ecological Footprint

- Sustainability
- Deforestation
- Habitat destruction and loss
- Processing
- Transportation
- Wastage
- Pollution

Stock forms/types

Timber is available in a variety of stock forms.

Name	Availability	Picture	
Regular sections	<ul style="list-style-type: none"> Timber is sold in a standard range of cross-sectional shapes and sizes – sawmills do this for convenience, so there is a limited range of sizes to cut Designers can use the standard sizes when designing products 		Commonly available sizes and shapes of timber
Mouldings	<ul style="list-style-type: none"> Lengths of timber cut into decorative shapes There are lots of shapes available for different purposes, such as skirting boards or decorative edging Saves time but can be relatively expensive 		Common moulding shapes
Dowels	<ul style="list-style-type: none"> Wooden rods that are round in cross-section Have a variety of uses, from model making to furniture construction – can be used to strengthen simple joints Short lengths of dowel are used to join pieces of wood with a dowel joint Requires accurate drilling of holes 		Different-sized dowels
Sheets	<ul style="list-style-type: none"> Manufactured boards come in standard-sized sheets in a range of thicknesses Available in large sizes but large sheets are relatively difficult to cut and edges may splinter 		A stack of manufactured boards in a warehouse

Selection of timber

Aesthetics factors

Form

Colour and texture

Environment Factors

Sustainability

Genetic engineering

Seasoning

Upcycling

Availability Factors

Use of stock materials

Use of specialist materials

Hurricanes, storms and disease

Cost Factors

Quality of material

Manufacturing processes necessary

Treatments

Social Factors

Use for different social groups

Trends, fashion and popularity

Cultural and ethical factors

Avoiding offence

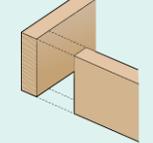
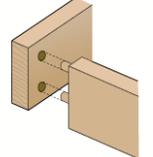
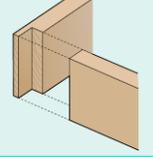
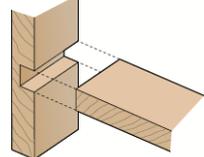
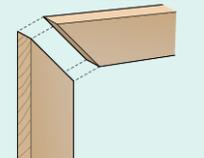
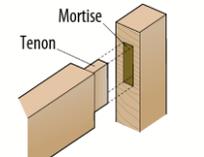
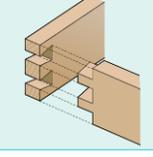
Suitability for intended market

The consumer society

The effects of mass production

Built in product obsolescence

Name	Appearance	Use	Advantages	Disadvantages
Twist drill		<ul style="list-style-type: none"> Drilling smaller-sized holes in most materials The flutes lift the swarf out of the hole 	Readily available in a wide range of sizes from very small up	<ul style="list-style-type: none"> Usually only up to 13 mm diameter Deep holes can block up the flutes
Flat bit		Drilling larger holes in wood	<ul style="list-style-type: none"> Centre spur gives an accurate starting point Drills quickly 	Cannot be used to make an existing hole bigger
Forstner bit		Drilling flat-bottomed holes in wood	Small centre spur can make a blind hole with a flat base	Slower than a flat bit
Auger		Drilling deep holes in wood	Can bore deep holes	Needs to be used at a slow speed
Hole saw		Cutting large holes	Can make a large hole in a sheet of manufactured board	<ul style="list-style-type: none"> Only good for quite thin materials Limited range of sizes available

Name	Appearance	Advantages	Disadvantages
Butt		Easy to make, it is just square ends glued together	<ul style="list-style-type: none"> Weak: there is no mechanical strength, just the glue Not aesthetically pleasing
Dowel		Automated machines can drill the dowel holes quickly and accurately	Hard to line up the dowels accurately by hand
Lap		Quite easy to cut	Not very strong
Housing		<ul style="list-style-type: none"> Holds a shelf or divider securely in the middle of a carcass (frame) Pairs well with corner lap joints 	<ul style="list-style-type: none"> Can be tricky to cut neatly on a wide board Very accurate marking out and cutting required to ensure a shelf is exactly level
Mitre		<ul style="list-style-type: none"> Looks good because no end grain shows Good for picture frames 	Weak, it is only a butt joint at 45°
Mortise and tenon		<ul style="list-style-type: none"> A strong joint Good for joining a table or chair frame to legs 	Time consuming to cut by hand
Dovetail		<ul style="list-style-type: none"> A very strong joint – the dovetails lock together securely Good for a drawer front that will get pulled hard 	Very tricky to cut accurately by hand

Machinery

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

Digital design and manufacture

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

Shaping

Drilling

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



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

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

Use of a mortiser

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

Use of a bag press

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

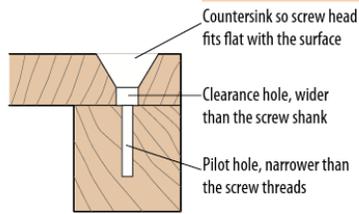


Figure 7.7.3 Drilling timber parts ready for a countersunk screw

Fabricating and constructing

Lamination

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

Veneering

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

Use of screws

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

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

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

Nailing

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

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

Adhesives

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

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

Scale	Description	Advantages	Disadvantages
One-off	One product made at a time, either for a specialist product or to test an idea	<ul style="list-style-type: none"> • No set-up cost • Made with existing equipment • Product can be customised to the user's needs 	Slow, so expensive to make several
Batch	Several copies of the same product are made at the same time	<ul style="list-style-type: none"> • Jigs, templates and moulds speed up the process and can be kept for future use • Special machinery is not needed, so set-up cost is not high 	<ul style="list-style-type: none"> • Labour intensive, so it is quite expensive per product • Takes time to make jigs, moulds and templates
Mass	Factory machinery set up to make lots of identical products	Can make a product quickly and cheaply	Machinery expensive to set up, so only worthwhile for making a lot of products
Continuous	Factory machinery making the same thing 24/7	Makes the product very quickly and cheaply	Machinery very expensive to set up, so only worthwhile for making huge quantities of a product

Jigs

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

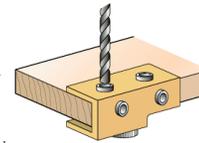


Figure 7.6.2 A drilling jig that has been clamped to the corner of the workpiece to get the holes in the correct place

Fixtures

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

Templates

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

Patterns

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

Sub-assembly

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

Computer-aided manufacturing

Computer-aided manufacturing (CAM) uses a computer to guide the cutters on a computer numerically controlled (CNC) machine. The product outline will be drawn on a computer-aided design package (CAD). The computer

sends cutting instructions to the CNC machine, which has cutters moved around by electric motors. This is very accurate and can operate 24/7. It has high initial costs and training is required for programmer.

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

Quality control

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

Working within tolerance

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

Efficient cutting to minimise waste

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

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

The purpose of a range of tools used for working wood

Tools and equipment

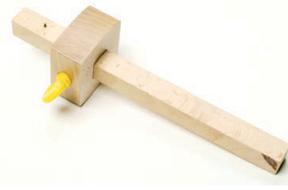
Hand tools

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

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



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



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

Name	Appearance	Use	Advantages	Disadvantages
Hand saw		Used to cut larger pieces of wood	Can cut long, deep cuts through big planks	<ul style="list-style-type: none"> Blade can bend, so it's important to saw straight Harder work than a power saw
Tenon saw		Used to cut smaller pieces of wood and accurate detail like joints	Stiffened blade makes it easier to make precise, straight cuts	Stiffened blade back means it cannot cut deeper than the blade, as the spine that keeps the blade stiff is thicker than the blade
Coping saw		Used to cut shapes out of thin wood and manufactured boards	<ul style="list-style-type: none"> Thin blade can go around curves Blade can be taken out and put through a hole to cut internal shapes 	<ul style="list-style-type: none"> Blade snaps quite easily Small teeth saw slowly
Scroll saw		Used to cut shapes out of thin wood and manufactured boards	Can cut fine, accurate details	Large pieces of wood cannot be cut with it
Jigsaw		<ul style="list-style-type: none"> The blade goes up and down Used to cut large thin pieces of wood clamped to a bench 	<ul style="list-style-type: none"> Can cut quite quickly Thin blade can cut curved shapes 	<ul style="list-style-type: none"> Difficult to cut straight lines Blade can wander in thicker materials

Name	Appearance	Use	Advantages	Disadvantages
File		A range of tooth sizes and shapes available	Good for smoothing and shaping the sawn edges of manufactured boards	Small teeth are quite slow on wood
Rasp		<ul style="list-style-type: none"> Large individual teeth Available in different shapes, usually flat, half-round and round 	<ul style="list-style-type: none"> Big teeth cut soft woods quickly Good for rough shaping 	Big teeth leave marks in the wood that need removing with a file or sandpaper
Surform		A frame holds the blade with pressed metal teeth, rather like a cheese grater	<ul style="list-style-type: none"> Good for rough shaping of soft materials Blade can be removed from frame and replaced 	<ul style="list-style-type: none"> Leaves a rough surface Hard work on harder woods

	Description	Advantages	Disadvantages
Painting	• A coloured pigment in liquid that dries out	• Available in a range of colours	• Covers up the natural wood grain
Staining	• A coloured liquid that soaks into the wood surface	• Makes a pale-coloured wood like pine a darker colour to mimic more expensive woods like oak or mahogany	• Does not look quite like another wood as the pine grain still shows
Varnishing	• A clear coating that dries to a shine	<ul style="list-style-type: none"> Gives a hardwearing finish that shows the grain of the wood Can be a high gloss or a matt finish 	• Can scratch or chip and expose the wood
Wax	• A soft solid that is rubbed into the surface with a cloth	<ul style="list-style-type: none"> Easy to apply Gives a plain, natural look 	<ul style="list-style-type: none"> Rubs away and needs reapplying Not a glossy finish
Oil	• Is rubbed onto the surface and soaks in	<ul style="list-style-type: none"> Good waterproofing for timber Vegetable oil on kitchen ware is non-toxic 	• Surface feels oily
Shellac	<ul style="list-style-type: none"> A cloudy liquid made from a resin secreted by a beetle Lots of layers are rubbed on and polished to create a finish called French polish 	• Traditionally used on expensive furniture for its glossy lustre	• Easily damaged by water and heat
Veneering	• A thin layer of wood glued onto the surface	• An expensive, decorative wood like mahogany can be put onto a cheaper wood like pine or chipboard	• The veneer is natural wood, so it still needs a finish applied

Planing

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

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

Chiselling

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

Turning

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

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.

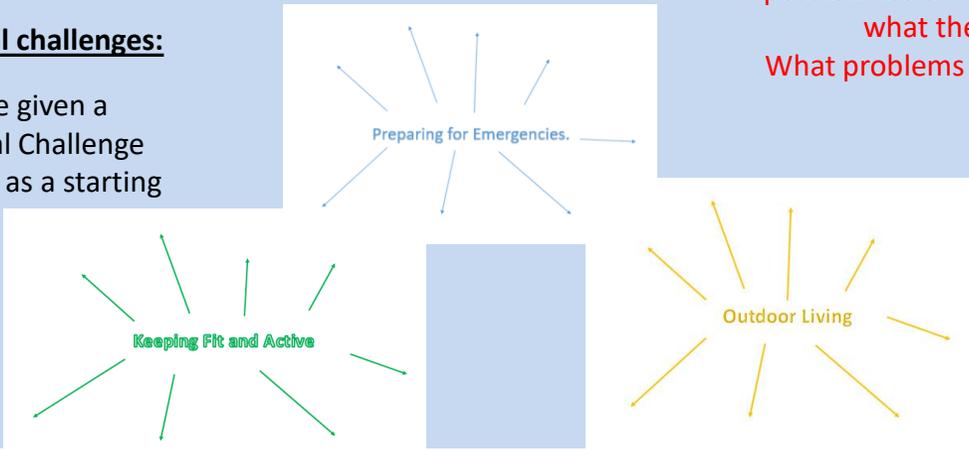


This icon is used to indicate which sections you have sought **inspiration** from other designers on.

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**.

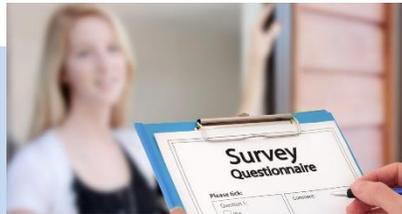
Customer/Client Profile:

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.

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.



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.

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

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.

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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?

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.

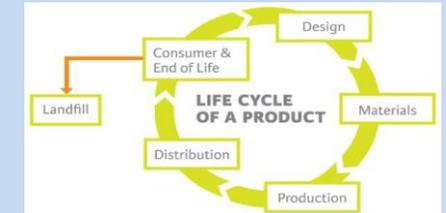


Think about the 6 R's of sustainability – explain how they can be incorporated into your product:

- 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:

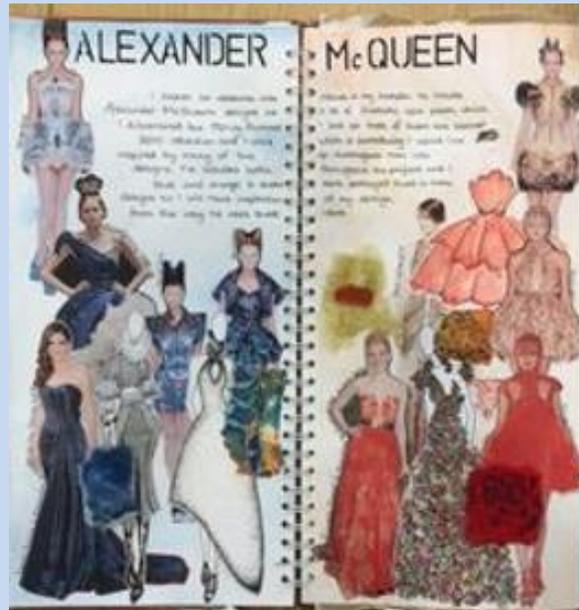
Use less material: *can you make things smaller, thinner lighter or with less parts?*

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.*

Be very aware of what is acceptable and what is not acceptable in society.

Issues with making products: Most people would prefer the products they want to be low cost and good quality.



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 have been made with chemicals that will damage the planet this will avoid ethical issues.
Life expectancy	My product should last around two years. If the client starts to skateboard a lot more and falls off more frequently, then the product might not last as long as a year.
Other information	The hoodie will be black. I want it to be black, because I have found out in my research that most skateboard hoodies are dark colours. I also want to make my hoodie black, because I want the white logo that I am putting on the front of it to stand out.

The statements in your SPECIFICATION need to be justified so you will need evidence that they are required and meet the needs and wants of the user/client.

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 needs to be long lasting, made from locally sourced materials 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

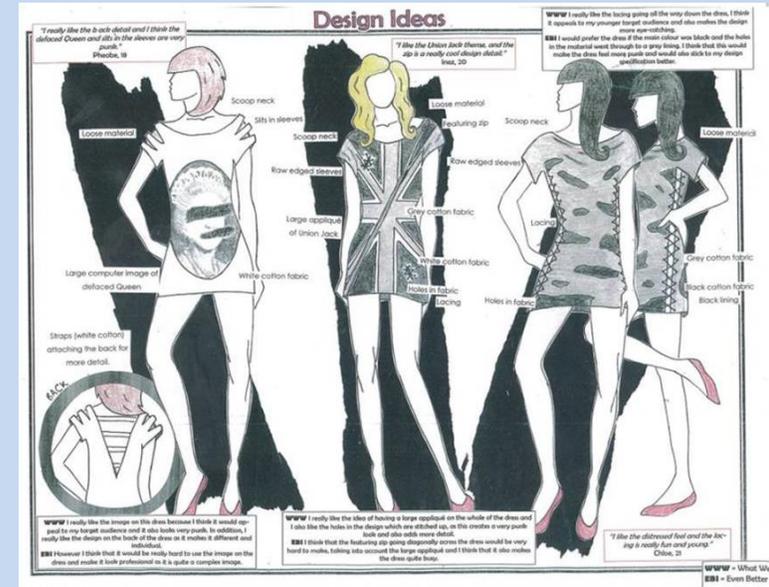
- Re-read your **DESIGN BRIEF**
- Look at your **RESEARCH**
- Re-read your **SPECIFICATION/DESIGN CRITERIA**.

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.



Evaluation

- Evaluate your idea making judgments about:
- How well will it work. Good points and bad points?
 - Are its aesthetics appealing to your clients?
 - How difficult will it be to make?
 - Will it be expensive, a reasonable cost, or cheap?

You will need three/four concept sheets.

Use the **Coursework guidance** to help you and always refer to the **coursework mark scheme** to make sure you are on track.

GENERATING DESIGN IDEAS concept two

You are expected to produce a range of imaginative, creative and innovative ideas some of which take inspiration from existing designs. A good design sheet will have a mixture of rough sketches, notes/annotations, better-refined sketches, evaluative comments and colour on it.



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.

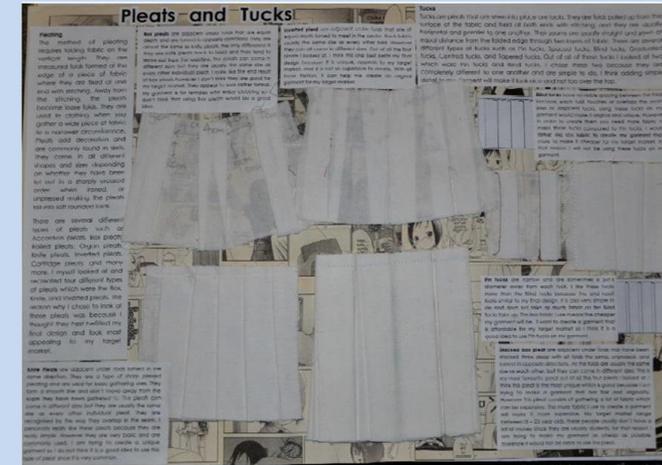
3. Development And Refinement Of Design Ideas

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?

AO2: Developing Design Ideas

4. Modelling Ideas

Produce a fully detailed model of your final prototype. The functionality, constructional detail and aesthetic appearance of your design should be finalised.



Use good technical knowledge and effectively use modelling to make quality refinements of your design ideas so that they fully meet the requirements of the design specification.

VIRTUAL MODEL

This iteration (the next improved version) of your design will be done through modelling – testing.

Produce a fully detailed model of your final prototype. The functionality, constructional detail and aesthetic appearance of your design should be finalised. Your model will be used to create a materials and equipment list, overall project cost and manufacturing specification. It is a massively important part of the project.



SCREENSHOT OF YOUR FINAL PROTOTYPE (FULL VIEW)



SCREENSHOT OF YOUR FINAL PROTOTYPE (EXPLODED VIEW)



SCREENSHOT OF YOUR FINAL PROTOTYPE (CROSS SECTION VIEW)

Feedback

Add some feedback from either your client or users at this stage. As well as positive comments it should include at least one thing that they think could be improved.

Use the **Coursework guidance** to help you and always refer to the **coursework mark scheme** to make sure you are on track.

5. MATERIALS AND EQUIPMENT LIST

MATERIALS AND EQUIPMENT LIST

Produce a list of materials, components, and other times you will use to make your product. Create a costings chart to show total cost of product.



INCLUDE AN IMAGE OF YOUR PATTERN ENVELOPE – FRONT AND BACK.



INCLUDE A LAYPLAN (LAYOUT) OF YOUR PATTERN PIECES.

Justification

Explain the purpose of the pattern, layplan and material list.

Summary

Comment on whether you feel the price is reasonable. What did your client specify? Have you been successful?

6. Final Design Idea

Present your final design idea. From your final design ideas:

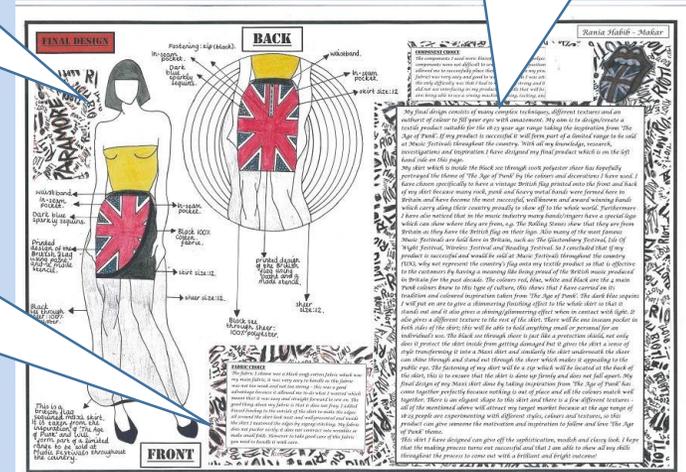
Choose the idea you want to make into a prototype and produce a presentation drawing or CAD image.

Make sure you get feedback from your client or end users regarding their thoughts on the chosen design.

Produce a list of materials, components, and other times you will use to make your product. Create a costings chart to show total cost of product.

Your modelling will be used to create a materials and equipment list, overall project cost and manufacturing specification. It is a massively important part of the project.

Make sure you have given consideration given to the materials, techniques and processes required to produce the chosen design.



AO2: Realising Design Ideas 7. Production of a prototype

You now need to start making the prototype of your final design.

Annotate all of your work.
 Explain what you did and importantly why you did.
 Say what went well, what went wrong and why

As you make your prototype take photographs to evidence the processes and techniques you use.

Include information on....
 Safety
 Quality control
 Material choices
 How you fixed problems

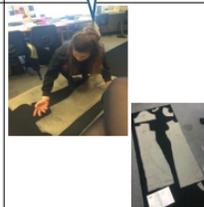
Part name - add
 Process used - add



Quality checks applied
 Describe the quality checks you did to check you had completed the task accurately / that it worked / looked good, etc. Name any checking equipment used, and focus on any tolerances applied.

Description of process
 Describe how you completed the work here naming the tools used.

Health & Safety
 Describe how you applied health and safety procedures to ensure the processes did not cause injury to you or others.

	Process	Photo	Equipment	Time	Health & Safety	Issues	How I made sure I produced a 'Quality' Product
1	I cut out pattern pieces I needed to make my dress		Felt tipped pen, paper scissors, pattern pieces	45 minutes			I selected the correct size for my TARGET AUDIENCE , I drew around the line I was cutting on in felt tip so that I made no mistake and cut out slowly and carefully.
2	I pinned down pattern pieces and cut them out in fabric (COTTON and VISCOSE) and interfacing.			1 hour & 15 minutes	I tied my hair back and worked in a clear area. I put equipment away after I had used it.		I pinned down making sure there were no creases which could alter the shape and size. I made sure that the GRAINLINE was parallel with the SELVEDGE of the fabric. I cut out all of the pattern pieces slowly and remembered to cut out NOTCHES on the patterns.
3			Needle, thread, fabric scissors, appropriate pattern pieces attached to its fabric	15 minutes	I tied my hair back and worked in a clear area. I put away NEEDLES and other equipment after I had used it.		I made sure that I had transferred all markings and that the loops were small and the ends were long on the TAILOR TACKING .
4	Using CARBON PAPER and a TRACING WHEEL , I marked on the DART pattern markings.		Carbon paper, tracing wheel, pattern pieces with its fabric attached	5 minutes	I tied my hair back and worked in a clear area. I put away needles and other equipment after I had used it. I used the TRACING WHEEL carefully as it is sharp.		

8. Finished Prototype

Summarise what you think of your work and how the final prototype meets the end user needs.

To get top marks ensure you produce a fully functioning prototype that fully meets the end user and meets the requirements of the specification.

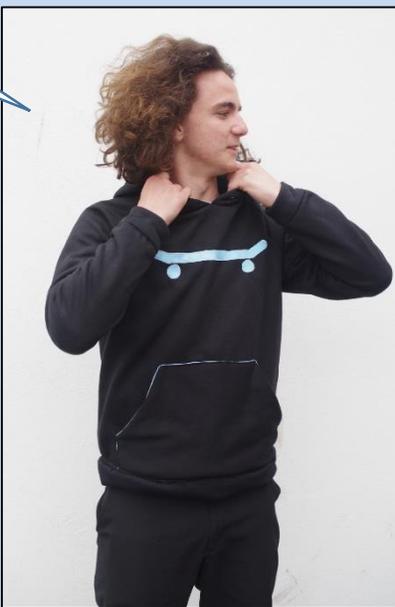
Annotate each photograph to include which tools were used and what features have been produced.

Make sure your prototype is accurately made and finished to a high quality.

Set-up and take at least one high quality presentation photograph.



Use the **Coursework guidance** to help you and always refer to the **coursework mark scheme** to make sure you are on track.



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

Chefs

Head Chef: The boss. The head chef is responsible for menu planning, food production, costing and purchasing, staff work rotas and training, hygiene of the kitchen and staff, stock control

Sous Chef - The Sous chef (sous=under in french) is directly in charge of food production, the minute by minute supervision of the kitchen staff, and food production

Pantry chef - aka garde manger - A pantry chef is responsible for the preparation of cold dishes, such as salads and pâtés

Pastry chef - aka le pâtissier - 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.

Key questions to check your learning for Learning Objective 1:

1. Recap what makes a business successful e.g. social media, prices of food, customer service and the atmosphere of the restaurant
2. What are the different salaries for jobs in the H&C industry?
3. What are the different types of service available?
4. What is the difference between commercial and non commercial?

Styles of service

TABLE SERVICE	COUNTER SERVICE	PERSONAL SERVICE
<p>Plate: Pre-plated meals from the kitchen. Can be a basic plated meal or a decorated nouveau cuisine style</p> <p>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</p> <p>Silver: Food is served by the staff using spoon and fork</p> <p>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</p>	<p>Cafeteria: A single long display counter but can sometimes be multiple counters</p> <p>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</p> <p>Fast Food: Takeaway with eat-in areas where customers collect food from one small counter</p>	<p>Tray or Trolley: An assembled meal provided or a choice of food and drink from a trolley</p> <p>Vending: Sold from a machine</p> <p>Home Delivery: Delivered to house individually or on a round</p>

Suppliers to the hospitality and catering industry:

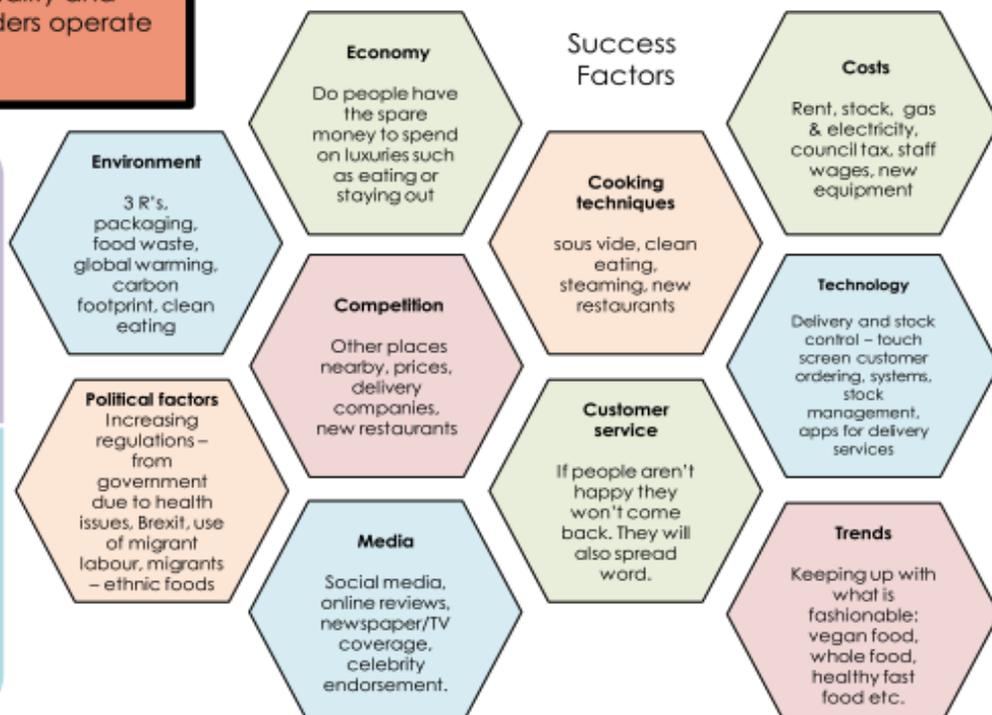
- Specialist markets – e.g. butchers, fish markets. Some deliver
- Local suppliers – local deliveries are better for the environment but might not have a wide selection of stock
- Equipment suppliers – provide equipment and appliances to the catering industry
- Large wholesalers – large quantities of stock, can buy premade and proportioned food but can be expensive
- Independent suppliers

Hotel job roles
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



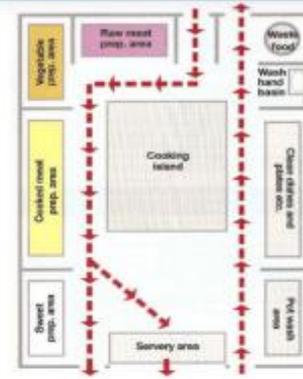
Kitchen

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

Front of House

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



Sous Vide



Blender



Oven



Hot plate



Bain Marie



Fryers



Blast Chiller



Percolator

Customer Rights

1. The right to be protected (against hazardous goods)
2. The right to be informed (about quality, quantity, allergies etc)
3. The right to have their complaints be heard
4. The right to seek redressal (compensation.)
5. the right to receive satisfactory goods that match their product description



POS Till Point



Grill



DRESS CODE:
White shirt
Formal trousers
Formal shoes
Apron
Tie



DRESS CODE:
Chef's jacket
Chef's pants
Hat
Neckerchief
Apron
Hand towel
Slip-resistant shoes

Key questions to check your learning for Learning Objective 2:

1. *What documentations are used in an establishment by law?*
2. *What is the workflow of a kitchen?*
3. *What are the different types of customers you may come across in an establishment and what do they require?*
4. *What are customer rights?*
5. *What is a correct dress code to have when working in a kitchen?*

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.

Key questions to check your learning for Learning Objective 3:

Can you recap all of the different health and safety requirements for each of these:

- HASAWA*
- COSHH*
- RIDDOR*
- Manual handling operations*
- PPER*
- What is a risk assessment?*
- What are security hazards?*

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 difuse 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

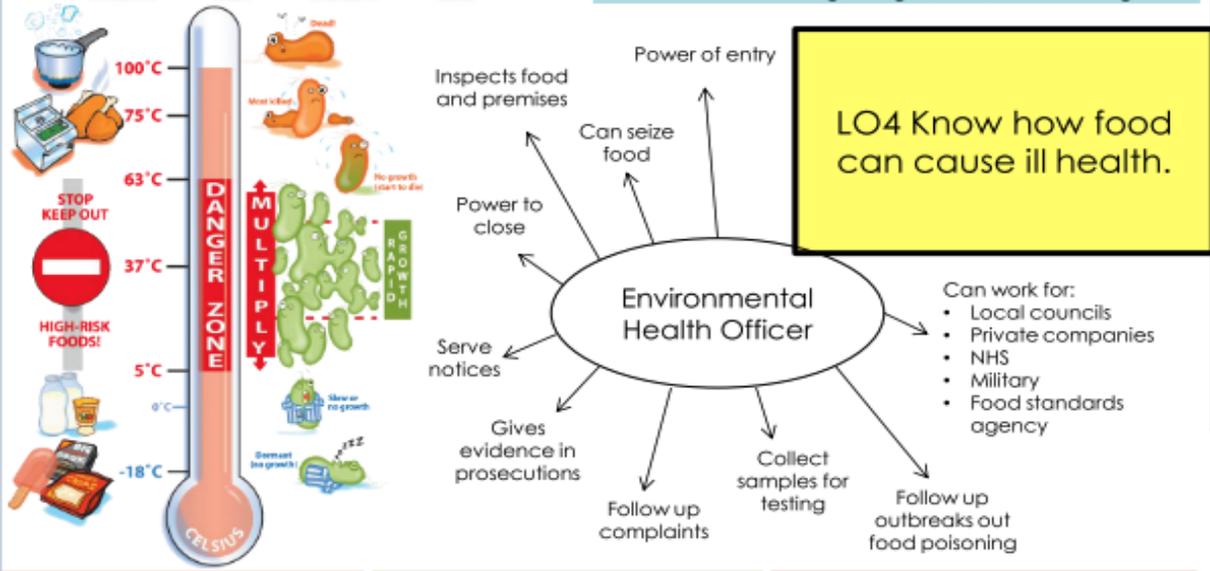
- Avoid milk and milk products
- Experience nausea, bloating, pain in the abdomen and diarrhoea
- Eat lactose-reduced products or alternatives such as goats cheese, soya milk, feta cheese, rice milk

Coeliac 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.

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

	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.

Key questions to check your learning for Learning Objective 4:

- Name at least 4 different types of food poisoning bacteria, give the symptoms and where they are found
- What does it mean to have an intolerance and what foods can this be for?
- What is the Food safety act?
- What are the food related causes of ill health?
- What is an allergen? Name some
- What is the danger zone?

Commodities - Fruit and Vegetables

Vegetables

Vegetables are classified according to which part of the plant they come from. Examples include fruit vegetables which are aubergines, tomato and cucumber or seed and pods which are peas and beans.

Fruit

Fruits contain a variety of vitamins and minerals, they are also a good source of fibre. Fruits are classified into groups. Examples are soft fruits such as raspberries and blackberries. Citrus fruits such as orange and lemon and tree fruits such as apples and pears.



Potatoes

Although potatoes are vegetables, a potato is actually a tuber. Tubers grow from the roots. In the Eatwell guide, potatoes are included in the starchy food section.

Farming Fruit and Vegetables

Intensive farming

Increase food production.
Pesticides, fertilisers are used to grow **high-yield** crops.

Organic farming

Natural food production with no chemical or synthetic treatments – **low yield**.
Natural compost and manure used as fertilisers.
GM-free
No evidence that organic food is more nutritious – it is a lifestyle choice.

Seasonal Fruit and Vegetables

Cheap
Good for the local economy reduces air miles and carbon footprint
Most nutritious



Nutritional Value

Carbohydrates- starch/sugar
Vitamin A (retinol for your retina_ in orange/yellow
Vitamin C – most - citrus fruit
Iron – green leafy vegetables
Dietary Fibre – found in the skins



Cooking Fruit and Vegetables

Colour: brightens but goes dull if overcooked

Flavour: flavour intensifies and sweetens as starch converts to sugar

Texture: softens due to starch degradation

Nutrition: water and fat soluble vitamins lost depending on method used so if you boil vegetables the vitamins B and C dissolve, if you fry then the vitamins A and D dissolve.

Avoiding Vitamin loss

Prepare close to time
Do not soak
Use as little water as possible
Cook quickly/short time
Use cooking liquid

Preserving

Freeze, dried, bottled, canned, MAP (modified atmosphere packaging)



Commodities – Dairy Products

Secondary processing

Milk is used to make a number of products during secondary processing.

These are known as dairy products

- butter
- cheese
- cream
- yoghurt



In the UK milk is supplied by dairy cows but is also available from sheep and goats. A dairy herd is usually milked twice a day.

Milk is the ideal substance for **bacteria** to grow in.

To **prevent food poisoning and extend the shelf life** of the milk, heat treatments are used. The **heat treatment** is carried out as soon as possible after the milk is collected.

Cream is the concentrated fat, which has been skimmed from the top of milk.

Types of cream:

Single cream

Double cream

Whipping cream

Clotted cream

Ultra heat treated (UHT) cream

cream

Flavoured cream – like

Chantilly cream

Cheese and yoghurt

Cheese and yoghurt are made from milk. Making milk into cheese and yoghurt is secondary processing. Bacteria are needed to make both cheese and yoghurt. These bacteria are called the starter culture, and are added to warm heat-treated milk. During cheese and yoghurt making, the starter culture causes the sugar in milk, called lactose, to turn into lactic acid. The acid gives more flavour to the cheese and yoghurt, and makes them last for longer.

Type of milk	Temperature, time and processing needed	Storage
Pasteurised	Heating milk to 72 degrees for 15 seconds. Most bacteria are destroyed.	In the fridge, use within 5 days
Sterilised	Heating milk to 110-130 degrees for 10 to 30 minutes. All bacteria are destroyed	At room temperature for about 6 months, once opened use within 5 days
Ultra- heat treatment (UHT)	Heating milk to 135 degrees for 1 second. All bacteria are destroyed	At room temperature for about 6 months, once opened use within 5 days

Nutritional value

Protein – HBV

Fat –depending on the type

Vitamin A and D – why does the amount of this depend on the amount of fat?

Calcium – for bones and teeth

Carbohydrate – Lactose



Commodities – Eggs

Types

There are many different types of eggs available in the UK:

- Hens
- Ducks
- Quails
- Geese.

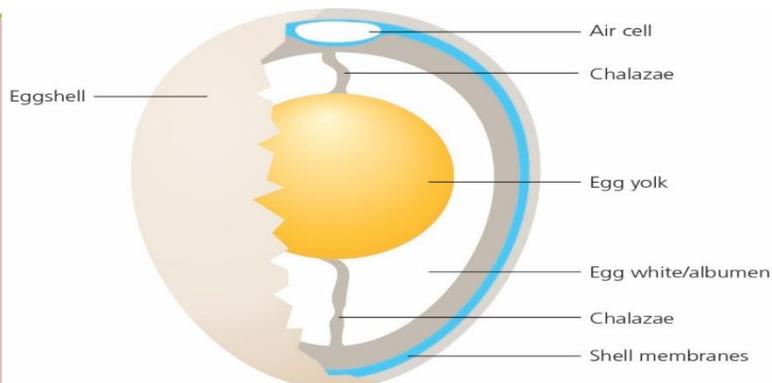
The most popular eggs we consume and use in food preparation and cooking are hens eggs.

Egg Production

Enriched cage production: Hens are kept in small, stacked cages in sheds to promote egg laying.

Free range eggs: This type of farming allows hens to walk around outside, scratch the soil and peck for food, sit up on perches and lay eggs in nests.

Barn eggs: Hens are allowed to roam freely inside, uncaged, and have perches to roost on.

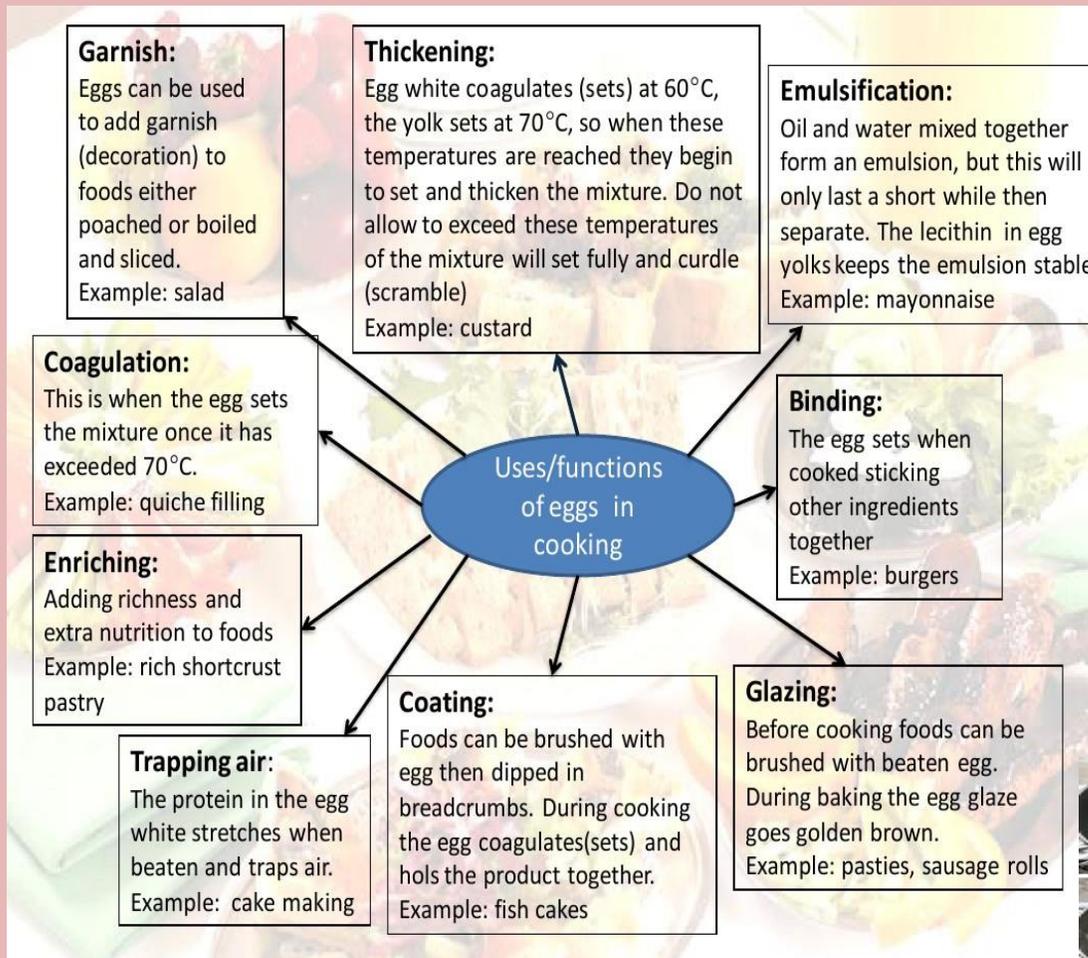
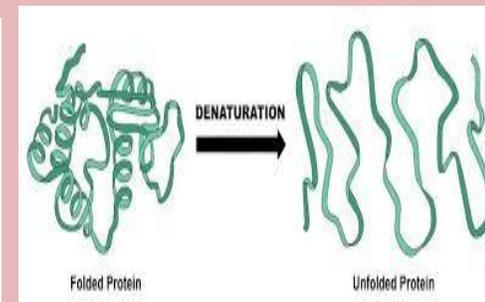


Nutritional Value

- Protein – in both the white and yolk.
- HBV
- Vitamins A, D and E in the yolk; B in the white
- Iron – in the yolk
- Fat – in the yolk
- Water – in both the white and yolk.

Denaturation of Protein

Many of the functions of eggs are related to the principle of denaturation – this is the unfolding of amino acid chains causing a change in the structure of proteins. This is why eggs change form liquid to solid when heated or are able to trap air when whisked



Coagulation



Aeration



Commodities – Protein

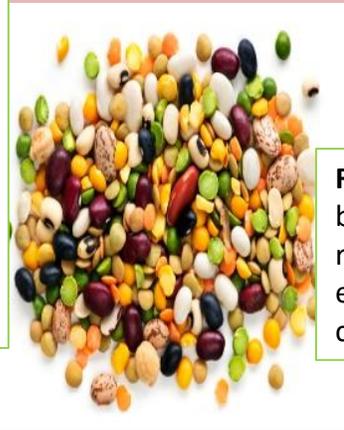
(Alternatives - soya, tofu, beans, nuts and seeds)

Soya

Soya beans are used to develop a textured vegetable protein to replace meat. Even though it is plant based it is HBV protein Low fat

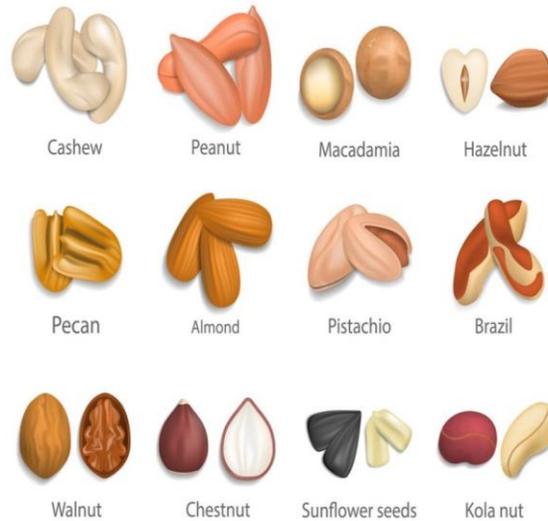


Tofu is a bean curd made from soya milk which has been curdled so it is solid. HBV protein and low in fat. Used in curries, stir fries and desserts



Reasons for use – versatile, health benefits, cost benefits (cheaper than meat), environmental reasons (reduces carbon footprint), moral and ethical issues around reducing meat consumption

Nuts are dry edible kernels within a shell. Nuts contain protein and fat, but the fat is unsaturated so it is good for us. Can cause allergic reactions so care needs to be taken



Seeds

We can eat the seeds of a wide variety of plants, they are a good source of vitamins and minerals. Examples include pumpkin, chai and sesame. They contain

Protein

B and E vitamins

Essential minerals such as iron and zinc



Legumes

A legume is a plant from the Fabaceae family, or the fruit or seed of such a plant.

When dried the seed is also called a pulse

Lentils, beans and chickpeas are examples

High in LBV protein

Good source of Vitamin D

Contains fibre



Beans are seeds from edible plants, they contain protein and are healthy because they are low in fat and high in fibre. Examples include broad beans, kidney beans and haricot beans. Beans contain some carbohydrates, LBV protein. B vitamins, Iron and Dietary Fibre

Commodities – Fats and Oils

Provides energy, insulates organs, source of fat soluble vitamins (A and D)

Saturated fats – animal fats – butter and lard

Saturated fats can increase cholesterol
Solid as they are saturated with Hydrogen molecules
Too much can lead to health problems

Unsaturated fats – plant fats/oils

Polyunsaturated/ monounsaturated, sunflower spread and olive oil

These can help to reduce cholesterol in the blood
Liquid as there are gaps in the molecular structure where hydrogen molecules are missing

Cooking with fats and oils

Adds flavour
Adds moisture
Adds fats
Reduces vitamin A and D
Browning



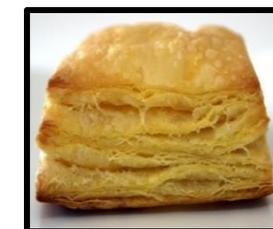
Cooking with oils

Dressings and Marinades
Used in some baking – moist results
Frying – lubricates
Roasting – keeps moist and lubricates



Cooking with fats – properties

Adds moisture
Plasticity – melts over a range of temperatures
Traps air – cake making
Shortening – pastry
Lamination – trapping air in flaky pastry
Enriching – mashed/jacket potato
Lubricating – frying and spreading on bread/toast



Healthy Fats

Fish Oil

Olive Oil



Cold-exPELLER-pressed plant oils

Such as grapeseed, walnut, sesame



Avocados



Nuts & Seeds



Olives



Coconut



Essential Fatty Acids

Omega 3

Fatty acids are found in oily fish and seeds help our brain function and may reduce the risk of heart disease

Omega 6

Fatty acids are found in foods such as chicken, nuts and vegetable oils, they help to reduce blood cholesterol and reduce inflammation

EAT

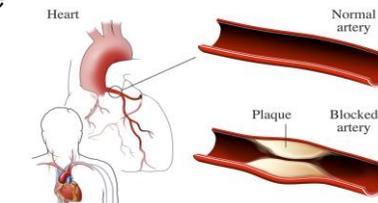


AVOID



Too much fat in the diet

Coronary heart disease
Stokes
High Blood pressure
Obesity
Joint problems
Psychological issues



Commodities – Sugar

Sugar Beet – grown in the UK



Sugar in Cooking

- Browns – caramelisation
- Aeration – with fat traps air
- Flavour – adds sweetness
- Delays staling – cakes
- Stabilises mixtures – egg whites
- Texture - Softens gluten in cakes



Non UK sugar is produced from sugar canes grown all round the world especially in hotter, wet climates such as India, Brazil, Thailand, China, USA, Mexico, Russia Pakistan and Australia



Types of sugar

All sugar ingredients are chemically named **sucrose** made from sugar cane or sugar beet

Sucrose is

- ✓ icing sugar
- ✓ caster sugar
- ✓ granulated sugar
- ✓ soft brown sugar
- ✓ demerara sugar
- ✓ molasses
- ✓ treacle and syrup



Too much sugar

Too much sugar can lead to tooth decay, weight gain, obesity, type 2 diabetes



Too little

Lack of sugar, not eating enough or problems with diabetic control can result in hypoglycaemia or very low blood sugar. It causes dizziness and fainting

Fairtrade

Sugar plantations run by small-scale farmers produce high quality sugar canes under Fairtrade agreements

Sugar Tax

Manufacturers get taxed if they make drinks containing too much sugar, it's called **The Sugar Tax**
The sugar tax pays for extra sport facilities in schools.

