The Trafalgar School at Downton

Knowledge Organiser

Year 10: Terms 1 and 2

Contents

Name……House……

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.	

Being Trafalgar

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

Language Methods to Practise in your Fortnightly Writing Challenge

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.
antithesis:	That's one small step for man, but a giant leap for mankind.
chiasmus:	'Let us never negotiate out of fear, but let us never fear to negotiate.'
emotive language:	Think about the poor, defenceless animals that suffer due to our rubbish!
experts:	'Group chat can often be a source of upset,' warned psychologist Dr Linda Pappadopolis.
extended metaphor:	*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.
foreshadowing:	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'.
imperative verbs:	Chill out! Do as I say! Don't eat the daisies! Please be quiet! Be quiet!
metaphor:	'The sun in the west was a drop of burning gold that slid near and nearer the sill of the world.'
modal verb:	You must be home by midnight. You could be tired if you're any later. E.g. mustn't, can, might, shouldn't, may, will etc.
pathetic fallacy:	In *Macbeth*, the night the King is murdered 'has been unruly ... in th' air, strange screams of death .... Some say the Earth was feverous and did shake.'
sensory description:	Wind swirled around the beach house, whistling loudly. He felt the snowflakes melting on his skin, their liquid trickling down his neck, cold, wet, seeping into his clothes.
simile:	Without warning, Lionel gave one of his tight little sneezes: it sounded like a bullet fired through a silencer.
statistics:	You only have a 20% chance of surviving a 60mph crash if you don't wear a seatbelt!
superlative:	This is the worst day of my life but at least we're in the finest café in London.
onomatopoeia:	The dog knocked over the vase with a crash!
personification:	Dancing on the water, the sun shone endlessly.
repetition:	'As my grandfather went, arm over arm, his heart making sour little shudders against his ribs, he kept listening for a sound, the sound of the tiger, the sound of anything but his own feet and lungs.'

COMMON MISTAKES

'I' versus 'me'

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

Boris Johnson and I shook hands.

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

The press took pictures of Boris and me shaking hands.

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

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

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

People can't lick their elbows.

their (shows ownership)

"Their" is like "our."

She is there already.

there (a place)

"There" is like "here."

They're all crazy!

they're (short for "they are")

"They're" = "they are"

Fortnightly Writing Challenge Year 10

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,

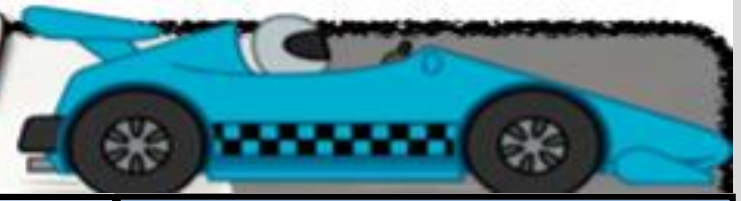
Meanwhile, Later that day, Seconds later, Subsequently, That afternoon,

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

Manage your online reputation — subtitles

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.

Privacy Matters

Make sure you set high privacy settings on 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.

effectively/fluently sequenced paragraphs

Writing Forms

....

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;

bullet points

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 [illegible] 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 — sub-headings

Today, before he even steps out on to the Centre Court for his Wimbledon semi-final against huge-hitting Pole Jerzy Janowicz, Murray will have been subject to several of these. He does this 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 partly be thanks to the bloke who inspects his wee.

introductory (overview) paragraph

fluently sequenced paragraphs

fluently sequenced paragraphs

Daily Diet

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

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.'

Thank you.

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

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 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 animals 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 allowing thousands of people per day to gawk at animals and spend far too much money on souvenirs and junk food. Zoos do not protect or help to repopulate animals, nor do they educate people on the specifics of these animals, and therefore should be abolished.

convincing conclusion

Writing a formal letter

writer's address

35 Hibiscus Crescent
Andover
Hants
SP10 3WE

221B Bakers Street
London
NW1 6XE

reader's address

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.

fluently sequenced paragraphs

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

Furthermore, ...

Yours faithfully
Boris Johnson

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

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 – a colour of burnt copper – and were battered and bruised through years of exposure to the elements.

Metaphor, simile, personification

sensory description

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

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, stroking the upholstery of the rotting seat as it passed.

sensory description

spatial discourse markers

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 f[illegible] 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

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.

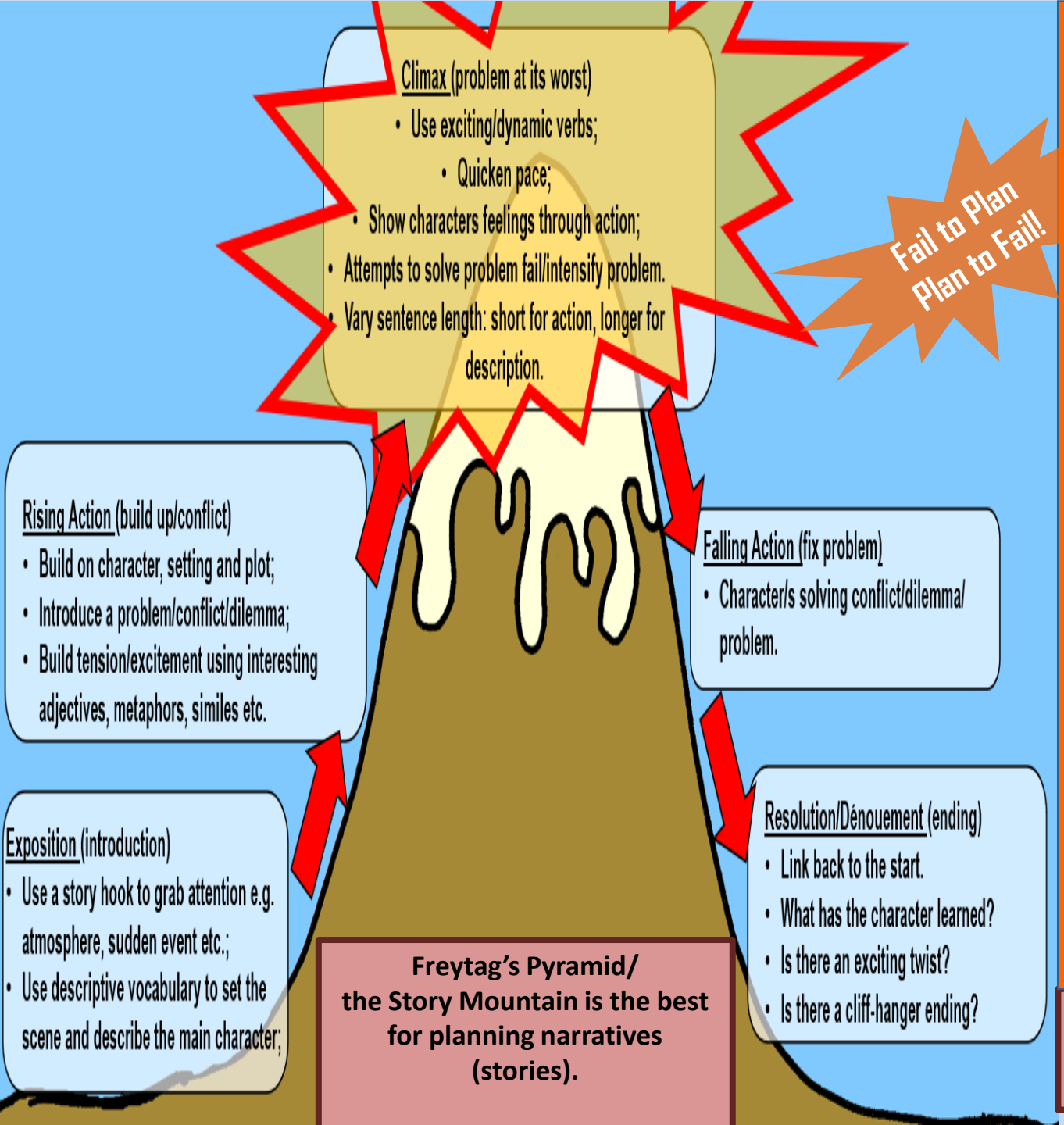
Of course she knew all about the communication-system. There was nothing mysterious in it. She would summon a car and it would fly with her down the tunnel until it reached the lift that communicated with the air-ship station: the system had been in use for many, many years, long before the universal 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.



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

P1

Form: Letter
Audience: Headmaster
Purpose: Argue change uniform

P2

P3

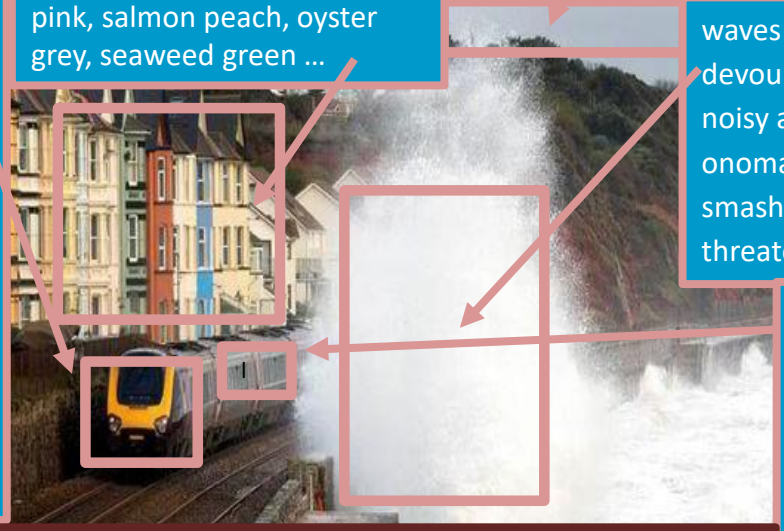
Counter: cost cheaper as not designer or from shops making huge profit
Argument: cost of blazers, trousers and skirts from school uni shop expensive as no competition, own clothes mix 'n' match so fewer outfits needed, wear weekends so more use,
Reasons to: emotive language: force poorer families to 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 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!

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.

1. Intro: Here you will find everything you need to know about buying a goldfish. Follow this advice to …
2. First of all, research the fishes needs and best fish breeds …
3. Next, decide where to put … bedroom could be best habitat for your fish because … However, it might be better to …
4. After this, it's back to the research. Make a list of … Don't …. Do …
5.

Linear flow and vertical charts are useful for planning writing that has to follow a step-by-step process. Each section/shape = a paragraph.

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!

Writing Purposes	Key Language/Structural methods	Chocolate Model!
Inform: tell the reader what they want/need to know.	➢ **Use interesting facts details;** ➢ **use brackets to explain technical terms.**	**Interestingly, chocolate** is actually made from the seeds of a cacao tree. After fermentation, the beans are dried, cleaned, and roasted. The shell is then removed to produce cacao nibs **(unadulterated chocolate in rough form).**
Explain: tell the reader how and why.	➢ **Use connectives: 'as a result', 'because', 'so that', when;** ➢ **use sequence discourse markers: Eventually, Another, Furthermore.**	**Often, when** in need of comfort or reassurance, or in stressful situations, people crave chocolate. Primarily, this is **because** dopamine is released into your brain **when** you eat chocolate, and **as a result** it can lower levels of anxiety ...
Describe: help the reader to picture it and imagine the experience.	➢ **Use similes, metaphors, personification, interesting adjectives/verbs, sensory description.**	**Enticingly,** the **dome** of **dark** chocolate**, flecked sporadically** with **lime slivers, remained encased** in its **fluted carapace. Around** the outside of it **cleaved** the **diminutive remains** of its **neighbour:** a **praline** long ago eaten**! Velvety smooth,** this **solitary bead** of **ganache glistened, revelling** in its **escape**, yet **mourning** its **rejection.**
Narrate: tell the reader a tale that will have them hanging on your every word.	➢ **Use the mountain/ pyramid structure;** ➢ **use some description;** ➢ **use a few lines of direct speech.**	**Suddenly**, she was aware she had arrived at her destination! On the door in front of her, a **scarlet square of shiny plastic printed** with the words 'Chocolate Laboratory' stood out on its **splintering wood**. **Why she was standing on this doorstep, though, and what, or who, had led her here in the first place?**
Persuade: try to get the reader to do as you ask/agree with you.	➢ **Use APE FOR REST: anecdote, personal pronouns, emotive language, fact, opinion, rhetorical questions, repetition, experts, statistics, triples.**	**One of** the **world's greatest comfort** foods, Chocolate, is **the unrivalled 'go-to'** when **life takes a bad turn**, an **easy gift** to **thrill** just about **everyone,** and a **tasty treat** that will **uplift even the most melancholy of moods.**
Argue: present two sides, but ensure your side appears strongest so reader agrees with you.	➢ **Use sequence discourse markers;** ➢ **use 'Some believe ..', 'However, most people would agree that';** ➢ **use APE FOR REST (above).**	**First of all, some believe that as chocolate** is high in calories, it is bad for you. **However, scientific experts have proven** that chocolate, as it contains high levels of antioxidants, could **lower cholesterol levels, improve mood and prevent memory decline**!
Advise: help warn and guide reader, but reassure with carefully considered advice.	➢ **Use imperative verbs (stop, do, don't, wait etc.), and modal verbs (if, could, might, should).** ➢ **use second person (you, your).**	**Most importantly, if you** are feeling bored and craving chocolate, **don't** give in to your yearning. Instead, **you could go** for a walk, **run** errands, **call** a friend or **read** a book. **If you** can take your mind off food for a short time, the craving **may** pass.

Most Often Misspelled words

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

Historical and Social Context of 'An Inspector Calls' by J.B. Priestley: set one evening in 1912, written/published in 1945, first performed in the UK in 1946.

Capitalism and **Socialism:** two main economic and political systems used in developed countries. **Capitalism** dates back to 1400 AD Europe. **Socialism** evolved in France during French Revolution (1789) and in Britain as a reaction against Industrialization (1700s-1800s): factory owners became wealthy, while many workers were often mistreated by them, lived in increasing poverty, working for long hours under difficult and sometimes dangerous conditions.

Capitalism:		Socialism:	
Traditionally a view of the conservative party (Churchill), Capitalism is a right-wring political belief in individual gain through hard work and a focus on profit. Capitalists accept that, for this to happen, there will always be people in society who are much better off than others.		Traditionally a view of the labour party (Clement Atlee, Priestley), Socialism is a left-wring political belief in greater equality and fairness for all, especially the poorest and most needy in society. Socialism creates equality by state/public ownership of money/capital and control of business, distributing wealth more evenly among the classes.	

In 1912 (year play set):

- Society divided into three rigidly fixed classes dependent on family background, wealth and education: Upper class – aristocracy (wealthiest, greatest political power: led opulent and leisurely lives); Middle-class: business owners, educated professionals (lawyer, doctor); Lower class: worked for middle and upper classes (servant, factory, shop).
- General belief of middle and upper class you look after yourself and your family only, and lower class poverty was caused by their laziness, drunkenness, and lack of morals.
- Few rights for workers, little support for unemployed, injury, illness, cost of medical treatment; millions of poor lived in city slums across UK; 2% London's poor were dying from cold; poor relied on help from charities, Government offering only the workhouse.
- Year for employee disputes after workers had appealed for social and economic reform unsuccessfully, for years: protests, riots, coal strikes, docks lying idle, garment workers walking out in their thousands.
- RMS Titanic was a British passenger liner that sank five days into maiden voyage (Southampton to NYC), after hitting an iceberg in North Atlantic Ocean, in April; approx. 1,500 people died (incl.130 first class, 166 second class and 536 third class passengers).
- Women treated as subservient to men; no social welfare system so many unemployed lower class women had no alternative but prostitution; upper class women also had few choices: most they could hope was to impress a rich man and marry him.

"An Inspector Calls" by J.B Priestley KNOWLEDGE ORGANISER

Historical and Social Context of 'An Inspector Calls' by J.B. Priestley: set one evening in 1912, written/published in 1945, first performed in the UK in 1946.

After WW1 (1914-19) and WW2 (1939-1945):

- Society recovering from two wars: they'd had to unite, rich with poor, old with young, man with woman; rationing further enforced equality, so people particularly open/desire to continue with social equality (treated equally) and social responsibility (looking out for each other).
- July 1945, Clement Atlee's Labour party won landslide victory in elections over Winston Churchill's Conservatives reflecting scale of enthusiasm for the social and moral reform and equality they offered.
- Women earned more valued place as had filled work roles of men: helped change perceptions about gender as men had to acknowledge women just as capable.

Priestley deliberately set 'An Inspector Calls' in 1912 as the year represented an era very different from the time he was writing it: rigid class and gender boundaries were now almost disbanded. Priestley wanted to make the most of these changes, so through his play, he encourages people to seize the opportunity to build a better, more caring society, rather than return to past inequalities.

John Boynton Priestley (1894 - 1984):

- Grew up in northern industrial town of Bradford, Yorkshire; socialist views formed here as noticed while many lived in poverty, city's respectable men folk could be smug, even hypocritical: pompously religious on Sundays, but on Saturday nights ill-using young women.
- Fought WW1; nearly died when buried alive by a trench mortar explosion, and later gassed.
- By 1930s, strong social conscience, troubled by effects of social inequality in Britain, and became actively involved in politics.
- Much of his writing was revolutionary and controversial; it included new ideas about possible parallel universes, and contained strong political messages.
- In 1942 he was a co-founder of new political party, the Common Wealth Party, which argued for public ownership of land, greater democracy, and a new 'morality' in politics. The party merged with the Labour Party in 1945, their mandate to create a 'welfare state' and a national health service, eliminating poverty.

Priestley's Dramatisation: Dramatic Methods

antagonist	a character who actively opposes main character; an adversary (Birling v Goole)
cliff-hanger	suspense at end of episode inciting anticipation about what will happen next
coup de theatre	(the peripeteia) a sudden dramatic turn of events
cyclical structure	ends as it begins (Priestley interested in theories about time: see themes)
dramatic irony	(commonly used in Greek tragedy), full significance of a character's words/actions is clear to audience/reader but unknown to the character
entrances/ exits	in AIC used for dramatic irony, propel story, amplify Inspector's image
everyman	a character who represents all ordinary men/human beings (Eva: everywoman)
foil	character whose function is to serve as a contrast to another character
linear structure	chronological order with beginning, middle and end (in that order)
props	a portable object used on stage (e.g. telephone)
subvert	undermine or challenge expected/r conventional
set and lighting 	highlight **themes** Priestley wanted to explore e.g. set in dining room (in 1912 only well-off would have one); **'substantial and heavily comfortable, but not cosy and homelike'** suggesting Birlings wealthy, live comfortably, but all show, not truly happy family

Act 1 Summary and Key Quotations

1. Set in1912, the play begins during a celebratory engagement dinner at the Birling residence: '**a fairly large suburban house**'.
2. Arthur Birling toasts the future marriage of his daughter, Sheila, to Gerald Croft (son of aristocrats Lord and Lady Croft), mentioning his hopes the marriage will enable his and the Croft's (rival) businesses to work together to '**lower costs and higher prices**'.
3. Sheila teases Gerald about his detachment towards her last summer. Arthur pontificates about the marriage being at a good time: '**passed the worst'** of the strikes**, 'there isn't a chance of war'**, time of great progression such as newly built Titanic, sailing next week, which is **'unsinkable, absolutely unsinkable'**.
4. After dinner, Arthur privately tells Gerald he's up for a knighthood, so Gerald can allay Lady Croft's fears he's marrying beneath him. He lectures Eric and Gerald on his belief one should '**look after himself and his own'** only – clearly rejecting ideas of socialism. The '***sharp ring of a doorbell***' interrupts his views.
5. It is Inspector Goole, who **'*creates at once an impression of massiveness, solidity and purposefulness***' and **'*speaks carefully, weightily*'.**
6. The Inspector states a girl named Eva Smith has committed suicide by drinking disinfectant which '**Burnt her inside out**'. He shows Arthur alone a photograph of her. Arthur admits employing Eva two years ago, she was a '**good worker**', but he dismissed her for being a ring-leader in a strike so he '**can't accept any responsibility'** for her suicide.
7. The Inspector explains Eva **'like a lot of young women'** in the country, had no relatives to help, **'few friends, lonely, half-starved'.** Due to a winter influenza outbreak, she secured a job at Milwards. After a very happy couple of months there, a customer complained, so she was fired. Goole then shows Sheila the photograph. She is shocked**, '*gives a half-stifled sob, and then runs out'.***
8. Sheila returns **'*distressed*',** confessing she had Eva sacked out of jealousy: a dress looked better up against Eva than on Sheila. She caught Eva smiling, thought she was mocking her, so told the manager she'd have her mother close their account if he didn't fire Eva. Sheila vows **'if I could help her now, I would'** and **'I'll never, never do it again to anybody'.**
9. The Inspector reveals Eva took a new name - Daisy Renton; Gerald is visibly '***startled***'. Sheila, alone with Gerald, questions him. At first he denies knowledge of the girl, but then admits it was where his attention was last summer! He thinks he can **'keep it from'** the Inspector. The '***door slowly opens and Inspector appears … Slow Curtain***'.

Characterisation: Character Profiles

Mr Arthur Birling is described as a ***'heavy-looking, rather portentous man'*** suggesting his affluent lifestyle. From the start of play, he comes across as arrogant, foolish and selfish:

- he makes political, social and economic predictions for the future that the audience know to be completely mistaken;
- he asserts a man should look out for himself, not wasting time with '**community and all that nonsense**';
- he brags he's a '**hard-headed business man … who knows what he's about',** who was **'Lord Mayor two years ago … still on the bench',** and up for a knighthood; he tries to use his status to influence others and evade the law, warning the Inspector Chief Constable Roberts is an old friend.

He doesn't learn any lessons: when it seems the Inspector might have been an imposter, he's overjoyed he'll retain his reputation, mocking others for being 'tricked' by the investigation. Priestley believed in socialism so he uses Arthur Birling to represent greedy businessmen, an example of the ills of capitalism, who only care for themselves, implying Eva Smiths of the world will continue to suffer if people like Birling remain in positions of power.

Sheila is the Birlings' daughter, in her early twenties. At the start of the play, celebrating her engagement, she's described as ***'very pleased with life and rather excited'.*** At first we get the impression she's a giddy, naïve and childish, but when the Inspector arrives she changes:

- she's shocked by the news of Eva Smith's death;
- she's deeply affected by and repentant of her own involvement in Eva's death, accepting responsibility at once, promising to never behave in such a way again;
- she matures quickly, standing up to her parents, and showing she's insightful and intelligent: she grasps where the investigation is going, so tries to warn others.

By the end of the play she has grown up and realises your actions can have grave consequences. Sheila, like Eric, allows Priestley to show his opinions on youth: he felt there was hope for the future in the young people of post-war Britain, viewing them as the ones who would help solve the problems the country had with class, gender and social responsibility.

Act 2 Summary and Key Quotations

1. In Act 2, the same setting, the Inspector tells Gerald and Sheila a girl had died that night '**in misery and agony – hating life**'.
2. Sybil enters and fails to see why they should be trying to understand actions of **'Girls of that class'.** Sheila warns her not to act complacently or **'build up a kind of wall between us and that girl**'.
3. Sybil admits Eric, who's **'only a boy**', drank too much at dinner. Sheila and Gerald shock her revealing **'he's been steadily drinking too much for the last two years**'.
4. The Inspector questions Gerald, who reluctantly concedes he knew Daisy; '***distressed'***, suddenly realizing **'she's dead',** he recounts how he rescued her in the theatre bar from the lecherous Meggarty '**one of the worst sots and rogues in Brumley**'. Mrs Birling is '***staggered***' by this description of an Alderman they know.
5. Gerald put Eva up in a friend's set of rooms; she became his mistress. He's embarrassed by his indiscretion, maintains his concern for Daisy was genuine, but eventually ended it, insisting on giving her money **'to see her through to the end of the year**'.
6. The Inspector tells him according to her diary, in September, she went to a '**seaside place**' for two months **'to make'** the memory of their affair **'last longer**'.
7. Sheila gives Gerald back the engagement ring, telling him they're '**not the same people who sat down to dinner**', they'd '**have to start all over again, getting to know each other**'. Gerald tells the Inspector he's going for a walk but will return.
8. Sheila queries why the Inspector didn't show Gerald the photograph. He insists Sybil see it. She immediately lies, saying she doesn't know the girl. Sheila begs her mother to tell the truth.
9. It's revealed that in her role as a member of the Brumley Women's Charity Organization, two weeks ago, Sybil refused to give Eva money because she pretended to be called 'Mrs Birling' and she '**didn't like her manner**'; Sybil states she used her '**influence to have it refused'.** The Inspector reveals Eva needed money as she was pregnant. Sybil told Eva to make the father '**responsible**' but Eva claimed she couldn't take the father's money as it was stolen. Sybil asserts Eva was **'claiming elaborate fine feelings and scruples that were simply absurd in a girl in her position'.**
10. Pressured by the Inspector, Sybil, who'll '**accept no blame for it at all',** insists the father should shoulder all responsibility for Eva's death and be **'compelled to confess in public'.** Suddenly, the Birlings realize who's the father of Eva's baby! '***Eric enters … the curtain falls slowly***'!

Characterisation: Character Profiles

Gerald Croft, about thirty, is the ***'easy well-bred young man-about-town***'. He's an aristocratic heir to a rival business, Crofts Ltd. At the beginning of the play he appears confident and charming; this changes after his secret affair is revealed:

- his outlook on life and business mirror Birling's: he agrees with Eva's dismissal and says the Crofts '**would have done the same thing**';
- he's acted immorally, given in to lust, having an affair (although at the beg. of the 20th Century it wasn't uncommon for upper class men to have a mistress), and when caught out initially tries to deny it to Sheila, and then a Police Inspector;
- he seems to have rescued Eva from the Palace Bar out of genuine concern, and provided her temporary accommodation, stating he didn't do this in order to have an affair, but she did become his mistress; he says he '**didn't feel about her as she felt about me**', so after some months, when it suited him, he ended it.

At one point it appears he's developing some remorse: **'I - well, I've suddenly realised - taken it in properly - that she's dead';** the Inspector later says he: '**at least had some affection for her and made her happy for a time**', but in the final act he's trying to get them all out of trouble, and says **'Everything's all right now, Sheila*. (holds up the ring)* What about this ring?'** suggesting he's learned nothing, inconsiderate of Sheila's feelings. It implies how ingrained attitudes to women and lower classes were in the upper class, and how difficult it was to change them. Priestley uses Gerald to attack the upper-classes, showing despite outward appearances and a privileged upbringing, they were capable of very questionable behaviour.

Mrs Sybil Birling, Arthur's wife, in initial stage directions is described as '***rather cold***' and '***her husband's social superior***'. From the outset we get the impression she's an unfeeling, haughty snob despite (we later find out) being a prominent member of the local women's charity:

- throughout dinner she tells Sheila and Eric off for slips in social etiquette, whilst blind to her son's drinking, ignorant of his long-standing drink problem and of the world around her: Alderman Meggarty; **'scruples…simply…absurd'** for '**Girls of that class**';
- she's unsympathetic of Eva's situation and refuses to take any responsibility for her suicide: '**I accept no blame for it at all**'.
- her cold, uncaring nature leads to her downfall as the Inspector forces her to unknowingly condemn her own son; her own children are disgusted by her lack of compassion for a pregnant, destitute lower-class girl.

By the play's end, Priestley shows she clearly learned nothing, and so is typical of an older generation who he believed couldn't accept responsibility, cared only for themselves, and were unwilling to change. He uses Sybil as a contrast to the future welfare state: in 1912 rich people like her decided, with their own prejudices, who deserved welfare and who didn't.

Act 3 Summary and Key Quotations

1. Eric confesses: very drunk one night in November, he met Eva, followed her home, and forced himself on her as he '**was in that state when a chap easily turns nasty'.**
2. A fortnight later they began a relationship; she fell pregnant. He offered to marry her but she refused as he '**didn't love her**'. He stole money from his father's company to support her.
3. The Inspector reiterates the parts each of them played in the girl's death. Hearing his mother's role for the first time, Eric tells her '**you killed them both'.** The Inspector reminds Eric he used Eva as '**an animal, a thing, not a person**', and all of them that even though '**One Eva Smith has gone … there are millions and millions of Eva Smiths and John Smiths still left with us',** and **'We don't live alone. We are members of one body. We are responsible for each other'** but '**if men will not learn that lesson, then they well be taught it in fire and blood and anguish'.** He says '**Goodnight**' and leaves.
4. Arthur worries about public scandal, blaming everything on Eric. Eric and Sheila criticize their father for worrying about his knighthood and reputation when someone has died.
5. Replaying the Inspector's arrival, just after Arthur had declared they shouldn't take any notice of those **'cranks'** who tell us **'everybody has to look after everybody else, as if we were all mixed up together',** they suspect Goole's a fraud. Sheila and Eric point out their actions are still terrible, but their parents disagree!
6. Gerald, having bumped into a police officer on the street, returns and confirms their suspicions: there's no such person as Inspector Goole. Arthur verifies it by ringing the Chief Constable!
7. For Eric and Sheila **'the girl's dead and we all helped to kill her – and that's what matters'.** However, the Birling parents and Gerald try to acquit themselves from responsibility again, for Eva Smith's death, by arguing their actions may have been performed on four or five different girls, and Eva might not even be dead.
8. Gerald phones the hospital and confirms there's been no suicide. Arthur and Sybil are overjoyed. Eric and Sheila are appalled at them: **'You began to learn something. And now you've stopped. You're ready to go on in the same old way.'**
9. Just as Arthur jovially mocks his children for their over-seriousness, the phone rings ….

Characterisation: Character Profiles

Eric is the Birlings' son, in his early twenties. He's described as ***'not quite at ease, half shy, half assertive'***. In other words, he lacks confidence, although at points he tries to stand up to his father but is talked down. He is drunk at the dinner table and later it's revealed that he's been drinking too much for quite some time:

- he forced himself on Eva one drunken night;
- he had an affair with her, she became pregnant, so he stole money from his father's business to help her;
- he offered to marry her, but she refused him;
- he attacks his parents' behaviour and values in the final act, showing he can be assertive.

Like Sheila, he's grown up considerably by the end of the play, and the evening's events can be seen as his path to adulthood and responsibility. Through Eric, Priestley shows that immoral behaviour, excessive drinking and casual relationships can have consequences.

Priestley uses **Inspector Goole:**

- as his mouthpiece, representing Priestley's socialist views so Goole speaks up for working class (Eva), he makes selfish middle/upper class characters reflect and take responsibility for unfair treatment of them. In Goole's dialogue, Priestley uses the plural pronoun 'we', for Birlings, the singular 'I', creating clear contrast between Birlings' self-interest and Goole's/Priestley's humanitarianism: '**We are members of one body',** threatening if we don't take responsibility for each other, world doomed by '**fire and blood and anguish**'.
- to heighten drama: all his entrances, exits and dialogue used to create maximum tension: pausing, interrupting, repeating, shocking language: '**a burnt out inside on a slab**'.
- to impose control: on entering, physically controlling aura as ***'need not be a big man'*** but must create an ***'impression of massiveness, solidity and purposefulness'***, even silences unstoppable Birling at one point; controls flow of information to audience: supplying dates, filling in background; controls structure of play: deals with '**one line of enquiry at a time**', each revelation driving play a further step forward, revealing the '**chain of events**' in order, but deliberately swapping Eric for Sybil from the chronological order to expose her double-standards.
- to reveal all crimes: he's omniscient, shedding light ('***pink and intimate***' to '**brighter and harder**' as soon as he arrives) on family's moral offences; plays role of God, urging characters to repent, knows extraordinary amount: history of Eva and Birlings' involvement in it (Sheila tells Gerald, '**Of course he knows**') even though Eva died only hours ago.
- to add a haunting layer of mystery: by end of play, revealed he's not an Inspector, but not clear who he is as know little about him; name 'Goole' pun on 'ghoul' suggests supernatural/other worldly; fishing village near home town of **Bradford** suggests he's fishing out the truth. For Priestley, Goole's dramatic power lies in the audience's speculations over his possible identity.

Genre and Structure

Greek tragedy: (originated Ancient Greece – one of oldest literary genres)

drama with a moral lesson telling story of high ranking character destroyed due to hubris (selfish or arrogant actions).

Priestley constructs play using the three unities of Greek tragedy (set of structural rules that classical Greek dramas adhered to): Unity of time: play should take place in period of less than 24 hours; Unity of place: play should take place in single physical location; Unity of action: play should focus on one storyline with few/no subplots.

Perhaps he thought this structural simplicity would help audience to focus entirely on his moral lesson.

Morality play: (genre based on religious mystery plays of Middle Age)

sought to teach audience lessons focused on seven deadly sins: lust, gluttony, greed, sloth, wrath, envy and pride. 

Characters who sinned were punished but if repented could redeem themselves.

Priestley perhaps uses this structure to teach 20th century audience lessons about social responsibility; audience invited to enjoy judging characters but also question own behaviour. He would have hoped audience left theatre as better people.

Well-made play: (popular dramatic genre from 19th-century)

plot based on events that happened before opening of play; each individual act repeats same pattern; contrived (engineered for max impact) entrances, exits and props (such as letters) to increase suspense; plot based on withheld secret revealed only, at climax, which reverses **misfortunes** of protagonist.

Priestley perhaps uses this structure to manipulate audience: they don't know what happened to Eva Smith so each revelation about her treatment by characters adds drama, each one more shocking than last, building to climax. He subverts genre by including his twist at the end, a reversal of fortune: another inspector on way! The curtain falls; the audience is left stunned.

Crime thriller /The 'Whodunnit' (genre based around a

a murder/mystery that needs solving; audience receives clues about who's committed crime and enjoy trying to guess outcome before end; a highly competent detective investigates and interrogates suspects.

Priestley subverts the genre as centres around suicide not murder investigation; initially seems no clear suspect but soon revealed all characters are guilty for different reasons, so audience would be considering who is 'more' to blame for the suicide. Priestley makes audience question if they too committed similar 'crimes' to the characters.

Themes

Age: Priestley uses age to illustrate the differing attitudes in society at time. Older characters, Arthur and Sybil, who believe in only looking after themselves and their family, represent outdated way of thinking; younger characters, Sheila and Eric, represent modern attitudes towards caring about others in society.

Responsibility and Remorse: Priestley shows a family forced to reflect upon their actions and responsibility for a young girl's demise. Sheila and Eric at once admit responsibility and feel guilty; Arthur and Sybil refuse to accept responsibility or feel guilt; Gerald's acceptance/guilt doesn't last out to the end of the play!

Secrecy and Lies: Priestley exposes hypocrisy and dishonesty of upper and middle classes: Arthur ironically (magistrate) wants the scandal covered up, Sheila vengefully uses her family's status to get Eva sacked, Gerald cheated (like many men of his class), Sybil lied to the inspector about recognising the girl in the photograph, Eric hides his alcoholism, child, and embezzlement.

Class and Gender: Priestley reveals unfairness of class system using Birlings and Croft as caricatures of all the bad qualities he felt ruling classes had, and how the working class (Eva) were victims of it, not the drunk, lazy, immoral ones! He exposes gender stereotypes: women - protected, clothes obsession, vain; men serious business, can sleep around. He challenges this with his rebellious young female characters: Eva and Sheila.

Time: over 100 references to time in the play; Priestley fascinated with the notion of time having read P.D. Ouspensky's reincarnation theory (we're reborn to exactly same life, over and over, unless we are spiritually enlightened in a life, which allows us to escape cycle, and enter new life in which we don't make same mistakes) and J.W. Dunne's theory: past, present and future all happen at same time. Human consciousness experiences this simultaneously in linear form!

We never meet **Eva Smith** during the course of the play, her voice is never heard, but it's her death that dominates the plot. We learn about her through the Inspector, who's read a letter, and diary she kept, and infer through the incidences with the other character:

- Birling's factory: good worker, brave, strong willed, intelligent;
- Sheila at Milwards: beautiful, a sense of humour;
- Gerald relationship (Daisy Renton): victim, emotionally sensitive, empathetic;
- Eric relationship: honest, principled/moral, mature;
- Sybil: desperate and resourceful.

She's always referred to in a positive light by characters, suggesting she's better person than any of them, but Goole/Priestley never lets audience or characters forget her gruesome death. His final speech reveals Priestley's lesson: millions of Eva Smiths are being exploited and it must stop. Eva/Daisy may not be a single person, but as Sheila realises, she is an 'Everywoman' - a symbol of all working class exploited by the rich.

Year 10 Term 3/4 Working in 2D

Hegarty Maths: Perimeter 548-552; Area 553-559; Circle Measures 534-547

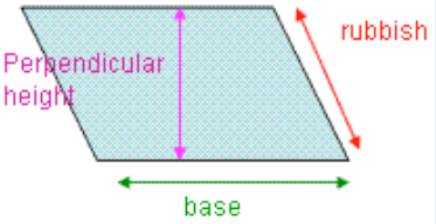
What do I need to be able to do?

- Use standard units of measure (mm, cm, m, km)
- Measure line segments and angles accurately
- Use scale drawings and bearings
- Know and apply formulae to calculate the area of triangles, parallelograms, trapezia and composite shapes
- Identify, describe and construct reflections, rotations, translations and enlargements
- Identify and apply circle definitions, properties and formulae

NEVER FORGET every time you work out an area, give your answer as SQUARED UNITS e.g. m^2, cm^2, km^2, mm^2 etc

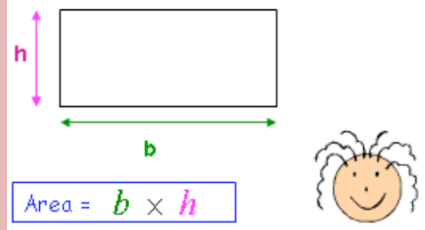
The Importance of Perpendicular Height

- As you will see, most of the formulas for area involve multiplying the base of the shape by it's height... but it's not just any old height!
- The height must be perpendicular to the base!



1. Rectangle

Hegarty: 554

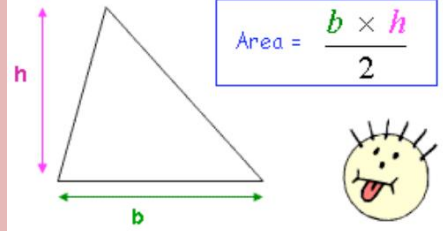


Area = $b \times h$

What to do: Multiply the base by the height!

2. Triangle

Hegarty: 557-8

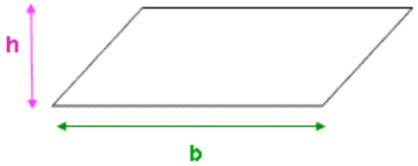


Area = $\frac{b \times h}{2}$

What to do: Multiply the base by the (perpendicular) height and remember to divide your answer by 2!

3. Parallelogram

Hegarty: 556

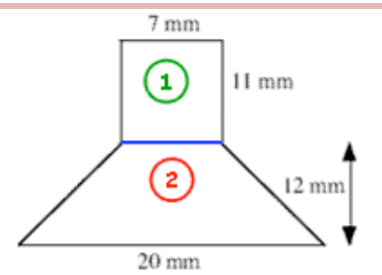


Area = $b \times h$

What to do: Multiply the base by the perpendicular height... definitely not the slanted height!

Compound Area

Hegarty: 555



I have chosen to split this shape up into a rectangle and a trapezium. It is also possible to split it up into rectangles and triangles. It is completely up to you!

1. Rectangle

Area = $b \times h$

Area = 7×11 = 77mm²

2. Trapezium

Area = $(\frac{p + q}{2}) \times h$

Area = $(\frac{20 + 7}{2}) \times 12$ = 162mm²

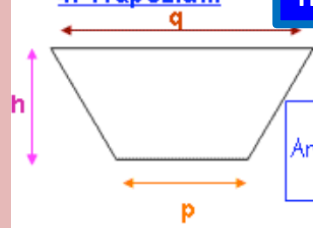
Total Area

77 + 162

= 239 mm²

4. Trapezium

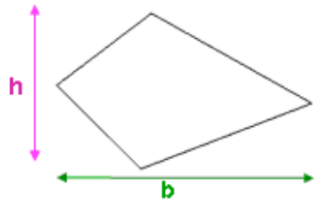
Hegarty: 559



Area = $(\frac{p + q}{2}) \times h$

What to do: Add together the lengths of your two parallel sides and divide the answer by 2. This gives you the average length of your base. Then multiply this by the vertical height!

5. Kite

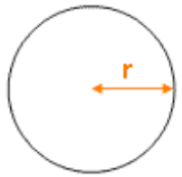


Area = $\frac{1}{2}b \times h$

What to do: The base and height in a kite are just the two diagonals from point to point... so multiply them together!

6. Circle

Hegarty: 539

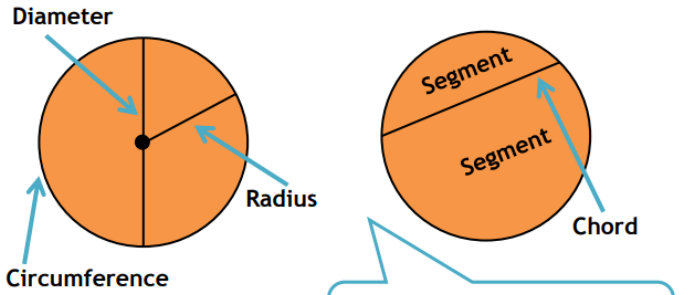


Area = $\pi \times r^2$

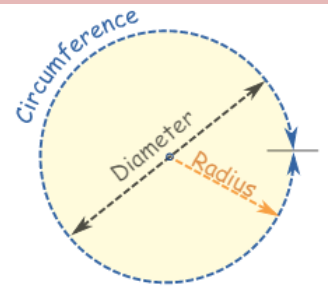
What to do: Find the radius of your circle (if you are given the diameter, just halve it!). Square the radius, and multiply your answer by pi!

The circle

Hegarty Maths: Circle Measures 534-547



Diameter = Double radius
Radius = Half diameter

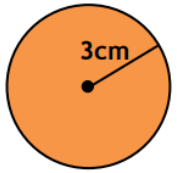


$\frac{\text{Circumference}}{\text{Diameter}} = \pi = 3.14159...$

Area: $A = \pi r^2$ | **Circumference: $C = \pi d$**

Diameter = Double radius Radius = Half diameter

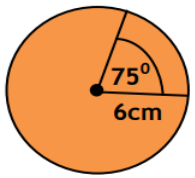
$A = \pi r^2$
$A = \pi \times 3^2$
$A = \pi \times 9$
$A = 28.3\ cm^2$
$(A = 9\pi\ cm^2)$



$C = \pi d$
$C = \pi \times 6$
$C = 18.8\ cm$
$(C = 6\pi\ cm)$

Sector area

$S = \frac{75}{360} \pi r^2$
$S = \frac{75}{360} \times \pi \times 6^2$
$S = \frac{75}{360} \times \pi \times 36$
$S = 23.6\ cm^2$
$(S = 7.5\pi\ cm^2)$



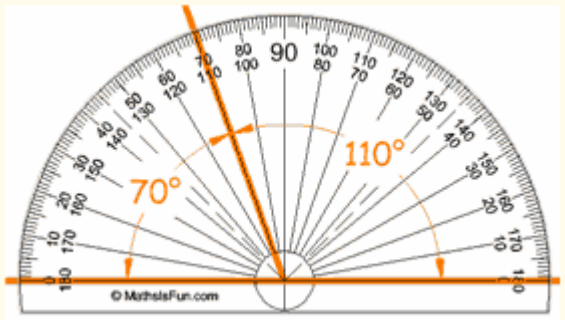
Arc length

$A = \frac{75}{360} \pi d$
$A = \frac{75}{360} \times \pi \times 12$
$A = 7.9\ cm$
$(A = 2.5\pi\ cm)$

An arc or sector is just a fraction of a whole circle

Measuring

Hegarty Maths: Angle Measures 455-461



Protractors usually have two sets of numbers going in opposite directions.

Be careful which one you use!

When in doubt think *"should this angle be bigger or smaller than 90° ?"*

Length

Hegarty: 691-694

We measure lengths in millimetres, centimetres, metres and kilometres

10mm = 1cm

100cm = 1m

1000mm = 1m

1000m = 1km

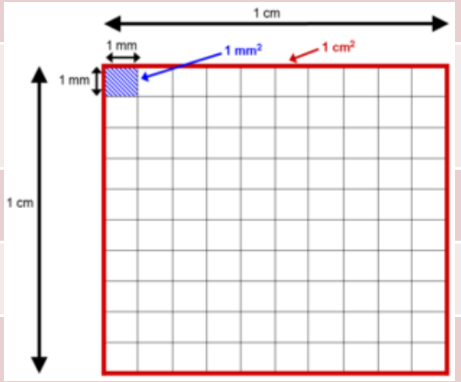
kilo (1000)
cent (100)
milli ($^1/_{1000}$)

Area

Hegarty: 700-701

Although there are 10mm in 1 cm, there are $100mm^2$ in $1cm^2$

$1cm \times 1cm = 1cm^2$



$10mm \times 10mm = 100mm^2$

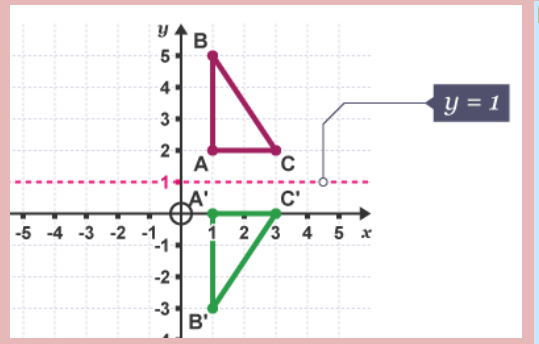
Transformations

Hegarty Maths: Transformations 637-658

Reflection

Hegarty: 639-641

A reflection is when you create a mirror image across a line. The image should be the same distance away from the mirror line.



Shape A'B'C' is a reflection of the shape ABC in the line y =1

Describing Reflections

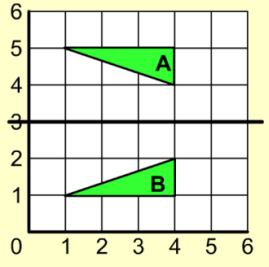
It a shape has been reflected, you must state it has been reflected and give the equation of the line it has been reflected in (mirror line)

Example: Describe the transformation of the shape A to shape B

Step 1: Find the equation of the mirror line

Equation is: y = 3

Answer is:
A reflection in the line y = 3

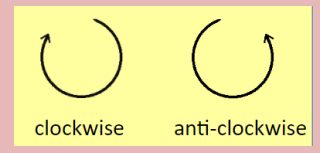


Rotation

Hegarty: 648-649,658

Rotating a shape means you are turning it around a point. You need 3 things:

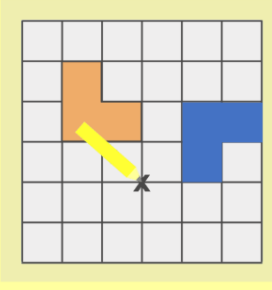
1) Angle of rotation
2) Centre of Rotation (usually a co-ordinate
3) Direction – Clockwise or Anti-clockwise

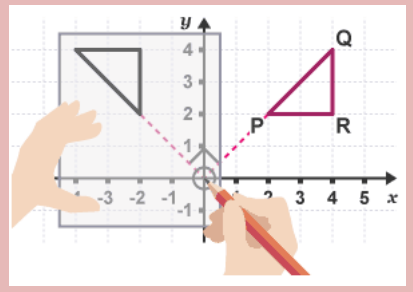


90° means a quarter turn
180° means a half turn
270° means a 3 quarters turn

Example: Rotate the shape 90 degrees about point marked x

Step 1: Place tracing paper over grid
Step 2: Copy the shape on the tracing paper
Step 3: Place your pencil on the marked point
Step 4: Rotate the shape
Step 5: Copy the shape onto the grid





Translation

Hegarty: 637-638

A translation is when you move or slide a shape without changing it in any other way.

Translations with Vectors

Vectors are used to describe translations

The top number tells you how far to move left or right

The bottom number tells you how far to up or down

A positive number corresponds to right/up and negative left/down

$\begin{pmatrix} -/+ \\ +/- \end{pmatrix}$

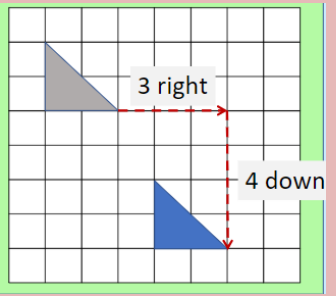
$\begin{pmatrix} 6 \\ 3 \end{pmatrix}$ means: right 6 and up 3

$\begin{pmatrix} -2 \\ 8 \end{pmatrix}$ means: left 2 and up 8

$\begin{pmatrix} 0 \\ -3 \end{pmatrix}$ means: left 0 and down 3

Translate Shape A by the vector $\begin{pmatrix} 3 \\ -4 \end{pmatrix}$

This means 3 right and 4 down

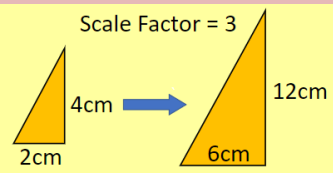


To describe a translation, you must state it has been translated and give the vector translation.

Enlargement

Hegarty: 643-647

An enlargement is when you change the size of a shape using a scale factor. The scale factor tells you how many times bigger the shape is.



Enlargements from a Point

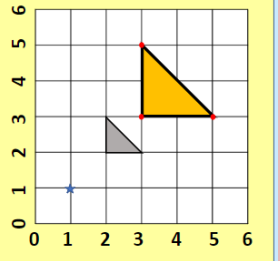
When a shape is enlarged from a point, the distance from the point is also enlarged

Example: Enlarge by a scale factor of 2 from the point (1,1)

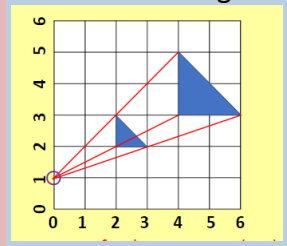
Step 1: Pick up a point and see how far away it is from the centre of enlargement

Step 2: Multiply the distance of both horizontal and vertical by the scale factor, and mark the new point

Step 3: Repeat for all corners of the shape **Draw the shape !**



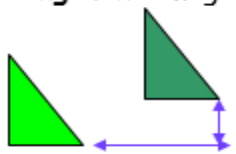
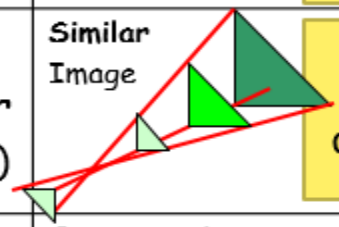
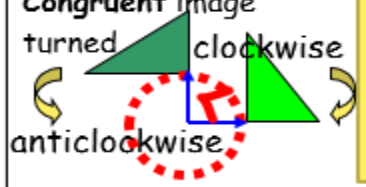
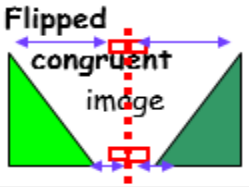
You can find the centre of enlargement by joining up the corresponding corners of the shapes. The point where the lines intersect is the centre of enlargement.



=(0, 1)

Remembering the details:
Transformation TERRACES: Translation; Enlargement; Rotation and Reflection
All produce CONGRUENT images EXCEPT Enlargement which is SIMILAR

Transformation TERRACES

Transformation	Effect	Needs…	Remember…
TRANSLATION	Moves	1) Vector $\begin{pmatrix}\text{horizontal movement}\\ \text{vertical movement}\end{pmatrix}$ (− ← → +; − ↓ +)	Congruent image in same orientation  Count movement from single point and then draw in shape
ENLARGEMENT	Grows or shrinks	1) Centre 2) Scale factor (as multiplier)	Similar Image  SF = NEW / OLD; >1 -> bigger; 0-1 -> smaller; <1 -> inverts
ROTATION	Turns	1) Centre 2) Angle 3) Direction	Congruent image turned clockwise anticlockwise  Use tracing for idea but check by counting squares
REFLECTION	Flips (Back to front)	1) Mirror line (perpendicular bisector)	Flipped congruent image  Horizontal y=… Vertical x = … +ve diagnl y = x -ve diagnl y=-x

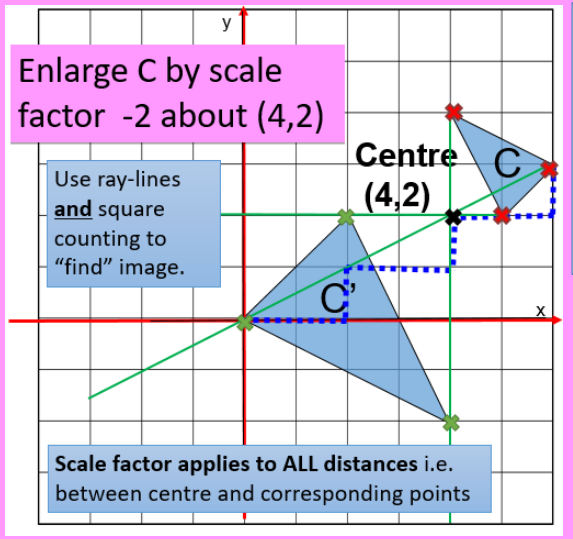
Combining Transformations:

Translation	**Rotation**	**Reflection** + rotation ➲ Reflection
T + T ➲ T	R + R ➲ R	Ref + Ref In parallel lines ➲ Translation
T + Rotⁿ ➲ Rotⁿ	R + T ➲ R	Ref + Ref In perpendicular lines ➲ Rotation

Hegarty: 656-657

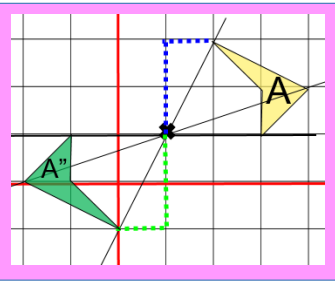
Enlarging by a **Negative** Scale Factor

A **negative scale factor** means that the image is INVERTED and on the OTHER side of the centre.



Enlarging by a Scale Factor -1

Has the same effect as **ROTATION by 180°** with the same centre



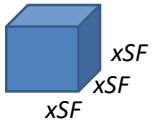
Effect of Scale Factor on Area and Volume

A scale factor is applied only to LENGTH

Its effect on area and volume will be magnified by the number of **dimensions** the scale factor is being applied.

For **AREA**: scale factor applied to length in **2 dimensions** **Effect is SQUARED**

For **VOLUME**: scale factor applied to length in **3 dimensions.** **Effect is CUBED**



For any similar object and image :-

Object ➲	Image
Length	x Scale Factor
Area	x Scale Factor²
Volume	x Scale Factor³

So to find the scale factor from …

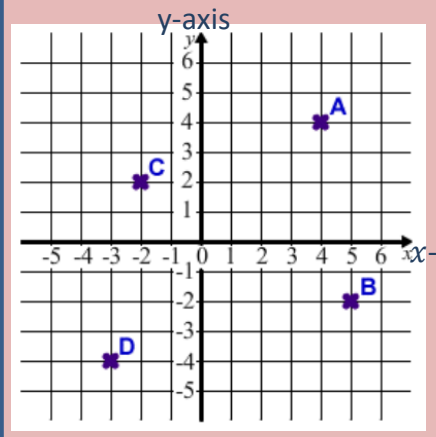
Area: $SF = \sqrt{\frac{Area\ Image}{Area\ Object}}$

Volume: $SF = \sqrt[3]{\frac{Volume\ Image}{Volume\ Object}}$

Straight Line Graphs

What do I need to be able to do?

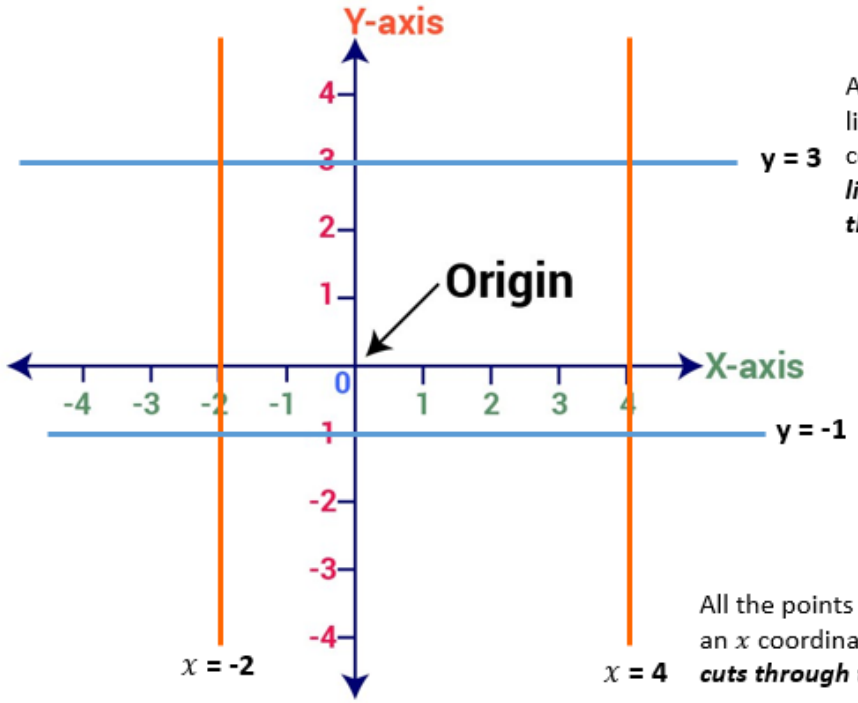
- Plot and read Cartesian Co-ordinates
- Identify and plot lines parallel to the axes
- Recognise the line y = x
- Understand what a gradient and y-intercept is
- Recognise a positive and negative gradient
- Give an equation of a line that is parallel to a given line
- Plot lines in the form y=mx + c
- Find the equation of a line



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

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

Hegarty: 199



All the points on this line have a y coordinate of 3. ***The line cuts through the y-axis at 3.***

All the points on this line have an x coordinate of 4. ***The line cuts through the x-axis at 4.***

Plotting a Straight Line Graph

Hegarty: Linear graphs 199-220

Every straight line has an equation in the form of:

$$y = mx + c$$

the steepness of the line — The **GRADIENT**

where the line cuts the y axis — The **y-INTERCEPT**

Suppose we want to plot the graph $y = 2x + 1$

We complete a table of values by substituting (replacing) the x values from the table into the equation.

E.g. When $x = 0$

$y = 2 \times 0 + 1 = 1$

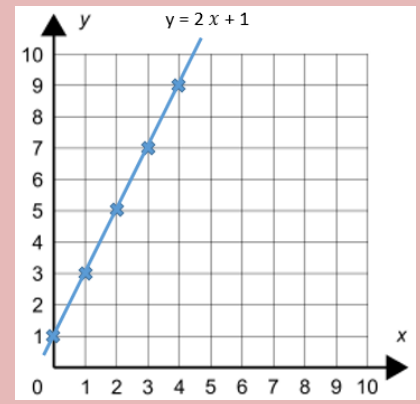
So the coordinate in the form (x, y) would be (0, 1)

Hegarty: 205

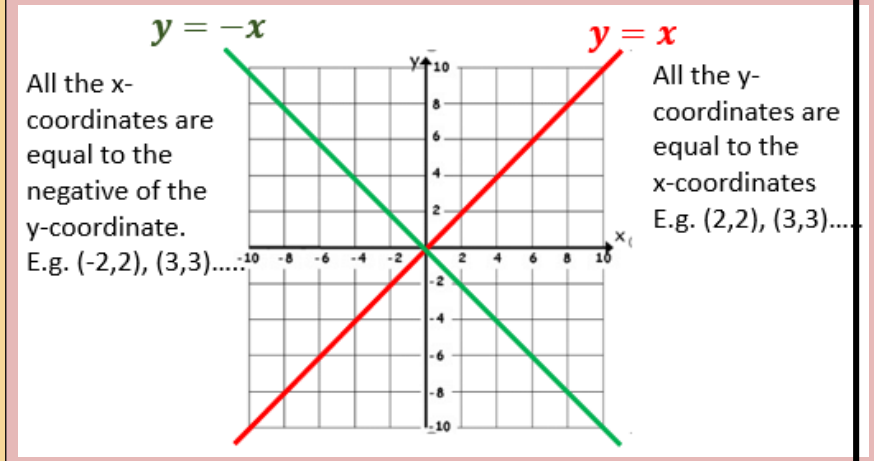
x	0	1	2	3	4	5	6
$y = x + 3$	1	3	5	7	9	11	13
	(0, 1)	(1, 3)	(2, 5)	(3, 7)	(4, 9)	(5, 11)	(6, 13)

We then plot these coordinates on the graph, join them with a straight line using a ruler and label the line with the equation.

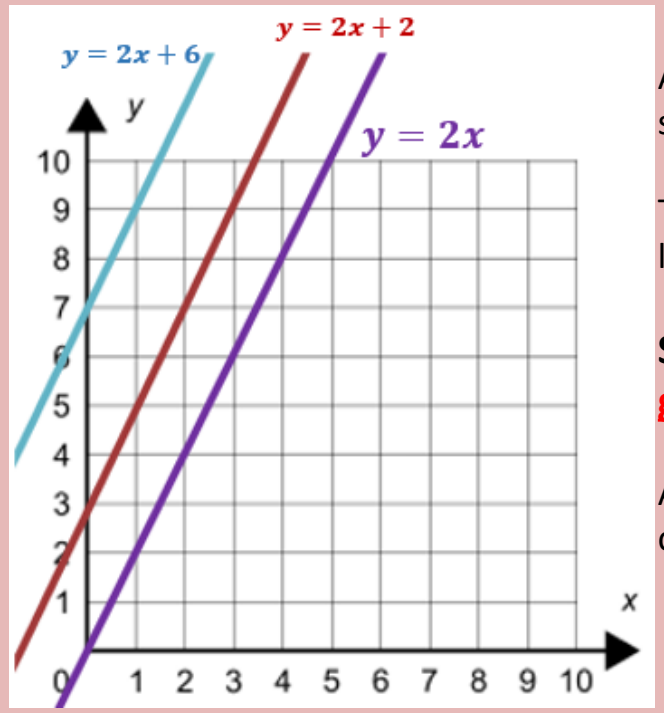
Notice the link between sequences: in this case you are finding the first 6 terms of the sequence 2n + 1



The gradient of the line y=$-x$ is -1. When the gradient is **negative**, the line slopes **down**.
The gradient of y=x is 1. When the gradient is **positive**, the line slopes **up**.
A line that goes straight across horizontally, has a gradient of 0.



Hegarty: 214



All these straight lines have the same gradient of 2.

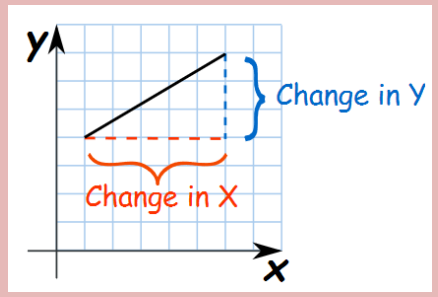
This means that for every unit the line goes across, it goes 2 units up.

So if two lines have the same gradient, they are parallel.

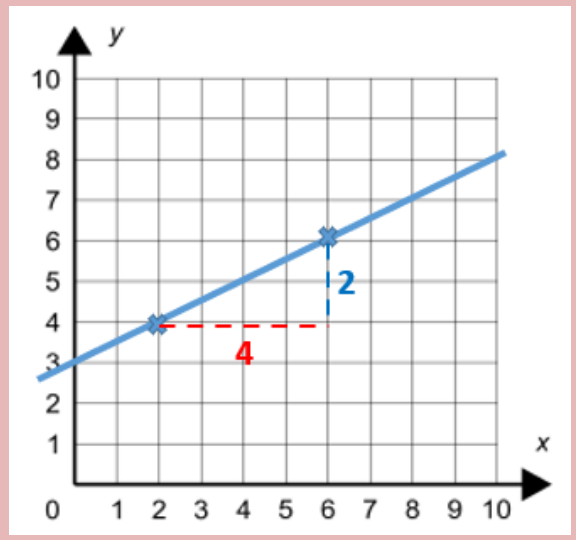
A line parallel to the line y = -5x + 7 could be y = -5x + 2

Finding the equation of a line from a graph

Gradient = $\frac{\text{Change in Y}}{\text{Change in X}}$



Hegarty: 201-204



To find the m (the gradient), pick 2 coordinates and draw a triangle. Divide the change in y by the change in x.

Gradient = $\frac{2}{4} = \frac{1}{2}$

This means that for every unit the line goes across, it goes $\frac{1}{2}$ a unit up.

The c, is where the line crosses the y-axis which is 3.

So the equation of this line is **y = $\frac{1}{2}x$ + 3**

When plotting graphs remember to:
Always label your axes 'x' and 'y'
Make sure your scale is even on your axes
Use a pencil and a ruler
Label your straight line graph

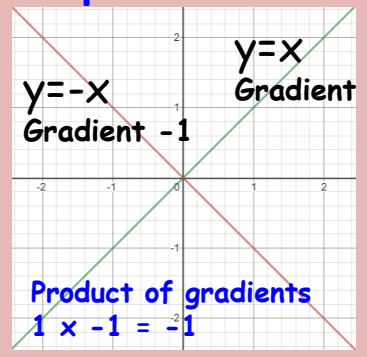
Key words
Axis/Axes (plural)
Origin – The point (0, 0)
Coordinates
Y-intercept
Gradient
Parallel
Plot

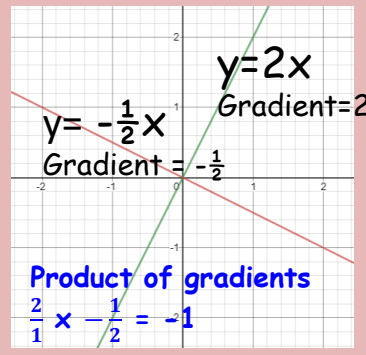
Parallel and Perpendicular Lines

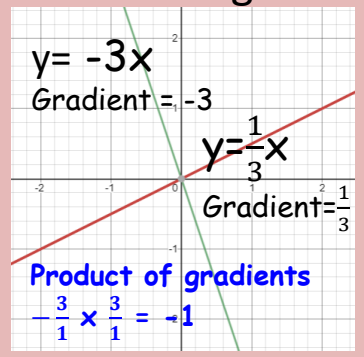
Hegarty: 214-216

Parallel lines will have the **SAME** gradient

Perpendicular lines have **NEGATIVELY RECIPROCAL** gradients







If 2 lines are perpendicular, the product of their gradients will be -1.

For any gradient ($^{m}/_{1}$), the perpendicular gradient will be ($-^{1}/_{m}$)

This means if you know a gradient, to find the gradient of its perpendicular, you need to (i) change the sign of the gradient and (ii) "flip the fraction"

Finding the equation of a line through a point

Hegarty: 206-213

Find the equation of a line **parallel** to **y=2x-1** and passing through **(3,4)**

Building from general equation of a straight line y=mx+c

Parallel lines have the same gradient → **y = 2x + c**

From given coordinate (3,4)

substitute known values **x=3**,**y=4**

→ 4 = 2x3 + c

→ Solve: 4=6+c (-6)

→ -2=c

Answer: y = 2x - 2

Find the equation of a line **perpendicular** to **y = 2 - 4x** and passing through **(8,3)**

General equation → y=mx+c

Perpendicular lines have negatively reciprocal gradients

so if m = -4; new gradient $-^{1}/_{m} = +¼$

→ **y = $-\frac{1}{4}$x + c**

… substitute known values **x=8**,**y=3**

→ 3 = ¼ x 8 + c

→ Solve: 3 = 2 + c (-2)

→ 1 = c

Answer: y = ¼x + 1

Finding the equation of a line through two points

Find the equation of a line passing through **(3,4) and (10,-10)**

Building from general equation of a straight line y=mx+c

Gradient = rise / run = difference in y / difference in x

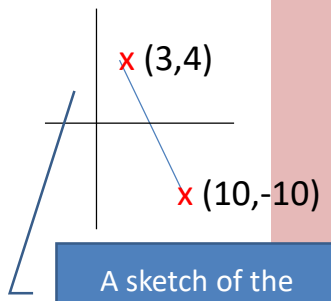
= (4 - -10) / (3 - 10)

= 14 / -7

= -2

Take care of SIGNS Always a subtraction problem… but if you minus a minus the effect is add

Keep the pattern of the coordinates the same in both calculations (3,4) and (10-10)



A sketch of the problem can help you visualise/check the of type gradient expected

Substitute in known coordinate: (3,4)

→ 4 = -2x3+c

Solve → 4 = -6 + c (+6)

→ 10 = c (+6)

Equation passing through points is y = -2x + 10

Find the equation of a line passing through (1.4) and **parallel** to the line between **(3,4) and (5,2)**

Gradient: rise / run = (4 - 2) / (3 - 5) = 2 / -2 = -1

Has same gradient → **y = -2x + c**

From given coordinate (1,4)

substitute known values **x=1**,**y=4**

→ 4 = -2x1 + c

→ Solve: 4 = -2 + c (-6)

→ -2 = c

Answer: y = -2x - 2

Find the equation of a line passing through (6,4) and **perpendicular** to the line between **(-2,-3) and (2,5)**

Gradient: rise / run = (-3 - 5) / (-2 - 2) = -8 / -4 = -2

Has negatively reciprocal gradient

so if m = -2; new gradient $-^{1}/_{m}$ = + ½

→ **y = ½x + c**

… substitute known values **x=6**,**y=4**

→ 4 = ½ x 6 + c

→ Solve: 4 = 3 + c (-3)

→ 1 = c

Answer: y = ½x +1

Representing Inequalities…

(i) …on a numberline

Hegarty: 265-266

Split double inequality into two: x > -4 and x ≤ 4 … the "arrows" from the two join to show the full range

Represent the following equations on a numberline

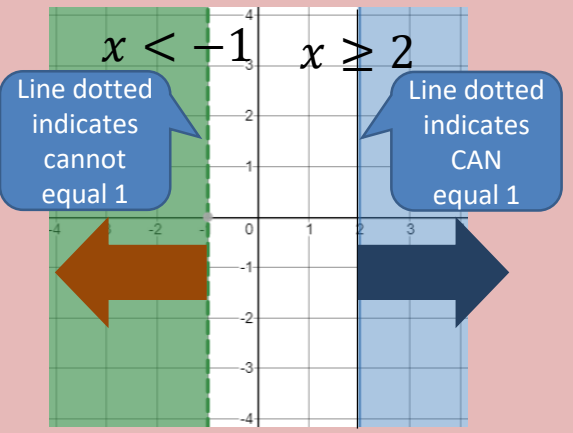
a) $x < -3$ b) $x \geq 2$ c) $-4 < x \leq 4$

Solid dots indicate the unknown can be EQUAL to that value; an "open" dot shows that the unknown can be greater (or less than) that value but NOT equal to it.

(ii) …on a graph

Hegarty: 273-76

Inequality graphs are plotted in the same way as equations
What is different is that the area "satisfying" the inequality is shaded … and the line joining points can be solid (greater/less than or equal to…) or dotted (greater than or less than but not equal to….)

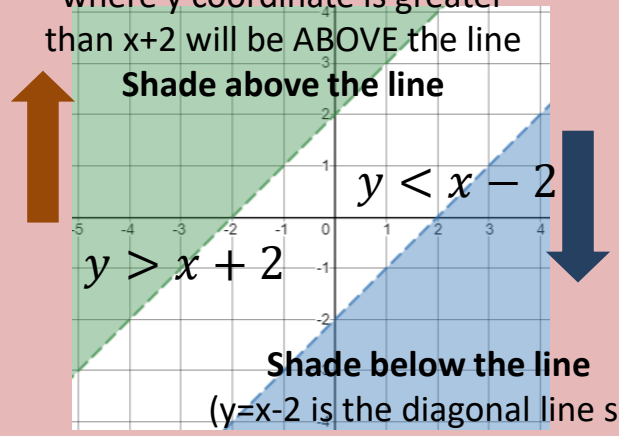


Area shaded where x coordinate is less than -1

Area shaded where x coordinate is greater than -1

(y=x+2 is the diagonal line so) where y coordinate is greater than x+2 will be ABOVE the line

Shade above the line



Shade below the line

(y=x-2 is the diagonal line so) where y coordinate is greater than x+2 will be BELOW the line

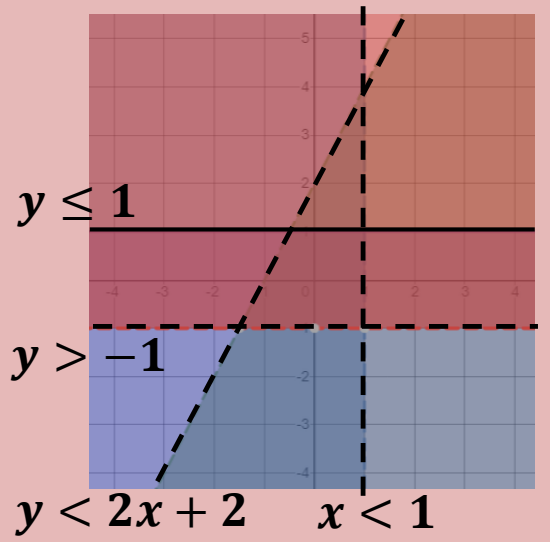
Problem Solving with Inequalities

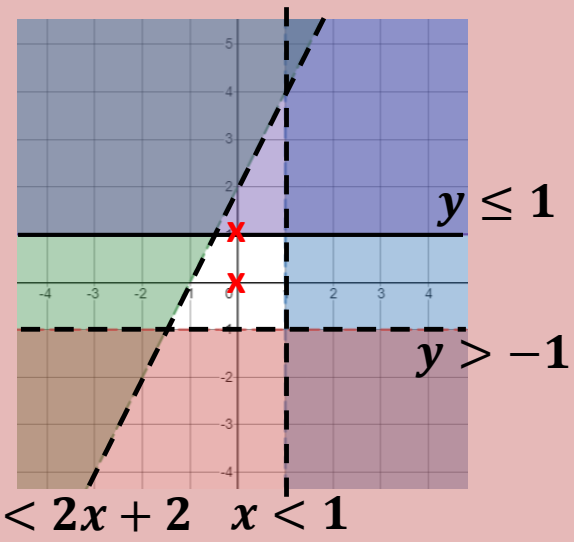
A common exam problem is to identify areas or coordinates which are true for a number of inequalities e.g.

"Find the region that satisfies these inequalities:

$y < 2x + 2$ $x < 1$ $-1 < y \leq 1$

Split double inequality into two: y > -1 and y ≤ 1





BOTH these graphs are representing the same inequalities… but it is much easier on the second to see the area that is true for ALL 4 inequalities… the clear unshaded trapezium in the middle. This is because if you SHADE THE AREAS NOT WANTED it leaves the wanted region clear!

Remember to pay attention to the notation of the lines with inequalities… if the question had been slightly different

"Find the **coordinates** that satisfy these inequalities:.."

It would be important to know whether coordinates lying on one of the lines would be "allowed" in the inequality or not. **(0,0) is a solution** being in the clear region, but all the all the inequalities are less than or more than **EXCEPT $y \leq 1$ …so the only point on a line which satisfies <u>all</u> criteria is (0,1)**

Solving Linear Equations

What do I need to be able to do?

- **Identify an equation as linear**
- **Understand algebraic notation**
- **Represent an equation as a function**
- **Identify inverse operations**
- **Solve single sided linear equations**
- **Solve double sided linear equations**
- **Solve equations involving brackets**
- **Solve equations involving fractions**
- **Solving inequalities**
- **Solve linear simultaneous equations**

Algebraic notation

Add and subtract? – depends on the sign IN FRONT of a term

Multiply? The × sign is not used in algebra (because it looks like x often used as an unknown number. If letters and numbers are written together remember there is a "hidden" times sign between them.

Divide? Algebra uses FRACTIONS to show divide rather than the ÷ sign

Recognising Linear Equations and Inequalities

Methods to solve equations depend on what type of equation it is … so recognising when an equation is linear is important

LINEAR equations only contain simple x terms

Examples:

2 step Linear	$2x + 5 = 11$
…with brackets	$5(x - 3) = 8$
Double sided Linear	$5x - 1 = 11x + 2$
…with fractions	$\frac{2x+5}{6} = \frac{x}{4} + 2$

If there is a term with x raised to any power the equation is not linear (a x^2 means the equation is QUADRATIC and x^3 means it is CUBIC

Inverse Operations

Every operation has an opposite which will undo its effect…

Add ⇔ Subtract	Multiply ⇔ Divide	Square ⇔ Square root
$+x \leftrightarrow -x$	$\times \leftrightarrow \div$	$x^2 \leftrightarrow \sqrt{x}$

Solving Linear Equations

Hegarty: 176-189

An equation explains a relationship – it is a number sentence where one element is unknown but the relationships around it are. When you are asked to **"SOLVE" a LINEAR equation**, you are being asked to find the **one value of the unknown** that means the number sentence is correct. To do this we can "unpick" the relationships around the unknown until we are just left with….

$x = (the\ number)$

Always aiming to get to this whatever you start with!

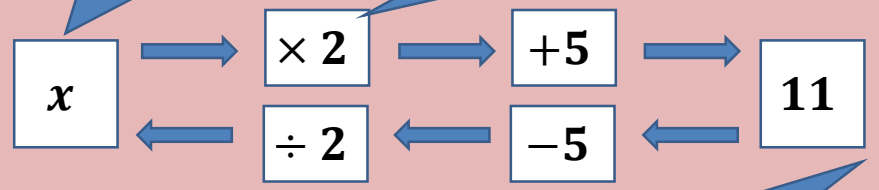
Understanding Linear Equations – Function Machines

If we need to "unpick" equations, to get to our final statement, we will need to understand how an expression is built up around x. A function machine is a good way to start….

Solve: $2x + 5 = 11$

REMEMBER: Algebra follows number rules… so think BIDMAS when working out which order the operations should appear

Always start with x



"Unpick" the problem by applying the inverse operation in the opposite order (working backwards from the previous "answer")

Workings: $x = (11 - 5) \div 2$

Solution $x = 3$

Solving Linear Equations

Hegarty: 176-189

Solving Linear Equations – Balance Method

Functions machines are good at understanding equations but cannot deal with all linear equation. The BALANCE METHOD can.
The principle that you want to "unpick" an equation from around x remains… you just need to remember whatever needs to be done to unpick one side of an equation, must be done to the other side also

Solving simple 2 step equations:

Solve: $2x + 5 = 11$ (-5)
$2x = 6$ $(\div 2)$
$x = 3$

Show workings i.e. what you are going to do to get to the next line…

Notice that these are exactly the same operations and order as identified in the function machine!

Check by substituting:
2x3+5 =11 ☑

As equations get more complex the principle remains the same… what do you need to do to unpick to get to "x=… " or in other words …
what looks horrible?… what's needs to be done to get rid of it?!

Solving Double Sided equations:

Solve: $5x - 1 = 11x + 2$
$5x - 1 = 11x + 2$ $(-5x)$
$-1 = 6x + 2$ (-2)
$-3 = 6x$
Just switched $6x = -3$ $(\div 6)$
$x = \frac{-3}{6} = -\frac{1}{2}$

What looks horrible?
"x" on both sides of equation
Fix? Get rid of one of them!
RECOMMENDED: REMOVE THE SMALLER UNKNOWN by adding or subtracting it (because removing the smaller will always leave a POSITIVE x term

Remember: Any division problem can be written as a fraction!

Solving Linear Equations – Brackets

Sometimes brackets can be dealt with using the function machine methods but if in doubt – **get rid of them by expanding!**

Solve: $4(x - 3) = 8$
$4x - 12 = 8$ $(+12)$
$4x = 20$ $(\div 4)$
$x = 5$

Check by substituting:
4(5-3) = 4x2 = 8 ☑

$3(x + 8) = 4 - 2x$
$3x + 24 = 4 - 2x$ $(+2x)$
$5x + 24 = 4$ (-24)
$5x = -20$ $(\div 5)$
$x = -4$

Check by substituting:
3(-4+8) = 3 x 4 = 12
and
4 -2x(-4) = 4+8 = 12 ☑

SMALLER unknown is negative… so ADD to remove!

Solving Linear Equations – Fractions

Sometimes fractions can be dealt with using the function machine methods but if in doubt – **get rid of them by multiplying through by denominator!**

Solve: $\frac{2x+5}{6} = 2$ (x6)
$2x + 5 = 12$ (-5)
$2x = 7$ (÷2)
$x = 3.5$

Solve: $\frac{2}{x} = 5$ (xx)
$2 = 5x$ (÷5)
$x = \frac{2}{5}$

After multiplying by the denominator:
- original numerator STAYS THE SAME
- ALL OTHER TERMS ARE SCALED UP

$\frac{3x-5}{2} + 1 = x + 2$ (x2)
$3x - 5 + 2 = 2x + 4$
$3x - 3 = 2x + 4$ (-2x)
$x - 3 = 4$ (+3)
$x = 7$

Solving Linear Equations

Checklist for Solving Linear Equations

"What don't I like in the equation?" | **How can I get rid of it?"**

FRACTIONS

$$\frac{2x+5}{6} = \frac{3x}{4} + 2$$

Rewrite all terms with a **common denominator**

$$\frac{2(2x+5)}{12} = \frac{9x}{12} + \frac{24}{12} \quad (\times 12)$$

Multiply all terms by denominator – numerators stay the same

BRACKETS

$$2(2x+5) = 9x + 24$$

Expand and simplify

DOUBLE SIDED

$$4x + 10 = 9x + 24 \quad (-4x)$$

Remove the smaller unknown first

So you will always end up with a positive x-term

$$10 = 5x + 24 \quad (-24)$$

REVERSE BIDMAS

$$-14 = 5x \quad (\text{switch so "x" is on left})$$

Unpick using reverse operations in the reverse order

$$5x = -14 \quad (\times 12)$$

NEED SOLUTION "1x=…."

$$x = -\frac{14}{5}$$

Remember all fractions are division problems - write final answer as a fraction if needed

Solving Linear Inequalities

Hegarty: 269-272

Linear **EQUATIONS** have an equal sign: $2x + 5 = 11$

There will be **1 solution** to the equation $x = 3$

Linear **INEQUALITIES** have an inequality sign

There will be a **RANGE of solutions** to the inequality depending on the sign:

e.g $x < 1$ …x can be anything as long as it is **less than** 1

$x \leq 1$ …x can be anything as long as it is **less than or equal to** 1

$x > 1$ …x can be anything as long as it is **greater than** 1

$x \geq 1$ …x can be anything as long as it is **greater than or equal to** 1

INEQUALITIES ARE SOLVED IN THE SAME WAY AS EQUATIONS

But you must remember

1) **Write the INEQUALITY** not an EQUAL sign
2) The inequality will be the **SAME as originally**

UNLESS

3) You have **multiplied or divided** by a **negative number**…. **MUST SWAP it round**

Solve: $2x + 5 < 11 \quad (-5)$

$2x < 6 \quad (\div 2)$

$x < 3$

Solve: $3x + 24 \geq 4 - 2x \quad (+2x)$

$5x + 24 \geq 4 \quad (-24)$

$5x \geq -20 \quad (\div 5)$

$x \geq -4$

Inequality stays the same for all operations…

12 < 30

14 < 32 (+2)

13 < 31 (-1)

52 < 124 (x4)

26 < 62 (÷2)

EXCEPT

12 < 30 (x -2)

-24 > -60

12 < 30 (÷ -2)

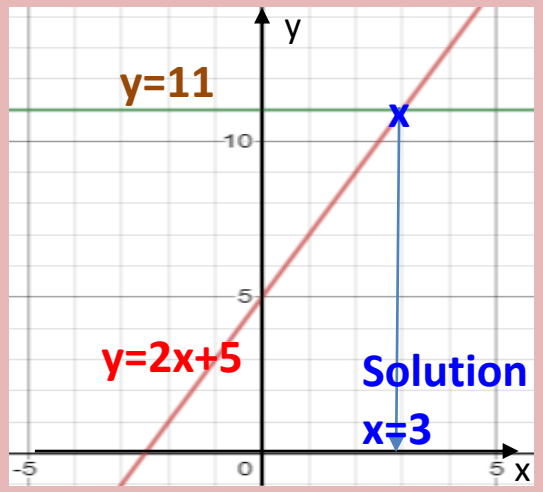
-6 > -15

Inequality needs to be reversed

Solving Linear Equations

Hegarty: 217-219

Solving Linear Equations – using graphs



Graphs can be used to solve equations

$$\underbrace{2x+5}=\underbrace{11}$$

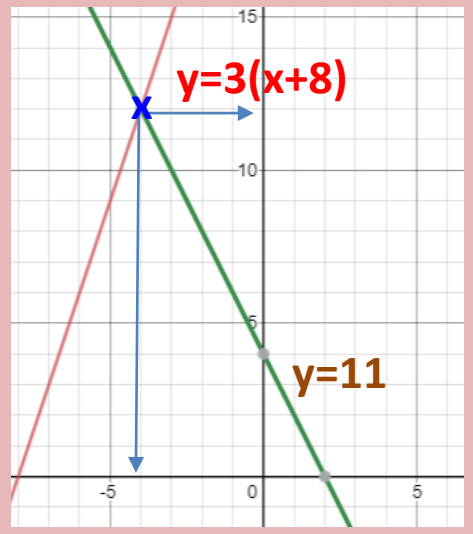
$y = 2x + 5$ $\quad$ $y = 11$

The intersection of the equation and where the y coordinate is 11 is the solution here

$$x = 3$$

Solving Simultaneous Equations using graphs

Using graphs is one way that **SIMULTANEOUS EQUATIONS** can be solved. "Simultaneous" just means "happening at the same time" and the solution to a simultaneous equation is the coordinate values which are the same for two equations… in other words, **the solution is where the two lines meet**.



Solve these simultaneous equations:

$y = 3(x + 8)$ $\quad$ $y = 4 - 2x$

Graphs cross at (-4, 12) so solution is

$$x = -4$$
$$y = 12$$

Note that this is the same solution for x as solving the linear equation:

$$\underbrace{3(x+8)}=\underbrace{4-2x}$$

$y = 3(x + 8)$ $\quad$ $y = 4 - 2x$

$x = -4$

y-coordinate needed only if a SIMULTANEOUS EQUATION to solve

Solving Linear Simultaneous Equations

Hegarty: 190-195

Simultaneous equations can be solved algebraically

Solve these simultaneous equations

$$3x + 2y = 11$$
$$x + y = 3$$

These equations cannot be solved individually as they have TWO unknowns but can be COMBINED and one unknown ELIMINATED … the other unknown can then be found and its value substituted back to find the other.

Simultaneous equations often given in **IMPLICIT** form (where x and y are on the same side) rather than **EXPLICIT** form i.e. y=mx+c. If they are given in different forms, one will need to be changed to match the other.

KEY PRINICIPLES:

1) Add or subtract the two equations to ELMINATE 1 unknown
2) Unknowns will only be eliminated if the have the SAME coefficient
3) If there is not a common coefficient scale one or both equations up so that the number in front of one unknown is the same in both equation.

PROCESS:

A) Get a common coefficient
2nd equation needs multiplying by 2 (or by 3) to get the same number in front of one of the unknowns

$3x + 2y = 11$
$x + y = 3$ $\quad (\times 2)$

Same - subtract

$\Rightarrow 3x + 2y = 11$
$\Rightarrow 2x + 2y = 6$

B) Add or subtract to eliminate unknown
Same Signs SUBTRACT ; Different signs ADD (2y-2y=0)
and solve any subsequent equation for the remaining unknown

$x = 5$

C) Substitute value back into ORIGINAL equation
to find an equation to solve for the second unknown

$x = 5$ then $5 + y = 3$
(-5) $\quad y = -2$

D) Check solutions by substituting BOTH values into OTHER original equation

Solution: $x = 5,\ y = -2$

CHECK: if $x = 5$ and $y = -2$ then for $3x + 2y = 11$

$3 \times 5 + 2 \times (-2) = 15 - 4 = 11$ ☑

Year 10 Maths Term 1 – Probability 1

Probability uses numbers to calculate or predict the chance of something happening in the future.

Vocabulary: Probability, Probability Scale, Relative frequency, Theoretical Probability,, Dependent Events, Independent Events, Sample Space, Venn diagrams,

Skills you will need: Addition, Subtraction, Multiplication of Fractions

A **Probability Scale** is used to describe all probabilities, or how likely

If an event is **Certain** its probability is 1
Boxing Day will follow Christmas Day in December

If an event is **Impossible** its probability is 0
You will grow to be 5m tall

An event has a probability **Evens** if the two outcomes are equally likely
Flipping a coin and getting heads

Likely describes the probability of an event which is more than evens chance but not certain.
You roll a die and get a number greater than 2

Unlikely describes the probability of an event which is less than evens chance but not impossible.
I choose a letter from the word RAIN and pick the A

The probability of an event happening is always greater than or equal to 0 (Impossible) but less than or equal to 1 (Certain)

$0 \leq \text{probability} \leq 1$

Relative Frequency (Experimental Probability)

This is the estimated probability based on the results of an experiment.
I surveyed 50 birds landing on my bird table. 18 of them were bullfinches.
The experimental probability of the next bird landing on my bird table being a bullfinch is 18/50 or 36%
The more trials that are performed, the more reliable the results will be.

Addition and Subtraction:

1. Find the LCM of the denominators
2. Convert them to their equivalent fractions where the denominators are the same
3. Once the fractions have the same denominator you can add or subtract the numerators. The denominator stays the same.
4. Simplify if you can

Multiplication:

1. Cancel any of the numerators with any of the denominators by finding common factors.
2. Multiply the numerators together and the denominators together.

$\frac{2}{9} + \frac{1}{5}$

LCM of 9 & 5 is 45

$\frac{10}{45} + \frac{9}{45} = \frac{19}{45}$

$\frac{2}{9} - \frac{1}{5} = \frac{1}{45}$

Check why

$\frac{\cancel{2}^{1}}{3} \times \frac{6}{\cancel{8}_{4}}$

$\frac{\cancel{2}^{1}}{\cancel{3}_{1}} \times \frac{\cancel{6}^{2}}{\cancel{8}_{4}} = \frac{2}{4} = \frac{1}{2}$

Hegarty: 557-8

Year 10 Maths Term 1 – Probability 2

More Vocabulary: Sample, Sample size, Probability notation, Expected outcomes, Mutually Exclusive Events, Exhaustive Events, Tree Diagrams

Hegarty: 349 - 369

A **Sample** is a selection of items from a population.
Your sample could be a selection of 20 pupils from your year group.
The larger the sample size or the more times you repeated a trial, the closer your probability will be to the true probability.

Probability Notation

P(X) refers to the probability of X occurring
P(Red, two) refers to a red two picked from a pack of cards

A **Sample Space** is way of recording the outcomes of two events.

This sample space records all the possible outcomes of a game of rock, paper scissors

	ROCK	PAPER	SCISSORS
ROCK	RR	RP	RS
PAPER	PR	PP	PS
SCISSORS	SR	SP	SS

Events are **Mutually Exclusive** if they cannot happen at the same time
Getting Heads or Tails on a coin
Turning Left or Right

Events are **Exhaustive** if they cover the entire range of possible outcomes
When you flip a coin the outcomes Heads and Tails are exhaustive because they cover all the possible outcomes
The probabilities of an exhaustive set of outcomes total 1.
Therefore, if the P(success) = 0.9
The P(Failure) = 1 – 0.9 =0.1

Theoretical Probability is a number between 0 and 1 representing the probability of something happening.

$$\frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}}$$

An **Independent Event** is when the probability of one event does not depend on the outcome of another event.
If I flip a coin the probability of getting a Head is 0.5. The probability will not change for any subsequent flipping of the coin.

Dependent Events. This is when the probability of one event depends on the outcome of another.
If I wake up late the probability of being late for school increases.

To find the **Expected outcomes** multiply the probability by the number of trials.
The probability of a team winning is 0.3. How many games can they expect to win in a season of 24 games?

0.3 X 24 = 8 8 games

Tree Diagrams can show all the possible outcomes of multiple events and can be used to calculate their probabilities.

Venn Diagrams can be used to show the relationship between multiple groups of things and how they overlap.

These diagrams can be used to calculate probabilities

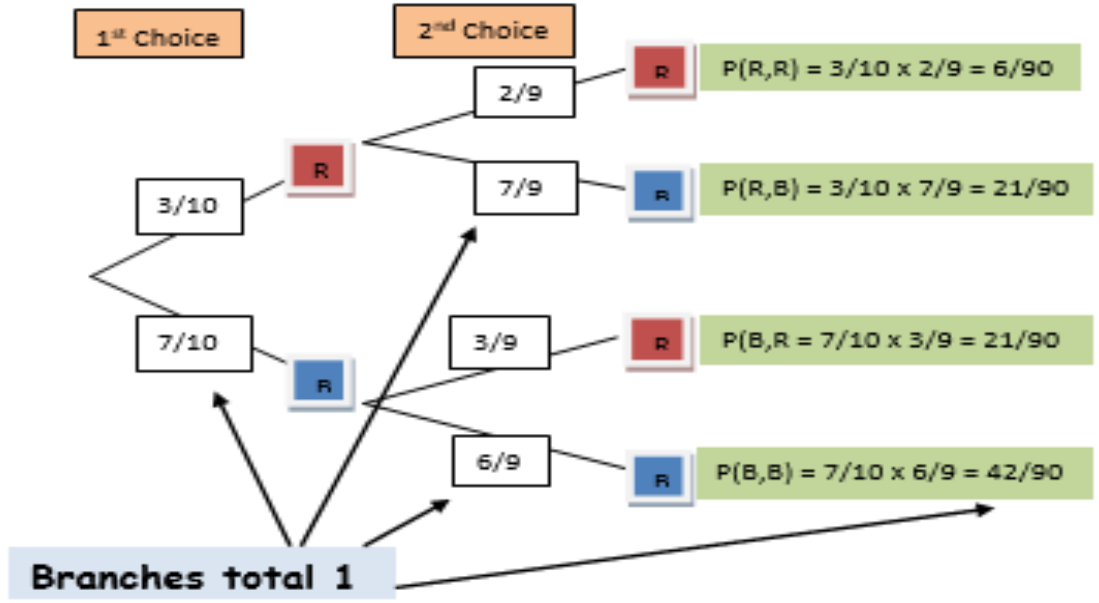
Year 10 Maths Term 1 – Probability 3

Combining Probabilities:

If you want to find the the probability of more than one thing happening you will need to multiply the probabilities.

Tree Diagrams

There are 3 Red Balls and 7 Blue Balls in a bag. Balls are taken from the bag and not replaced.



P(Choosing at least one red) = 6/90 + 21/90 + 21/90 = 48/90

Corbett Maths Video 252

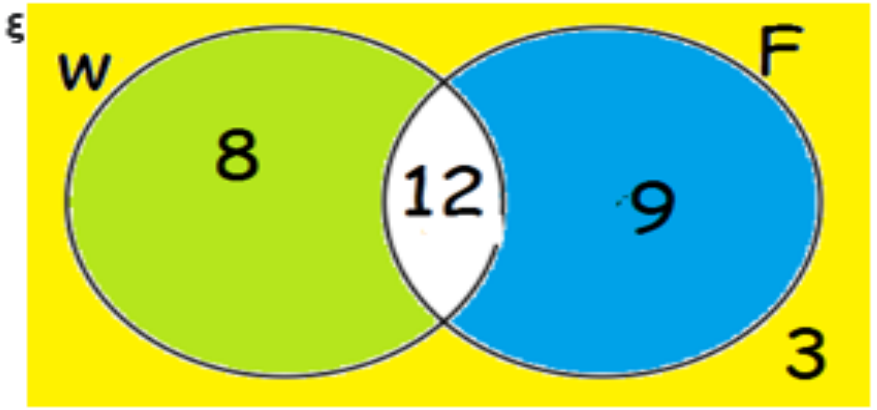
Hegarty: 361-388

Venn Diagrams

Corbett Maths Video 380

Hegarty: 383-388

ξ : 32 pupils in a class
W: pupils who walk to school
F : pupils who like football



P(W ∩ F) = 12/32
P(W ∩ F') = 8/32
P(W' ∩ F') = 3/32
P(W ∪ F)' = 3/32

Two way Tables – Holidays

Hegarty Clip 423

	Spain	France	Other	Total
June	5	19	3	29
July	12	17	3	32
August	17	15	7	39
Total	34	51	15	100

What is the probability that a person selected at random

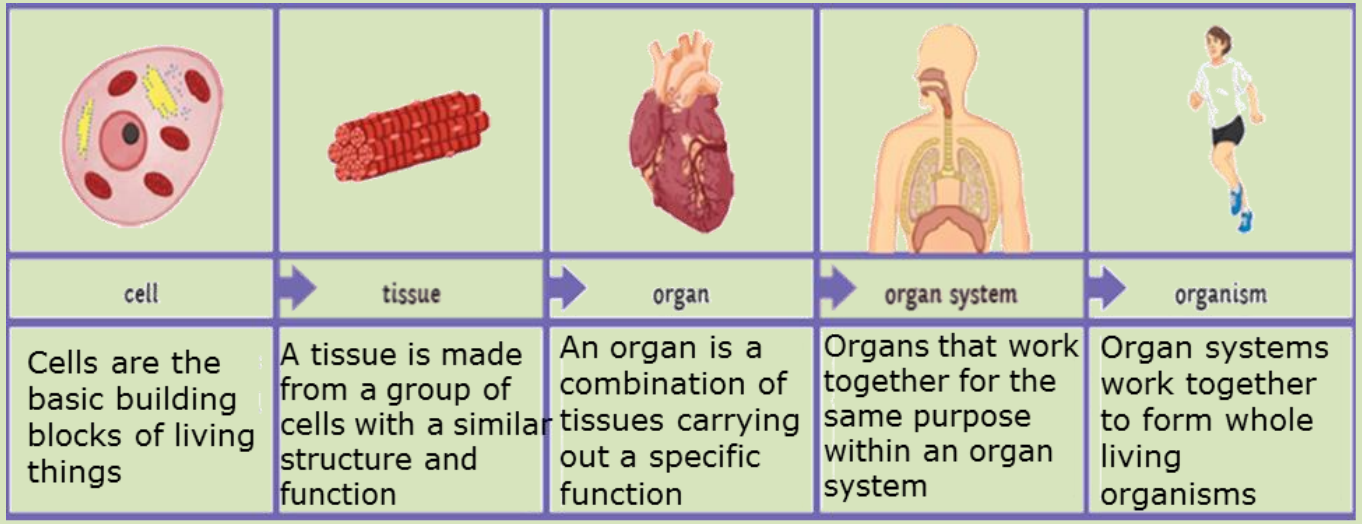
Went to France on holiday?	51/100
Did not visit either Spain or France?	15/100
Went on holiday in July?	32/100
Went to Spain in June?	5/100

KS4 Biology: B3 Organisation & the digestive system

Keyword	Definition
Enzyme	Protein with an active site of a specific shape which speeds up reactions
Villi	Finger like projections in the small intestine that increase surface area, helping with absorption
Catalyst	A molecule/chemical that speeds up the rate of reaction
Lock and key mechanism	Only one type of substrate can fit into the active site of an enzyme, like a key fits into a lock.
Active site	The part of the enzyme that helps break down the substrate
Substrate	The specific molecule that binds to an enzyme's active site
Rate of reaction	The speed at which a reactant is converted into a product
Denatured	When the active site of an enzyme changes shape and the substrate can no longer fit in. Can be caused by pH or temperature
pH	How acidic or alkaline a substance is. Enzymes are very sensitive to pH.
Bile	Alkaline substance produced in the liver and stored in the gall bladder. It neutralises stomach acid and breaks down fats into small droplets
Emulsification	Mixing two liquids such as oil and water that would not normally mix

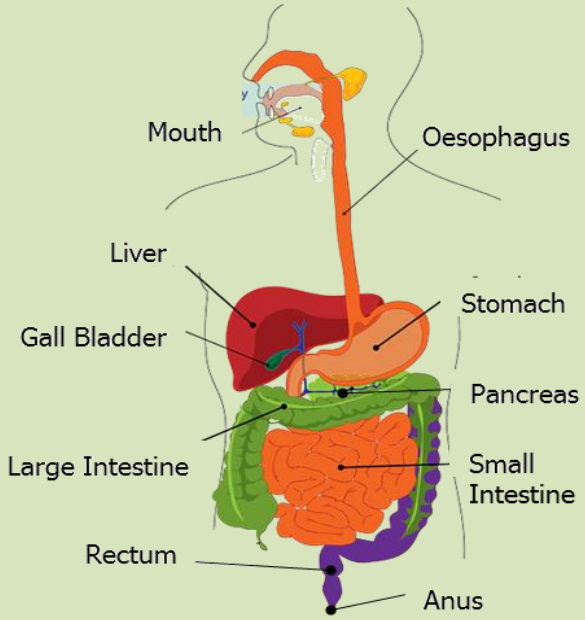
Organisation

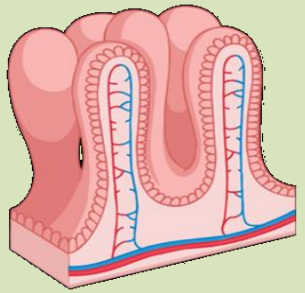
Organisms like you and I are organised from our smallest units (cells)



The digestive system

This system is made up of multiple organs that break down and absorb your food

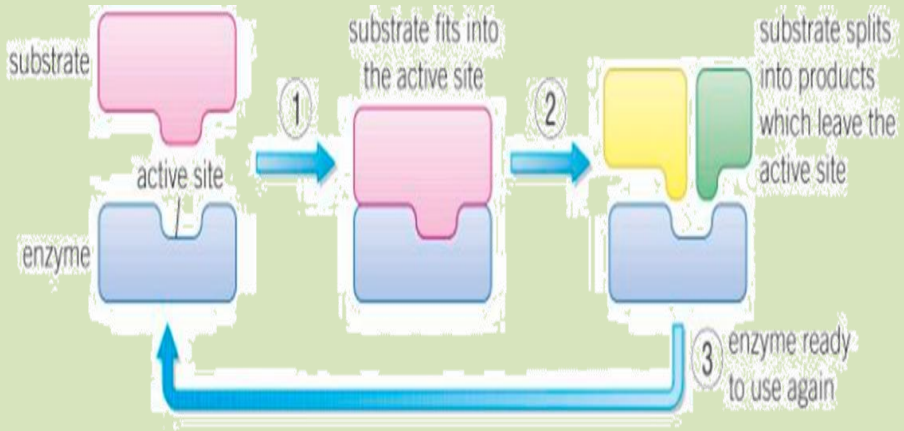




Your small intestine absorbs all of the required nutrients from your food. The villi help it do this by increasing the surface area

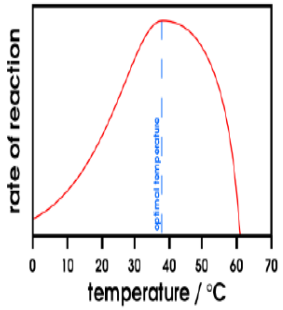
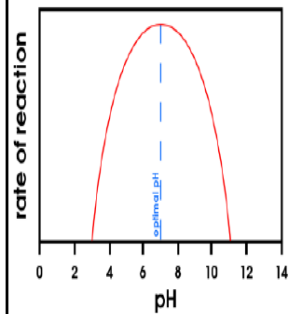
Organ	Function
Liver	Produces bile
Stomach	Breaks down large insoluble molecules into smaller soluble ones
Small intestine	Further breaking down of larger molecules and absorption into the blood
Large intestine	Absorbing water from undigested food

Enzymes are proteins and function in many reactions in the body as a biological catalyst- this means they do not change the reaction but they do <u>speed it up</u>



Most enzymes are specific, meaning that only one type of substrate will only bind to the enzymes active site- like a key fitting a lock

The activity of enzymes is affected by changes in temperature and pH

Enzymes activity has an optimum temperature	*Enzyme activity has an optimum pH*
	

Enzymes have 3 main functions
- To make larger molecules from smaller ones
- Breaking down larger molecules into smaller ones
- Converting molecules- e.g converting one amino acid to another

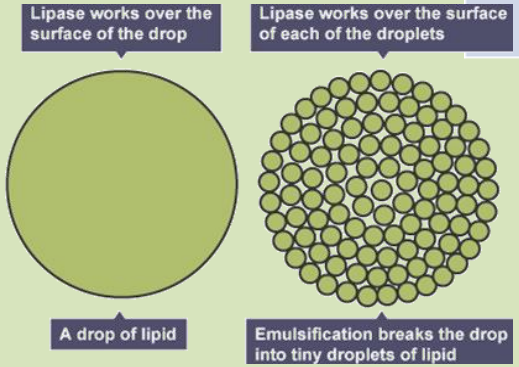
If the temperature is too high or the pH is not optimum then the active site will be denatured

Carbohydrates, lipids and proteins make up the cell's structure-and are needed in a balanced diet- we can test food for these using the following tests

Molecule	What is it made from	Chemical test	Positive result looks like
Sugar	Carbohydrates with one or two sugar units	Benedict's reagent and heat	Small amount= green Large amount = yellow/red
Starch	Is a complex carbohydrate made from long chains of simple sugars bonded together	Iodine	Turns blue/black
Protein	Made from long chains of amino acids	Biuret reagent	Turns purple
Lipid/fat	3 fatty acids bonded to a glycerol molecule	Ethanol	Dissolve in ethanol and then turn <u>white/cloudy</u> when water is added

The digestive system uses several enzymes which work on different organs of the system- the three main sites are the mouth, stomach and small intestine

Digestive enzyme	Where is it produced	Site of action	substrate	product
Carbohydrase (e.g amylase)	Salivary glands, pancreas and small intestine wall	Mouth and small intestine	Complex carbohydrates - e.g. starch	Simple sugars - e.g. glucose
Protease (e.g pepsin)	Stomach, pancreas, small intestine wall	stomach	Proteins	Amino acids
Lipase	Pancreas, small intestine wall	Small intestine	Lipids	Glycerol and fatty acids

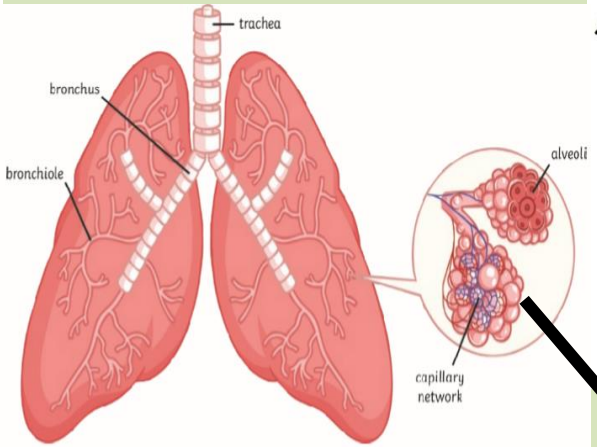


<u>Bile</u> (not an enzyme)

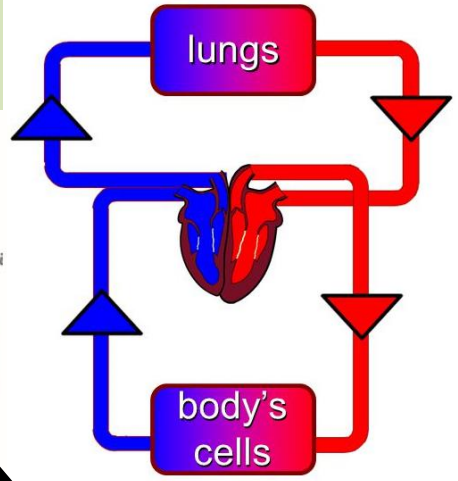
- Produced by the liver this is transported to the small intestine to neutralise stomach acid.
- It also emulsifies fat, increasing its surface area for lipase to work on

KS4 Biology: B4 Organising animals and plants

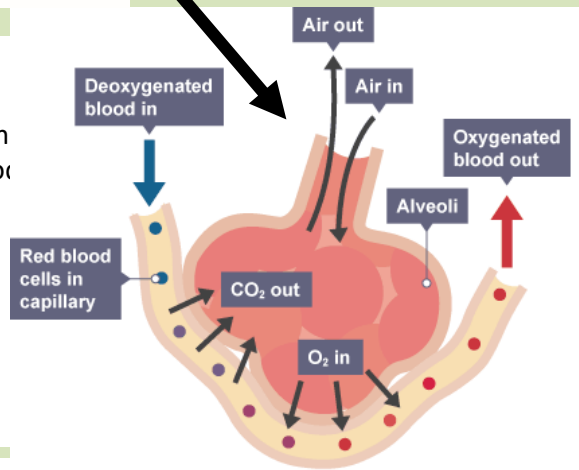
Arteries	Veins	Capillaries
From heart to rest of body	From rest of body to heart	Connects arteries and veins
Carries mostly oxygenated blood	Carries mostly deoxygenated blood	Carries both [de]oxygenated blood
High pressure with thicker walls	Low pressure with thinner walls	Walls only one-cell thick for diffusion
No valves	Has valves	No valves



The lungs are adapted for efficient gas exchange



The alveoli have a large surface area, capillaries around th alveoli lead to a goo blood supply, concentration gradient to allow a short diffusion pathway.

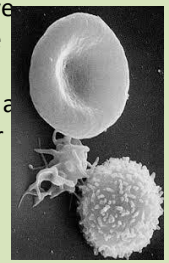


Aorta	The artery leaving the left ventricle.
Artery	Blood vessel that carries blood away from the heart.
Atria	Smaller top chambers of the heart.
Blood vessel	How blood is transported around the body.
Capillary	Blood vessel that connects arteries and veins.
Coronary blood vessel	The heart muscle needs its own blood supply. This comes from branches from the aorta as soon as it leaves the heart called **coronary** arteries.
Pulmonary artery	The blood vessel leaving the right ventricle, carrying blood to the lungs.
Pulmonary vein	Vein leading from the lungs back to the heart (to the left atrium).
Valves	Prevent back flow of blood. Allows blood to only flow the correct way.
Vein	Blood vessel that carries blood towards the heart.
Vena cava	The major vein transporting blood from the whole body back to the heart (to the right atrium)
Ventricle	The larger bottom chambers in the heart.

Red Blood Cells

Disc shaped and biconcave. This increases the surface area so can absorb and more oxygen. Don't have a nucleus so more room for haemoglobin.

White Blood Cells



Part of the immune system to fight communicable disease. They all have large nuclei, and can also change shape so they can **engulf** microorganisms

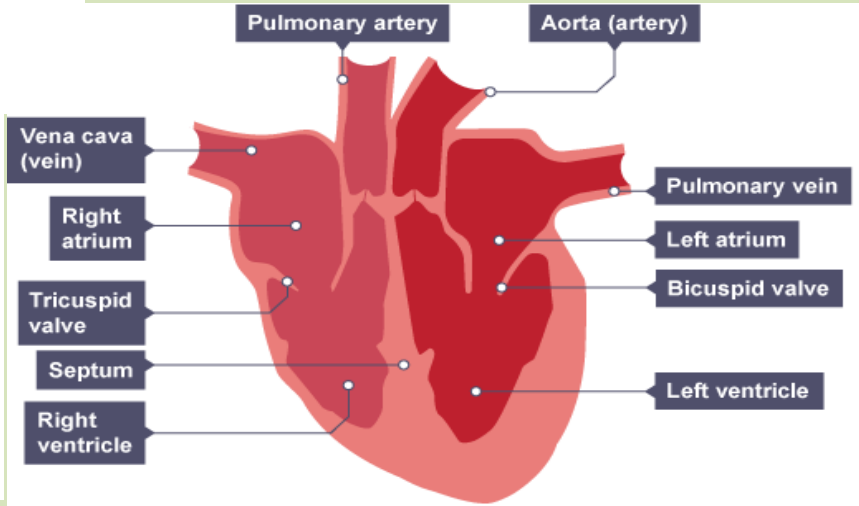
Plasma

This makes up 55% of the blood. It is mostly made of water, but with substances like glucose, proteins, ions and carbon dioxide dissolved in it. The other blood components are suspended in the plasma.

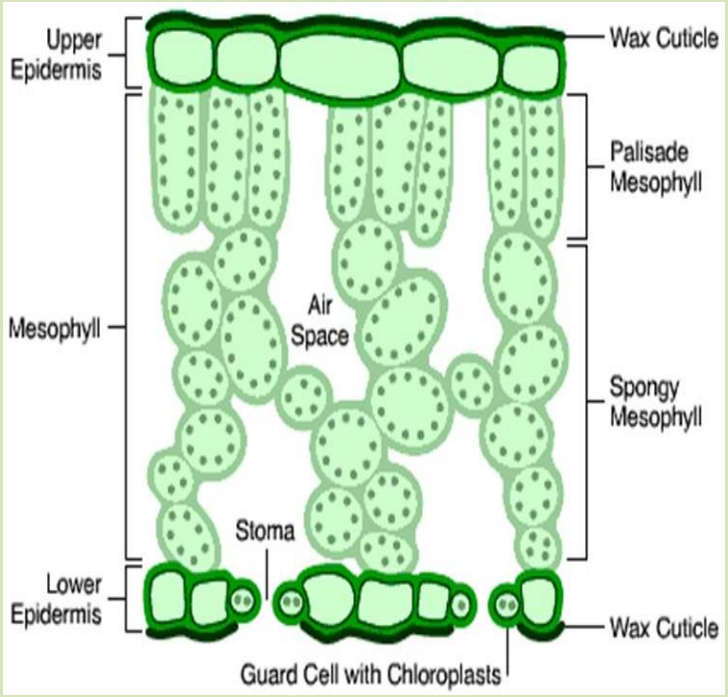
Platelets

Fragments of cells. They start the process of **clotting** at a wound which blocks the injury until proper healing happens, preventing blood loss.

When the heart 'beats' the muscles contract to pump the blood.
Heart rate is controlled by a group of cells in the right atrium that act as a **pacemaker.** These cells set off the impulses that make the heart muscle contract.
Artificial pacemakers are electrical devices used to correct any irregularities in the heart rate.



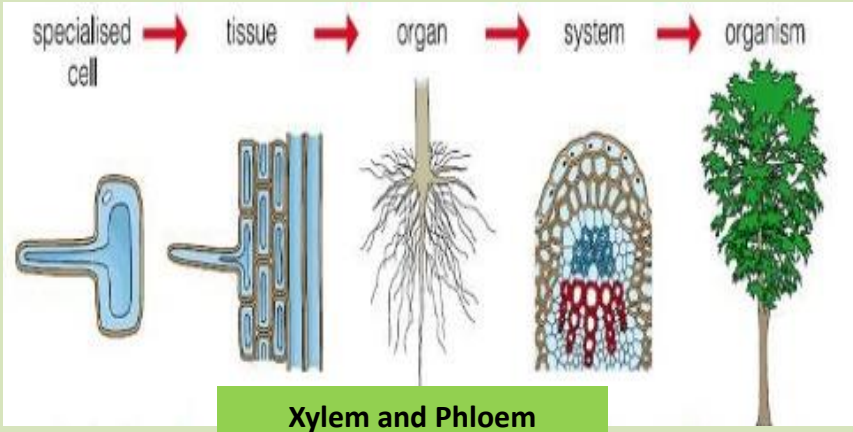
The Leaf



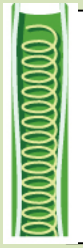
Epidermis	Transparent to allow sunlight to pass through
Palisade layer	Packed with chloroplasts to allow photosynthesis
Mesophyll layer	Air spaces to allow the diffusion of gases
Stoma	Gaps on the underside of the leaf to allow gases in and out of the leaf
Guard cells	Allow stomata to open and close

Water vapour is lost through the stomata on underside of the leaf by evaporation but the stomata need to be open to allow carbon dioxide to diffuse into leaf and oxygen to diffuse out

Plants, like humans, are made of cells, tissues, organs and organ systems.



Xylem and Phloem

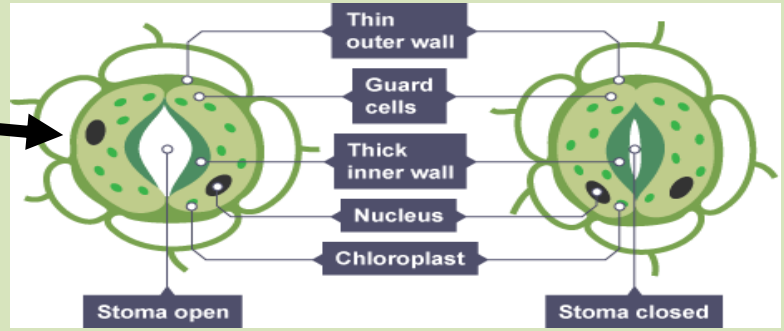


Xylem is made from hollow tubes made from cell walls of dead cells and strengthened by lignin.

Phloem is made of living cells elongated and stacked to form tubes.

Translocation

Phloem transports dissolved sugars from the leaves to other parts of the plant in a process called translocation.
Cell sap, containing the dissolved sugars, is able to flow from one phloem cell to the next through pores at the end of each wall.



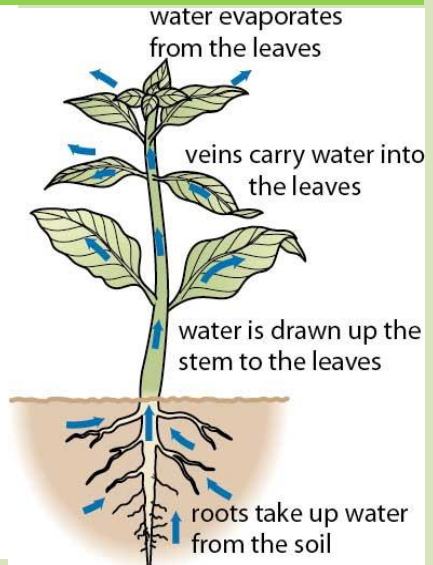
Active transport	Movement of particles against a concentration gradient
Diffusion	Movement of particles from high concentration to low concentration
Organ	A group of different tissues working together to perform a specific function
Organ system	Group of organs working together to carry out specific functions and to form organisms
Phloem	Living tissue which transports dissolved sugars around plant
Tissue	Group of specialised cells with similar structure and function working together
Translocation	Movement of dissolved sugars from leaves to rest of plant through phloem
Transpiration	Movement of water through a plant
Vascular bundle	Strand containing the xylem and phloem
Xylem	Non-living tissue which transports water and minerals from the roots to the leaves and shoots

Transpiration

Plants absorb water through the roots. It is transported against gravity from roots to leaves. Plants are constantly losing water as vapour through the leaves.

Transpiration can be increased by:
- Brighter light
- Increased temperature
- Increased air movement (wind)
- Decreased humidity (steeper concentration gradient)

Rate of transpiration measured using a potometer



KS4 Biology: B5 Communicable diseases

Key term	Definition
Communicable disease	Disease caused **pathogens** that can be passed from **one organism to another**.
Pathogen	Microorganisms that cause disease may be **viruses, bacteria, fungi or protists.**
Bacteria	Prokaryotes that reproduce rapidly inside the body and may produce poisons (**toxins**) that damage tissues and make us feel ill, treated with **antibiotics.**
Virus	Live and reproduce **inside cells,** causing cell damage.
Protist	Eg malaria
Vaccine	Dead or inactive pathogenic material used in vaccination to develop immunity to a disease in a healthy person.
White blood cells	**Macrophages ingest** pathogens **(phagocytosis), lymphocytes** produce **antibodies**, other white blood cells produce **antitoxins.**
Antibody	Special proteins that target particular bacteria or viruses and destroy them. You need a **unique antibody for each type of pathogen.** When your white blood cells have produced antibodies once against a pathogen, they can be made **very quickly** if that pathogen enters your body again.
Antitoxin	Made by white blood cells, these counteract (cancel out) toxins made by pathogens.
Antigen	Proteins on the surface of cells that act like markers – your immune system can detect antigens that are not your own.
Cilia	Tiny hair-like projections on cells lining the trachea which beat out dirt/pathogens to the throat to be swallowed.

How pathogens are spread:

- By **air (including droplet infection).** When you are ill, your you expel tiny droplets full of pathogens when you cough, sneeze or talk.
- By **direct contact:**
  - Eg when one plant touches another hence you have to **remove and burn/destroy** infected plants.
  - Eg in humans; sex, cuts, scratches, and needle punctures (drug users).
  - Animals can act as vectors transferring pathogens.
- By **water:**
  - Eg fungal spores carried by water to plants.
  - Eg Humans eating raw, undercooked or contaminated food or drinking water containing sewage. Pathogens enter via the digestive system.

Preventing infection:

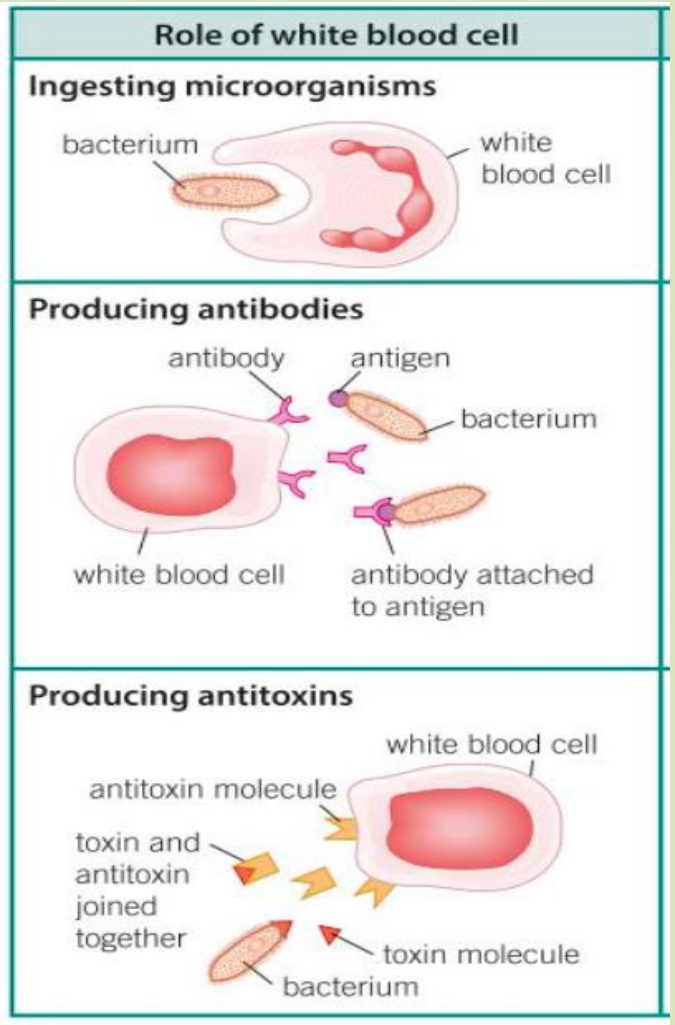
- **Wash hands** for 60s in warm water with soap.
- Use **disinfectants** on kitchen work surfaces, toilets etc.
- Keep raw meat away from food that is eaten uncooked.
- Cough/sneeze into a tissue – bin it – wash hands.
- **Vaccines (see B6 topic).**
- Maintain hygiene of agricultural equipment.
- **Isolate** someone who has the disease.
- **Destroy or control the vector** eg use mosquito spray/nets.

Human defence responses (stop the pathogens getting in!):

- Skin acts as a barrier and produces antimicrobial secretions and is covered in microorganisms that are not pathogenic.
- Respiratory system defences:
  - **Nose** full of **hairs** and produces **mucus** which trap pathogens to be blown out.
  - **Trachea and bronchi** secrete **mucus** and have **cilia** which **trap dirt** and **beat it** up to the throat to be **swallowed.**
  - **Stomach** produces **acid** which destroys the microorganisms in the **mucus** and in any **food/drink**.

Disease	Type of pathogen	How is it passed on?	Symptoms	Treatment	Prevention
Measles	Virus	Inhalation of droplets, coughs/sneezes	Red rash – can cause blindness, brain damage, death	None	Vaccination
HIV/AIDS	Virus	Sex, share needles.	Mild flu at start, then none, then damages immune system so much that you die from infection or cancer.	Antiretroviral drugs to control the disease	Condoms
Tobacco mosaic virus	Virus	Contact between plants, a vector – insects.	Mosaic pattern on leaves - less photosynthesis – less yield from crop.	None	Grow disease resistant crops.
Salmonella food poisoning	Bacteria	Undercooked food eg chicken/eggs.	Vomiting, diarrhoea	Doesn't last for long so they don't use antibiotics.	Cook food properly.
Gonorrhoea	Bacteria	Sex	Yellow/green discharge from penis or vagina but may be symptomless – can lead to infertility.	Antibiotics	Condoms
Rose black spot	Fungal	Spores in the air, rain droplets splashing between leaves.	Black spots, yellow leaves – less photosynthesis, doesn't flower well.	Cut off infected parts, burn them.	Disease resistant crops, wash gardening tools.
Malaria	Protist	Mosquito bites	Damaged liver and red blood cell leading to weakness and death.	If diagnosed quickly drugs can be used.	Nets, anti malarial drugs, insect repellent.
Plant Galls	Bacteria	Transfer of plasmid into the plant.	Growths of genetically modified cells.	None stated.	None stated.

The immune system – internal defences



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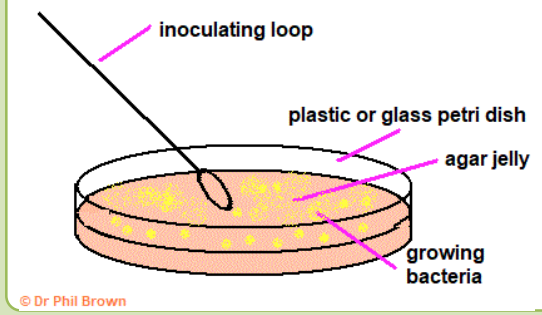
https://www.youtube.com/watch?v=QYWNXp36O48&safe=active

https://www.youtube.com/watch?v=LXJy3T1McpM&safe=active

Culturing microorganisms

Bacteria multiply by simple cell division **(binary fission)** as often as every **20min** if they have the correct **nutrients and temperature.**
Bacteria can be grown in **nutrient broth solution** or as **colonies** on an **agar gel plate.**
WHY? Uncontaminated cultures of microorganisms are required for investigating the action of disinfectants and antibiotics.

Petri dish setup for culturing microorganisms



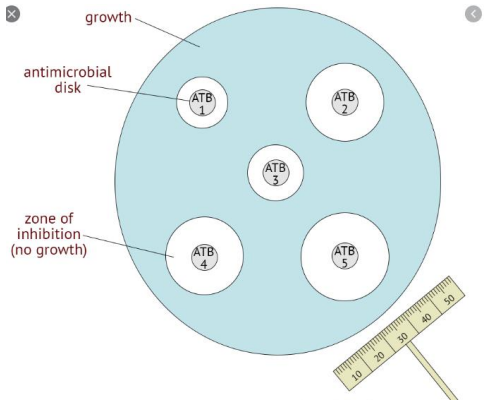
ASEPTIC TECHNIQUE

- **Sterilise Petri dishes and culture media** to prevent contamination.
- **Pass inoculating loops through a flame** to sterilise.
- **Secure lid of the Petri dish with tape** (to prevent transfer of pathogens) and store upside down to prevent condensation build up.
- In **school laboratories**, cultures should be **incubated at 25ºC** to prevent growth of human pathogens which survive best at body temperature.

REQUIRED PRACTICAL: Investigate the effect of antiseptics or antibiotics on bacterial growth using agar plates and measuring zones of inhibition.
IV: this could one of a variety eg type of disinfectant, concentration of antibiotic, type of antibiotic. I have chosen one for this example.
Eg IV: type of disinfectant
DV: zone of inhibition (area of bacteria killed around the disc of disinfectant) – **measure the radius (or half the diameter).**
CV: concentration of disinfectant, size of disc.

Method:

1. Set up a culture plate using aseptic technique (mention the steps in the box above).
2. Place a drop of bacteria on the growth media and spread it with a sterile lawn spreader.
3. Add discs of filter paper soaked in the different disinfectants.
4. Leave for 24h.
5. Measure the diameter of the circles of clear area around the discs.
6. Divide the diameter by 2 to find the radius.
7. Calculate the area of the clear circles using πr^2.
8. The larger the area the more effective the disinfectant.



[HT only]
Plant diseases can be detected by:

- Stunted growth
- Spots on leaves
- Areas of decay (rot)
- Growths
- Malformed stems of leaves
- Discolouration
- The presence of pests

Identification can be made by:

- Reference to a **gardening manual or website**
- Taking infected plants to a **laboratory** to identify the pathogen
- Using testing kits that contain **monoclonal antibodies** (see B6 topic)

You just need to know the plant diseases listed on the previous table + **aphids are insects that insert a feeding tube into the phloem of plants to feed on the glucose produced by photosynthesis.**

Plants can be damaged by a range of **ion deficiency conditions**:
Stunted growth caused by **nitrate deficiency** (nitrate needed to make protein)
Chlorosis (yellow leaves) caused by **magnesium deficiency** (magnesium needed to make chlorophyll to allow photosynthesis).

Physical defence responses to resist invasion of microorganisms:
Cellulose cell walls
Tough waxy cuticle on leaves
Layers of dead cells around stems (bark) which falls off.
Chemical plant defence responses:
Antibacterial chemicals
Poisons to deter herbivores
Mechanical adaptations:
Thorns, hairs to deter animals. Leaves which droop/curl when touched.
Mimicry to trick animals.

https://www.youtube.com/watch?v=BkbLI2mAMP8&safe=active

KS4 Biology: B6 Preventing and treating disease

Key term	Definition
Vaccine	Dead or inactive pathogenic material used in vaccination to develop immunity to a disease in a healthy person.
White blood cells	**Macrophages ingest** pathogens **(phagocytosis), lymphocytes** produce **antibodies**, other white blood cells produce **antitoxins.**
Antibody	Special proteins that target particular bacteria or viruses and destroy them. You need a **unique antibody for each type of pathogen.** When your white blood cells have produced antibodies once against a pathogen, they can be made **very quickly** if that pathogen enters your body again.
Antitoxin	Made by white blood cells, these counteract (cancel out) toxins made by pathogens.
Antigen	Proteins on the surface of cells that act like markers – your immune system can detect antigens that are not your own.
Antibiotic	Cure bacterial diseases by killing the bacterial pathogens inside your body.
Placebo	A medicine that does not contain the active drug being tested, used in clinical trials of new medicines.
Double blind trial	Neither patient or prescribing doctor know if they are taking/giving the drug or the placebo so they cannot be **bias.**
Mutate	Change in DNA.
Pre-clinical testing	Carried out on a potential new medicine in a laboratory using cells, tissues, and live animals.
Clinical testing	Test potential new drugs on healthy and patient volunteers for safety, efficacy and dosage.

Vaccination
Introduce a small quantities of **dead** or **inactive** forms of a **pathogen** into the body to stimulate the **white blood cells** to produce **antibodies.** If the same pathogen re-enters the body the WBC respond quickly to produce the correct **antibodies**, preventing **infection.**
MMR = measles, mumps, rubella vaccine

Herd immunity
If a large proportion of the population is immune to a pathogen, spread of the pathogen is reduced. Vaccination can speed up herd immunity e.g. measles.

Antibiotics e.g. penicillin
Kill bacteria whilst they are inside the body without damaging body cells – either taken as a pill or put straight into the blood stream.
Specific bacteria treated by specific antibiotic.
Decreased deaths from bacterial infections but some bacteria are now becoming resistant to antibiotics eg MRSA.
To prevent this: don't prescribe for viral infections, limit use in agriculture, take the full course.
ANTIBIOTICS DO NOT TREAT VIRAL INFECTIONS.

Treating symptoms:
Viruses have no cure (it is difficult to develop drugs that kill viruses without damaging the body's tissues).
You can treat the symptoms of both viral and bacterial infection though.
e.g. Aspirin and paracetamol are pain killers.
e.g. Ibuprofen targets inflammation.

https://www.enhancetv.com.au/video/operation-ouch-what-is-a-vaccine-and-herd-immunity/63222

Discovery and development drugs

Traditionally drugs were extracted from plants and microorganisms.

- The **heart drug** digitalis originates from **foxgloves.**

- The painkiller **aspirin** originates from **willow.**

- **Penicillin** was discovered by **Alexander Fleming** from the ***Penicillium*** mould.

- New drugs synthesised by chemists in the pharmaceutical industry. The starting point may still be a chemical extracted from a plant**.**

New medical drugs have to be tested for:

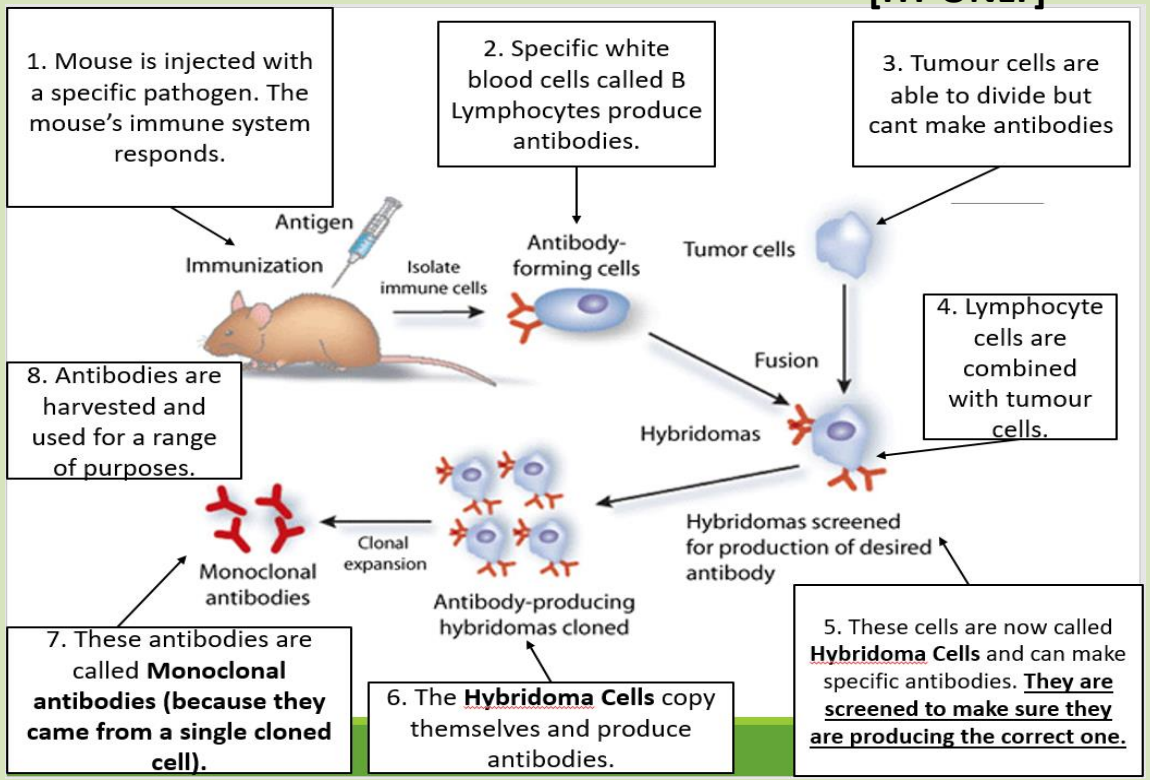
- **Toxicity –** is it safe to use do the benefits outweigh the side effects?
- **Efficacy –** does it prevent, cure a disease or make you feel better?
- **Dosage –** how much to take to be effective but limit side effects?

Preclinical testing – done in a laboratory using cells, tissues and live animals.

Clinical trials – healthy volunteers and patients.

- Very low doses of the drug and given at the start of the clinical trial.
- If the drug is found to be safe, further clinical trials are carried out to find the **optimum dose** for the drug.
- In **double blind trials,** some patients are given a **placebo.**

Biology only - Making monoclonal antibodies **[HT ONLY]**



Biology only - Uses of monoclonal antibodies

[HT ONLY]

- For diagnosis eg **pregnancy kits**
- In laboratories to **measure levels of hormones** and other chemicals in the blood or **detect pathogens.**
- In research to **locate** or **identify** specific molecules in a cell or tissue by **binding them to a fluorescent dye.**
- To **treat** some **diseases:** for **cancer,** the monoclonal antibody can be bound to a **radioactive substance, a toxic drug or a chemical which stops cells growing and dividing.** It delivers the substance to the cancer cells without harming other cells in the body.

Key word	Definition **[HT ONLY]**
Clone	Identical copy
B Lymphocyte	White blood cells that produce antibodies
Tumour cell	Cells able to divide repeatedly
Hybridoma cell	Cells made in a lab by fusing antibody specific B-lymphocytes and tumour cells together. Once screened and cloned, they produce monoclonal antibodies.

KS4 Biology: B7 Non-communicable diseases

Key term	Definition
Non-communicable diseases	Are **not infectious** and **cannot be passed from one organism to another.**
Carcinogen	Agents that **cause cancer** or significantly increase the risk of developing cancer.
Ionising radiation	Has enough **energy** to cause **ionisation** in the material it passes through, which in turn can make them biologically active and may result in **mutation** and **cancer**
Correlation	An apparent **link** or relationship between **two factors.**
Causal mechanism	Something that explains how one factor influences another.
Mutation	A change in the genetic material of an organism.
Benign tumour	**Growths of abnormal cells** that are contained in **one area,** usually within a membrane, and **do not invade** other tissues.
Malignant tumour	**Invade neighbouring tissues** and **spread** to **different parts of the body** in the blood where they form **secondary tumours.** They are also known as **cancers.**

Health is the state of being free from **illness** or **disease.** It refers to **physical** and **mental** wellbeing.

Disease and lifestyle **risk factors** such as diet, smoking, alcohol consumption and the use of illegal drugs, can all impact the health of a person.

Some conditions are linked with certain lifestyle choices and **causal mechanisms have been proven:**

- **Liver conditions** associated with poor **diet and prolonged excessive alcohol consumption.**
- **Lung cancer** is linked to **smoking.**
- Memory loss, poor physical health and hygiene are associated with the use of illegal or recreational drugs.
- **Obesity and diabetes** are associated with poor diet.

To study these risk factors, **samples of the population** have been selected to study the correlations.

To select the groups, scientists try to find:

- LARGE SAMPLE GROUPS – the more people the more reliable the data.
- Controls:
  - Age
  - Gender
  - Lifestyle (diet, exercise)

Impact of disease:

- On families: financial cost if a wage-earner cannot work.
- On Local communities: cost of supporting people wither through taxes or by taking care of affected families.
- On the Nation: expense of treating ill people, loss of money earned when large amount of people are ill.
- Globally: economy suffers especially if young people are ill.
- **Non-communicable diseases affect far more people that communicable diseases so have more impact on human and economic levels.**

Cancer

The result of changes in cells that lead to **uncontrolled growth and division.**

Benign tumour
Usually grow slowly.
Usually grow within a membrane and can be easily removed.
Can cause damage to organs and be life-threatening e.g. brain tumours have no space to grow and can put pressure on the brain.
Does not spread around the body
Does not normally grow back.

Malignant tumour
Usually grow rapidly.
Cancerous
Cells can break away and cause secondary tumours to grow in other areas of the body.
Can spread around the body, via the bloodstream.

Causes: Some **genetic** risk factors e.g. early breast cancer, **mutations from carcinogens** e.g. tar in tobacco or asbestos, **ionising radiation** too much UV light from sunlight and X-rays.
Treatments: Radiotherapy which stops mitosis or Chemotherapy which causes cells to self-destruct.

Smoking

Cigarettes produce around 4000 different chemicals that are inhaled into the throat, trachea and lungs. **150 of these are linked to disease.**
Nicotine: addictive.
Carbon monoxide: reduces the ability of red blood cells to carry oxygen for respiration.

Smoking in pregnancy: reduces the oxygen available for the foetus can lead to:
- Premature birth
- Low birthweight
- Still birth, when the baby is born dead.

Cilia damage: cilia become anaesthetised by some of the cigarette chemicals so dirt and mucus not removed from trachea and bronchi leading to increased risk of infection.

Carcinogens: tar can cause cancer of throat, larynx, trachea and lungs.

Tar: thick sticky black chemical can increase risk of bronchitis and COPD (chronic obstructive pulmonary disease). Can lead to breathlessness and death.

Heart: smokers are more likely to have cardiovascular problems, narrowing of blood vessels also causes you to look older.

Diet, exercise, obesity

If you eat too much, the excess is stored as **fat.**

Being obese can lead to: **type 2 diabetes, high blood pressure and heart disease.**

Exercise increases heart fitness and lung capacity. You also get more muscle which does more respiration using more energy from food.

Type 2 diabetes cells stop responding to insulin so blood glucose levels rise too high.
Causes problems in:
- Circulation
- Kidney function
- Eyesight

Type 2 diabetes can often be controlled by low carbohydrate diet and exercise.

Alcohol

Alcohol is addictive.
After drinking, ethanol is absorbed into the blood and can pass easily into other tissues e.g. the brain.

In small amounts:
- Relaxed, cheerful, reduced inhibitions.

In larger amounts:
- Lack of self-control, lack of judgement.
- Possibly unconsciousness, coma, death.

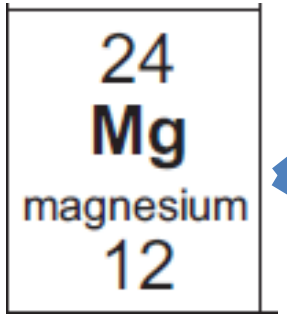
Longer term addiction:
- Cirrhosis of the liver (scarring of the liver tissue).
- Cancer of the liver.
- Brain damage.

In pregnancy:
- Alcohol can pass through the placenta.
- Can cause miscarriage, stillbirth, premature birth, low birthweight, fetal alcohol syndrome (facial deformities and learning difficulties).

KS4 Chemistry: C4 Chemical Calculations

Keyword	Definition
Relative atomic mass (RAM)	the weight in grams of the number of atoms in 1 mole of an element
Relative formula mass (RFM)	The sum of the RAMs of the elements in a compound
Mole	Unit of measurement of chemical substances. 6.02×10^{23} particles in 1 mole
Balanced equation	Is an equation showing the ratio in moles of reactants and products
Limiting reactant	The substance that stops the reaction when it is all used up
Yield (percentage yield)	The % of the product you desire against the total of all products
Atom economy	A measure of the amount of starting materials (reactants) that end up as useful products
Concentration	The mass or moles of a substance dissolved in a volume of solvent- forming a solution (measured in g/dm^3 or mol/dm^3)
Titration	Titration is the slow addition of one solution of a known concentration to a known volume of another solution, to calculate its concentration

Relative atomic masses and relative formula mass



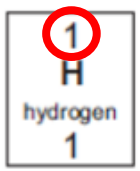
Relative atomic mass=24

Number of protons= 12

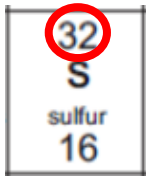
Relative atomic masses allow us to compare the masses of atoms compared to the mass of $1/12^{th}$ of carbon 12

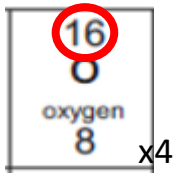
The relative atomic mass will always be the larger of the 2 values for elements on the periodic table

H_2SO_4 = Sulphuric acid



x2





x4

The relative formula mass (RFM) of H_2SO_4 is (1x2) + 32 + (16x4)= 98

Calculating % mass of an element in a compound

$$\%\ \text{mass} = \frac{\text{RAM of element}}{\text{RFM of compound}} \times 100$$

RAM of C= 12

RFM of CO_2= 44

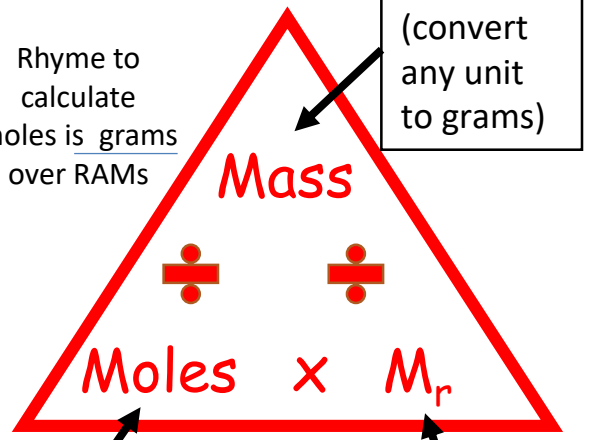
$$\%\ \text{mass of C in } CO_2 = \frac{12}{44} \times 100$$

0.273 x 100= 27.3%

Moles- HT only

A mole is simply a unit to describe how much of a chemical substance there is. It is linked to RAM so that 1 mole of a substance will have a mass of its RAM in grams.

Rhyme to calculate moles is grams over RAMs



Grams (convert any unit to grams)

Moles

Relative atomic (or formula) mass (RAM or RFM

"how many moles are there in 12g of Carbon"

Moles= Mass ÷ RAM or RFM

"What will the mass be of 8 moles of NaCl"

Mass = Moles X RAM or RFM

"the mass of 1 mole of substance X is 35.5g," what is its relative atomic mass

RAM or RFM = Mass ÷ Moles

Masses to balanced equations- HT only

Balanced equations tell you the molar ratio of reactants, reacting to form products. Seeing as mass and moles are linked- we can use masses of reactants and products to help us balance an equation

To balanced an equation using masses and RAM/RFM follow the 4 steps

Step 1= unbalanced equation of reactants and products

Sb	+	Cl_2	→	$SbCl_3$
488g		426g		914g

Step 2= mole calculations

Sb	+	Cl_2	→	$SbCl_3$
488g		426g		914g
RAM 122		RAM 71		RAM 228.5
4 moles	:	6 moles	:	4 moles

Step 3= simplify the ratio

4 moles : 6 moles : 4 moles

2 moles : 3 moles : 2 moles

Step 4= balance equation using ratio

2 Sb + 3 Cl_2 → 2 $SbCl_3$

Reacting masses (masses from balanced equations) –HT only

Balanced symbol equations are used to calculate the mass of reactants and the mass of products in reactions.

one hydrogen molecule		one chlorine molecule		two hydrogen chloride molecules
H_2	+	Cl_2	→	2HCl
1 mole of hydrogen molecules		1 mole of chlorine molecules		2 moles of hydrogen chloride molecules

"What mass of hydrogen chloride (HCl) will be" produced from 4g of hydrogen (H_2)

When doing a reacting masses question always layout your workings in the grid below

	H_2	2HCl
RAM	2	36.5
Moles	2 moles x2	4 moles
Mass in grams	4g	146g

Step 1: enter the RAM for both chemicals mentioned and the known mass for one chemical

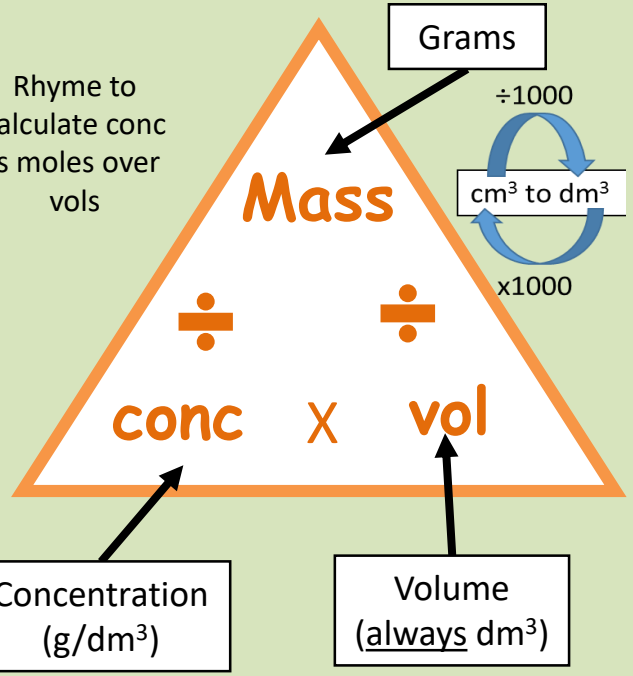
Step 2: work out the moles for chemical of known mass. (Grams over RAMs)

Step 3: if the molar ratio is the same then the moles of the substance of unknown mass are the same- if not then multiply accordingly

Step 4: use the RAM and moles to calculate the mass of the chemical produced (HCl)

Expressing concentrations

Rhyme to calculate conc is moles over vols



Concentration = Moles ÷ Volume

Moles = Concentration X Volume

Volume = Moles ÷ Concentration

Increasing concentration- HT only

You can increase the concentration of solutions by

- Dissolving more solute in the same volume of solution
- Evaporating water from the solution to reduce the volume

% yield of a reaction- Chem only

% yield is a measure of how much of a product is made during a reaction over how much could have theoretically been made

$$\%\ \text{yield} = \frac{\text{actual mass produced}}{\text{Maximum theoretical yeild}} \times 100$$

If the maximum theoretical yield is not provided then you will have to calculate it using the reacting masses method

Factors affecting % yield

- Reaction may be reversible
- There may be unknown alternative reactions happening
- Some products lost in handling
- Impure reactants
- Product lost during separation method

Atom economy- Chem only

Atom economy is becoming more important as it aims to conserve limited resources. It is a percentage of atoms found in desired product over the atoms in the reactants

$$\text{Atom economy} = \frac{\text{RFM of desired prodcut}}{\text{RFMs of reactants}} \times 100$$

Reactions can form the desired product can be compared to see which has the larger atom economy, using few resources and causing less pollution

Reaction 1: $C_2H_4 + HCl \rightarrow C_2H_5Cl$

$$\frac{\text{(RAM of } C_2H_5Cl)}{\text{(RAM of } C_2H_4 + HCl)} \times 100 = 100\%$$

Reaction 2: $C_2H_5OH + HCl \rightarrow C_2H_5Cl + H_2O$

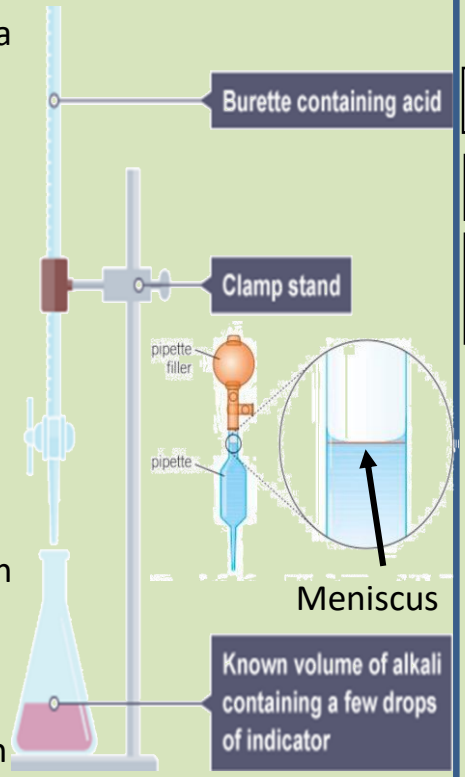
$$\frac{\text{(RAM of } C_2H_5Cl)}{\text{(RAM of } C_2H_5OH + HCl)} \times 100 = 78.2\%$$

Titrations - Chem only

A titration is used to measure accurately what volumes of acid and alkali react together completely. Different pH indicators are used to shown when the acids and alkalis are neutralised.

Indicator	Acidic	Neutral	Alkaline
Universal indicator	Red	Green	Blue/Purple
Phenolphthalein	Colourless	Colourless	Pink
Methyl orange	Red	Yellow	Yellow

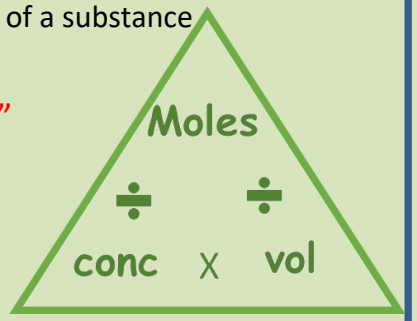
1. Measure known volume of alkali using a volumetric pipette for accuracy
2. Add indicator to the alkali
3. Add acid to the burette, measuring volume to the bottom of meniscus
4. Add acid to the alkali in small volumes until indicator shows the solution is neutralised. This is a rough titration
5. Now you have a rough idea of the turning point, repeat step 4, three times until you have concordant (Similar) results to calculate a mean volume



Titration calculations - Chem only and HT

Once you have an accurate measurement of the volume of acid/alkali to neutralise, you can then do a titration calculation to work out the unknown concentration of a substance

"25cm³ of NaOH was neutralised" using 45cm³ of 0.1mol/dm³ HCl- calculate the concentration of NaOH in mol/dm³ and g/dm³



	HCl	NaOH
Volume (dm³)	0.045 dm³	0.025 dm³
Moles	0.0045 ⟷	0.0045
Concentration (mol/dm³)	0.1	0.18

÷1000 / cm³ to dm³ / x1000

x40 → 7.2g/dm³

Step 1: calculate the volume of both acid and alkalis (in dm³) and the known concentration for either acid/alkali

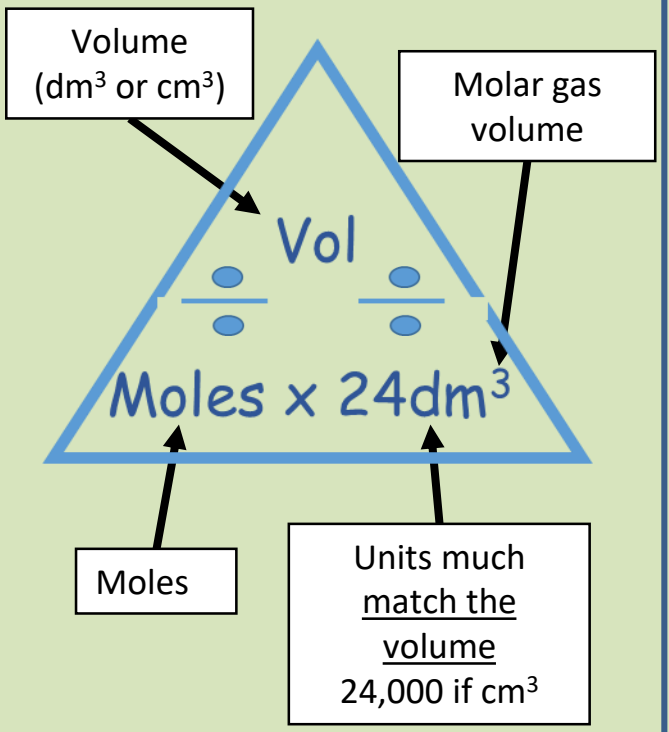
Step 2: using the known concentration of your acid/alkali work out the moles of known substance (conc x vol)

Step 3: if the molar ratio is the same then the moles of the unknown acid/alkali are the same- if not then multiply accordingly

Step 4: use the volume and moles to calculate the concentration (Moles over Vols)

Conc (g/dm³) ⟷ (÷ RAM of solute / x RAM of solute) ⟷ Conc (mol/dm³)

Volumes of gases- Chem only and HT



Moles= Volume ÷ 24 dm³ or 24000 cm³

Volume = Moles X 24 dm³ or 24000 cm³

Volume = Moles X 24 dm³ or 24000 cm³

Further reading

https://www.bbc.co.uk/bitesize/topics/z87mw6f

https://www.youtube.com/watch?v=eAibVvhmsK0

https://www.savemyexams.co.uk/gcse-combined-science-trilogy-chemistry-aqa-new/revision-notes/

KS4 Chemistry C6 - Electrolysis

Electrolysis

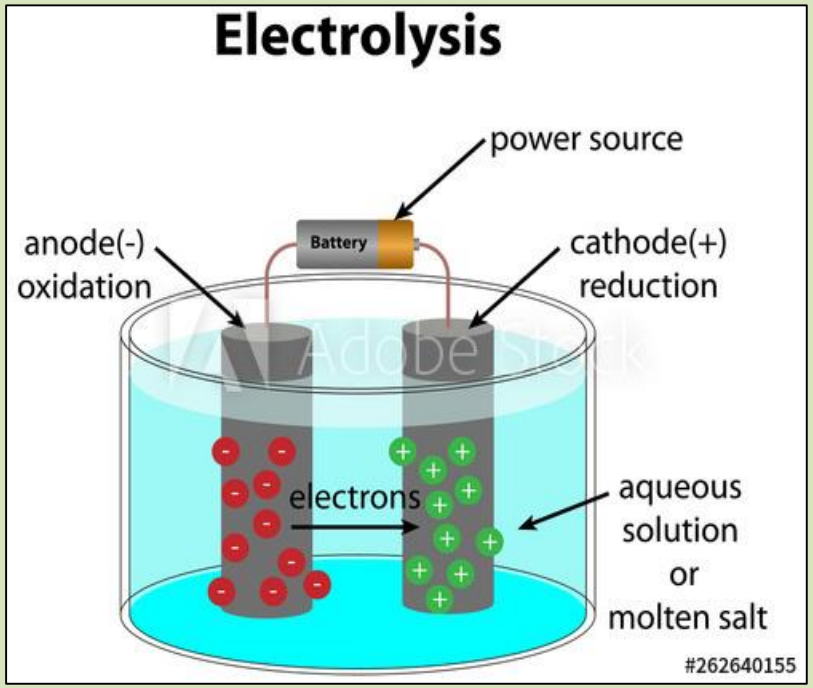
When an ionic compound is melted or dissolved in water, the ions are free to move about within the liquid or solution (electrolyte).Electrolytes can conduct electricity.
If an electric current is passed through this solution the ions will move to the electrodes.
Opposites attract.
Positive ions (cations) will go to the negative electrode (cathode)
Negative ions (anions) go to the positive electrode (anode).
For example in the electrolysis of lead bromide, Lead (Pb^{2+}) goes to the negative electrode and bromine (Br^{-}) goes to the positive electrode.

Links to Further Reading:
https://www.youtube.com/watch?v=AhTRiL6xjBA&safe=active
https://www.bbc.co.uk/bitesize/guides/zpxn82p/revision/1

Key Term	Definition
Electrolysis	The breaking down of a substance using electricity
Electrolyte	The solution which is being broken down during electrolysis
Oxidation	The loss of electrons
Reduction	The gain of electrons
Anode	The positive electrode
Cathode	The negative electrode
Half Equation	An equation that shows the reaction at each electrode

Electrolysis of Copper Sulphate
Which elements form at which electrode depends on the **reactivity** of the elements involved. For example, in the electrolysis of aqueous copper sulphate is the electrolysis of copper sulphate, however there are also H^+ and OH^- ions form the water which is used as the solvent. This means there is more than one possible ion that can go to each electrode.
Positive ions: sodium (Cu^{2}+) and hydrogen(H^+)
Negative ions: sulphate(SO_4^{2-}) and hydroxide(OH-)

Copper is **less reactive** than hydrogen, so copper (Cu) is produced at the negative electrode.
The half equation is: $Cu^{2+} + 2e^- \rightarrow Cu$
The hydroxide ion is more reactive than the sulphate ion, therefore this **forms water (H_2O) and oxygen** at the positive electrode.
The half equation is: $4OH^- \rightarrow O_2 + 2H_2O + 4e^-$



Remember OILRIG – Oxidation is Losing, Reduction Is Gaining (electrons)
When a positive Ion reaches the negative electrode, it gains electrons. This is a reduction reaction.
When the negative ion reaches the positive electrode, it loses electrons, this is an oxidation reaction.
We can represent these using half equations A half equation can represent the reaction at each electrode. Half equations show how electrons are transferred and an electron is represented in an equation by an *e*- symbol
Half equations show electrons (e-) and how ions become atoms. For example $Cu^{2+} + 2e^- \rightarrow Cu$.
1. Write down the ion and atom: $Cl^- \rightarrow Cl_2$
2. Adjust the number of ions (if needed) and add electrons to balance the charges if required $2Cl^- \rightarrow Cl_2 + 2\,e^-$

Remember that non-metal ions will typically form diatomic molecules.

Extracting Aluminium from bauxite

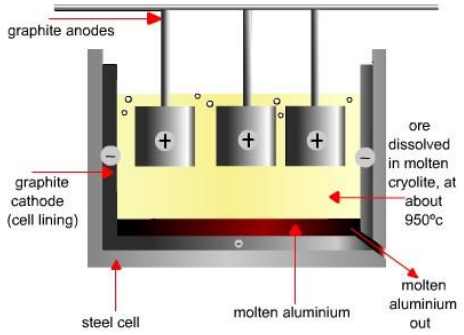
Aluminium oxide is dissolved in molten cryolite .
Cryolite reduces the melting point of aluminium oxide so the process requires less energy.
Aluminium ions (Al^{3+}) are attracted to the negative electrode.
Aluminium atoms are formed at the negative electrode (gain 1 electron)
Oxide ions are attracted to the positive electrode
Oxygen is formed at the positive electrode (each ion loses 2 electrons)
Oxygen reacts with carbon to make carbon dioxide. This electrode needs to be replaced constantly.

At the negative electrode:

$Al^{3+} + 3e^- \longrightarrow Al$

At the positive electrode

$2O^{2-} \longrightarrow O_2 + 4e^-$



Overall equation: $2Al_2O_3 \longrightarrow 4Al+3O_2$

Electrolysis of Brine – required practical

Which elements form at which electrode depends on the **reactivity** of the elements involved.
The electrolysis of brine is the electrolysis of a solution of sodium chloride so there are also H^+ and OH^- ions from the water which is used as the solvent. This means there is more than one possible ion that can go to each electrode.

· **Positive ions:** sodium (Na+) and hydrogen (H+)
· **Negative ions:** chlorine (Cl-) and hydroxide (OH-)

When there is a mixture of ions, the products formed depend on the reactivity of the elements involved.
Hydrogen is less reactive than sodium, so hydrogen gas (H_2) is produced at the negative electrode.
Chlorine gas (Cl_2) is produced at the positive electrode.
Sodium hydroxide is produced from the ions that remain in solution.

Rules if there is more than one positive or negative ion present

If there are 2 positive ions present, the lease reactive element gets discharged
If there are 2 negative ions present the halogen (if present) will be discharged first.

Types of ions

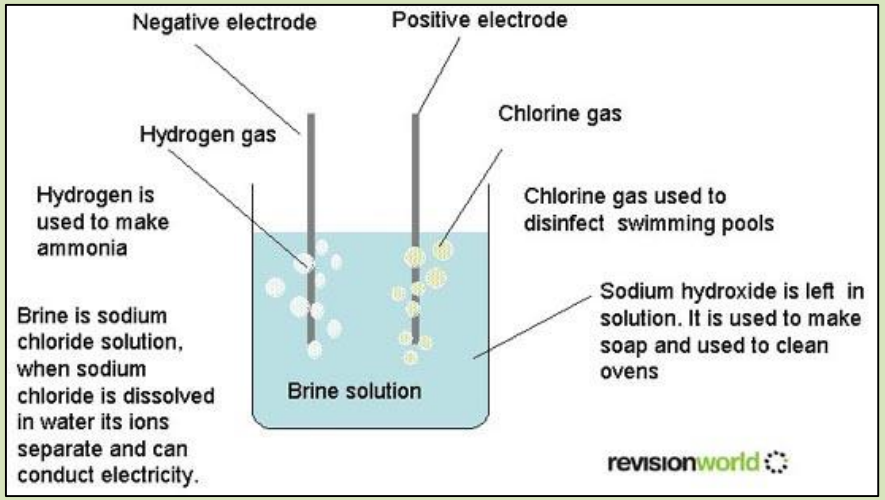
Metals and hydrogen form positive ions e.g. H^+. Na^+. Mg^{2+}, Al^{3+}
Non-metals from negative ions e.g. O^{2-}, Cl^-, OH^-

The formula of the compound formed depends on the charges on the ions and the number of positive and negative ions needed to form a neutral compound.

Gas Tests

During electrolysis the products made are often gases. Below are the tests for three common gases you need to know

Gas	Test	Result
Hydrogen	Place a lit splint into the gas	If a squeaky pop is heard hydrogen is present
Oxygen	Place glowing splint into gas	If splint is relighted then oxygen is present
Chlorine	Damp litmus paper placed in gas	If paper bleaches chlorine is present
Carbon Dioxide	Bubble the gas through limewater	If the limewater goes cloudy carbon dioxide is present



KS4 Chemistry – C5 Chemical Changes

Reactivity Series

A *list* of metals in order of how reactive they are:

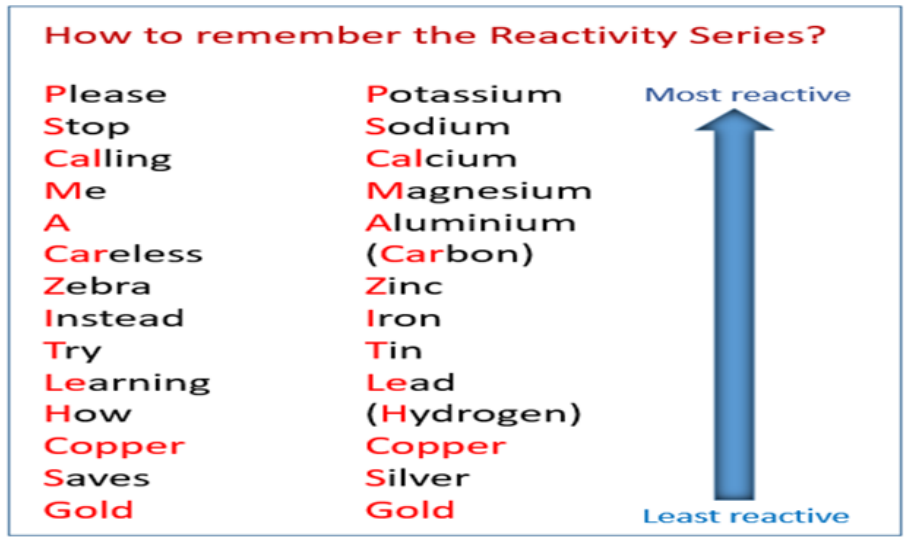
Some metals are *very reactive* (at the top) and react easily in chemical reactions. E.g. Sodium

Some metals are *unreactive* (at the bottom) and do not react easily or at all in reaction e.g. gold

Further reading:

https://www.youtube.com/watch?v=KTmXEIiU_Go&safe=active

https://www.bbc.co.uk/bitesize/topics/zcdj97h



Displacement Reactions

Displacement reactions involve a metal and a compound of a different metal; the more reactive metal *displaces* (pushes out) the less reactive metal from its compound:

Magnesium + Copper Sulfate → Magnesium sulfate + copper

$Mg\ (s) + CuSO_4\ (aq) \rightarrow MgSO_4\ (aq) + Cu\ (s)$

Ionic Equations (H tier only)

$Mg\ (s) + Cu^{2+}\ (aq) \longrightarrow Mg^{2+}\ (aq) + Cu\ (s)$

Half Equations (H tier only)

At the anode: $Mg\ (s) - 2\ e^- \longrightarrow Mg^{2+}\ (aq)$

At the cathode: $Cu^{2+}\ (aq) + 2\ e^- \longrightarrow Cu\ (s)$

Keyword	Definition
Acid	An acid has a pH value of less than 7
Alkali	Its solution has a pH value more than 7
Base	A soluble alkali that forms a salt when it reacts with an acid
Displacement reaction	When a more reactive metal replaces a less reactive metal in a compound
Electrolysis	The breakdown of a substance containing ions by electricity
Indicator	A substance that changes colour when added to acids or alkalis
Insoluble	Does not dissolve in water
Neutralisation	The reaction of an acid with a base producing salt and water
Ore	Rock which contains enough metal to make it economically worth extracting
Oxidation	The reaction when oxygen is added to a substance or electrons are lost
pH Scale	A number which shows how strongly acid or alkaline and solution is
Reduction	A reaction in which oxygen is removed or electrons are gained
Salts	A compound formed when some of the H in an acid is replaced by a metal
Soluble	Dissolves in water
Reactivity Series	A list of metals showing how reactive they are
Half Equation	An equation that describes the gain or loss of electrons
Ionic Equation	An equations that shows only those ions or atoms that change in a chemical reaction
Strong Acid	An acid that completely dissociated into ions in solution e.g. nitric acid
Weak Acid	An acid that is only partly ionized e.g. ethanoic acid

Reduction of metals by carbon and hydrogen

The oxides of metals below carbon in the series can be reduced by carbon

Metal oxide + carbon → metal + carbon dioxide

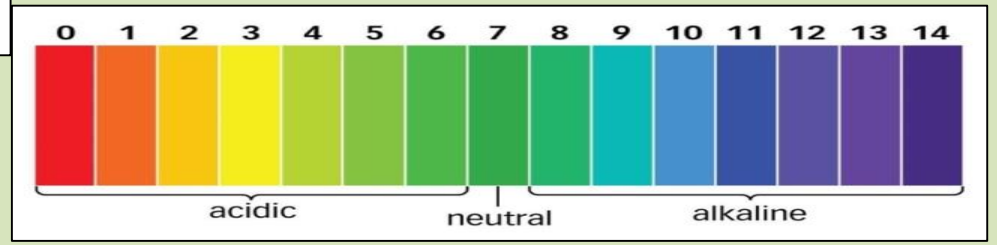
e.g. lead oxide + carbon → lead + carbon dioxide

$2PbO\ (s) + C\ (s) \rightarrow 2Pb\ (l) + CO_2\ (g)$

OILRIG is a useful way of remembering:

Oxidation Is Losing

Reduction Is Gaining (electrons)



Making Salts

There are various ways salts can be made. You need to know the products.

Acid + metal → salt + Hydrogen

Acid + Base → salt + Water

Acid + Alkali → salt + Water

Acid + metal carbonate → salt + water + Carbon dioxide

Names of Salts

The acid used provides the negative ions present in all salts.

Hydrochloric acids make salts called ***chlorides*** containing Cl^- ions

Sulphuric acid H_2SO_4 makes ***sulphates*** containing SO_4^{2-} ions

Nitric acid HNO_3 makes ***nitrates*** called NO_3^- ions

pH Scale

Universal Indicator changes colour depending on the pH of a solution.

Acids can be dilute (lots of water) or concentrated (less water)

Weak Acids e.g. citric acid are not harmful even when in concentrated solutions

Strong acids e.g. hydrochloric acid can be harmful even when diluted

Making a copper salt – this is a required practical

Sulphuric acid + copper oxide → copper sulphate + water

$H_2SO_4\ (l) + CuO\ (s) \rightarrow CuSO_4\ (aq) + H_2O\ (l)$

Method:

Add EXCESS insoluble copper oxide to sulphuric acid and stir

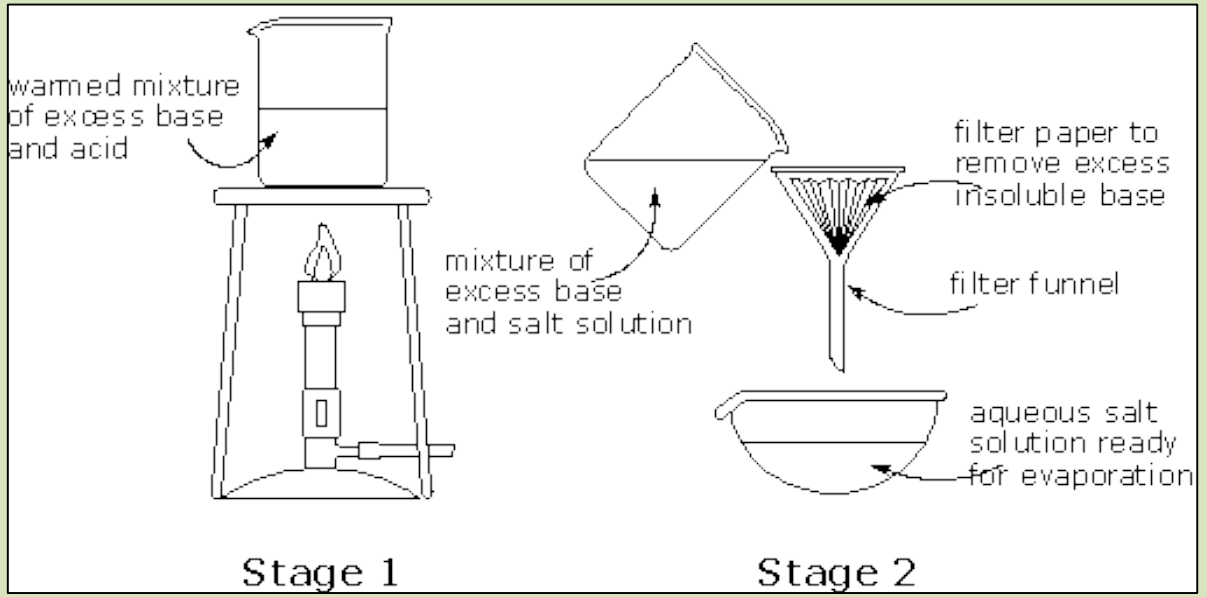
Warm gently on a tripod – the solution will turn blue

Filter off excess copper oxide

Evaporate the water so that crystals of copper sulphate start to form

Stop heating when you have evaporated about half the water and allow the rest of the water to evaporate off naturally

Making a salt from a metal carbonate is also a required practical



KS4 Physics: Energy transfer

Types of energy store

- **Kinetic energy store** ➢ Energy stored by moving objects
- **Sound energy store**
- **Light energy store**
- **Elastic potential energy store** ➢ Energy stored in compressed springs or stretched elastic bands
- **Thermal energy store**
- **Gravitational potential energy store** ➢ Energy stored by lifting something against the force of gravity
- **Electrical energy store**
- **Chemical energy store** ➢ Energy stored in chemical bonds examples include batteries, coal, gas, and food. Released by chemical reactions.
- **Nuclear energy store**
- **Magnetic energy store**

Energy is measured in Joules (J)

Energy can be transferred:
Mechanically when work is done by a force
Electrically when a moving charge does work
By **Heating** when energy is transferred from a hot object to a cooler one

Energy transformations

Energy transformations describe how energy transforms from one form to another.

Chemical energy store → kinetic energy store + sound energy store + thermal energy store

Chemical energy store → Electrical energy store → Light energy store + thermal energy store

The arrow means transforms into

Key words	
Power	The amount of energy transferred per second measured in Watts (W).
Work (work done)	The energy transferred by a force. **Work done** means **Energy transferred**
Conservation of energy	Energy can not be created or destroyed, only transformed from one form to another.
Energy dissipation	Energy transferred to the surroundings, usually as thermal energy or sound.
Friction	A force the opposes the motion of an object.
Efficiency	The proportion energy transferred in a useful way. Given as a percentage, decimal of fraction.
A system	An object or group of objects – In a closed system the energy before and after energy transformations always remain the same.

Friction: When you apply the brakes in a car, the brake pads do work on the brake disks causing the wheel's kinetic energy store to transfer to the thermal energy store of the brake disks, resulting in the car slowing down.

input energy: Electrical energy store **200J** → useful output energy: Light energy store **160J** + wasted energy: Thermal energy store **40J**

Orders of Magnitude:

1W	1W	Watt	1
1KW	**1,000**W	**Kilo** Watt	$1x10^3$
1MW	**1,000,000**W	**Mega** Watt	$1x10^6$
1GW	**1,000,000,000**W	**Giga** Watt	$1x10^9$

Example Calculation: Calculate the work done if a person lifts a 10N weight 1.5m off the ground?

Work done = Force x distance

W = F x d

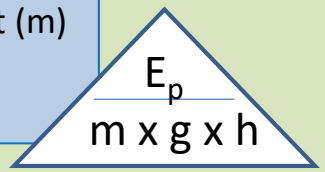
W = 10 x 1.5

W = 15J

Always write out the equation you will use, substitute in the numbers, calculate the answer and give the unit

Gravitational potential energy (J) = mass (Kg) x gravitational field strength (N/Kg) x height (m)

$E_p = m\ g\ h$



E Energy	**F Force**
P Power	**d distance**
g gravitational field strength	**t time**
E_k Kinetic energy	**v velocity**
E_p Gravitational potential energy	**x extension**
E_e Elastic potential energy	**h height**

Energy stored in a spring(J) = ½ x Spring constant (N/m) x extension ^{2} (m)

$E_e = ½\ kx^2$

Kinetic energy (J) = ½ x mass (Kg) x velocity ^{2} (m/s)

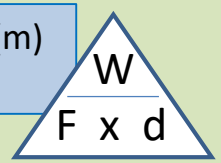
$E_k = ½\ mv^2$

Efficiency = $\left(\frac{\text{Useful power output}}{\text{Total power input}}\right)$ x 100

Efficiency = $\left(\frac{\text{Useful energy output}}{\text{Total energy input}}\right)$ x 100

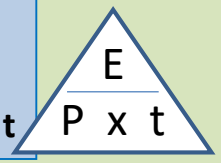
Work done (J) = Force (N) x distance (m)

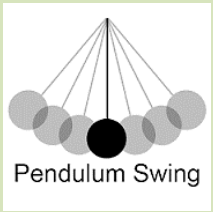
$W = F \times d$



Power (W) = $\frac{\text{Energy (J)}}{\text{Time (s)}}$

$P = \frac{E}{t}$

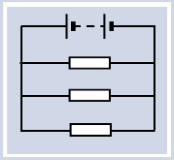
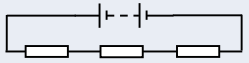


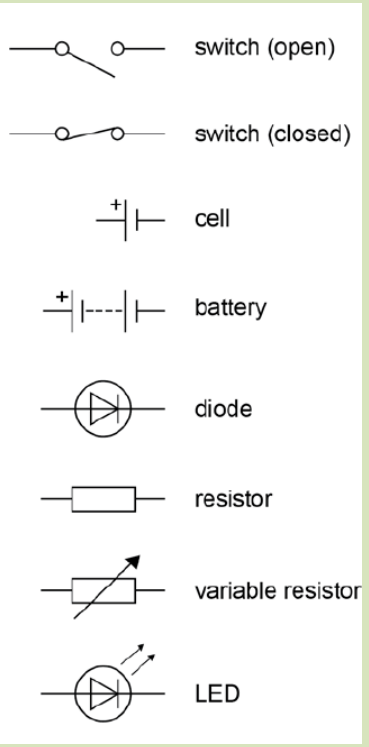


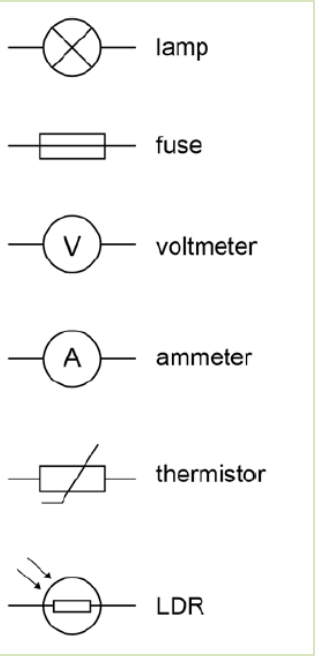
Energy dissipation: A pendulum eventually comes to rest as **energy is transferred to the surrounding**. Energy is **dissipated** as heat caused by friction and air resistance.

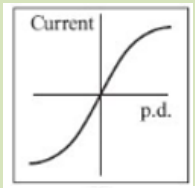
Energy dissipation: When a ball falls, its gravitational potential energy store decreases and its kinetic energy store increases. When it bounces some energy is transferred to the thermal energy store of the ball and ground. Eventually the original energy is transferred to the thermal energy store of the surroundings

KS4 Physics: Electrical circuits

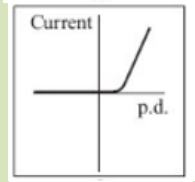
Key words	
Current	The flow of charge. Negatively charged electrons flow in the wire. The current (I) through a component depends on both the resistance (R) of the component and the potential difference (V) across the component. The greater the resistance of the component the smaller the current for a given potential difference (pd) across the component.
Charge	Charge is a property of a body which experiences a force in an electric field. Charge is measured in coulombs (C).
Potential difference (Voltage)	A measure of the difference in electrical energy between two parts of a circuit. Measured in Volts. It tells us how many joules of energy is transferred by each coulomb of charge. *You will only ever be asked about **potential difference** in exam questions however most equations refer to voltage. So for your GCSEs remember **voltage** is the same as **potential difference***
Resistance	The wires and the other components in a circuit reduces the flow of charge through them. This is called resistance. Resistance is measured in Ohms.
Parallel circuits 	In parallel circuits, electrical components are connected alongside one another, forming extra loops. When two components are connected in parallel, an individual charge will flow through one of the components only, not both.
Series circuits 	When components are connected in series a charge will flow through all the components in the circuit



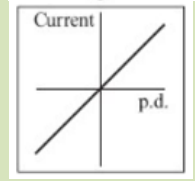




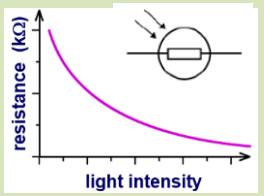
Filament bulb: As you pass a voltage across a filament lamp, the filament wire gets hotter. This causes the ions in the wire to vibrate faster making it harder for electrons to flow, increasing the resistance. As you increase the voltage the current increases but at a decreasing rate.



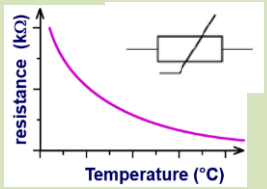
Diode: Diodes only allow current to flow in one direction. In the other direction they have an extremely high resistance



Resistor: For a resistor at a constant temperature current is directly proportional to voltage. The resistance remains constant.

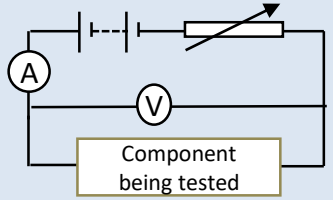


Light dependent resistor (LDR): As the light intensity increases the resistance of an LDR deceases. They are often used as light sensors.

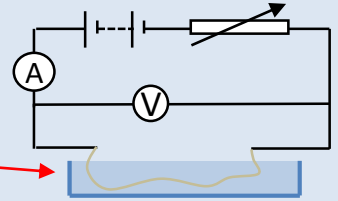


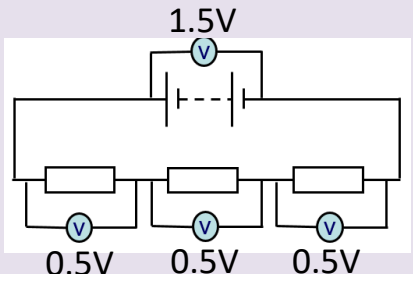
Thermistor: As the temperature of a thermistor increases the resistance deceases. They are often used in thermostats and temperature sensors.

Required practical 4 – investigate the how potential difference affects current for a diode, filament lamp and resistor at constant temperature.

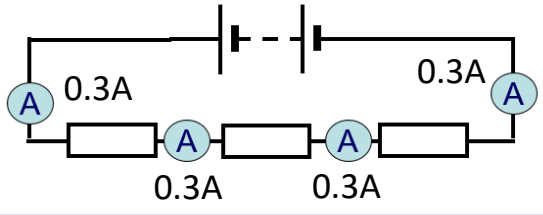


Through of water with wire submerged to maintain a constant temperature





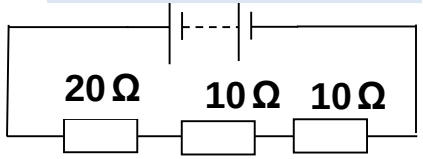
In Series
Potential difference is shared across each component depending on the resistance of each component



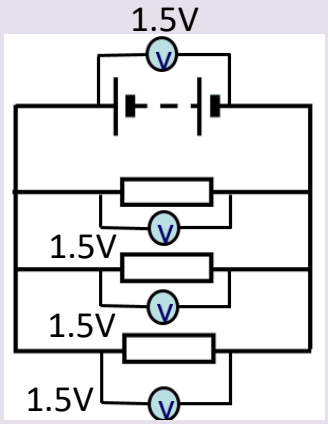
Current is the same every where in the circuit

When **resistors** are connected in **series** the total resistance of the circuit is the sum of their resistances.

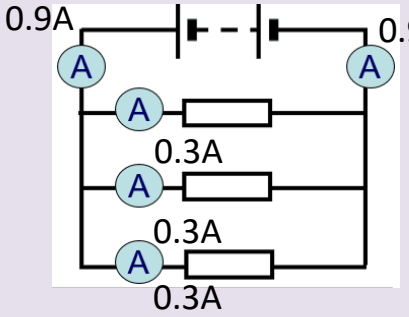
$R_T = R_1 + R_2 + R_3$



total resistance = 20 + 10 + 10 = **40 Ω**



In Parallel
Potential difference the same across each branch of the circuit



Current is shared across each branch of the circuit depending on the resistance of each component

When **resistors** are connected in **parallel**, then the total resistance of the circuit decreases. Even though you have added another resistor, you have given more pathways for current to flow, thus reducing the overall resistance.

$$Q = I\ t$$

Charge = current x time

Q / I x t

$I = \frac{Q}{t}$

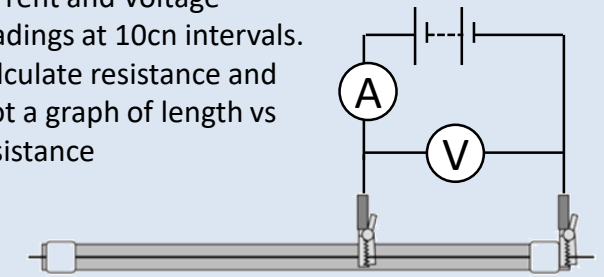
This equation helps us understand current, current is the amount of charge passing a point in a given time (1 Amp = 1 coulomb per second)

Required practical 3

How does length of a wire affect its resistance

IV – length of wire
DV – current and voltage (to calculate resistance)
CVs – cross sectional area of wire, temperature of wire, input voltage

Attach a piece of resistance wire to a meter rule. Take current and Voltage readings at 10cn intervals. Calculate resistance and plot a graph of length vs resistance



$$V = I\ R$$

Voltage = current x Resistance

Potential difference (V, Volts) (A, Amps) (Ω, Ohms)

V / I x R

$$V = \frac{E}{Q}$$

Potential difference Voltage (V, Volts) = Energy (J, Joules) / Charge (C, Coulombs)

E / V x Q

This equation helps us understand voltage, it tells us that voltage is the amount of energy per coulomb of charge

Symbols to remember:
V Voltage or Potential difference
I Current
P Power
R Resistance
t Time
E Energy

Power, Current, Voltage

$$P = I \times V$$

Power (W, Watts) = current (A, Amps) x Voltage (V, Volts) Potential difference

P / I x V

Power, Current, Resistance

$$P = I^2 R$$

Power (W, Watts) = current (A, Amps) x Resistance (Ω, Ohms)

P / I^2 x R

Computational Thinking – Data Representation – Term 1

128	64	32	16	8	4	2	1
0	0	0	0	1	0	1	1

8 + 2 + 1 = 11

128	64	32	16	8	4	2	1
0	0	0	1	0	1	0	1

16 + 4 + 1 = 21

128	64	32	16	8	4	2	1
0	1	1	0	0	1	0	0

64 + 32 + 4 = 100

Converting Binary into Denary

People use the Denary (or Decimal) number system in their day-to-day lives. This system has 10 digits that we can use: **0, 1, 2, 3, 4, 5, 6, 7, 8 and 9.**

This is how we understand and count. For us to understand what PC's are trying to do we need to learn to convert Binary into Denary.

Scan this with your phone to take you to the Thinct.com page on Data Representation

Converting Binary into Decimal

The value of each binary place value is calculated by multiplying the previous place value by two. The first eight binary place values are:

128	**64**	**32**	**16**	**8**	**4**	**2**	**1**

In binary, each place value can only be represented by 1 or a 0.

To convert binary to denary, simply take each place value that has a 1, and add them together.

For example, the binary number 00001011 in binary place values is:

128	**64**	**32**	**16**	**8**	**4**	**2**	**1**
0	**0**	**0**	**0**	**1**	**0**	**1**	**1**

Result: (0 × 128) + (0 × 64) + (0 × 32) + (0 × 16) + (1 × 8) + (0 × 4) + (1 × 2) + (1 × 1)
Result: 0 + 0 + 0 + 0 + 8 + 0 + 2 + 1 = 11

Example above

Hexadecimal

Hexadecimal (or **hex**) is a base 16 system used to simplify how binary is represented. A **hex** digit can be any of the following 16 digits: **0 1 2 3 4 5 6 7 8 9 A B C D E F.**
Each **hex** digit reflects a 4-bit binary sequence.
This table shows each **hex** digit with the equivalent values in binary and denary:

Denary	Binary	Hexadecimal
0	0000	0
1	0001	1
2	0010	2
3	0011	3
4	0100	4
5	0101	5
6	0110	6
7	0111	7
8	1000	8
9	1001	9
10	1010	A
11	1011	B
12	1100	C
13	1101	D
14	1110	E
15	1111	F

Example:
•**11010100** in binary would be **D4** in hex
•**FFFF3** in hex would be **11111111111111110011** in binary

Computational Thinking – Data Representation – Term 1

How do Computers represent characters?

When any key on a keyboard is pressed, it needs to be converted into a binary number so that it can be processed by the computer and the typed character can appear on the screen.

A code where each number represents a character can be used to convert text into binary. One code we can use for this is called **ASCII**. The **ASCII** code takes each character on the keyboard and assigns it a binary number. For example:

- The letter '**a**' has the binary number 0110 0001 (this is the denary number 97)
- The letter '**b**' has the binary number 0110 0010 (this is the denary number 98)
- The letter '**c**' has the binary number 0110 0011 (this is the denary number 99)

Text characters start at denary number 0 in the **ASCII** code, but this covers special characters including punctuation, the return key and control characters as well as the number keys, capital letters and lower case letters.

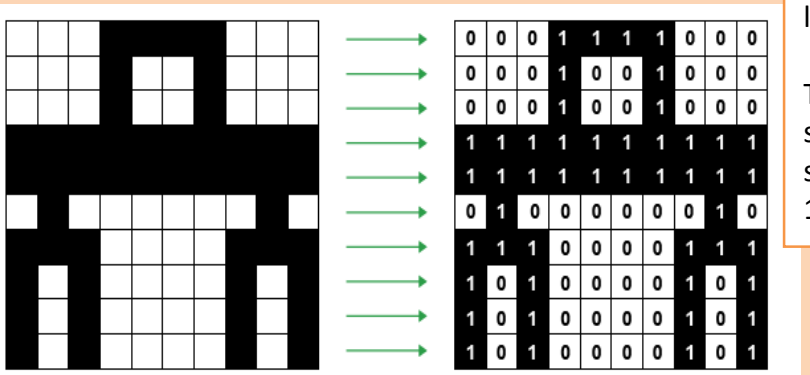
ASCII code can only store 128 characters, which is enough for most words in English but not enough for other languages. If you want to use accents in European languages or larger alphabets such as Cyrillic (the Russian alphabet) and Chinese Mandarin then more characters are needed. Therefore another code, called **Unicode**, was created. This meant that computers could be used by people using different languages.

How do Computers represent Images?

Images also need to be converted into binary in order for a computer to process them so that they can be seen on our screen. Digital images are made up of **pixels**. Each **pixel** in an image is made up of binary numbers.

If we say that 1 is black (or on) and 0 is white (or off), then a simple black and white picture can be created using binary.

To create the picture, a grid can be set out and the squares coloured (1 – black and 0 – white). But before the grid can be created, the size of the grid needs be known. This data is called metadata and computers need metadata to know the size of an image. If the metadata for the image to be created is 10x10, this means the picture will be 10 **pixels** across and 10 **pixels** down.



How do Computers represent Sound?

Sound needs to be converted into binary for computers to be able to process it. To do this, sound is captured - usually by a microphone - and then converted into a digital signal.

An analogue to digital converter will sample a sound wave at regular time intervals. The samples can then be converted to binary. They will be recorded to the nearest whole number.

If the time samples are then plotted back onto the same graph, it can be seen that the sound wave now looks different. This is because sampling does not take into account what the sound wave is doing in between each time sample.

This means that the sound loses quality as data has been lost between the time samples. The way to increase the quality and store the sound at a quality closer to the original, is to have more time samples that are closer together. This way, more detail about the sound can be collected, so when it's converted to digital and back to analogue again it does not lose as much quality.

The frequency at which samples are taken is called the sample rate, and is measured in Hertz (Hz). 1 Hz is one sample per second. Most CD-quality audio is sampled at 44 100 or 48 000 KHz.

Scan this with your phone to take you to the Thinct.com page on Data Representation

Computational Thinking – Data Representation – Term 1

What is Compression

Processing power and storage space is very valuable on a computer. To get the best out of both, it can mean that we need to reduce the file size of text, image and audio data in order to transfer it more quickly and so that it takes up less storage space.

In addition, large files take a lot longer to download or upload which leads to web pages, songs and videos that take longer to load and play when using the internet. Compression addresses these issues.

Any kind of data can be compressed. There are two main types of compression: lossy and lossless.

Lossy

Lossy compression removes some of a file's original data in order to reduce the file size. This might mean reducing the numbers of colours in an image or reducing the number of samples in a sound file. This can result in a small loss of quality of an image or sound file.

A popular lossy compression method for images is the **JPEG**, which is why most images on the internet are JPEG images. A popular lossy compression method for sounds is **MP3**. **Once a file has been compressed using lossy compression, the discarded data cannot be retrieved again**.

Lossless

Lossless compression doesn't reduce the quality of the file at all. No data is lost, so lossless compression allows a file to be recreated exactly as it was when originally created. There are various algorithms for doing this, usually by looking for patterns in the data that are repeated. **Zip** files are an example of lossless compression.

The space savings of lossless compression are not as good as they are with lossy compression.

Scan this with your phone to take you to the Thinct.com page on Data Representation

Type	Lossy compression	Lossless compression
Formats	JPG, MP3, WMV, MPG	TIF, PDF, GIF, PNG, MOV, ZIP
Examples		
Advantages	Smallest file sizes, least transmission time, reduces Internet traffic and collisions	Original quality is preserved / no information or data is lost
Disadvantages	Detail is permanently lost	Less significant reduction in file size
Example uses	Music streaming, online images and video, image libraries on devices or in the cloud	Text documents, electronic books, high resolution print documents

Computational Thinking – Networking – Term 2

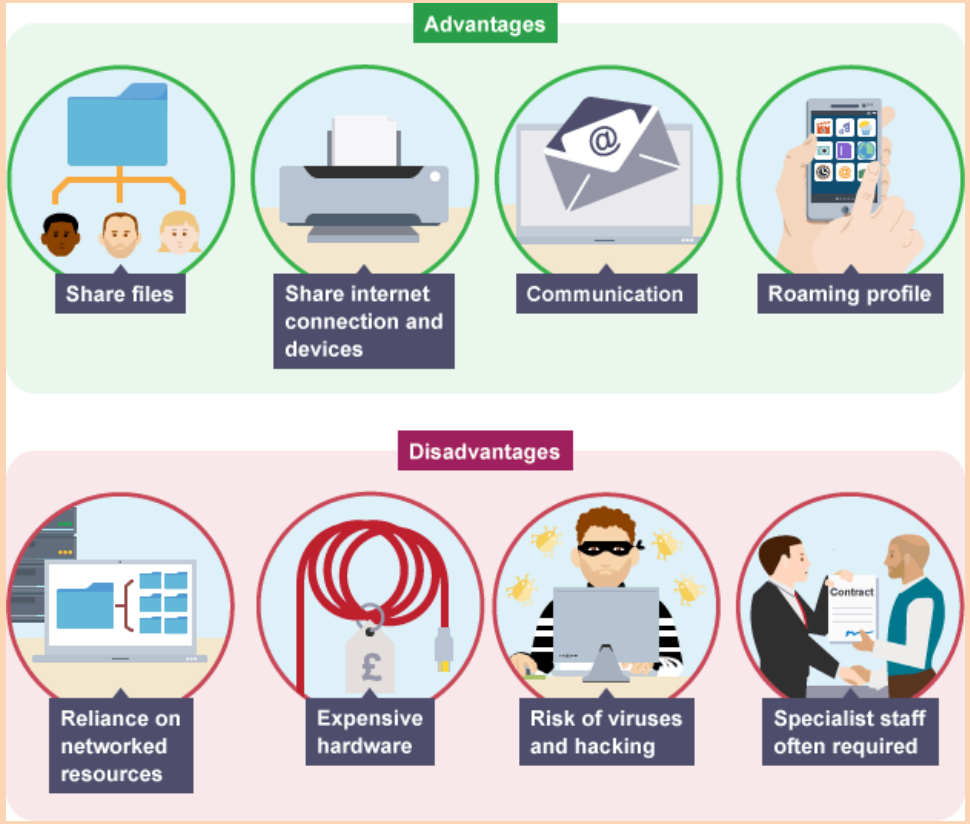
Introducing networks

A network is created when more than one device is connected together. A network can be a small collection of computers connected within a building (e.g. a school, business or home) or it can be a wide collection of computers connected around the world.

Data packets

The main purpose of networking is to share data between computers. A file has to be broken up into small chunks of data known as data packets in order to be transmitted over a network. The data is then re-built once it reaches the destination computer. Networking hardware is required to connect computers and manage how data packets are communicated. Protocols are used to control how data is transmitted across networks.

There are advantages and disadvantages to using networks.



Disadvantages

- **Dependence** – users relying on a network might be stuck without access to it.
- **Hacking** - criminal hackers attempt to break into networks in order to steal personal information and banking details. This wouldn't be possible on a stand-alone computer without physically getting into the room, but with a network it is easier to gain access.
- **Hardware** – **routers**, **network cards** and other network hardware is required to set up a network. At home, it is quite easy to set up a wireless network without much technical expertise. However, a complicated network in a school or an office would require professional expertise.
- **Viruses** - networks make it easier to share **viruses** and other malware. They can quickly spread and damage files on many computers via a network.

Advantages

- **Communication** – it is easy (and often free) to communicate using email, text messages, voice calls and video calls.
- **Roaming** – if information is stored on a network, it means users are not fixed to one place. They can use computers anywhere in the world to access their information.
- **Sharing information** – it is easy to share files and information over a network. Music and video files, for instance, can be stored on one device and shared across many computers, so every computer does not need to fill the **hard drive** with files.
- **Sharing resources** – it is easy to share resources such as printers. Twenty computers in a room could share one printer over a network.
- **Sharing software** – it is possible to **stream** software using **web applications**. This avoids needing to download and store the whole software file.

Types of networks

A network can be anything from two computers connected together, to millions of computers connected on the internet. There are many different types of networks such as **LAN**, **WAN**, and **PAN**.

PAN: Personal area network - e.g. Bluetooth phone to speaker.
LAN: Local area network - small geographical area.
MAN: Metropolitan network - e.g. London network.
WAN: Wide area network - large geographical area (Internet).

Computational Thinking – Networking – Term 2

Network Topologies – Network Design

There are different ways of setting up a **LAN**, each with different benefits in terms of network speed and cost. Three of the main **topologies** include bus, star and ring.

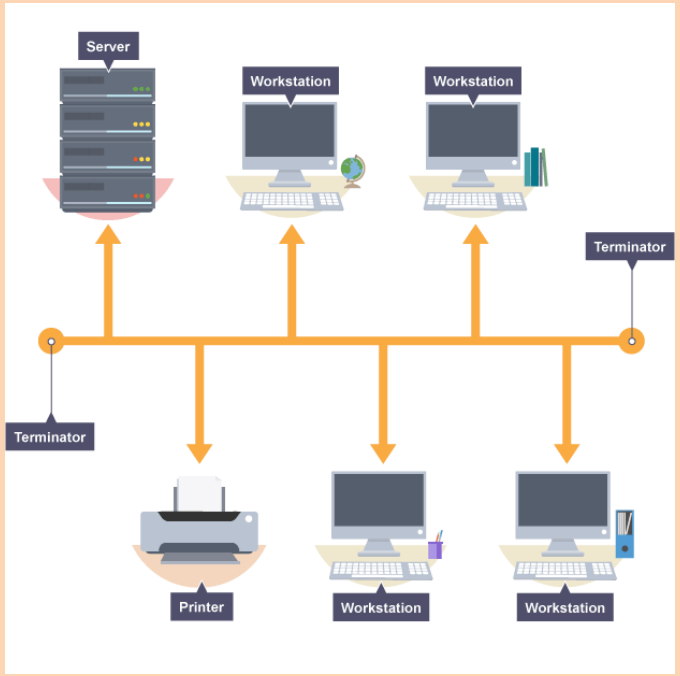
Network Equipment

Routers: A **router** can form a **LAN** by connecting devices within a building. It also makes it possible to connect different networks together. Homes and businesses use a router to connect to the internet. A router can often incorporate a modem within the hardware.

Switches: Connects different nodes on same network. It stores the MAC addresses of devices on the network and filters data packets to see which devices have asked for them.

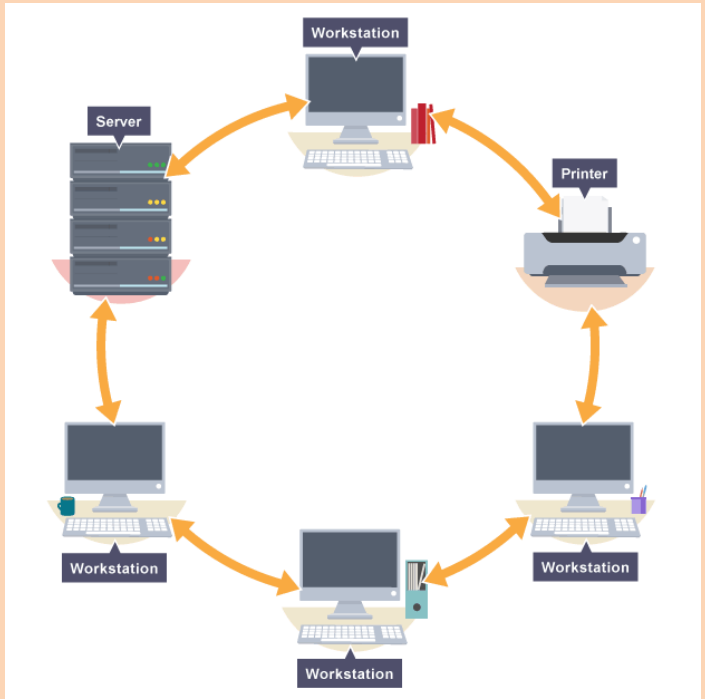
Bus Network

In a **bus network** all the **workstations**, **servers** and printers are joined to one cable - 'the bus'. At each end of the cable a **terminator** is fitted to stop signals reflecting back down the bus.



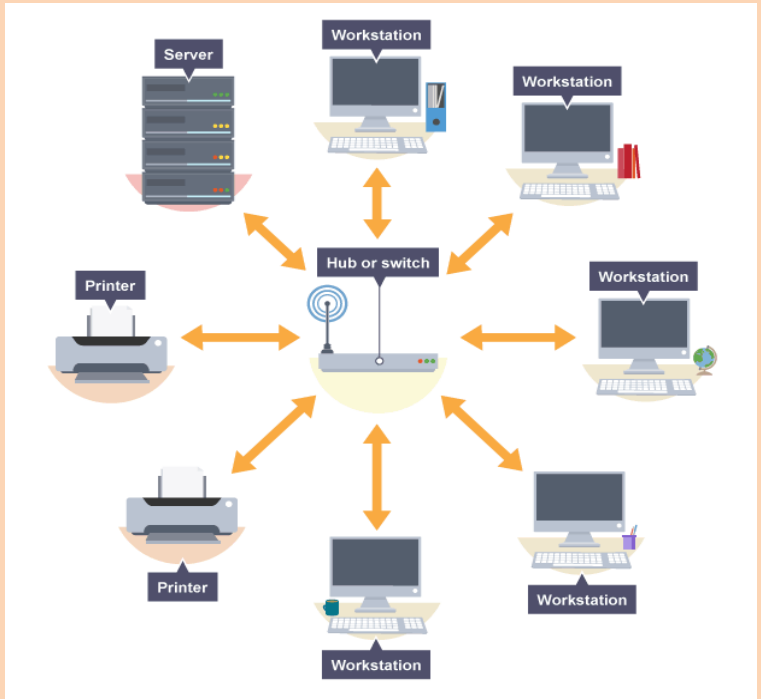
Ring network

In a ring network, each device (e.g. workstation, server, printer) is connected in a ring so each one is connected to two other devices. Each **data packet** on the network travels in one direction. Each device receives each packet in turn until the destination device receives it.



Star network

In a star network, each device on the network has its own cable that connects to a **switch** or **hub**. This is the most popular way of setting up a LAN. You may find a star network in a small network of five or six computers where speed is a priority.



Computational Thinking – Networking – Term 2

Protocol

The internet is similar to a road network in that it has rules (**protocols**) that you need to follow and only a certain number of vehicles (**data**) can get through at a time (**bandwidth**). If too many vehicles try to go down the same road you get congestion (reduced bandwidth).
When two devices send messages to each other it is called **handshaking** - the **client** requests access, the **server** grants it, and the **protocols** are agreed. Once the handshaking process is complete, the data transfer can begin.

Protocols establish how two computers send and receive a message. **Data packets** travel between source and destination from one **router** to the next. The process of exchanging data packets is known as **packet switching**.
Protocols manage key points about a message:

- Speed of transmission.
- Size of the message.
- Error checking.
- Deciding if the transmission is **synchronous** or **asynchronous.**

Different protocols are used for different purposes:

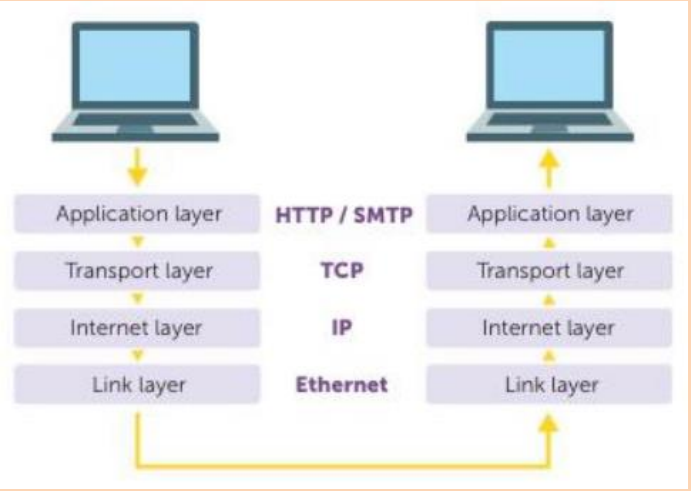
Protocol	Purpose	Key features
HTTP (Hypertext Transfer Protocol)	Used by a browser to access a webpage from a web server	Delivers web page data
HTTPS (Hypertext Transfer Protocol Secure)	As HTTP with encryption	Encrypts the data and uses a secure socket layer for greater protection
FTP (File Transfer Protocol)	Transmitting files between client and server computers	Used to upload and download files from a server
POP (Post Office Protocol)	Retrieving an email from an email server to your device	Deletes messages on the email server once they have been downloaded to a single device
IMAP (Internet Message Access Protocol)	Accessing email on a mail server via multiple devices	Maintains synchronisation of an email account across all devices
SMTP (Simple Mail Transfer Protocol)	Sending email messages between mail servers	Used for sending only

TCP/IP Protocol Layers

TCP/IP (also known as the internet protocol suite) is the set of protocols used over the internet. It organises how data packets are communicated and makes sure packets have the following information:

- **Source** - which computer the message came from.
- **Destination** - where the message should go.
- **Packet sequence** - the order the message data should be re-assembled.
- **Data** - the data of the message.
- **Error check** - the check to see that the message has been sent correctly.

Enables engineers to specialise in an area without needing to know about other layer. If protocols are changed in one layer they do not affect protocols in other layers



iMedia – Pre – Production - Term 1

Pre – Production Documents

What is a Mood Board

A Mood Board is a visual tool that communicates our concepts and visual ideas. It is a well thought out and planned arrangement of images, materials, pieces of text, etc. that is intended to evoke or project a particular style or concept.

Purpose:

- To generate visual ideas about how the campaign or product could look.
- To develop a feel for the Campaign/Product style.
- To show the client the fonts, images, colours to be used in the campaign.
- Can be Digital or Physical. We will be focusing Primarily on Digital Mood Boards.

Please scan this QR code to find the iMedia website section on this. (**Mood Boards**)

What is a Mind Map

A Mind Map is an easy way to brainstorm thoughts organically without worrying about order and structure. It allows you to visually structure your ideas to help with analysis and recall for your project moving forward.

Purpose:

- To quickly generate outline ideas and to Link or connect aspects of ideas. Based on Central Idea (Hub) and has Branches off for different aspect using Sub-Nodes.

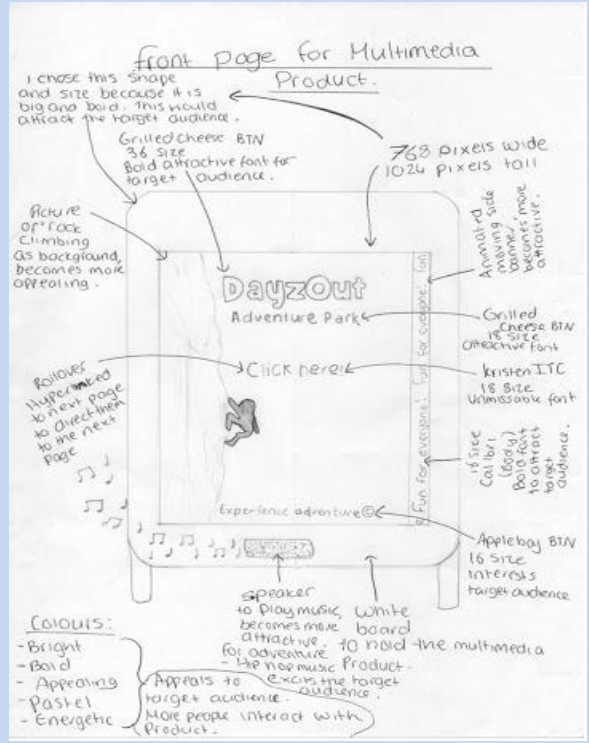
Please scan this QR code to find the iMedia website section on this. (**Mind Maps**)

What is a Visualisation Diagrams

Visualisation diagrams are a rough drawing or sketch of what the final static image product is intended to look like. They will have annotations to describe the design ideas. Typically, a visualisation diagram is hand drawn, but it does not need any artistic skills to communicate ideas.

Purpose:

- To plan the layout of a product to see what the design will look like. Shows how the finished item may look and make changes where needed.



Please scan this QR code to find the iMedia website section on this. (**Visualisation Diagrams**)

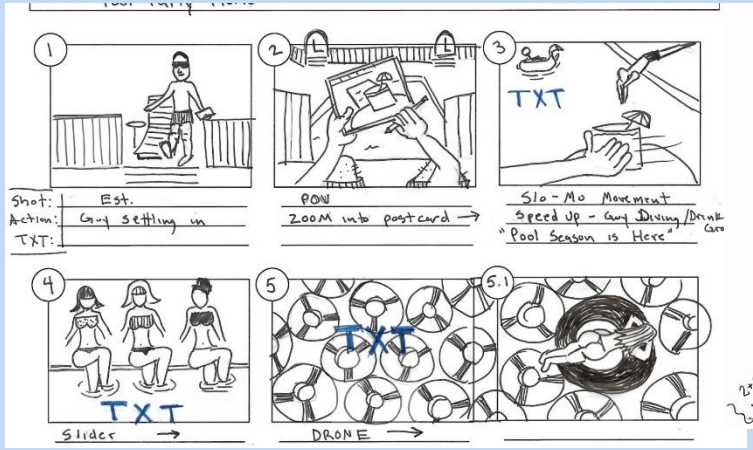
iMedia – Pre – Production Term 1

What is a Storyboard

A storyboard is a graphic organizer that plans a narrative. Storyboards are a powerful way to visually present information; the linear direction of the cells is perfect for storytelling, explaining a process, and showing the passage of time. A cell is another word for a panel. See below!

Purpose:

- Breaks down a film/animation into separate scene. It will have a flow of scenes that follow a timeline. Allows the Editor to piece together the different scenes in to the correct order.

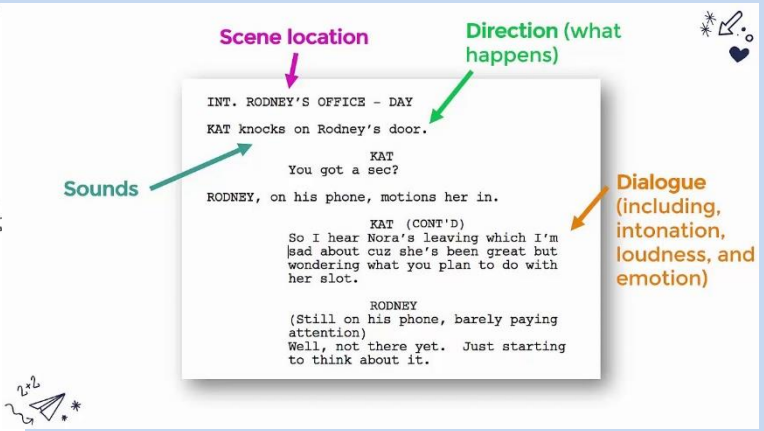


What is a Script

A written document used to plan TV, films or games. It shows the what is said, who speaks and directions for a scene.

Purpose:

- Provide lines for characters so they know what to say
- Provide details about expressions or actions
- Provide stage directions for actors and production crew If the scene is set inside (Interior/ INT) or outside (Exterior/EXT) the specific location, and the time of day.



Please scan this QR code to find the iMedia website section on both of these sections. (**Storyboards and Scripts**)

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.

iMedia – Pre – Production Term 2

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.

Please scan this QR code to find the iMedia website section on this (**Client Brief**)

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.

PROJECT TITLE
[Company Name]
[Project Lead]

Project Start: Mon, 1/2/2017
Display: Weekly

vertex42
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WBS	TASK DESCRIPTION	PROGRESS	PLAN START	PLAN END	PLAN DAYS	ACTUAL START	ACTUAL END	ACTUAL DAYS
	Phase 1 Title	25%	1/15/17	5/5/17	111	2/1/17	5/7/17	96
	Task 1	25%	1/15/17	1/28/17	14	2/1/17	2/14/17	14
	Task 2	60%	1/29/17	2/25/17	28	2/15/17	3/7/17	21
	Task 3	50%	2/26/17	3/15/17	18	2/1/17	2/10/17	10
	Task 4		3/16/17	4/6/17	22	2/13/17	3/25/17	41
	Task 5		2/26/17	4/2/17	36	2/28/17	4/4/17	36
	Task 6		3/23/17	5/4/17	43	3/25/17	5/6/17	43
	Phase 1 Milestone		5/5/17	5/5/17	1	5/7/17	5/7/17	1
	Phase 2 Title							
	Task 1		1/9/17	1/29/17	21	2/6/17	2/18/17	13
	Task 2		1/30/17	2/19/17	21	2/17/17	3/1/17	13
	Task 3		2/20/17	3/12/17	21	2/28/17	3/12/17	13
	Task 4		3/13/17	4/2/17	21	3/11/17	3/23/17	13
	Task 5		4/3/17	4/23/17	21	3/22/17	4/3/17	13
	Task 6		4/24/17	5/14/17	21	4/2/17	4/14/17	13
	Insert new rows ABOVE this one							

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!

iMedia – Pre – Production Term 2

Hardware and Software

In order to create or digitise pre-production documents, different types of computer hardware are needed which are split into different categories. These are the computer systems, peripherals, imaging devices and other equipment

- Computer Peripherals – attachments to increase functionality of the system. e.g. keyboard, mouse, trackpad, graphics tablet, monitor, speakers, microphone etc.
- Imaging device – devices used to capture or create images e.g. digital cameras, camcorders, scanners
- Other equipment – these are pieces of equipment not connected to a computer system.

They are often materials that are used, such as pens, pencils, paper. They are still classed as Hardware because they are needed especially when pre-production documents can also be created by hand.

Hardware and Software

All components of a computer system can be categorised into Hardware and Software.

- Hardware – the parts of the computer system you can physically touch:
e.g. Monitor, Printer, Camera, Microphone, Scanner
- Software – Programs that are installed and run on a computer to perform a specific task:
e.g. Web browser, Desktop Publishing, Film Editing, Image Editing, Word Processing & Web Authoring.

Health and Safety

It is important that you understand this potential risks of working on computers and graphic tablets.

Risks:

- Glare or bright reflections from the screen should be avoided. This can be accomplished by making sure that it is not facing windows or bright lights.
- Curtains or blinds should be used to block out intrusive light.
- There should be space under the desk for employees to move their legs.
- Space should be left in front of the keyboard for the hands and wrists to rest when not typing.

Key Words/Terms

Hardware Software Web Browser
Digitising Peripheral Computer system
Plan Mind Map Storyboard
Pre-Production Visualisation

Design and layout of graphics

This refers to the use of colour, composition, white space and styles in the digital graphic in the context of a given target audience. For example, choices of colour can be very different depending on the age group of the target audience. The colours should also contrast and complement each other. Composition refers to the layout of the different elements on the overall graphic, using suitable sizes and positions of different images and assets. White space is not necessarily a white colour – it is any blank space and can be used effectively to emphasise key parts of the graphic. The styles are associated with different genres of graphic products. Examples would include themed magazine covers, gaming covers, film posters, advertisements. These concepts of design and layout can be applied in the development of the visualisation diagram.

Primary Research

When planning a product for a client is it important that some research is undertaken in order to ensure your product is appropriate for both the client and it's intended target audience.

Primary research is where fresh or new data is collected for the first time. Examples of primary research methods are: questionnaires, surveys, interviews, focus groups or monitoring of particular behaviours or interactions. Others include photos, videos or recordings.

Secondary Research

Secondary research involves the gathering of pre-existing data that has already been produced.

Secondary research is where information or data is collected from reports or previous studies by agencies such as the government or business within a particular area of business or industry that has previously collected primary research, Others include biographies, articles or news broadcasts

Please scan this QR code to find the iMedia website section on this (**Research**)

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.

Weimar and Nazi Germany 1918-39 Key Topic 1: The Weimar Republic, 1918-29

The Weimar Republic

This was the name given to Germany after the Kaiser had abdicated in November 1918. This was a time of despair and hope for Germany. At first, the country faced lots of chaos but under Gustav Stresemann, there was some stability.

Key events

1918 World War One ended. The Kaiser abdicated and Germany became a country without a monarch (a Republic).

1919 January Spartacist Uprising

1919 June Signing of the Treaty of Versailles

1919 August Weimar Constitution finalised

1920 Kapp Putsch

1923 French occupation of the Ruhr and hyperinflation

1924 Dawes Plan

1925 Locarno Pact

1926 Germany joins League of Nations

1928 Kellogg Briand Pact

1929 Young Plan

Key Concepts

The Weimar Republic faced much opposition, It was disliked by the left wing who wanted Germany to be like Communist Russia and it was disliked by the right wing who wanted the monarchy back.

The Treaty of Versailles caused many problems for Germany. The German people disliked the politicians for signing it and it caused political problems and economic problems.

Gustav Stresemann helped to bring about recovery in Germany after 1924. He solved economic problems by making friends with other countries. However, historians have very different views about the extent of this recovery.

The Golden Age was the period from 1924-29 and it saw significant changes in culture, the standard of living and the position of women.

YouTube

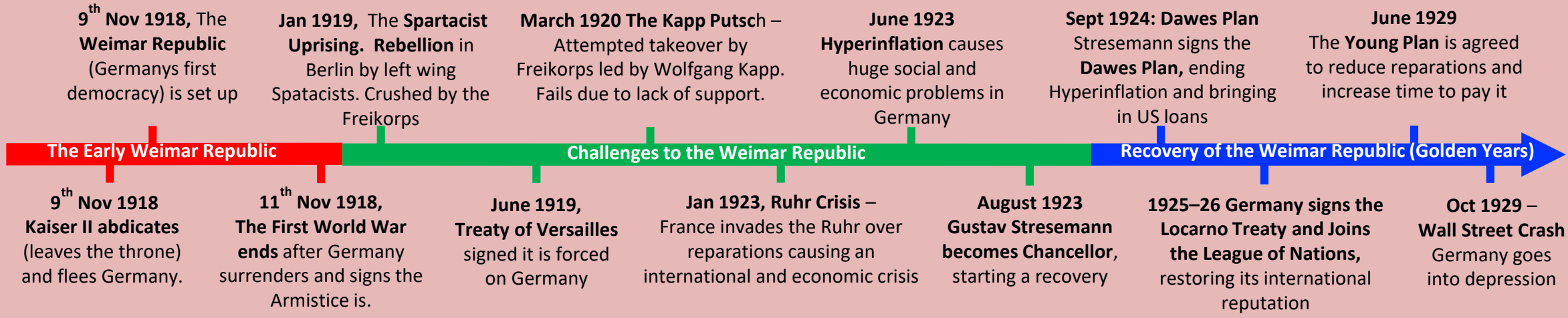
Problems facing the Weimar Republic

SCAN ME

Key Words	
Abdication	When a monarch leaves the throne
Republic	A country without a King or a Queen
Ebert	The first President of the Republic
Stresemann	The Chancellor of Germany from the Summer of 1923
Article 48	The President could use this to ignore the Reichstag and rule as he saw fit
Kaiser	King
Armistice	An agreement to end war
Weimar	The new government could not meet in Berlin as it was so dangerous, so they met here instead
Constitution	This is an agreement about how the country would be ruled
Reichstag	German parliament
Dictat	Dictated (forced) peace agreement
Freikorps	Ex military soldiers who wanted to overthrow the Republic
Rentenmark	The currency of Germany after November 1923
Hyperinflation	When money looses its value
Dawes Plan	An agreement where the USA would lend Germany money
Young Plan	This lowered the reparations payment and gave Germany longer to pay
Treaty of Versailles	This decided how Germany was going to be treated after WW1
Locarno Pact	An agreement on borders signed by Britain, France, Italy and Belgium
Kellogg Briand Pact	65 counties including Germany agreed to resolve conflict peacefully
Coalition	A government of two or more political parties

Weimar Germany 1919-29

Timeline



Key People

Kaiser Wilhem II	Emperor of Germany, who fled in November 1918
Friedrich Ebert	First Chancellor of Germany, leader of Social Democrats(SPD)
Rosa Luxembourg	Leader of the left wing Spartacists, executed after the uprising
Wolfgang Kapp	Politician who led the Freikorp in the Kapp Putsch
Gustav Stresemann	Chancellor from 1923–29, solved Hyperinflation, Ruhr Crisis and brought about a period of stability and success to Germany

Key Terms

Armistice	Agreement to stop fighting, Germany asked for it in 1918
November Criminals	Weimar politicians blamed for the 'Stab in the Back' of Germany by surrendering at the end of World War One.
Constitution	The system of laws and rules of a country
Reichstag	The German Parliament, also name of the government building
Article 48	Gave the President 'emergency powers' in times of crisis, this means he can pass any law without permission
Proportional Representation	A system where parties gain seats in proportion to the number of votes they receive. E.g. 33% of votes = 33% of seats in the Reichstag. Meant to be fair but led to coalitions
Chancellor	Head of Government, chosen by the President
President	Head of state (Weimar Republic and Army), voted by people, could use Article 48 and had power to dismiss government.

Strengths	Weaknesses
• Equal voting rights for men/women over 21, Freedom of Speech, Press, Religion • Germany is a democracy, voted for parties and President • **Proportional representation** where political parties have fair share of seats in government compared to vote • Not one party or person can become too powerful	**Proportional representation** causes lack of strong government as too many parties (29) means there are coalitions they do not get along! **Article 48** gave President too much power, could pass laws in crisis, this wasn't democratic Army, nationalists and rich wanted return of Kaiser

How did the Treaty of Versailles affect Germany?

Weimar forced to accept Treaty of Versailles 1919, called it the '**Diktat**' a dictated peace: they hated it

- **Military** – 100,000 men, no conscription, 6 battleships, no submarines, no airforce, Rhineland demilitarised. **Result:** Germany felt weak/vulnerable and this helped cause violence 1919–21 (Freikorps)
- **Article 231**, *War Guilt Clause*: Germany had to accept full blame for World War War.` **Result**: They felt humiliated and blamed Weimar
- **Economic** – Reparations of £6.6 billion to pay for WW1 and Saar Coalfields given to France for 15 years. Loss of Navy/Empire. **Result**: Bankruptcy which helps caused Ruhr Crisis & Hyperinflation in 1923
- **Territory** – Lost 10% of land and 13% population. Alsace-Lorraine to France, loses empire, West Prussia and Polish Corridor given to Poland. **Result:** Splits up Germany; loss of economy, population & power.

What threats faced the Weimar Republic 1919-23

Political	**Hatred of Weimar**	Government called November Criminals for loss of WW1 (*Stab in the Back/Dolschtoss*), dislike of new democracy. There is fear of revolution and violence, with 376 assassinations between 1919–21
Political	**Spartacist Uprising, 1919**	Left wing Spartacists, led by Rosa Luxembourg aim to takeover and turn Germany into a communist country. Freikorp puts down, Spartacists fail and Luxembourg killed
Political	**Kapp Putsch 1919**	The Freikorp (ex army nationalists) led by Wolfgang Kapp capture government buildings in Berlin announcing a right wing takeover (putsch). The army refuses to help the Weimar but workers go on strike which causes chaos & putsch fails.
Economic	**ToV 1919**	Reparations, loss of Saar Coalfields and territory/empire causes bankruptcy, government can't pay France, causes Ruhr Crisis and Hyperinflation, 1923
Economic	**Ruhr Crisis 1923**	France invades Ruhr industrial region to take payments, 60,000 workers go on strike and production stops. There are protests & violence. Weimar prints more money to pay strikers & but with no money this causes Hyperinflation, a greater financial crisis.
Economic	**Hyper – inflation 1923**	Hyperinflation = prices rise rapidly whilst value of mark drops. Over the space of months the money value drops Prices rise: Bread rises from 1 mark to 200,000 billion, 1923. Mass poverty and starvation, bankruptcy & loss of savings

How did Stresemann help German recovery 1924-29

	Political stability	Stresemann gets coalitions to work together so decisions can be made and things can get done. As a result, people have more faith in government
Economics	**Young Plan, 1924**	1924, Germany gets loans ($800m at first, $3 billion in total) from US. Stresemann burns mark and introduces temporary currency, the Rentenmark, to end hyperinflation and resets prices, as a result Industry grows by 40%.
Economics	**Dawes Plan**	Another US deal (1928) which reduces reparations from £6 to £1.85 billion, also extends payments by 60 years. Meaning Germany has more money!
Economics	**Ruhr Crisis**	Ends the Ruhr strike and France to leave which means that German industry can start again, allowing Germany to make payments & recover from hyperinflation.
Internationally	**Locarno Treaty**	Stresemann signs Treaty (1925) with France and Belgium, Great Britain and Italy. Agrees ToV borders which improved friendship with countries in Europe.
Internationally	**League of Nations**	Germany joins League in 1925 (after being banned in ToV). This increased Germanys international respect and made them a 'Great Power' again.
Internationally	**Kellogg Briand**	Stresemann signs Kellogg Briand Pact in 1928 with 64 countries who agree to peace and solving future problems peacefully rather than through force.

Had Germany fully recovered by 1929?

- **No:** Germany VERY reliant on US loans/money and If US economy collapsed it would bring down Germany (It did in 1929, Wall Street Crash!) Unemployed remained about% 10, Farmers/Middle Class still struggled
- **Yes:** Weimar Republic was stable, extreme parties like Nazis got few votes, wages increased/working hours decreased, Industry rose 40% and internationally Germanys reputation was stronger.

How did Society change in the Weimar Republic?

Women

Equal rights in voting, marriage & work. Enjoyed social freedom (fashion, smoking and drinking) but opposition by old German. Jobs: Only 36% worked and wages still below men but 3000 doctors by 1930 and 112 elected to Reichstag by 1932.

Standards of Living

Wages increase by 10%, working hours dropped BUT unemployment still remained 10% and middle class struggled. New housing (2 million built), 60% less homeless. Benefits for unemployed (60 marks weekly)war veterans & single mothers

Culture

Germany becomes culture capital, no censorship under Weimar Republic, freedom of speech encourage new architecture (Bauhaus) Art (Modernism) Golden Age of German cinema famous film Metropolis, 3800 cinemas 1932

Weimar and Nazi Germany 1918-39
Key Topic 2: Hitler's Rise to Power, 1919-33

Hitler's Rise to Power
Hitler sets up the Nazi Party in 1920 and becomes Chancellor in January 1933. This happens for a variety of reasons – Hitler's strengths, inbuilt problems of the Weimar Republic, and the weaknesses of others.
Key events
1919 Hitler joins the German Worker's Party
1920 Hitler sets up the Nazi Party
1921 Hitler introduces the SA
1923 The Munich Putsch
1925 Mein Kampf published
1926 Bamberg Conference
1928 Nazis win 12 seats in Reichstag
1929 Death of Stresemann and Wall Street Crash
1930 Nazis win 107 seats in Reichstag
1932 July Nazis win 230 seats in Reichstag
1932 November Nazis win 196 seats in Reichstag
1933 January Hitler becomes Chancellor
Key Concepts
The Munich Putsch is a significant event. Although a failure, Hitler gained publicity, he wrote Mein Kampf and he realised that if he was to win power, he needed to do this by votes and not by force.
Stable Stresemann caused problems for the popularity of the Nazi Party. When times were good, voters were not attracted to the Nazi policies.
The Wall Street Crash was a major turning point in the fortunes of the Nazi Party. The Nazi message did not change but people were now prepared to hear it.
The Backstairs Intrigue - At a time when Nazi popularity at the polls was decreasing, Hitler was handed power by political elites who feared a Communist take over and Civil War.

YouTube

Hitler's Rise to Power

SCAN ME

Key Words	
NSDAP	The Nazis
Iron Cross Award	Given for bravery in war
Volk	The notion of pure German people
25 Point Programme	The political manifesto of the Nazi Party
Volkischer Beobachter	People's Observer, a Nazi newspaper
Fuhrerprinzip	Belief that one person should run a Party
Swastika	Emblem of the Nazi Party
SA or Sturmabteilung	Private army of the Nazi Party headed by Himmler
Aryan	Pure German people
Anti-Semitism	Hatred of the Jewish people
Mein Kampf	Hitler's autobiography
Putsch	An attempt to get power illegally
Blood Martyrs	16 Nazis who died at the Munich Putsch
Gaue	Local party branches
SS or Schutzstaffel	Hitler's bodyguards
KPD	German Communist Party
Propaganda	Goebbels attempted to make people think in a certain way
Hindenburg	The President of the Republic from 1925 to 1934
Roter Frontkampferbund	The Communist's own private army

Weimar and Nazi Germany 1918-39
Key Topic 3: Nazi Control and Dictatorship

BBC Bitesize

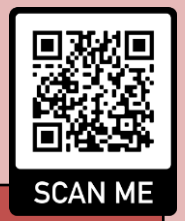
Creation of the Dictatorship

SCAN ME

Nazi Control and Dictatorship
This was a time when Hitler formed a legal dictatorship and put in place methods of propaganda and censorship to persuade and encourage all Germany people to support Nazi ideals.
Key events
1933 January Hitler becomes Chancellor
1933 February Reichstag Fire
1933 March Nazis win 288 seats
1933 March Enabling Act passed
1933 July Nazis become the only legal party in Germany
1934 June Night of the Long Knives
1934 August President Hindenburg dies
1934 August Hitler combines the post of Chancellor and President and becomes Fuhrer
1934 August German army swears allegiance to Hitler
1938 Over the course of the year, Hitler removes 16 army generals from their positions
Key Concepts
Removal – From 1933 to 1934, Hitler removed all opposition and established himself as Fuhrer.
Control – There was an attempt to control and influence attitudes. This was done by propaganda and terror.
Opposition – The youth and the churches opposed the regime.

Key Words	
Marinus van der Lubbe	The Reichstag Fire was blamed on this Communist
Enabling Act	Gave the Nazis full power for the next 4 years
Gleichschaltung	Hitler's attempt to bring German society into line with Nazi philosophy
German Labour Front (DAF)	Set up to replace Trade Unions
Dachau	First concentration camp
Centralisation	Germany had been divided into districts called Lander. Now Germany was run from Belin alone
Purge	To get rid of opposition
Gestapo	Secret police headed by Goering.
Night of the Long Knives	Removal on internal and external opposition
Sicherheitsdienst (SD)	The intelligence body of the Nazi Party
Concordat	In July 1933 the Pope agreed to stay out of political matters if the Nazis did not interfere with Catholic affairs
Eidelweiss Pirates and Swing Youth	Groups who apposed the Hitler Youth
Confessional Church	Followed traditional German Protestantism and refused to allow the Nazification of religion. Led by Pastor Martin Niemoller
Mit Brennender Sorge (With Burning Concern)	The Pope wrote to priests in Germany about his concerns over the Nazi attempts to control religion

Weimar and Nazi Germany 1918-39
Key Topic 4: Life in Nazi Germany, 1933-39



Life in Nazi Germany

The lives of German citizens were changed after Hitler's appointment as Chancellor. For some, life was better under the Nazis but for others, it was much worse.

Key events

1933 Boycott of Jewish shops and businesses. Law for the Encouragement of Marriage. Sterilisation Law passed.
1935 The Nuremberg Laws were passed.
1935 Conscription introduced.
1936 Membership of the Hitler Youth made compulsory.
1938 Jewish children were not allowed to attend German schools. Lebensborn programme introduced. Kristallnacht.
1939 The euthanasia campaign began. Designated Jewish ghettos established.

Key Concepts

Anti-Semitism – Persecution of the Jews grew continuously after 1933.

Young– The Nazis placed much emphasis on controlling the young as only then could they secure a 'thousand year Reich'. Youth organisations and education indoctrinated the German youth.

Women – The Nazis had traditional family values but even these were tested by the needs of war and the desire to ensure a growing Aryan population.

Living Standards – The Nazis did reduce unemployment but they did this by banning Jews and women from the workplace and by putting Germany on a war footing. Workers had limited rights.

Key Words	
Kinder, Kuche, Kirche	Children, Kitchen, Church. This summed up the Nazi ideal of womanhood
The Motherhood Cross Award	Given to women for large families
Lebensborn	Where unmarried women were impregnated by SS men.
Napola	Schools intended to train the future leaders of Germany
Nazi Teachers League	All teachers had to swear an oath of loyalty to the Nazis
Reich Labour Service	A scheme to provide young men with manual labour jobs
Invisible unemployment	The Nazi unemployment figures did not include women, Jews, opponent and unmarried men under 25
Autobahn	Motorway
Rearmament	Building up the armed forces I readiness for war
Volksgemeinshaft	The Nazi community
Strength Through Joy	An attempt to improve the leisure time of German workers
Beauty of Labour	Tried to improve working conditions of German workers.
Volkswagon	People's car
Eintopf	A one pot dish
Herrenvolk	The master race or the Aryans
Nuremberg Laws	Jews were stripped of their citizenship rights and marriage between Jews and no Jews was forbidden
Kristallnacht (Night of the Broken Glass)	A Nazi sponsored event against the Jewish community

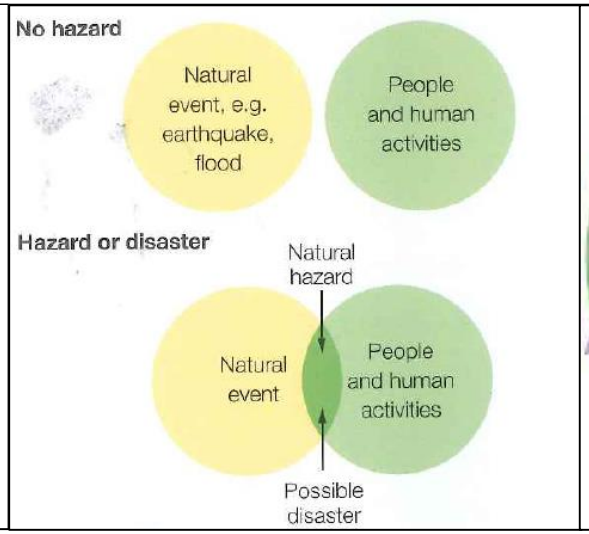
Paper 1 (physical) – Topic: Natural hazards overview and Tectonics

What is a natural hazard?

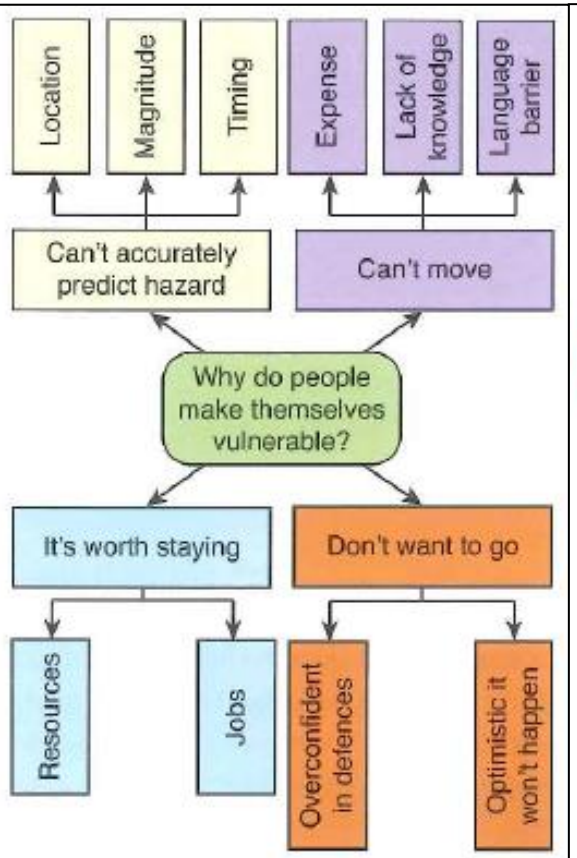
A natural hazard is a naturally occurring event which can cause harm to humans.

Types of natural hazard include:

- Atmospheric (including climatic and meteorological) hazards such as tropical storms
- Geophysical hazards such as earthquakes
- Hydrological hazards such as flooding



Hazard mitigation is the process of trying to mitigate – reduce – the effects of natural hazards. This can take many forms (left) but will need to be tailored for each specific hazard. For example, mitigation strategies for a volcanic eruption are unlikely to be successful in the event of an avalanche. Mitigating the risk of natural disasters is also very expensive – So while HICs may be able to put effective strategies in place that limit the impact of such disasters – less deaths, quicker recover, etc – LICs are likely to be unable to do so, and therefore are more dependent on international assistance in the event of a disaster. These general ideas are trends and patterns you will observe in both the tectonic hazards and weather hazards section.



What factors affect risk?

There are several factors that have led to an increase in the number of people at risk from natural events.

Poverty
In poorer parts of the world poverty may force people to live in areas at risk. This is especially true in cities such as Lima in Peru or Caracas in Venezuela. Here, a shortage of housing has led to people building on unstable slopes prone to floods and landslides.

Urbanisation
Over 50 per cent of the world's population now live in cities. Some of the world's largest cities (for example, Tokyo, Istanbul and Los Angeles) are at risk from earthquakes.
Densely populated urban areas are at great risk from natural events such as earthquakes and tropical cyclones. The 2010 Haiti earthquake destroyed much of the capital Port-au-Prince killing some 230 000 people.

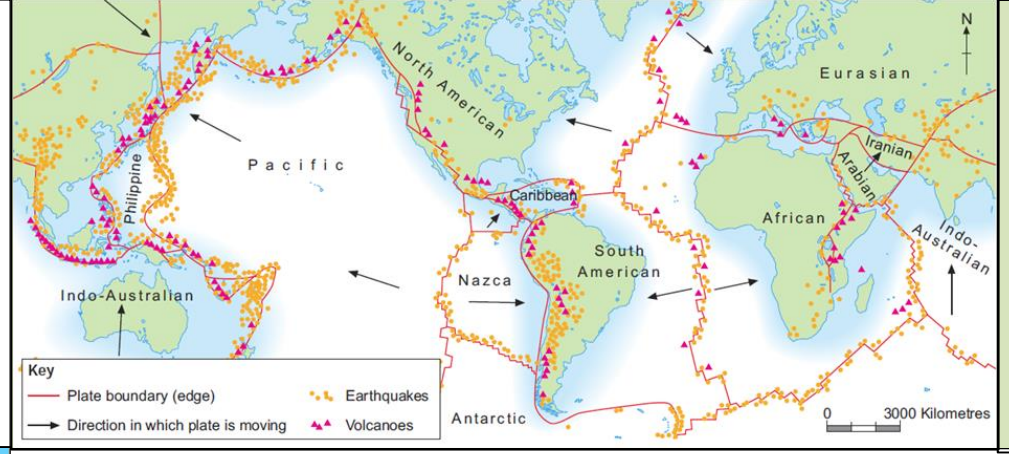
Factors increasing the risk from natural hazards

Farming
When a river floods it deposits fertile silt on its floodplain, which is excellent for farming. But when people choose to live there they are putting themselves at risk. In low-lying countries many people may live on floodplains, like that of the River Ganges in Bangladesh.

Climate change
In a warmer world the atmosphere will have more energy leading to more intense storms and hurricanes. Climate change may cause some parts of the world to become wetter with an increased risk of flooding. Other areas may become drier and prone to droughts and famines.

Tectonic theory

Tectonic plates move because the core of the earth is very hot and having heated the magma in the mantle, this then rises as it is less dense, before reaching the crust, travelling in each direction underneath it, cooling again which makes it denser, and sinking back towards the core. As this process happens, friction moves the plates with it. Evidence for this includes matching geology and fossils on different continents, from when they were joined.



Global distribution

Earthquakes are commonly found in thin narrow belts associated with a plate boundary. Most volcanoes are distributed along the plate boundaries, too, but only constructive and destructive boundaries/margins. Occasionally, volcanoes are found in the middle of plates (e.g. Hawaii). These are called hot spots.

Key terms and definitions for this topic

Inner core- solid centre of Earth; 5500°C; extremely dense, mostly made of iron and nickel.

Outer core-liquid around inner core due to lower pressures+ temperatures

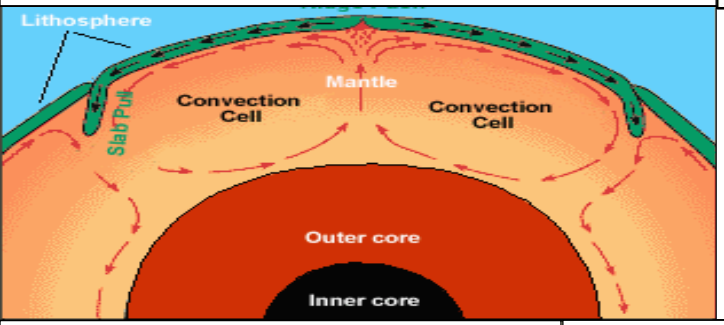
Mantle- made mostly of iron, magnesium and silicon, it is dense, hot and semi-solid.

Crust- outer layer, solid but fractured like a broken egg shell

Richter Scale- a numerical, logarithmic scale for expressing the magnitude of an earthquake on the basis of seismograph oscillations

Magnitude- the size of an earthquake measured on the Richter Scale

Subduction- the process of one plate being taken under, and destroyed under, another plate as they move towards each other



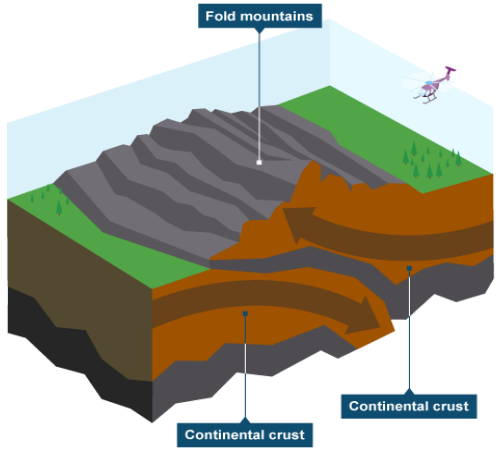
Types of plates

There are two types of tectonic plate: oceanic and continental. Continental plates are less dense and cannot be destroyed or renewed. The Eurasian, African and North American plates are all examples of continental plates.

Oceanic plates are denser and can be destroyed and renewed at plate boundaries. An example of an oceanic plate is the Pacific plate; found beneath the Pacific Ocean.

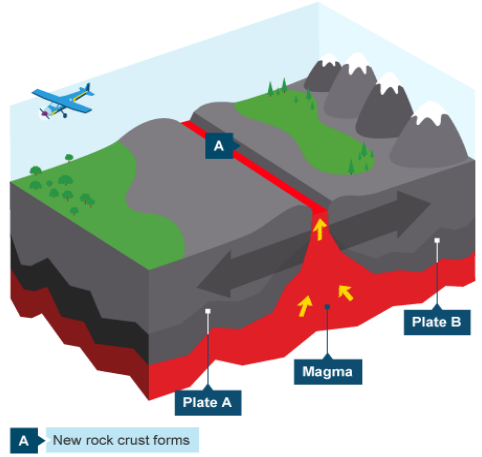
Collision plate boundary

Two plates of equal density collide and buckle to form Fold Mountains. Found in the Himalayas.



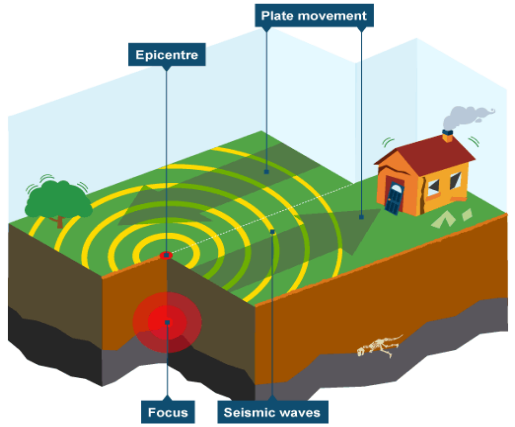
Constructive plate boundary

As 2 plates pull apart, eruptions occur and new crust is formed. Found in the mid-Atlantic ridge.



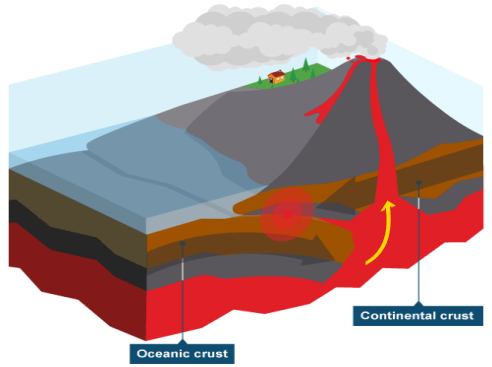
Conservative plate boundary

Two plates scrape past each other, causing violent earthquakes. Found in the San Andreas fault.



Destructive plate boundaries

Two plates of different densities move towards each other. The denser oceanic plate is subducted causing earthquakes, volcanoes and tsunamis. Found in the ring of fire.



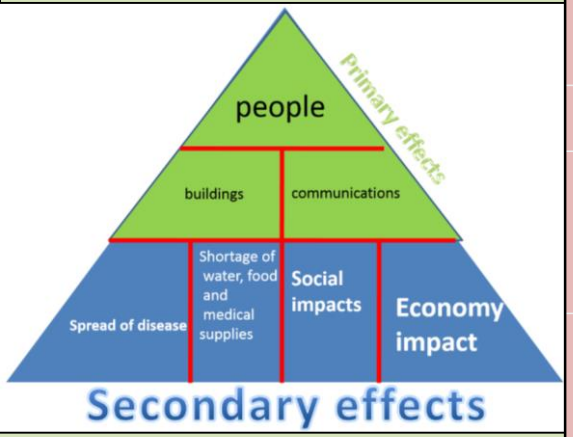
Primary and Secondary effects of tectonic hazards

<u>Primary effects happen immediately as a direct result of the ground shaking</u>

People – dead, injured, trapped
Buildings – collapse
Communications – eg bridge, airport, port, roads – damaged or destroyed.

<u>Secondary effects are driven by the severity of the primary effects</u>

Shortage of food, water and shelter
Spread of disease from dirty water or dead bodies left unattended
Social impacts of trauma and grief – young children not able to go to school
Economic – impacts often higher in richer HIC



Chile = High Income Country
(38th Richest country in the world)
Nepal = Low Income Country
(109th Richest country out of 193)

CHILE HIC – PRIMARY EFFECTS	NEPAL LIC – PRIMARY EFFECTS	IMMEDIATE RESPONSES—CHILE	IMMEDIATE RESPONSES NEPAL	LONG TERM RESPONSE—CHILE	LONG TERM RESPONSE NEPAL
Primary effects—about 500 people died, 12,000 injured and 800,000 people in total affected	9000 people died, 20,000 injured and over 8 million people affected (1/3 pop)	Swift response from all emergency services—international help needed to supply field hospitals, satellite phones and floating bridges.	Search and rescue teams arrived **quickly** from UK, India and China. Helicopters rescued many people caught in avalanches and delivered supplies to villages cut off by landslides.	Month later Chile launched a housing reconstruction for 200,000 households for people affected by the earthquake.	7000 schools to be rebuilt—with improved building regulations.
220,000 homes , 4500 schools and 53 ports and 56 hospitals destroyed.	3 million people left homeless when homes destroyed.	Swift temporary repairs to Route 5 north—south highway to help trade distribution from Santiago capital.	Half a million tents needed to provide shelter for the homeless. Field hospitals set up to cope with demand and overcrowded hospitals. 50,000 simple tents delivered in 4 days to shelter people in minus temps.	President said complete rebuild and recovery may take 4 years including ports and damaged buildings	Very poor country not prepared—Water restored to Kathmandu but it was contaminated
Santiago airport badly damaged – total cost of earthquake US$30 billion	Electricity and water supplies and sanitation and communications affected.—1.4 million people needed food, shelter and water in the days and weeks after the quake. 7000 schools destroyed and cost of damage US$5 billion.	Power and water restored to 90% of homes within 10 days. National appeal raised US$60 million—enough to pay for 30,000 emergency shelters.	300,000 people migrated to Kathmandu to seek shelter with family and friends. Nepal couldn't cope—they asked for $415 million in aid Within 24 hours 100 international search and recue teams arrived to help . Over 100 search dogs help rescue 16 people. Waived visa regulations for rescue workers. India sent 8 helicopters and 1000 people from it's disaster response team.		Geohazards international with Kathmandu Valley risk programme to better prepare Nepal in the future.
SECONDARY EFFECTS	**SECONDARY EFFECTS**				
1500Km of roads damaged by landslides, remote communities cut off for many days.	Ground shaking triggered avalanches—on Mt Everest 19 people died.				
Several coastal towns hit by tsunami and several Pacific countries but no loss of life due to early warning.	Langtang avalanche 250 people missing. Landslide on Kali Gandaka River—people evacuated in case of flooding.				
Santiago chemical plant fire—people evacuated from the area.					

You need to be able to confidently compare the effects and responses of the two earthquakes (Chile 2010 and Nepal 2015), both in terms of similarities and differences, but also considering their relative wealth – this has a massive impact upon both effects and response.

Protection

Many areas prone to earthquake hazards now use building codes. Any new building or adjustment to existing buildings must be built to strict guidelines that would protect people from future earthquake hazards. Protection involves constructing buildings so that they are safe to live in and will not collapse. Some examples of building improvements are:

Rubber shock absorbers in the foundations to absorb the earth tremors.
Steel frames that can sway during earth movements.
Open areas outside of the buildings where people can assemble during an evacuation.
Low cost methods, such as wire mesh retrofitting, are used in rural areas and developing countries. These are affordable and appropriate to the resources and people living there.
Lightweight roofs and safety glass designed to reduce damage and injury.
Example of an earthquake-proof building.
An earthquake-proof tower block has steel frames that can sway, has rubber shock absorbers in the foundations, and has open areas outside for people to assemble

Reducing vulnerability in earthquake active regions

Preparation

Hospitals, emergency services and residents practise for an earthquake in earthquake-prone countries. They have drills in all public buildings so that people know what to do in the event of an earthquake. This helps to reduce the impact and increases people's chance of survival.

Prediction

Prediction involves using seismometers to monitor earth tremors. Experts know where earthquakes are likely to happen, however it's very difficult to predict when they will happen. Even looking at the time between earthquakes doesn't seem to work. Along the San Andreas fault in California, USA, scientists have some of the most advanced technical equipment and education in predicting earthquakes – but they too cannot be exactly sure of when or where an earthquake may strike.

Reducing vulnerability in volcanically active regions

Volcanic eruptions are unpredictable, however scientists can monitor volcanoes to try and estimate when they are likely to erupt. Scientists can use a variety of techniques to do this, such as:

- seismometers – used to measure earthquakes occurring near an eruption
- tiltmeters and global positioning systems (GPS) satellites – these devices monitor any changes in landscape, e.g. volcanoes tend to swell near an eruption
- thermal imaging – this allows a camera to monitor heat sources within the crust or volcano, it may help predict the onset of an eruption
- infrared camera imagery – these images can potentially show the magma chamber and any build-up of hot gases, steam or lava
- monitoring gases escaping from a volcano using robots called spiders – often there is an increased release of sulphur dioxide near an eruption as the magma gets closer to the surface
- measuring temperature – volcanoes become hotter when magma starts to rise through the **main vent**
- looking at previous eruptions – scientists can identify patterns of activity

Practice questions worth 1 or 2 marks

Define what a natural hazard is.

What are the characteristics of oceanic plates?

Suggest two pieces of evidence that plates have moved around earth.

Practice questions worth 8 or 9 marks

Evaluate the response to the Nepal earthquake.

Evaluate to what extent different factors increase the risk from natural hazards.

It is understandable millions of people live in zones of tectonic activity. Using evidence explain why this is the case.

Practice questions worth 4 marks

With the aid of a diagram explain how earthquakes occur at conservative margins.

With the aid of a diagram(s) explain how volcanoes are formed at destructive margins.

Describe the structure of the earth.

Explain why people live near a natural hazard.

Compare the difference between a constructive and conservative plate.
Explain the physical processes that happen at destructive plate margins.

Practice questions worth 6 marks

To what extent can we reduce the effects of an earthquake?

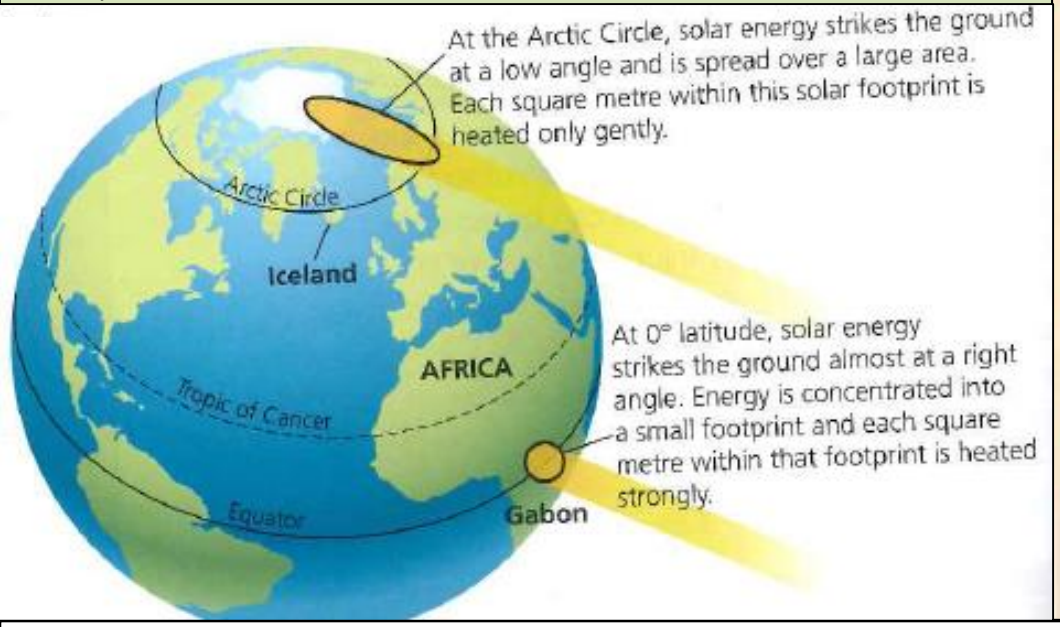
Use an example to illustrate how buildings can be protected against earthquakes.

Discuss the differences between an earthquake in an HIC and LIC, using examples you have studied, in terms of their effects.

Explain how different levels of wealth and development affected the impact of the earthquakes in Chile and Nepal.

For an earthquake you have studied describe the immediate and long term responses to the disaster.

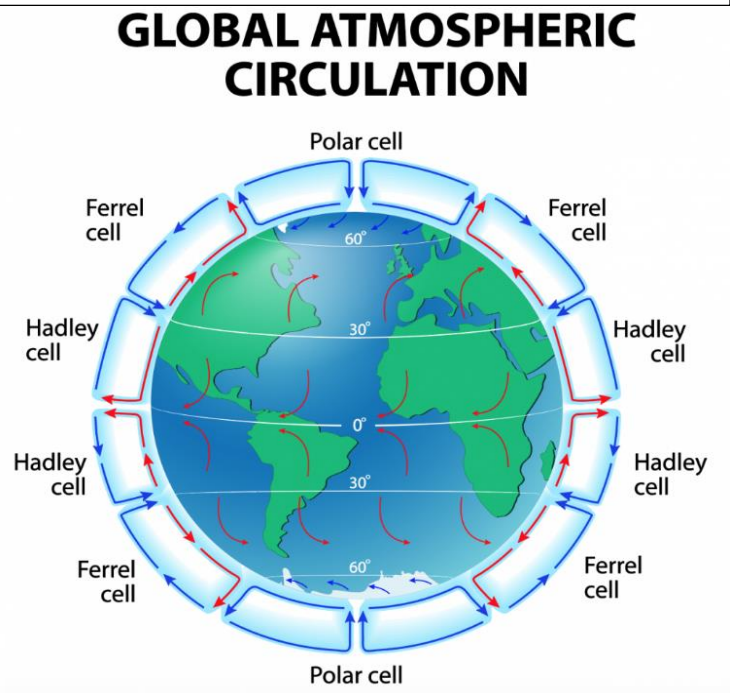
What causes global patterns of weather and climate?
It is all to do with the circulation of air and convection currents! But how? The most important influence on variations in climate is **LATITUDE.** This is because of the Earth's curved surface. The Equator receives much higher **INSOLATION (solar heating)** than the Polar latitudes. It is, therefore, warmer. (see diagram below)



How does global atmospheric circulation work?

Diagram **B** shows global atmospheric circulation. This involves a number of circular air movements called cells. These cells all join together to form the overall circulation of the Earth's atmosphere.

- Air that is *sinking* towards the ground surface forms areas of *high pressure* (for example, at the North Pole). Winds on the ground move outwards from these areas.
- Air that is *rising* from the ground surface forms areas of *low pressure* on the ground, for example at the Equator. Winds on the ground move towards these areas of low pressure.
- Winds on the ground are distorted by the Earth's rotation. They curve as they move from areas of high pressure to areas of low pressure.
- Surface winds are very important in transferring heat and moisture from one place to another.
- The patterns of pressure belts and winds are affected by seasonal changes. The tilt and rotation of the Earth causes relative changes in the position of the overhead Sun. These seasonal changes cause pressure belts and winds to move north during our summer and then south during our winter.



Global Atmospheric Circulation – further detail

- Air sinks towards the ground surface because it is cool and more dense, forming areas of high pressure (for example, the North Pole); wind on the ground move outward from these areas.
- Air that is rising from the ground surface because it is warm and less dense forms areas of low pressure (for example, the Equator); wind on the ground move towards these areas of low pressure.
- These winds are distorted by Earth's rotation, and curve as they move from areas of high to low pressure. (Red/Blue arrows on diagram)
- Surface winds are important in transferring heat and moisture from place to another.
- Pressure belts and winds are affected by seasonal changes. The tilt and rotation of the Earth causes changes in the position of the overhead sun, which means the pressure belts and winds move North during the summer and South during the winter.

Typhoon Haiyan, a category 5 typhoon, struck the Philippines on 8th November 2013 at 4.40am. The tropical storm originated in the northwest Pacific Ocean. It is one of the most powerful typhoons to affect the Philippines. Wind speeds of 314 kilometres per hour (195 miles per hour) were recorded.

Tropical storms (hurricanes, cyclones, typhoons)

Definition

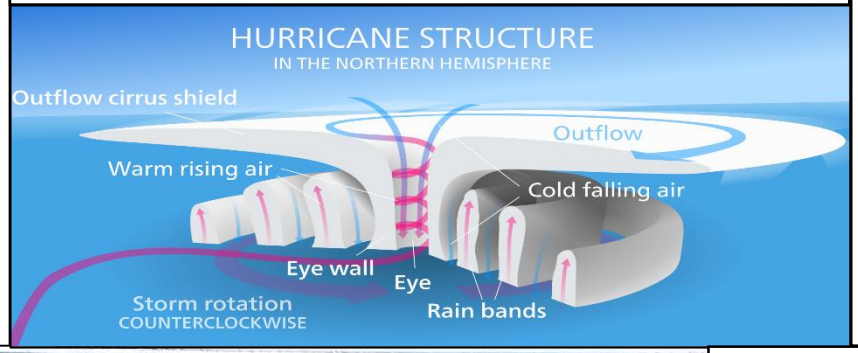
A tropical storm is a natural hazard that occurs when warm tropical air rises over a body of water which is at least 27°C, to create an area of intense low pressure. As this warm, moist air reaches high altitudes powerful winds spiral around the calm central point (the eye of the storm). The moisture condenses leading to heavy rainfall.

Statistics/Key Facts

- 80-100 tropical storms occur every year
- Can't be on the equator
- Sea temperature must be over 27 degrees Celsius
- Must be between 5 and 30 degrees North or South of the equator
- Sea depth must be roughly 60-70 metres
- When 75mph is reached it officially becomes a tropical storm
- The Coriolis affect is what causes things to veer clockwise or anticlockwise

Lifecycle of a tropical storm

- A strong upward movement of air draws water vapour up from the warm ocean surface
- Evaporated air cools as it rises and condenses to form thunder clouds
- As the air condenses it releases heat which powers the storm
- Smaller thunderstorms join to a giant spinning storm
- The eye of the storm is now formed
- The storm is carried across the ocean by prevailing winds, gathering strength
- Once the land is reached the storms energy supply is cut off
- Friction with the land will cause the storm to weaken



Typhoon Haiyan- *Primary Effects:*

- Building and possessions destroyed/damaged
- 6300 people killedand 6000000 homeless
- 40 000 homes damaged/destroyed
- 90% of Tacloban City destroyed
- Tacloban airport terminal badly damaged
- 30 000 fishing boats destroyed
- Damaged buildings, power lines and crops
- Over 400mm of rain causing flooding

Secondary Effects-

- Looting and violence broke out in Tacloban City
- Jobs lost, hospitals and schools damaged affecting livelihood and education
- Water, food and shelter shortages- disease
- Ferry and airline flights disrupted, hindering aid
- Power supplies cut off for around a month
- 6 million have lost their source of income
- Flooding caused landslides, in turn blocking roads and cutting off aid to remote locations

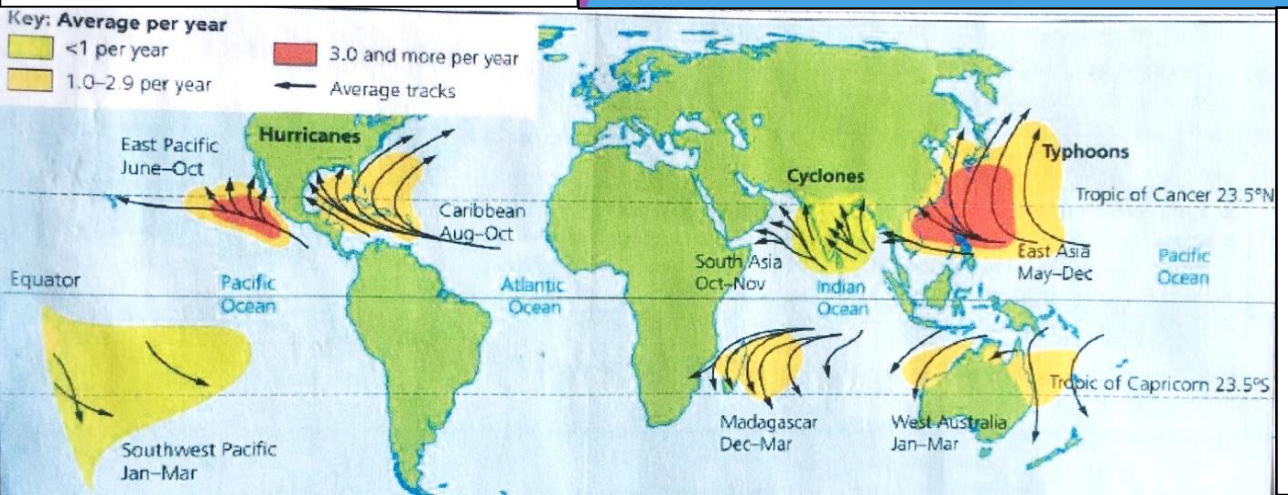
Typhoon Haiyan – November 2013

Short-term Responses:

- International government and aid responded with water, food and shelter
- The US helped with search and rescue
- The UK sent shelter kits
- The French, Belgian and Israeli set up field hospitals
- The Philippines' Red Cross delivered food
- 1200 evacuation centres set up

Long-term Responses:

- Other countries/organisations (such as the UN) donated aid
- Roads and bridges were rebuilt
- "cash for work" projects set up
- Oxfam helped rebuild boats
- More cyclone shelters were built
- Thousands of homes were built in better places



Storm Shelters – protection method

- Constructed out of concrete (durable)
- Stilts (in case of flooding)
- Stairs (to reach ground)
- Built on raised ground (flooding)
- Shutters on windows (wind/debris)
- Can be used as a medical centre or school at other times

Affects of climate change on tropical storms

Distribution-
Climate change will cause tropical storms to be distributed more evenly all over the world. This is because there will be warmer oceans able to support storms where they used to be cold.

Frequency-
Climate change will not affect the frequency.

Intensity-
Climate change will cause tropical storms to become more intense. This is because the sea is warmer and will be able to provide more energy for stronger storms.

UK Weather Hazards

There are various types of extreme weather that affect the UK.

Drought

A prolonged period of abnormally low rainfall, leading to a shortage of water

Potential Impacts:

- Crop failure can lead to higher food prices, lower incomes for farmers and reliance on food imports.
- Water conservation regulations, such as hosepipe bans, may be introduced, which can affect businesses and householders.

Gales

A period of strong, sustained surface winds (common in the west and in upland and coastal regions)

Potential Impacts:

- Buildings, transport links and electricity lines may be damaged.
- Fallen trees and large branches block roads and cause injury.

Heavy Rain

A period of abnormally heavy rain

Potential Impacts:

- Short periods of intense rain can cause flash floods. Prolonged rain saturates the ground, which can lead to river flooding.
- Damage may occur to buildings, transport links, communication links and energy supplies.
- Flooded farmland kills crops and animals.
- Repairs often cost millions and can take years to complete.
- Businesses and homeowners in high-risk areas may be denied insurance.

Extreme Cold Weather

A period of abnormally cold weather leading to snow and ice

Potential Impacts:

- Travel disruptions and safety concerns force businesses and schools to close.
- Food shortages may occur.
- People may become hypothermic and die.
- Slippery conditions cause an increase in fall-related injuries.
- Councils have to spend money on salting, gritting and snow ploughing.
- Crops may be damaged and livestock killed.

Heatwaves

A prolonged period of abnormally hot weather

Potential Impacts:

- Fatalities and health issues, such as heat exhaustion and breathing difficulties, can occur.
- Road surfaces can melt and rail lines can deform, disrupting transport.
- Crops wither and scorch, which may lead to higher food prices, lower incomes for farmers and reliance on food imports.

Thunderstorms

A heavy rain storm accompanied by thunder and lightning, caused by hot and humid conditions (common in the south-east)

Potential Impacts:

- Lightning can cause fires, electricity surges, fatalities and damage to buildings.
- Flash flooding due to heavy rainfall can damage buildings and transport links.
- Associated winds and hail may damage crops and buildings.

Evidence shows that the weather in the UK is becoming more extreme.

- Temperatures are becoming more extreme: 2014 was the warmest year since 1910, and December 2014 was the coldest month for over 100 years.
- Rainfall is heavier, and storms are more intense and frequent. December 2015 was the wettest UK month on record.

Polar Maritime Air Mass

Originates from: Greenland
Wet, cold air brings cold, showery weather

Arctic Maritime Air Mass

Originates from: Arctic
Wet, cold air brings snow in winter

Polar Continental Air Mass

Originates from: Central Europe
Hot air brings dry summers
Cold air brings snow in winter

Returning Polar Maritime

Originates from: Greenland/ Arctic via North Atlantic Moist, mild and unstable air bringing cloud and showers

Tropical Maritime Air Mass

Originates from: The Atlantic
Warm, moist air brings cloud, rain and mild weather

Tropical Continental Air Mass

Originates from: North Africa
Hot, dry air brings hot weather in summer

The Somerset Levels Flood Case Study – an example of extreme weather in the UK

The Somerset Levels are a coastal plain and wetland area of Somerset, England. Thousands of years ago the area was covered by the sea, but today it's a landscape of rivers and wetlands – artificially drained, irrigated and modified to allow productive farming. The Somerset Levels are one of the lowest areas in the UK. Much of the area lies below the high-water mark of spring tides. The area is very flat and has a maximum altitude of 8m above sea level. In January 2014 the Somerset Levels experienced floods greater than any other in living memory. Estimates suggest that 10% of the area was underwater when the flooding was greatest.

Causes

A quick succession of prolonged Atlantic storms, with persistent rainfall and gale-force winds were the major cause of flooding. The rivers could not cope with the significant amount of rainfall that fell. Additionally, high tides in the Bristol Channel and its narrowing estuary created tidal surges. These blocked the floodwater trying to escape the Somerset Levels. Coastal defences coped with the tidal surges.

Leading up to 2014 there had been less dredging of the river channels on the Somerset Levels. As a result of this, the channels had raised due to the accumulation of sediment. This reduced the capacity of rivers to transport water, leading to flooding. Change in farming practices has also contributed to flooding. Much of the land has been converted from grassland to grow maize. This more intensive use of the land means it is less able to retain water, causing it to run over the surface rather than being absorbed.

Impacts

Over 600 homes and 6880 hectares of agricultural land were flooded. A number of villages were cut off after roads were flooded. There were several incidents of crime during the floods. 900 litres of fuel was stolen from a pumping station in Westonzoyland. There were also reports of heating oil and quad bikes being stolen from homes affected by flooding. Many main roads were closed, including the A361 linking Taunton and Street. Flooding also disrupted train services on the main Bristol line between Taunton and Bridgwater. There were considerable economic costs associated with the floods. Fuel used to power emergency pumps cost £200 000 per week. An estimated £1 million was lost by local businesses. The Somerset floods cost the county's tourism industry an estimated £200 million. Soil was damaged after being underwater for nearly three months. In some areas, it took over two years to restore the soil before crops could be grown. Insurance costs increased in flood-hit areas of Somerset.

Immediate Response

As expected for a high-income country (HIC), the response to the flood was well organised and rapid. Local people in South West England were warned of heavy rain when the Met Office issued an amber warning. The public was advised to prepare for significant flooding by the Environmental Agency. Many people used sandbags to protect their property and moved valuable items upstairs. In Moorland, a man constructed a large wall out of clay and mud to protect his house from flooding. Rescue boats were used to help stranded people by the fire brigade who also visited hundreds of properties. Rescue crews supported residents of Moorland in evacuating. The owners of some 80 homes agreed to evacuate, however, around 30 residents stayed at home. Additional police patrols were introduced as the result of increased crime. The army was sent into the area with specialist equipment towards the end of January. The issued sandbags and distributed food. They were later joined by 40 Royal Marines to provide additional support. Sixty-five pumps were used to drain 65 million m3 of floodwater. Local people, led by the Flooding on the Levels Action Group (FLAG) provided local support to people affected by the floods. This included fundraising and the collection and distribution of food. They also used social media, such as Facebook and Twitter, to share news. An estimated £15m was made available by the government to meet the immediate costs associated with protecting lives and properties.

Long Term Response

The long-term response to the Somerset Levels flood focussed on management techniques to reduce the risk of future floods on this scale. The Somerset Levels and Moors Action Plan was developed and included measures such as reintroducing dredging to increase capacity in the rivers, the construction of a tidal barrage and additional permanent pumping stations. The scheme is part of a 20-year plan for the Somerset Levels and will cost of £100 million.

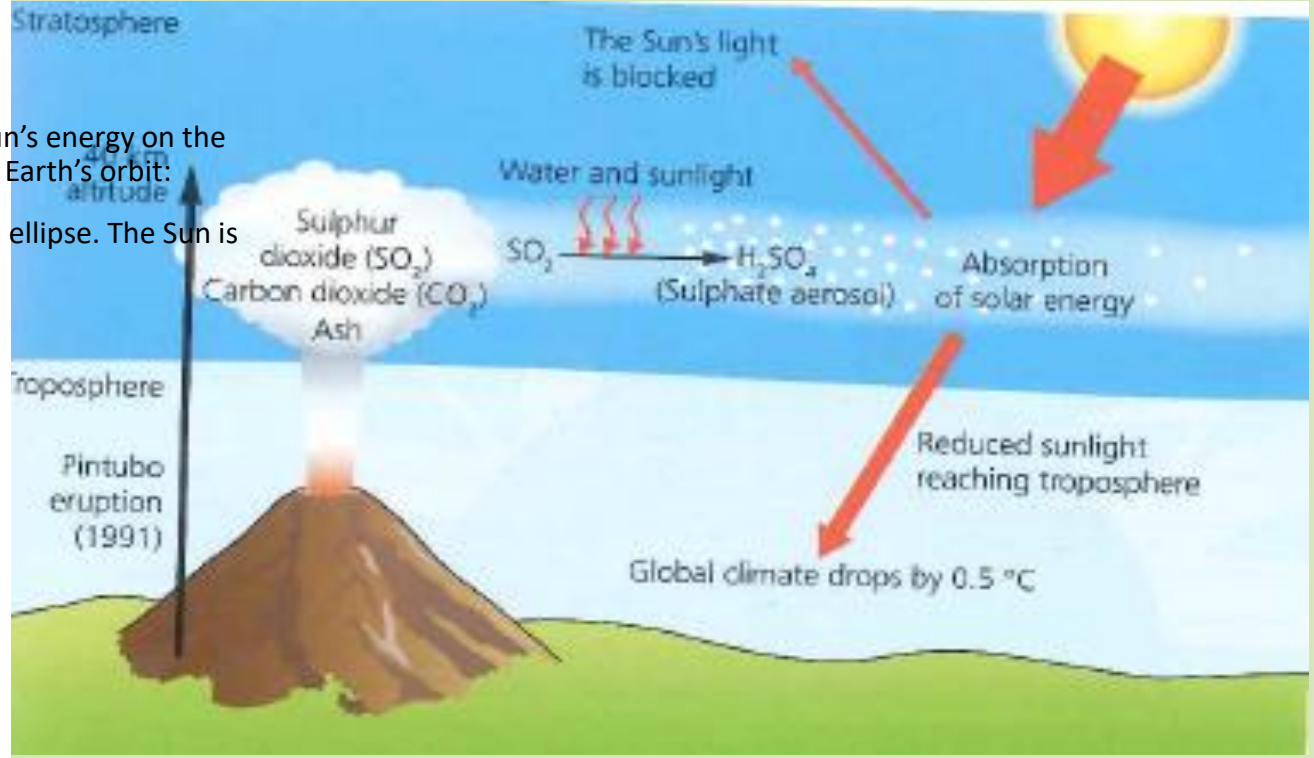
Causes of climate change

Orbital changes

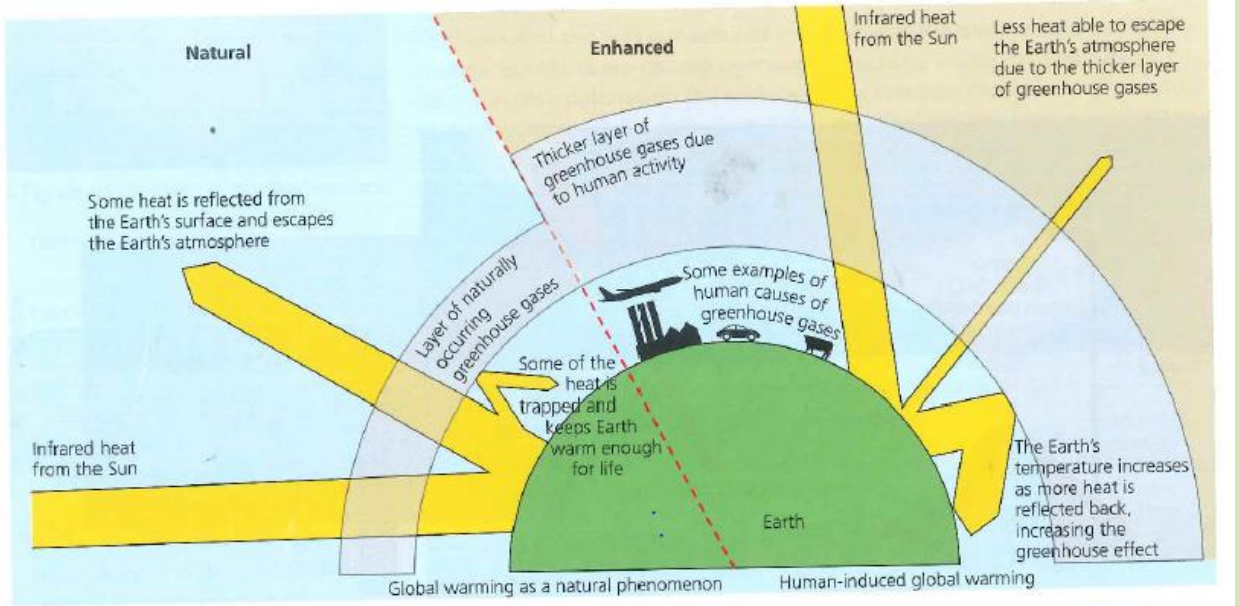
The distribution of the Sun's energy on the Earth changes due to the Earth's orbit:

- The Earth's orbit is an ellipse. The Sun is not perfectly in the centre of the ellipse and the ellipse changes shape every 100,000 years. This means the distance between the Earth and the Sun changes as the Earth orbits. As the Earth orbits closer to the Sun, the climate becomes warmer, and the opposite happens as it orbits away.
- The Earth's axis is tilted on an angle. The angle of the tilt changes due to the gravitational pull of the Moon. When the angle of the tilt increases, this can exaggerate the climate, so summers get warmer and winters get colder. The angle of the tilt moves back and forth every 41,000 years.
- The Earth is not a perfect sphere, so as the Earth spins, it wobbles on its axis in a 20,000-year cycle.

Together, these three **orbital changes** vary the distribution of the Sun's energy on the Earth. This can mean a significant impact on climate change. However, scientists suggest that orbital changes would not cause an ice age for at least 30,000 years.



- Fossil Fuels release greenhouse gases as they are burnt, for transport, energy generation, etc. More people on the planet need more energy, so this problem is getting worse…
- Agriculture – As the world's population continues to increase, so we need more food. Livestock produces huge amounts of methane, as does decaying organic matter used to fertilise crops.
- Deforestation – cutting down trees for building roads, farms etc is in itself bad but also trees take in CO2 during photosynthesis, so by reducing the number of trees, we are also reducing the capacity for greenhouse gases to be absorbed in this way.



▲ Figure 4.9 The greenhouse effect: natural and enhanced

What is the evidence for climate change?

Temperature is measured directly using an instrument called a thermometer. Reliable measurements using thermometers go back only about a hundred years. In the UK, for example, reliable weather records began in 1910. So, how do we know what temperatures were in the distant past?

Without the use of thermometers, scientists use indirect data stored as a fossil record. These are found in deep ocean sediments and frozen ice cores.

When layers of sediment or fresh falls of snow become buried they trap and preserve evidence of the global temperature at that time. Scientists can study the oxygen in ocean sediments or water molecules in ice to calculate temperature. They can be accurately dated and this information used to plot graphs such as graph **A**. Ice cores have been used to reconstruct temperature patterns from as long as 400000 years ago (photo **C**).

Positive and negative impacts of climate change

Impact on the world

The possible impacts of climate change will vary widely across the globe. People who live in the least developed countries will be the hardest hit.

Negative impacts could include:

- rising sea levels due to melting ice and thermal expansion (a billion people live in coastal areas)
- changing patterns of rainfall, causing desertification in some areas and increased flooding in others
- more frequent extreme weather events including heatwaves, droughts and heavy rainfall; tropical storms would also increase in strength and frequency
- extinction of certain species due to shifting temperature regimes
- spreading of diseases such as malaria (an additional 280 million people could be affected)
- desertification or coastal flooding leading to human migration which could become a source of political and even military conflict
- ski resorts, in places such as the Alps, could close due to a lack of snow

Positive impacts of a warmer global climate could include:

- warmer temperatures and increased CO_2 levels, leading to more vigorous plant growth
- longer growing season leading to a higher yields in current farming areas
- frozen regions, such as Canada and Siberia, could be able to grow crops

Impact on the UK

<u>Negative impacts of climate change in the UK include:</u>

- rising sea levels flooding low-lying areas, particularly in southeast England - valuable farmland such as the Fens would be lost
- increased cost of building sea defences
- droughts and floods would become more likely as extreme weather increases
- increased demand for water in hotter summers putting pressure on water supplies

<u>Positive impacts of climate change in the UK include:</u>

- higher year-round temperatures and longer growing seasons could mean that new crops such as oranges flourish in the UK
- higher yields of many outdoor crops such as cereals due to a longer growing season and higher temperatures
- warmer temperatures would reduce winter heating costs
- warmer temperatures could lead to healthier outdoor lifestyles
- growth in the UK tourist industry, particularly seaside resorts, with warmer, drier summers

How can we adapt to climate change?

Scientists believe that climate change will have a huge impact on agricultural systems across the world.

- Patterns of rainfall and temperature will change.
- Extreme weather events such as heatwaves, droughts and floods will become more common.
- The distribution of pests and diseases will change.

Farmers will need to adapt to these changes.

Agricultural adaptation in low latitudes

Scientists think that the greatest changes to agriculture will occur in low latitudes. Southern Africa's maize crop could fall by 30 per cent by 2030 and the production of rice in South Asia could fall by 10 per cent.

There are several adaptations that can be made (photo **A**).

Agricultural adaptation in middle latitudes

A warmer climate in Europe and North America could lead to an increase in production of certain crops such as wheat. In the UK, Mediterranean crops such as vines (photo **B**) and olives may thrive.

Solar energy

In 2013, 14.9 per cent of the UK's electricity was generated by renewable energy sources. Photovoltaic solar energy generated 3.8 per cent of renewable energy sources. When light shines on solar panels it creates an electrical field. The stronger the sunshine on solar panels, the more electricity that is produced. A typical home saves over a tonne of CO_2 per year as there are no greenhouse gas emissions to contribute to climate change (Energy Saving Trust, 2014). However, at times when there is no sunshine, such as night, solar energy cannot be relied on to generate electricity.

International agreements

The UN negotiated a new international climate change agreement for all countries at the 2015 Paris climate conference. It will be implemented from 2020. The European Commission has set the EU's vision for a new agreement that will reduce global emissions by at least 40 per cent below 2010 levels by 2030, and by 60 per cent by 2050. It was a challenge for countries to agree on targets that will go far enough to manage climate change. Some countries can afford to mitigate climate change more than others, and some are considered more responsible for causing climate change than others.

Planting trees

Deforestation is a global problem as it is a major driver of climate change (see Chapter 6). According to the United Nations Environment Programme, deforestation and forest degradation occurs at a rate of 13 million hectares per year. A US$40 billion investment in **reforestation**, and payments to landholders for conservation each year from 2010 to 2050, could increase forest carbon storage by 28 per cent.

The Nature of God (his qualities)

BVT
Christian Beliefs

Key vocabulary

Omnipotent
Incarnation
Parable
Trinity
Baptism
Immanent

All powerful or Omnipotent:

Examples of this include

- God creating the world in 6 days *"In the beginning was the Word and the Word was God"*
- God working through Moses and Jesus to perform miracles e.g. calming of the storm / 10 plagues
- Resurrection of Christ

Impacts: Feel protected / safe, in awe of God's power and wonder, nothing can defeat God.

Trinity

This means the 3 parts that make up God – The Father, the Son and the Holy Spirit. The Father is God, the Son is Jesus and the Holy Spirit is the power that binds the 3 together.

Examples that illustrate the Trinity are

- Incarnation of Jesus. This is where God lives through Jesus on earth – showing that God sent down his son to earth to guide us. The quote *"The Word became flesh and lived among us for a while"* shows this
- On Jesus return after death he told the disciples to *"Go make disciples of all nations and baptise them in the name of the Father, Son and Holy Spirit".*

Impacts: Follow Jesus' teachings to become baptised and embrace the Holy Spirit within them. Teaches God is all powerful and can intervene through Jesus Christ (incarnation).

All-Loving or Omnibenevolent:

Examples of God being all loving include

- The incarnation of Jesus. This is where God lives through Jesus on earth – showing that God sent down his son to earth to guide us. The quote *"The Word became flesh and lived among us for a while"* shows this
- The parable of the Prodigal Son.
- Jesus said that people should "Pray for your enemies and those that persecute you"
- Gods sacrifice to let Jesus die also shows he is all loving to us: "for God loved the world so much He gave His only Son"

Impacts: Personal relationship with God. God is immanent and can intervene if they need help. They can pray to speak to God or ask him for forgiveness. This will influence them to be loving and forgiving.

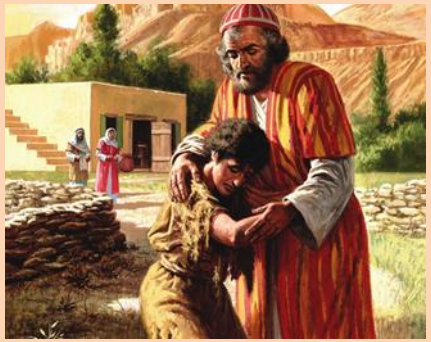
God is immanent

This means God is **active in our lives** – he is involved in our lives.
Examples of this would be incarnation, miracles, resurrection of Christ, Judgement and punishment for sin.
This would develop a **personal relationship** with God

Parable of the Prodigal Son

A farmer leaves his inheritance for his 2 sons. One son saves his inheritance and stays to work on the farm, the other son leaves and spends all his inheritance. He returns home with no money and no place to go. The farmer welcomes his son back and forgives him.

This parable story teaches to be loving to one another and forgiving of mistakes



Christian Beliefs

The Nature of God - continued (his qualities)

Just

This is the belief that God is fair and brings justice: He can reward those that serve him and punish those that commit sin.

Examples of God being just include:

- God is **Omniscient** – all knowing
- Judgement day: When religious believers die they believe if they are good their souls will go to Heaven, if not they will go to Hell.
- The parable of **Lazarus and the Rich man**.
- The **Original Sin** (the Story of Adam and Eve)

Impacts: Understand actions have consequences. Understanding of **Salvation through law.** Christians will care and show respect for others, pray and connect to God, follow God and Jesus' teachings. They will understand that sin and evil will be punished.

Key vocabulary

Omnipotent
Parable
Original Sin
Transcendent

Parable of Lazarus and the Rich man

A beggar called Lazarus is begging on the street. Each day a rich man walks past and does not give him any money or food. When the rich man dies God sends him to hell.

This teaches God is almighty and can punish those that sin

God is Transcendent

This means God is **beyond our world, understanding and intelligence**.

Examples of this would be his omnipotence, creation, Judgement and punishment for sin. This would develop an **impersonal relationship** with God

Original Sin

God told Adam and Eve, not to eat from the forbidden Tree. Eve was convinced by the serpent to eat the fruit. Eve then tempted Adam to also eat the fruit.

God became angry and punished their actions:

Eve damned women to a lifetime of painful childbirth and your husband will rule over you.

Adam damned man to a life long of hard labour in farming.

Both were banished from the Garden of Eden.

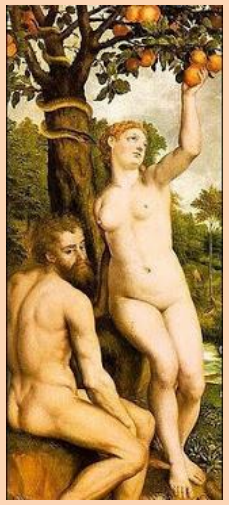
The story is called Original Sin as it is the first Sin of man and also some believe that mankind was then born with sin.

Is God is all loving? - Suffering

One of the Key arguments is if God is All Loving – why is there suffering?

These are arguments that Christians would make to explain suffering:

- God gave mankind free will, he will make mistakes and therefore need to be punished by God, as God is just.
- Suffering is a test from God to strengthen your faith and make you become stronger and more resilient. **(Story of Job)**
- Suffering is God balancing out the world, it can't always be all good!
- God is too powerful and divine to understand what he does (transcendent)
- Suffering is caused by evil in the world, Satan has made individuals to act in evil ways



Story of Job

JOB's faith was tested as he suffered the death of his children, his cattle and farm was destroyed and he became very ill.

He remained faithful through this suffering and God rewarded and saved him.

The birth and death of Jesus

Christian Beliefs

Incarnation of Jesus

This means God lives through Jesus on Earth. He came to earth to guide and teach us ***"The Word became flesh and lived among us for a while"*** – *The Word is God*

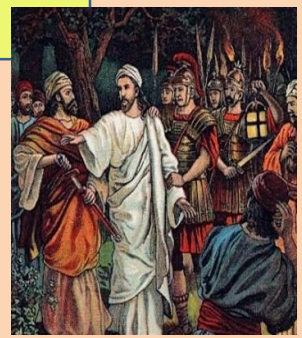
The incarnation is also proof that God is **Omnipotent** and of the **Trinity**

The idea for Christians that God would humble us to come to earth fills Christians with the idea that God is **all loving**.

It impacts Christians and inspires them to be loving to others too. It shows them that God is **immanent** and this will give them comfort.

How and why did Jesus die?

- Jesus came to Jerusalem causing a scene stating that he was the Son of God – this was Blasphemy.
- This threatened the influence and power of the Jewish high priests.
- Judas took a bride a told the Jewish Priests where to find Jesus.
- Guards arrested Jesus in the Garden of Gethsamane.
- They took him to Roman governor **Pontius Pilate** who was able to give the death sentence, which he did.
- On Good Friday Jesus' was crucified. He told the guards who tied him up that **he forgave them**.
- Just before his death he called out "My God , My God, why have you forsaken me". Jesus took **6 hours** to die in a very painful way. When he died is it said that the curtain **temple** tor in two.



Key vocabulary

Incarnation
Omnipotent
Trinity
Immanent
Atonement
Reconciliation
Salvation
Resurrection
Ascension

KEY QUOTE
"God loved the world so much he gave his only son"

Resurrection and Ascension

- Jesus' body was put into a tomb and a stone bolder rolled across its entrance.
- On the Sunday morning 3 women returned to tend to the body of Jesus. When they reached the tomb the stone in font had been rolled to the side. They went inside and the body had disappeared.
- A young man had told them that Jesus had risen and he would be in Galilee. **Mary Magdalene** was one of the women, she went to tell the disciples that Jesus had risen (called the resurrection.)
- When the disciples meet with Jesus, they preached with him for 40 days about God. Jesus told the disciples to "make disciples of all nations, baptising them in the name of the Father and of the Son and of the Holy Spirit".
- After 40 days Jesus died and ascended to Heaven, this is called his ascension.

Why did Jesus die?

God saw how the mankind behaving badly, sinning, turning away from God… God is JUST so mankind needed punishing.
However God is also ALL LOVING he cannot punish all people
God decides that Jesus will take the punishment for mankind; This was a sacrifice for God as well as Jesus.

This is called Jesus' atonement – Jesus make up for the sins of mankind

When Jesus atoned mankind's sin it **reconciled the relationship between God and mankind.** God forgave man and man saw what Jesus had done.

Many believed in Jesus and God and stopped sinning, they had gained **salvation – God's love and acceptance into Heaven**.
Salvation comes from the word save – it is often said that Jesus saved us. This means Jesus' death saved us from sin and therefore acceptance into Heaven by God.

Christian Beliefs

Why is the Resurrection and ascension of Jesus important

The **impact** of the resurrection is when Jesus resurrected and came back to life for 40 days, is that it shows Jesus ready **IS** the Son of God.
"The word became flesh and lived among us for a while"

This goes to show God's POWER – that he is **omnipotent**. This gives Jesus' teaching **authority** and meaning. Christians today will follow Jesus' teachings to follow God.

The **impact** of Jesus' ascension when he went to Heaven – shows Christians that there is an after life. This gives them **hope** and **comfort** knowing there is eternal love and life with God.

Key vocabulary

Resurrection
Omnipotence
Ascension
Crucifixion
Atonement
Reconciliation
Salvation
Salvation through law
Salvation through Grace
God's Grace

Salvation

Key term	Definition
Salvation	Acceptance by God into Heaven
Salvation through Law	Following Gods laws (e.g. 10 Commandments) will earn you a place into Heaven
God's Grace	God loves you
Salvation through Grace	God loves you and therefore you are allowed into Heaven
Universalism of Heaven	God is by nature all loving (his love is universal – meaning for everyone) and therefore you will go to heaven, no matter what, because God is all loving.

Summary of Key concepts

Concept	Evidence	Impact
Crucifixion	6 hours Jesus died on the cross. Jesus forgave the guards the placed him on the cross	Empathy for suffering. Determination to get through difficult times. Shows that all acts can be forgiven, forgiveness is important.
Atonement	"God loved the world so much he gave his only Son"	God and Jesus are all loving to mankind. Sacrifice: willing to give. This will inspire Christians to be loving and self sacrificing.
Reconciliation	Jesus died for our sins to repair our relationship with God	God and man have reconciled (repaired) their relationship. Brought Salvation. Mankind's' sins have been forgiven. It will encourage Christians to forgive others.
Salvation	The reconciliation of man and God. Jesus said "Go make disciples of all nations"	God and Jesus are all loving to mankind. Christians should be baptised to accept the Holy Trinity then they are accepted to heaven.
Resurrection	"The word became flesh and lived among us for a while"	Jesus is really the Son of God. Jesus' teachings have authority
Ascension	Jesus died after 40 days	Proof of the after life. Gives Christians hope and comfort for eternal life with God

Judgement

Judgement day:

This is when Christians die they will face judgement by God on the actions of their life. This follows with the idea that **God is just** and will reward those with the after life of Heaven and condemn those who have sinned to Hell. Some Christians believe in **purgatory**. This is a waiting state before Heaven. It is similar to Hell – like a state of punishment for their sins before being accepted into Heaven.

Jesus taught about Judgement through **parables; Lazarus and the Rich Man and the Sheep and the Goats**.

Final Judgement:

This is something different. Final Judgement is when Judgement will come to the whole world. This is believed by **Catholics**.
The belief is that Jesus will return to earth, bringing the age of time and space to an end (end of the world). There will be a final judgement on all living and dead souls for a place in Heaven or Hell.

Parable of the Sheep and Goats.
This parable makes reference to God being like a shepherd. The shepherd separates the sheep from the goats (the sheep being the ones to stay with the shepherd). The reference is liking God separating the good from the bad, in teaching the idea of judgement.

Parable of Lazarus and the Rich man

A beggar called Lazarus is begging on the street. Each day a rich man walks past and does not give him any money or food. When the rich man dies God sends him to hell.

This teaches God is almighty and can punish those that sin

Christian Beliefs

Key vocabulary
Judgement Day
Final judgement
Parable
Heaven
Hell
Purgatory

The Impacts of this will by significant on how a Christians lives:
Following laws e.g. 10 commandment
Behaviour to others
Following teachings of Jesus ..e.g.'s…

The afterlife

HEAVEN

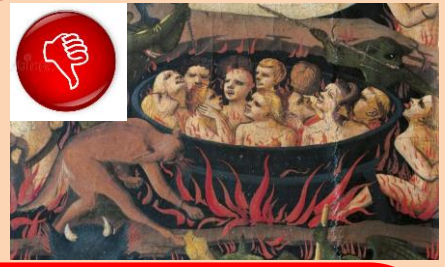
Christians do **NOT believe** that Heaven is a place in the clouds with a big pearly gate. Images we have of Heaven have come from illustrations in History, many of which were from the renaissance period of art and culture within religion.

Christians believe that **Heaven is a STATE OF BEING (not a physical place) ETERNALLY WITH GOD.**

WITH HIM

GOD

WITH OUT HIM



HELL

Much like Heaven, the notion that Hell is a place of fire and punishment is **NOT believed** by Christians. This image had been created by the Medieval church to scare people into following the Churches rules – maintaining the power of the church in History.

Christians believe that **Hell is ETERNAL SEPARATION FROM GOD**.

Many Christians see that though God is JUST **Hell has not been decided by God, but by themselves because God gave mankind FREE WILL.** Therefore you are responsible for your actions and consequences.

Where do we come from?

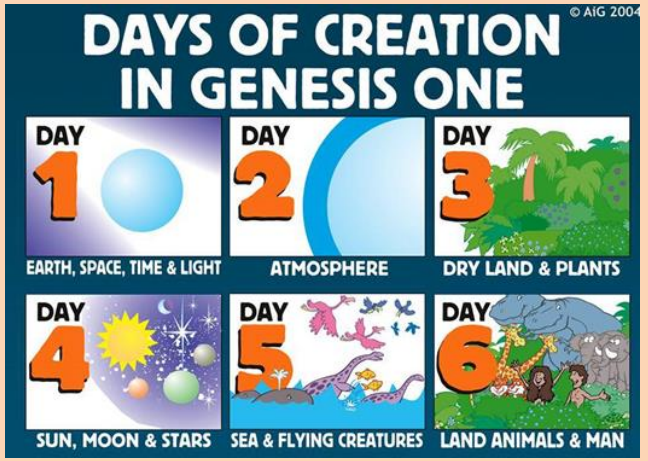
This unit looks at different theories on how we were created and how we have evolved.
Below shows the different theories.

It is important think about the problems with these theories, but also the impacts for people holding these beliefs.

It will show that science and religion can go hand in hand!

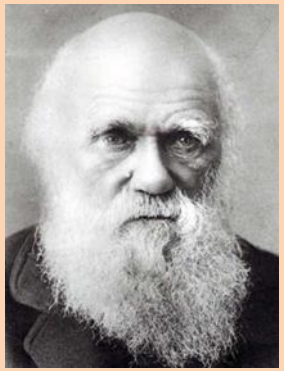
Religion and Life

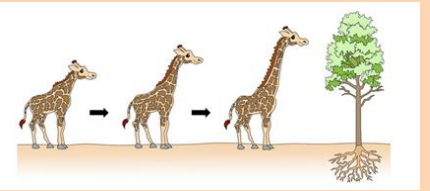
Key vocabulary
Literalist
Non-Literalist
Big bang theory
Theory of Evolution
Theory of Intellectual Design



Different Theories of Creation and Evolution

Literalist Christians	Non-Literalist Christians	Big Bang Theory	Charles Darwin
These are Christians that believe the bible literally – word for word, of the creation story in the book of genesis. "In the beginning was the Word… and the Word was God" (Genesis) – therefore God created the world. **St Thomas Aquinas** philosophised that since nothing happens on its own; everything neds a cause, including creation; therefore God must have created the world.	These are Christians that believe God created the world – but maybe in 6 stages. These stages could be longer periods of time – e.g. thousands or millions of years. This comes from when the bible was translated into English – the word used in Hebrew meant period of time, however the English bible used the word day. They believe that it was the power of God that started the universe … maybe they believe that God created the explosion at the start?? Also non-litertalists are not so concerned with how God created the world – but that he created it for them, with love.	About 14 billion years ago, an incredibly powerful explosion occurred, called a Big Bang. Scientists theorise that energy created this explosion, however where did the energy come from? There is always the unknown question – what came before this? Within a millionth of a second after the explosion, neutrons and electrons were created. In the explosion, enormous heat was generated, but as the universe cooler down a little, elements like helium and hydrogen were created. From these elements, stars, galaxies, planets and solar systems were formed. As the universe continued to cool, on at least one planet (which we call earth) about 3 billion years ago, life began to develop. Today scientists have found background radiation. Scientists believe that this radiation has existed since the big bang. The **Pulsating Theory** adds to this about the Theory, taking the ideas that the universe expanded to evolve.	Darwin believed that as environments changed, some species died and some survived – this was called "Natural selection". Those that survived adapted due to their changing environment e.g. giraffe grew long neck to reach tall trees. **Theory of evolution.** Darwin was a Christian and believed God played a part in this; he came up with the **"Theory of intellectual design"** – that God gave some animals ability to adapt and survive.





Religion and Life

Environmental problems

Reliance on Fossil Fuels rather than renewable

Lifestyle and technology

WHY do we have environmental issues?

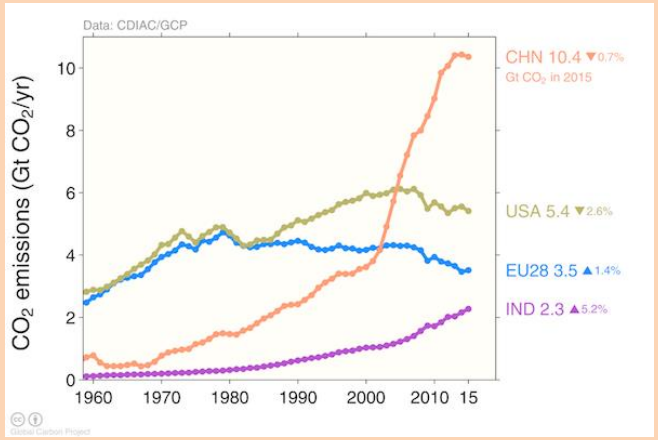
Governments / counties unwilling to make a change

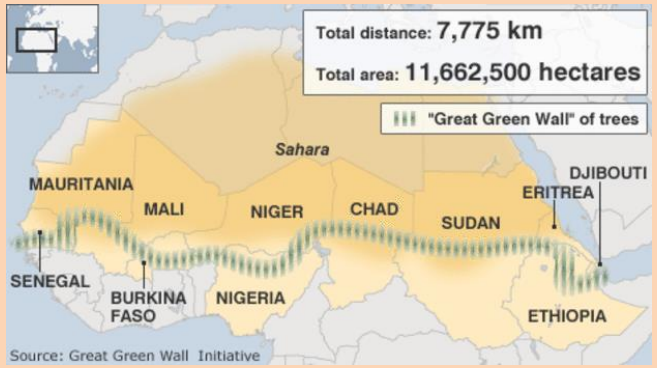
Population demands - consumption

Key vocabulary

Natural Resources
Sustainability
Stewardship
Dominion
Conservation

CAUSES	IMPACTS
Global Warming: Build-up of greenhouse gases in the atmosphere e.g. CO2 due to development of industrialisation and burning of fossil fuels. Some countries are not decreasing their levels e.g. China largest producer	- Impacts: Floods, drought, rising temperatures. + Gretta Thunberg, climate change protests + Paris Agreement in 2015 UN countries agreed to reduce temperature rise + Green Wall – horizontal wall of trees across Sahara in Africa. Trees are drought resistant and replace CO2
Plastics: More usage of plastics in modern life e.g. food packaging. 8 million tons in the oceans in 2019	- killing coral reefs, being ingested by animals e.g. birds + Plastic Pact in UK retailers have committed to using recyclable or compostable plastic by 2025.





SCAN ME

SCAN ME

SCAN ME

Environment and Animals

Religion and Life

Religious Groups that support Stewardship:

Green Christian
- Are concerned that the earths resources are limited and we are using them too fast.
- Publicise stewardship through leaflets, write blogs, pray and fast for the environment. Speak out against **Fast Fashion**.

Ifee (Islamic Foundation for Ecology and Environment)
- Concerned with destruction of ecosystem / climate change
- Project: **Green mosques** – making them eco-friendly e.g. saving water systems.

Key vocabulary

Stewardship
Dominion
Ummah
Sewa

Animal Testing

There are many appalling things about animal testing:
- ❑ Animals will endure pain when tested on
- ❑ Some testing is for worthless gain e.g. cosmetic testing
- ❑ Some testing for cosmetics could be done of human tissue samples rather than animals.

However some people believe that animals testing has benefits too:
- ❑ Terminal disease drugs like cancer, can be tested on animals to preserve life for humans with life threatening diseases.
- ❑ Procedures for transplants, e.g. heart, can be done by trainee doctors on animals in preparation for humans.

Eat meat?	Don't eat meat?
• Jesus ate meat. • God gave humans dominion – this means we have dominance over animals, as long as this is done responsibly. • Muslims must eat Halal meat. • Religious believers may eat free range meat, so animals are not unnecessarily harmed	• In the Qur'an eating of pork is haram (forbidden). • There are plenty of land to use for agriculture based foods and a vegetarian diet can provide enough nutrients • Buddhist don't eat meat – 5 precepts , do not harm anything living

GreenChristian

Religious Beliefs about Environment / Animals

- "The earth is the Lord's and everything in it" Bible
- "The world is green and beautiful and Allah appointed us stewards over it" Qur'an
- Muslims believe in **Ummah** – which means community.
- God appointed humans with **dominion** (responsibility) to look after the world
- Religious believers believe in **Stewardship** – they should protect the environment and animals.
- Animal testing is cruel and does not show stewardship
- Pope John Paul wrote "We must abandon these factories of death" talking about animal testing labs
- Many religions are vegetarian
- God gave humans **dominion** (power) over animals.
- God created animals for humans to eat
- Animal experimentation can be used to help humans such as advances in medical procedure or cures for diseases.
- Sikhs believing **Sewa** – meaning service to other humans. For this reason they are pro animal testing for medical reasons to help other humans
- Humans life is sacred and should be preserved at whatever cost – therefore testing to preserve human life is acceptable.

Medical Ethics

Medical Ethics means doing what is ethical and right in Medicine and healthcare.
In order for doctors to comply with this they take the **Hippocratic oath**. The key messages of this are:

- To preserve all life.
- That the patient is most important, not the science, or medicine or family.
- That the need to be careful not to play God but to use their knowledge and experience with each individual patient.

Religion and Life

Key vocabulary

Hippocratic oath
Sanctity of Life
Quality of Life
Abortion
Pro Life
Pro Choice
Euthanasia
Hospices

Sanctity of Life	Quality of Life
All life is special and should be preserved at all costs. Abortion and Euthanasia go AGAINST the sanctity of life It is not our right to take away life	How good our lives are: this could be in terms of health, living conditions, mental state…. Sometimes quality of life becomes so awful that some people feel it is acceptable to end life.

Abortion

Abortion is legally available in the UK up to **24 weeks** since 1967.
However it must be agreed that either the **baby or mother's life will be impacted in a negative way.** E.g. for the mother/child this could be socio-economic factors as well as health.
Most abortions are done before 8 weeks. Early abortions are done by taking a pill that induces miscarriage. Later abortions are more invasive.

The topic of Abortion has divided many of their viewpoint.
What is important to remember is that there are many different situations when people have abortions.
You may be against abortion totally, or you may think there are circumstances when abortion is acceptable.

Ireland recently changed law to allow abortions. Poland changed their law in 2020 to ban abortions.

Catholics	Anglicans	Muslims
Are against abortion as they believe that life begins at conception. The only exception for Catholics is if the mother's life is in danger. Catholics believe in the Sanctity of life, that all life is sacred The bible teaches: 10 Commandments – Thou shall not kill. "I your God, give life, and I take it away" Only God has the right to take away life	Abortion is seen as an evil necessity sometimes. Like Catholics if there is danger to the mother – her life is sacred. BUT also in cases of rape or if the if child maybe mentally or physically disabled, abortion is allowed.	Abortion is frowned upon - however can happen before ensoulment. Ensoulment is when it is believed that a foetus has a soul. Ensoulment is usually at 120 days (so abortion before then is acceptable if necessary).

Medical Ethics

Euthanasia

Euthanasia ending someone's life. It is illegal under the UK Suicide Act of 1961. However in some countries such as Switzerland and Belgium Euthanasia is legal.

There are 4 kinds:

1. **Voluntary Euthanasia** – person asks to be helped to die
2. **Involuntary Euthanasia** – person has no say
3. **Active Euthanasia** – a specific action takes place to end a persons life, such as an overdose of tablets
4. **Passive Euthanasia** – stopping doing something e.g. life support treatment is removed

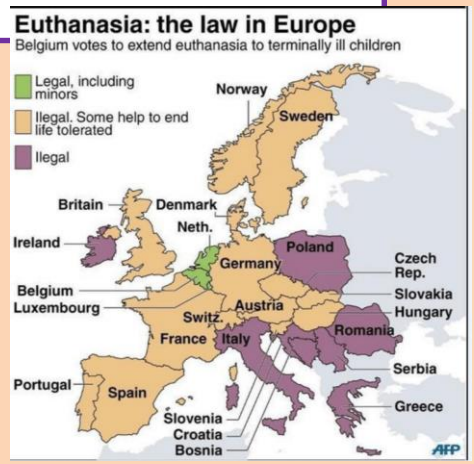
Religion and Life

Key vocabulary

Sanctity of Life
Quality of Life
Euthanasia
4 Noble truths
Hospices

Catholics	Buddhists
Are against Euthanasia as they believe in the Sanctity of life, that all life is sacred. The bible teaches: 10 Commandments – Thou shall not kill. "I your God, give life, and I take it away" Only God has the right to take away life	A primary principle of Buddhists is to reduce suffering – this is part of the belief the **4 Noble Truths** Dalai Lama "Where a person is going to die and keeping them alive leads to more suffering, then termination of their life is permitted" Buddhists must show compassion (understanding and love) to other humans. However – every situation needs to be judged separately.

The topic of Euthanasia has divided many of their viewpoint.
There are 2 main situations when Euthanasia occurs:
Involuntary - ending someone's life in **critical care / life support**
Voluntary – when someone wants to end their life due to health problems – these could be a **terminal illness, a degenerate illness or prolonged mental health issues.**
You may be against Euthanasia totally, or you may think there are circumstances when Euthanasia is acceptable.



Salisbury Hospice Charity

Hospices

Originally they were set up by Christians. Hospices are an **alternative to euthanasia, specialising in end of life care.** They are voluntary funded and each patient is given an individual care plan, suited to their personal needs.

Hospices help by:

1. Relieve physical pain of an illness through medicine, but also massage / meditation
2. Care for the emotional and spiritual side for patients reaching the end of their life.
3. To support families. They offer services to help families come to terms with loosing someone
4. Educate others about hospices as a way of helping those terminally dying.

GCSE FRENCH

<u>Présente-toi</u> *(Present yourself / tell me about yourself)*

je m'appelle *(my name is / I'm called)*

j'ai … ans (I'm … years old)

j'ai les cheveux blonds / bruns / courts / longs *(I've go blonde / brown / short / long hair)*

j'ai les yeux bleus / verts *(I've got blue / green eyes)*

je suis timide / calme / intelligent(e) *(I'm shy / quiet / clever)*

<u>Comment est ta famille?</u> *(What's your family like)* + As-tu un meilleur ami? *(Do you have a best friend?)* + As-tu un petit ami / une petite amie? *(Do you have a boyfriend / girlfriend?)*

j'ai un frère / une soeur / un demi frère <u>qui</u> s'appelle… *(I have a brother /sister / step-brother <u>who</u> is called…)*

je suis fille /fils unique *(I'm an only child)*

mon père / ma mère / mes parents *(my dad / mum / parents)*

il / elle est *(he / she is)*

ils / elles sont *(they are)*

il / elle a *(he/ she has)*

ils /elles ont *(they have)*

ils s'appellent *(they are called)*

quand je suis avec mes amis *(when I'm with my friends)*

quand je suis au collège *(when I'm at school)*

quand je suis chez moi *(when I'm at home)*

selon mes parents *(according to my parents)*

selon mes profs *(according to my teachers)*

je peux être *(I can be)*

il peut être *(he can be)*

quelquefois *(sometimes)*

toujours *(always)*

des fois *(at times)*

ne...jamais *(never)*

je ne suis jamais... *(I am never...)*

s'il fait chaud *(if it's hot)*

si j'ai beucoup de devoirs *(if I have lots of homework)*

<u>Est-ce qu'on se dispute?</u> *(Do you / do people argue [in your house])*

on se dispute quand / si… *(we argue when / if…)*

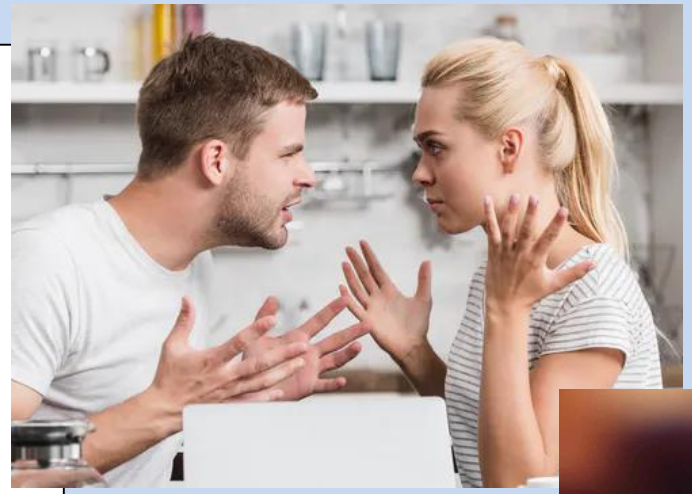
on s'entend bien *(we get on well)*

on ne s'entend pas bien *(we don't get on well)*

je m'entends bien avec… *(I get on well with…)*

je ne me dispute pas... *(I don't argue)*

je ne me dispute jamais... *(I never argue)*



<u>Veux-tu te marier dans le futur?</u> ***(Do you want to marry in the future?)***

Je vais / je veux / je voudrais me marier avec … *(I'm going / I want / I would like to get married to, with…)*

Je ne vais pas me marier *(I'm not going to get married)*

Je ne marierai jamais! *(I will never get married)*

Je pense que le mariage est… *(I think that marriage is…)*

Si / quand *(if / when)*

Le partenaire / l'homme / la femme de mes rêves *(the partner / man / woman of my dreams)*

serait / aurait *(would be / would have)*

<u>As-tu une fête préférée? Lesquelles préfères-tu: les fêtes anglaises ou françaises?</u> *(Do you have a favourite festival? Which do you prefer – English or French festivals?)*

j'aime / j'adore… *(I like / love)*

ma fête préférée est… *(my favourite festival is…)*

Noël / Pâques *(Christmas / Easter)*

je préfère / j'aime mieux *(I prefer)*

car / parce que / puisque *(as / because / since)*

Using adjectives

Adjectives describe things or people. They need to show agreement with the thing they are describing. To do this accurately, you need to consider whether the word is MASCULINE (a 'le' or 'un' word), FEMININE (a 'la' or 'une' word) or PLURAL (more than one).

These go AFTER the noun

Adjective	*masculine*	*feminine*
white	blanc(s)	blanche(s)
black	noir(s)	noire(s)
green	vert(s)	verte(s)
red	rouge(s)	rouge(s)
blue	bleu(s)	bleue(s)
funny	amusant(s)	amusante(s)
clever	intelligent(s)	intelligente(s)
funny	amusant(s)	amusante(s)
naughty	méchant(s)	méchante(s)

These go BEFORE the noun

Adjective	*masculine*	*feminine*
big	grand(s)	grande(s)
small	petit(s)	petite(s)
good	bon(s)	bonne(s)
bad	mauvais	mauvaise (s)
beautiful	beau(x)	belle(s)
young	jeune(s)	jeune(s)
old	vieux / vieil	vieille(s)
fat	gros	grosse(s)
pretty	joli(s)	jolie (s)

Examples:

j'ai les cheveux **noirs** = I have **black** hair

mon **grand** frère a les yeux **bleus** = my **big** brother has **blue** eyes

nous avons un **jeune** chien **intelligent** et **amusant** = we have a **young**, **clever** and **funny** dog

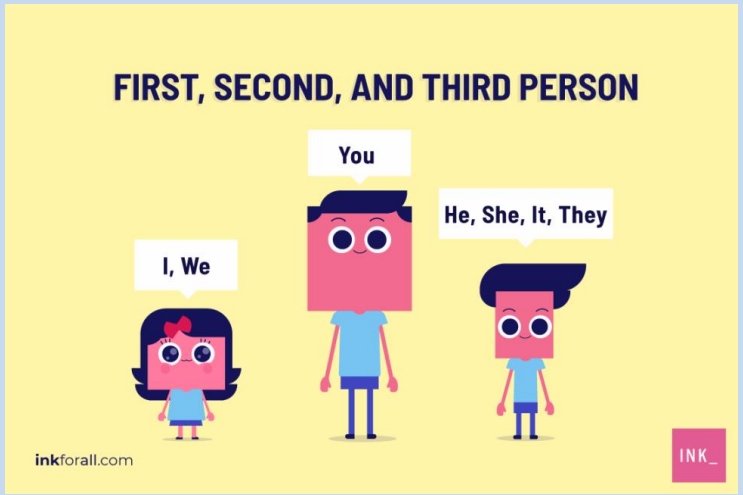
OR we could say

nous avons un jeune chien **qui** est intelligent et amusant = we have a young dog **who** is clever and funny

Key Grammar

Describing yourself – using key basic verbs

Pronoun	**être** *(to be)*	**avoir** *(to have)*	**s'appeller** *(to be called)*
je *(I)*	**suis** *(am)*	**ai** *(have)*	**m'appelle** *(am called)*
tu *(you)*	**es** *(are)*	**as** *(have)*	**t'appelles** *(are called)*
il / elle / on *(he/she/one)*	**est** *(is)*	**a** *(has)*	**s'appelle** *(is called)*
nous *(we)*	**sommes** *(are)*	**avons** *(have)*	**nous appellons** *(are called)*
vous *(you)*	**êtes** *(are)*	**avez** *(have)*	**vous appellez** *(are called)*
ils / elles *(they)*	**sont** *(are)*	**ont** *(have)*	**s'appellent** *(are called)*



NB:

tu = you (informal; talking to younger people, people you know)

vous = you (formal; talking to older people, adults, people you don't know or groups)

Using reflexive verbs

This is a group of verbs which have an extra **pronoun**. You have met one already when you give your name.

Je m'appelle' = I am called **LITERALLY** I call **myself.** ***This is what the 'me' stands for.***

Pronoun	**s'entendre (to get on with)**	**se disputer (to argue)**
je (I)	m'entends	me dispute
tu (you)	t'entends	te dispute
il / elle / on (he/she/one)	s'entend	se dispute
nous (we)	nous entendons	nous disputons
vous (you)	vous entendez	vous disputez
ils / elles (they)	s'entendent	se disputent

Examples:
je m'entends bien avec mes soeurs = *I get on well with my sisters*
mon oncle se dispute souvent avec la police = *my uncle often argues with the police*
mes cousins s'entendent bien avec leurs voisins = *my cousins get on well with their cousins*
nous nous disputons toujours = *we always argue*

Talking about the future

There are a number of ways you can talk about future plans. These all use the **INFINITVE** form of the verb.

Examples:

Je veux = *I want*	+	**aller** *(to go)*
Je voudrais = *I would like*		**avoir** *(to have)*
J'espère = *I hope*		**être** *(to be)*
Je vais = *I am going*		**habiter** *(to live)*
J'aimerais = *I would like*		**trouver** *(to find)*
J'ai l'intention de = *I intend*		**me marier avec** *(to get myself married to / with)*
Je pense à = *I'm thinking about*		**travailler** *(to work)*
		gagner *(to earn)*
		étudier *(to study)*
		voyager *(to travel)*

OR – you could follow this link and find out about the simple future...! Go on. Dare you...!

Examples:

Dans le futur, je veux aller en France et gagner beaucoup d'argent! = in the future I want to go to France and earn lots of money!

J'ai l'intention de me marier avec l'homme de mes rêves = I intend to marry the man of my dreams!

Je voudrais avoir une grande famille = I would like to have a big family

As-tu un portable? Que fais-tu avec? *(Do you have a mobile? What do you do with it?)*

j'ai un portable / je n'ai pas de portable / c'est un… *(I have / don't have a phone / it's a…)*

mes parents m'ont donné mon portable *(my parents gave me my phone)*

mes parents me paient mon forfeit *(my parents pay for my contract)*

j'utilise mon portable pour …. *(I use my phone to…)*

envoyer des textos *(sending texts)*

faire mes devoirs *(doing my homework)*

jouer aux jeux *(playing games)*

regarder des vidéos *(watching videos)*

Est-ce que internet c'est nécessaire de nos jours? *(Is the Internet necessary these days?)*

A mon avis *(in my opinion)*

Je pense que *(I think that)*

Je crois que *(I believe that)*

aujourd'hui *(today)*

de nos jours *(these days)*

c'est important / indispensable *(it's important / indispensable)*

surtout / especialement *(above all / especially)*

Watch the clip. If you want, put on 'CC' and follow the text too! Don't worry if you only get a tiny fraction of it. It's good to get your ear 'tuned'!

Quels sont les avantages et les inconvénients de la technologie moderne? *(What are the advantages and disadvantages of modern technology?)*

ça nous aide beaucoup *(it helps us a lot)*

c'est très important pour les étudiants *(it's very important for students)*

on ne pourrait pas survivre sans internet *(you couldn't survive without the Internet)*

utile *(useful)*

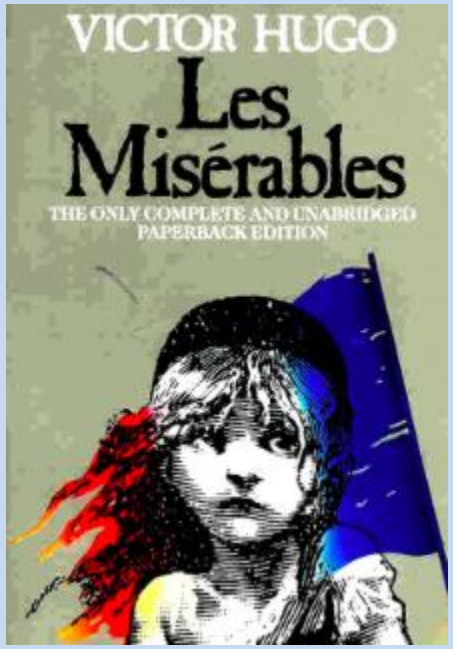
dangereux *(dangerous)*

il y a des inconnus *(there are unknown people / strangers)*

il y a un problème avec… *(there is a problem with…)*

la cybercriminalité *(cyber crime)*

la cyber intimidation *(cyber bullying)*



Que penses-tu de 'Facebook' et des autres réseaux sociaux? *(What do you think of Facebook and other social media?)*

c'est très utile *(it's very useful)*

je n'aime pas beaucoup *(I don't really like it)*

on peut rester en contact avec … *(you can stay in contact with…)*

on peut envoyer / échanger des photos *(you can send / exchange photos)*

je préfère Instagram car… *(I prefer Instagram because…)*

Aimes-tu lire? Quel genre de livres aimes-tu*? (Do you like to read? What type of books do you like?)* **+ Aimes-tu regarder la télé?** *(Do you like to watch TV?)* **+ Parle-moi des films que tu aimes... / As-tu jamais vu un film français?** *(Tell me about films you like… / Have you ever seen a French film?)*

j'aime / je n'aime pas *(I like / don't like)*

regarder / voir / lire / écouter *(to watch / to see / to read / to listen)*

je suis fana de *(I'm a fan of)*

je ne supporte pas *(I can't stand)*

le genre *(type)*

la sorte *(type)*

le roman *(novel)*

le film *(film)*

l'émission *(TV programme)*

hier / la semaine dernère / il y a un mois *(yesterday / last week / a month ago)*

j'ai vu / j'ai regardé *(I saw / I watched)*

j'ai lu / j'ai écouté *(I read / I listened to)*

c'était *(it was)*

j'ai beaucoup aimé *(I really liked)*

je n'ai pas aimé *(I didn't like)*

je l'ai trouvé *(I found it)*

Key grammar

Using infinitives

The ***infinitive*** form of the verb can be used to help give opinions.

j'aime **regarder** / je déteste **voir** / j'adore **lire** *(I like **to watch** / I hate **to see** / I love to **read**)*

If you want to say 'in order to do something' use **pour** + **infinitive**

j'ustilise mon portable **pour** envoyer des photos – I use my phone to send photos

Using adverbs of time

Develop your sentences by making references to when / how often you do something.

*Notice that a lot of the time, words ending in **–lly** in English will end with **–ment** in French*

normalement – normally

généralement – generally

habituellement - usually

quelquefois – sometimes

des fois – at times

une fois par semaine – once a week

Using negatives

Making negative sentences will help give your responses contrast. *Notice they go round the verb.*

ne…pas – not / don't

ne…jamais – never

ne…que – only

Examples:

je **ne** regarde **pas** la télé – I don't watch TV

je **ne** regarde **jamais** des émissions de sport – I never watch sports programmes

je **n'**écoute **que** la musique hip-hop (I only listen to hip-hop)

Using past tenses

When talking about something you've done, you will be using either the perfect or imperfect tense.

Reminder:

use 'avoir' or 'être' + past participle to make the **perfect tense:**

j'ai vu – *I have seen / I saw*

j'ai regardé – *I have watched / I watched*

nous avons écouté – *we listened (to)*

je suis allé au cinéma – *I went to the cinema*

nous sommes allés à un concert – *we went to a concert*

The **imperfect tense** will describe what something **was** like or what you **were doing**.

c'était – *it was*

j'aimais – *I used to like*

j'habitais – *I used to live*

je regardais – *I was watching / I used to watch*

j'avais – *I used to have / I had*

avoir – reminder!

j'ai = I have
tu as = you have
il / elle a = he / she has

nous avons = we have
vous avez = you have
ils / elles ont = they have

être – a reminder!

je suis = I am
tu es = you are
il /elle est = he / she is

nous sommes = we are
vous êtes = you are
ils / elles sont = they are

Useful guide if you're confused by past tenses!

GCSE SPANISH

<u>Hablame de tu mismo</u> *(Tell me about yourself)*
me llamo *(my name is / I'm called)*
tengo ... años (I'm … years old)
tengo el pelo rubio / moreno, castaño / corto / largo *(I've go blonde / brown / short / long hair)*
tengo los ojos azules / verdes *(I've got blue / green eyes)*
soy timido / tranquilo / inteligente, listo *(I'm shy / quiet / clever)*

<u>¿Cómo es tu familia?</u> *(What's your family like)* + **<u>¿Tienes un mejor amigo</u>**? *(Do you have a best friend?)* + **<u>¿Tienes un novio / una novia?</u>** *(Do you have a boyfriend / girlfriend?)*
tengo un hermano / una hermana / una hermanastra <u>que</u> se llama... *(I have a brother /sister / step-brother <u>who</u> is called…)*
soy hijo único / hija única *(I'm an only child)*
mi padre / mi madre / mis padres *(my dad / mum / parents)*
son *(they are)*
tiene *(he/ she has)*
tienen *(they have)*
se llaman *(they are called)*

cuando estoy con mis amigos *(when I'm with my friends)*
cuando estoy en mi insti *(when I'm at school)*
cuando estoy en mi casa / con mi familia *(when I'm at home)*
según mis padres *(according to my parents)*
según mis profesores *(according to my teachers)*
puedo ser *(I can be)*
(él) puede ser *(he can be)*
a veces *(sometimes)*
siempre *(always)*
de vez en cuando *(occasionally)*
nunca *(never)*
si hace calor *(if it's hot)*
si tengo muchos deberes *(if I have lots of homework)*

¿Te llevas bien con tu famlia y tus amigos? *(Do you / do people argue [in your house])*

nos peleamos cuando / si… *(we argue when / if…)*

nos llevamos bien *(we get on well)*

no nos llevamos bien *(we don't get on well)*

me llevo bien con *(I get on well with…)*

no me peleo … *(I don't argue)*

me peleo nunca... *(I never argue)*

¿Quieres casarte en el futuro? ***(Do you want to marry in the future?)***
voy a / quiero / me gustaría casarme con... *(I'm going / I want / I would like to get married to, with…)*
no voy a casarme *(I'm not going to get married)*
¡me casaré nunca! *(I will never get married)*
pienso que el matrimonio es... *(I think that marriage is…)*
si / cuando *(if / when)*
la pareja / el hombre / la mujer de mis sueños *(the partner / man / woman of my dreams)*
sería / tendría *(would be / would have)*

¿Tienes una fiesta favorita?
¿Prefieres las fiestas ingléses o españoles?
(Do you have a favourite festival? Do you prefer English or Spanish festivals?)

me gusta / me encanta / prefiero *(I like / love / I prefer)*

mi fiesta favorita es … *(my favourite festival is…)*

Navidad / Pascua *(Christmas / Easter)*

prefiero *(I prefer)*

porque / ya que / como *(as / because / since)*

se come / se bebe / se va *(people eat / people drink / people go)*

recibo regalos de... *(I get presents from...)*

Using adjectives

Adjectives describe things or people. They need to show agreement with the thing they are describing. To do this accurately, you need to consider whether the word is MASCULINE (a 'el' or 'un' word), FEMININE (a 'la' or 'una' word) or PLURAL (more than one).

These go AFTER the noun

Adjective	*masculine*	*feminine*
white	blanco(s)	blanca(s)
black	negro(s)	negra(s)
green	verde (s)	verde(s)
red	rojo(s)	roja(s)
blue	azul(es)	azul(es)
fun	divertido (s)	divertida (s)
clever	intelligente(s)	intelligente(s)
funny	gracioso (s)	graciosa(s)
naughty	travieso (s)	traviesa (s)

Adjective	*masculine*	*feminine*
big	grande(s)	grande(s)
small	pequeño (s)	pequeña(s)
good	bueno (s)	buena (s)
bad	malo (s)	mala (s)
beautiful	hermoso (s)	hermosa (s)
young	jóven (es)	jóven (es)
old	viejo (s)	vieja (s)
fat	gordo (s)	gorda (s)
pretty	bonito (s)	bonita (s)

Examples:

tengo el pelo **negro** = I have **black** hair

mi hermano **mayor** tiene los ojos azules = my **big** *(age)* brother has **blue** eyes

tenemos un perro **jóven** , **inteligente** y **gracioso** = we have a **young**, **clever** and **funny** dog

OR we could say

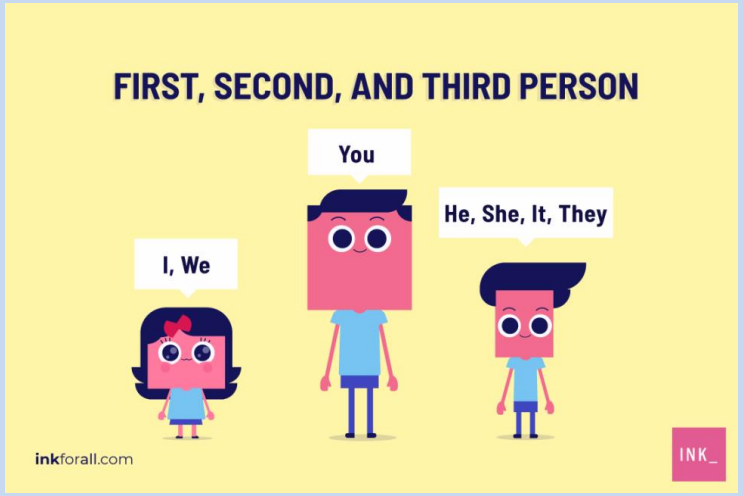
tenemos un perro jóven **que** es inteligente y gracioso = we have a young dog **who** is clever and funny

Key Grammar

Describing yourself – using key basic verbs

In Spanish, you normally don't bother using the words for 'I', 'you', 'he' etc

Pronoun	**ser** *(to be)*	**tener** *(to have)*	**llamarse** *(to be called)*
yo *(I)*	**soy** *(am)*	**tengo** *(have)*	**me llamo** *(am called)*
tú *(you)*	**eres** *(are)*	**tienes** *(have)*	**te llamas** *(are called)*
él / ella / Usted *(he/she /you)*	**es** *(is)*	**tiene** *(has)*	**se llama** *(is called)*
nosotros *(we)*	**somos** *(are)*	**tenemos** *(have)*	**nos llamamos** *(are called)*
vosotros *(you)*	**soís** *(are)*	**tenéis** *(have)*	**os llamáis** *(are called)*
ellos / ellas *(they)*	**son** *(are)*	**tienen** *(have)*	**se llaman** *(are called)*



NB:

tú *(you)* = you (informal; talking to younger people, people you know)

Usted = you (formal; talking to older people, adults, people you don't know)

Using reflexive verbs

This is a group of verbs which have an extra **pronoun**. You have met one already when you give your name.

me llamo = I am called **LITERALLY** I call **myself.** ***This is what the 'me' stands for.***

Pronoun	**llevarse** *(to get on with)*	**pelearse** *(to argue)*
yo *(I)*	**me llevo**	**me peleo**
tú *(you)*	**te llevas**	**te peleas**
él / ella / Usted *(he/she /you)*	**se lleva**	**se pelea**
nosotros *(we)*	**nos llevamos**	**nos peleamos**
vosotros *(you)*	**os lleváis**	**os peleáis**
ellos / ellas *(they)*	**se llevan**	**se pelean**

Examples:

me llevo bien con mis hermanas = *I get on well with my sisters*
mi tío se pelea a menudo con la policía = *my uncle often argues with the police*
mis primos se llevan bien con sus padres = *my cousins get on well with their parents*
nos peleamos siempre = *we always argue*

Talking about the future

There are a number of ways you can talk about future plans. These all use the **INFINITVE** form of the verb.

Examples:

quiero = *I want*	+	**ir** *(to go)*
quisiera = *I would like*		**tener** *(to have)*
me gustaría = I would like		**ser** *(to be)*
voy a = *I am going*		**vivir** *(to live)*
espero = *I hope*		**encontrar** *(to find)*
tengo la intención de = *I intend*		**casarme con** *(to get myself married to / with)*
pienso = *I'm thinking about / I'm considering*		**trabajar** *(to work)*
		ganar *(to earn)*
		estudar *(to study)*
		viajar *(to travel)*

OR – you could follow this link and find out about the simple future…! Go on. Dare you…!

Examples:

Tengo la intención de casarme con el hombre de mis sueños = *I intend to marry the man of my dreams*!
Me gustaría tener una familia grande = *I would like to have a big family*

¿Tienes un móvil ? Que haces con él? *(Do you have a mobile? What do you do with it?)*

Tengo / no tengo un móvil / es un... *(I have / don't have a phone / it's a…)*

Mis padres me han dado mi móvil *(my parents gave me my phone)*

Mis padres me pagan mi contrato / mi factura *(my parents pay for my contract)*

Uso mi móvil para …. *(I use my phone to…)*

Mandar mensajes *(sending texts)*

Hacer mis deberes *(doing my homework)*

Jugar a videojuegos *(playing games)*

Ver videos / películas *(watching videos)*

¿Es el Internet necesario hoy en día? *(Is the Internet necessary these days?)*
Pienso que *(I think that)*
Opino que (*in my opinion)*
Creo que *(I believe that)*
Hoy *(today)*
Hoy en día *(these days)*
Es importante / indispensable *(it's important / indispensable)*
Sobre todo / especialemente *(above all / especially)*

Watch the clip. If you want, put on 'CC' and follow the text too! Don't worry if you only get a tiny fraction of it. It's good to get your ear 'tuned'!

¿Cuáles son las ventajas y desventajas de la technología moderna? *(What are the advantages and disadvantages of modern technology?)*

Nos ayuda mucho *(it helps us a lot)*

Es muy importante para los estudiantes *(it's very important for students)*

No es possible / no se podría sobrevivir sin el Internet *(you couldn't survive without the Internet)*

Util *(useful)*

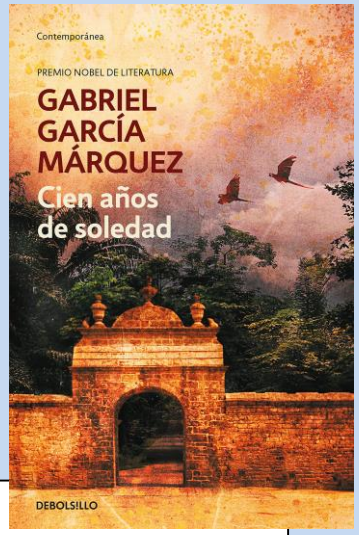
Peligroso *(dangerous)*

Hay personas desconocidas *(there are unknown people / strangers)*

Hay un problema con ... *(there is a problem with…)*

El delito cibernético *(cyber crime)*

el ciberacoso *(cyber bullying)*



¿Qué piensas de 'Facebook' y otras redes sociales ? *(What do you think of Facebook and other social media?)*

Es muy útil *(it's very useful)*

Es mi vida *(it's my life)*

No me gusta mucho *(I don't really like it)*

Se puede estar en contacto con … *(you can stay in contact with…)*

Se puede mandar / cambiar fotos *(you can send / exchange photos)*

Prefiero Instagram porque… *(I prefer Instagram because…)*

¿Te gusta leer Qué tipo de libros te gustan*? (Do you like to read? What type of books do you like?)* **+ Te gusta ver la tele?** *(Do you like to watch TV?)* **+ Hablame un poco de las películas que te gustan... ¿Has visto una película española?** *(Tell me about films you like… / Have you ever seen Spanish film?)*

Me gusta / no me gusta *(I like / don't like)*

Ver / mirar / leer / escuchar *(to watch / to see / to read / to listen)*

Soy un fan de ... *(I'm a fan of)*

No soporto *I can't stand)*

El tipo *(type)*

El género *(genre)*

Una novela *(novel)*

La película *(film)*

Un programa *(TV programme)*

Ayer / la semana pasada / hace un mes *(yesterday / last week / a month ago)*

Veí / miré *(I saw / I watched)*

Leí / escuché *(I read / I listened to)*

Fue *(it was)*

Me gustó mucho *(I really liked)*

No me gustó mucho *(I didn't like)*

Lo / la encontré *(I found it)*

Key grammar

Using infinitives

The ***infinitive*** form of the verb can be used to help give opinions.

me gusta **ver** / odio **ver** / me encanta **leer** *(I like **to watch** / I hate **to see** / I love to **read**). Most infinitives end in –ar, but al large group end in either –ir or –er too!*

If you want to say 'in order to do something' use **para** + **infinitive**

uso mi móvil **para mandar** mensajes – I use my phone to send photos

Using adverbs of time

Develop your sentences by making references to when / how often you do something.

*Notice that a lot of the time, words ending in **–lly** in English will end with **–mente** in Spanish*

normalmente – normally

generalmente – generally

tipicamente - typically

a veces – sometimes

a menudo – often

una vez por la semana – once a week

Using negatives

Making negative sentences will help give your responses contrast.

no – not / don't

nunca – never

Examples:

no veo la tele– I don't watch TV

nunca veo los programas de deporte – I never watch sports programmes

Using past tenses

When talking about something you've done, you will be using either the **preterite** or **imperfect** tense.

Reminder – it's all in the endings!

Preterite – states something you did, a one-off event.

escuché – *I listened*

compré – *I bought*

fui – *I went / I was*

veí – *I saw*

tuve – *I had*

Imperfect tense will describe what something was like or what you were doing; it can also mean what you used to do

escuchaba – I **was** listening / I used to listen

compraba – *it was*

iba – *I was going / I used to go*

era – *I was / I used to be*

veía – *I was watching / I used to watch*

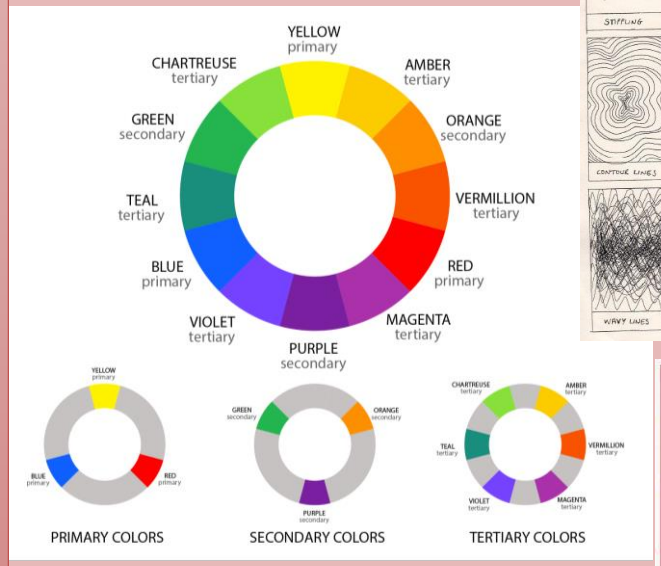
tenía – *I used to have / I had*

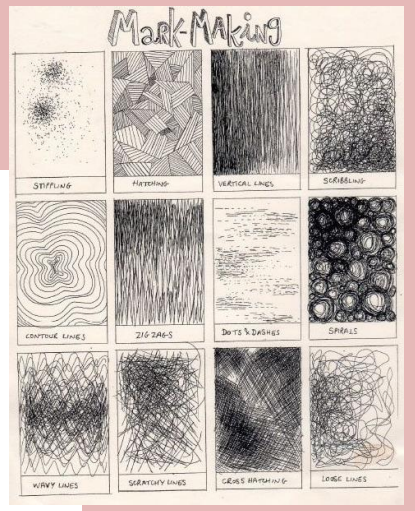
Useful guide if you're confused by past tenses!

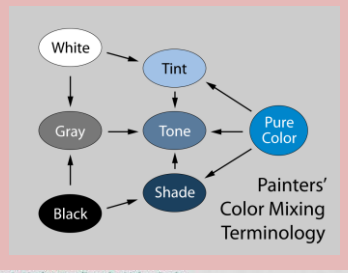
The Fundamentals of Art

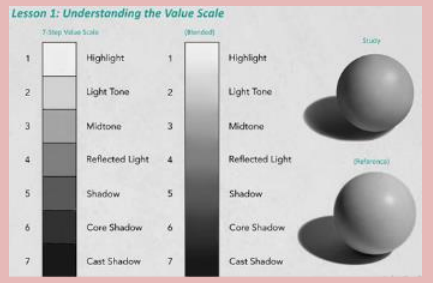
ESSENTIAL EQUIPMENT:
- PENCIL PACK (2B, 4B, 6B ETC)
- ERASER
- SHARPENER
- SKETCHBOOK

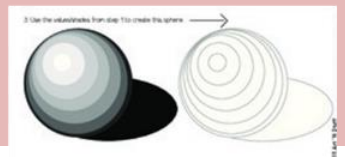
OPTIONAL EQUIPMENT:
- DRAWING PENS
- WATERCOLOUR SET
- WATERCOLOUR PENCILS
- PAINTBRUSHES

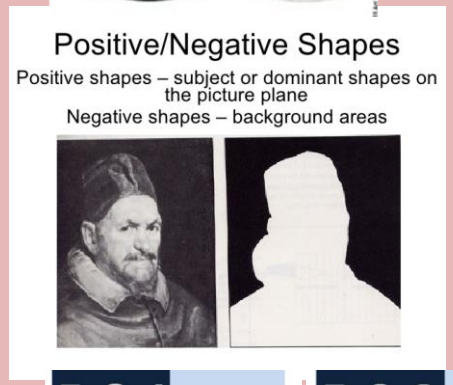












ATTITUDE

Be positive and try your best!

RESPECT

Respect others, work and the room

THINK

Understand and demonstrate.

IMAGIINE

Be creative, use you imagination!

SPOTLESS

Tidy up after yourself.

TARGET

Follow directions.

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

ART ANALYSIS GUIDE

CONTENT/DESCRIPTOPN OF AN IMAGE

- What is it? (portrait/landscape/painting/mixed media etc)
- What is it about? What is happening? (describe the contents)
- Type of image? (black and white/colour/pencil etc)
- What is the theme of the image? Is there a greater meaning to the image?
- 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?

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?

PROCESS

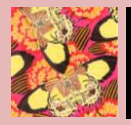
- What type and direction of light was used/created? (harsh, soft, artificial lamp/natural lighting)
- How was this image 'built'?
- What kind of patterns and/or textures are in the image? How would you describe them?
- Describe the use of tone/texture/detail/scale/ perspective/composition/colour within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

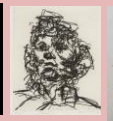
FORM/VISUAL ANALYSIS

- 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?

NATURAL FORMS

TERM 1, 2, 3, 4





Artists you could research:
Billy Kidd
Rocio Montoya
Georgia O'Keeffe
Karl Blossfeldt
Ellsworth Kelly
Ernst Haeckel
Christian La Croix
Helen Ahpornsiri
Kate Malone
Micheal Brennand-Wood
Angie Lewin
Henry Moore
Polly Morgan

A **LINE** is the path left by a moving point, eg. A pencil or a brush dipped in paint. A **LINE** can take many forms, eg.
Horizontal, diagonal or curved.
A **LINE** can be used to show contours,
movements, feelings and expressions.

TONE

TONE means the lightness or darkness of something. This could be a shade or how dark or light a colour appears.





TEXTURE

TEXTURE is the surface quality of something, the way
something feels or looks like it feels.
There are two types of texture: **ACTUCAL TEXTURE** and **VISUAL TEXTURE**.
ACTUAL TEXTURE: really exists so you can feel it and touch it
VISUAL TEXTURE: created using different marks that represent actual **TEXTURE**

COLOUR

There are 3 primary **COLOURS**: RED, YELLOW, BLUE

By mixing any 2 **PRIMARY COLOURS** together you create **SECONDARY COLOURS**; ORANGE, GREEN, PURPLE

Natural forms are organic objects found in nature.

This includes;

- Shells, seaweed, fish, sea life
- Plants, flowers, seedpods, leaves, trees
- Skulls, bones, DNA
- People, portraits, figures
- Patterns found in nature
- Fruit, vegetables, roots
- Animals, insects, birds, wings, feathers



PATTERN

PATTERN is a design that is created by
repeating **LINES**, **SHAPES**, **TONES** or
COLOURS.

Patterns can be manmade or natural.

SHAPE/FORM

A **SHAPE** is an area enclosed by a **LINE**. It could be just an outline or it could be shaded in.
FORM is a three dimensional shape such as a sphere, cube or a cone.

Sculpture and 3D design are about creating **FORMS**







An Introduction to GCSE and a focus on the **Component one** examination requirements

Basic & essential information.
There are three examinations in drama. They are called components one, two and three. Together they assess all four objectives of this course of study that you have chosen.

4 Drama Assessment Objectives (A/Os)

AO1) Create & develop ideas to communicate meaning for theatrical performance.
AO2) Apply theatrical skills to realise artistic intentions in live performance.
AO3) Demonstrate knowledge & understanding of how drama & theatre is developed & performed.
AO4) Analyse & evaluate your own work and the work of others.AO

Component 1 *Devised Theatre*

You will sit this paper, 'for real' in November of Year 11. Here, we will practise. It is in 3 parts:

1) **Devising** – researching ideas around your chosen stimulus and documenting them in a written portfolio of 900 words responding to 3 set questions.
2) **Realising** – Making the play and performing to a live audience in the studio on a set evening.
3) **Evaluating** – evaluating **your** performance & contribution to the performance on the night. 90 minute written examination in the hall.

A 'picture' of the first two terms in lesson.

To begin we will to gain a basic understanding and familiarity with the main aspects of the three components. Tasks will refresh your knowledge of key skills and theory from KS3. They will develop your confidence and identify one or two areas for you to work on.
You will learn to be part of this new group through the work itself rather than any specific, '*get to know you exercises*'.
We will use ideas of **youth** and **childhood** as a theme. We will explore these ideas through whole class improvisation on a first day at school. We will develop this by experimenting in pairs within the genre of **Children's Early Learning Television**.
We will look to perform these short theatre pieces to an invited audience one lunch or after school.
Midway through the term we fill focus our studies on the requirements for **Component One**. Our chosen Practitioner/ genre will be **Theatre In Education** (**TIE**). You will work in a small group as a small scale TIE touring company to devise a performance around a given stimulus in the Theatre In Education genre. You will complete a **portfolio** in approximately 900 words. This portfolio will document the collaborative creative process you went through in devising your performance piece. The week after performance you will sit a written examination where you will **evaluate** your performance and contribution to your final TIE performance.

Theatre In Education (TIE)
Background

After the Second World War, people with an interest in education realised the huge potential that drama and theatre techniques might have in of harnessing effective learning in schools. This became known as **Theatre in Education** or '**TIE**' for short. Brian Way, who founded the Theatre Centre in 1953, was an early practitioner, and influenced the team, including Gordon Vallins, who established TIE at the Belgrade Theatre, Coventry in 1965. Their work was so influential that it spread nationwide. Originally, TIE companies received funding from various Arts Councils to research and develop and tour their plays in schools in their regional base and across the country. Now, TIE companies rely on fees from schools to fund their projects. As schools have had little spare money in recent years there has been a decline in TIE companies bringing plays into school and where they have appeared it is with subjects specifically requested by schools.

We are lucky to have Forest Forge on our doorstep. Hopefully we will be able to meet with them and maybe see a production.

When asked how to create a play for children, Stanislavski replied: The same as for adults, only better.

https://www.bbc.co.uk/bitesize/guides/zsbjn39/revision/1

Key features of TIE

It's important for you to remember the following characteristics that typify TIE:

- **There is a clear aim and educational objective running throughout.**
- **A small cast so actors must be versatile and often multi-role. (you will be a small group)**
- **A low budget so actors often play instruments too. (we will review this)**
- **The production must be portable so the design is simple and representational.**
- **They explore issues from various viewpoints, so we can see the effect of an action upon a range of people.**
- **There is some level of audience involvement. (We will have to review this)**
- **They are rarely wholly naturalistic because direct audience address (breaking the 4th wall) or narration is used to engage the audience.**
- **The costumes are simple and representational, especially if actors have to multi-role.**
- **They may include facts and figures to educate the audience.**
- **They may have a strong message or moral running throughout.**

Part1: Devising 40% of total grade

You devise a piece of theatre **in response** to the stimulus which demonstrates the techniques of a **theatre practitioner** or **genre.**
You create and develop ideas to communicate meaning to an audience by:

☐ **Researching** and developing ideas using the techniques or characteristics of the practitioner or genre (TIE in your case).

☐ **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.

Part 1 20%

Devising – assessed through written portfolio

1 How I have **researched, created & developed ideas** in response to my chosen stimulus.
In this part it is important that you **show how** you got from your stimulus to your final idea. You should show this creative journey- including the chopping & changing and abandoning ideas. It is important to say why you abandoned your idea; maybe the subject was too close to home, maybe the idea was too difficult to do in an epic style and kept leading you to naturalistic situations. It is really important to note the research you did, the discussions you had that led you from one thing to another and another. Say **how your research** suggested (specific, named) **improvisations/ scenes, hot seating, setting ideas, dialogue ideas, character ideas** – in the pursuit of your ***artistic intentions.***
2 How I have **incorporated TIE ideas** to **communicate meaning.**
Name each of the TIE ideas and techniques you used. Give an example of where you used it, what it was, why you used it at **this particular moment** in your play- what its function was and how it helped communicate your key message aim and your chosen style.
3 How I have **developed amended & refined** my ideas during the **development** of my play.
Choose one – maximum two key moments where you had a breakthrough. Go into real depth and detail about how did things/ changed things/ turned things around that led you (back) onto a good creative path and that led you to your final vision /version of your play and assisted you in realising your artistic/ political aims.

Part 2 Realising- performing 10%

This part of the examination is where you share your devised play.made in the style of a practitioner or particular theatre genre eg - TIE

C1: Part 3 - Evaluation

You will evaluate the final performance under supervised conditions. You indicate your chosen stimulus and chosen practitioner (TIE this occasion). You evaluate in **3 sections**:

Exam questions.

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

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).

In your final C1 Evaluation exam you will have **1 hour 30 minutes** to complete the evaluation. In this trial run, you will have **1 hour.** 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.

Remember that this a drama essay and use drama, acting and theatre vocabulary. You may submit supporting material which enhances your presentation.

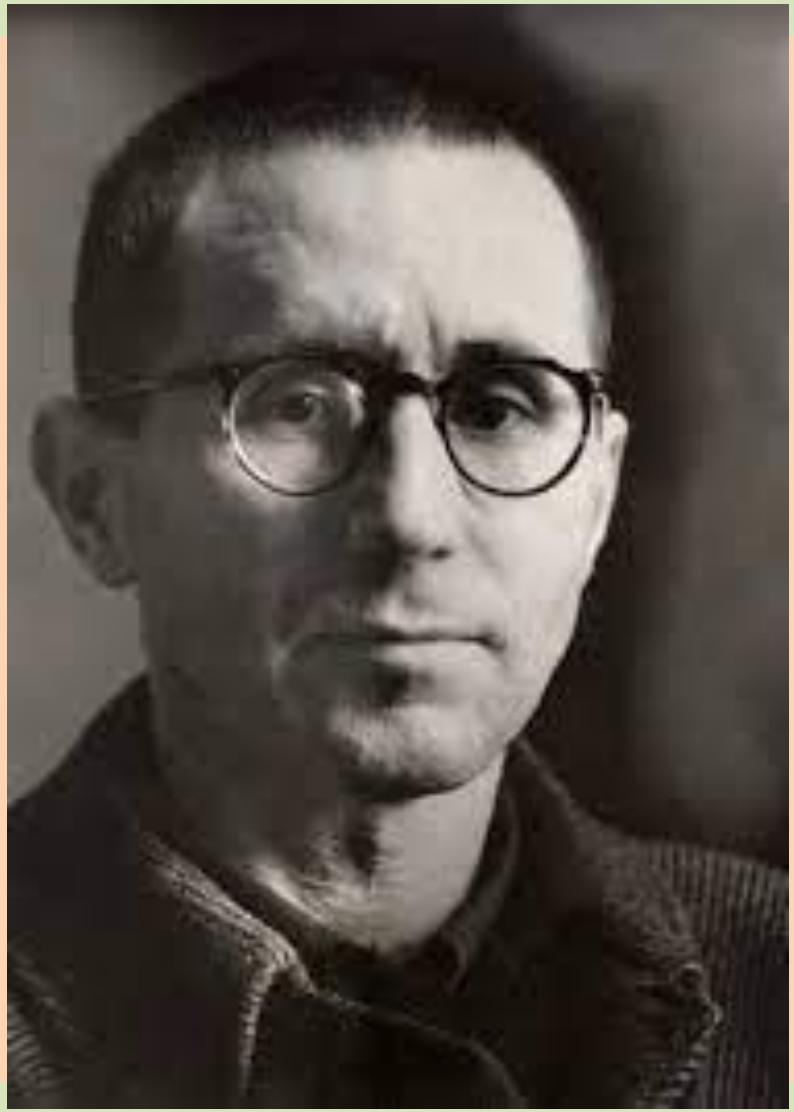
Evaluating your work and other people's work

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.

Intelligent **Imaginative** Creative **Skilful** Exciting **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**

Drama – Terms 1 & 2



Bertolt Brecht

Assessment in Terms 1 & 2

- The Component 1 examination assesses you in a wide range of skills. You will be assessed formatively to guide you in how to improve and a summative one so you get a clear and straightforward idea of where you are at in terms of expected grade.
- **Assessment Tasks include**
- The group performance of a play
- A portfolio documenting your research and artistic journey to performance.
- An extended written examination where you analyse and evaluate your contribution in the performance.
-

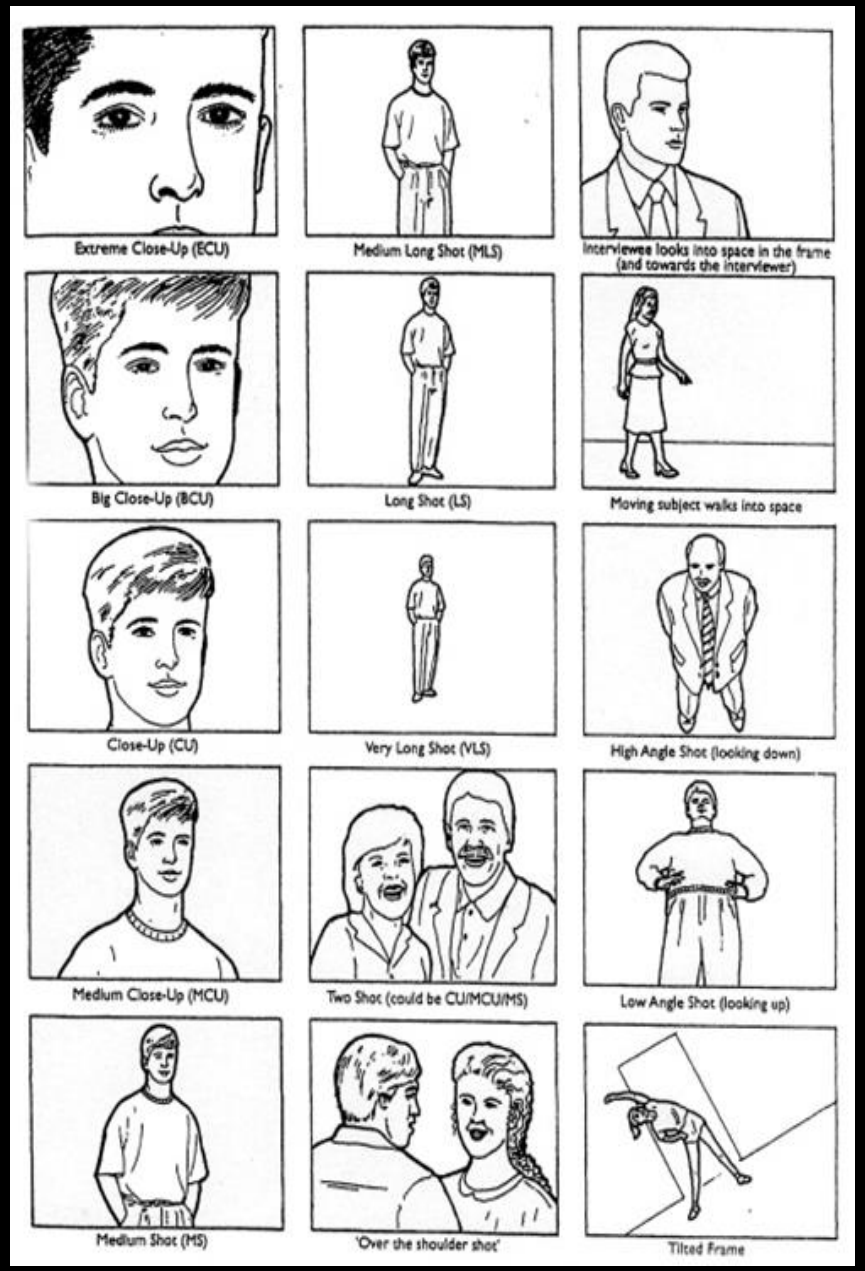
Homework Tasks

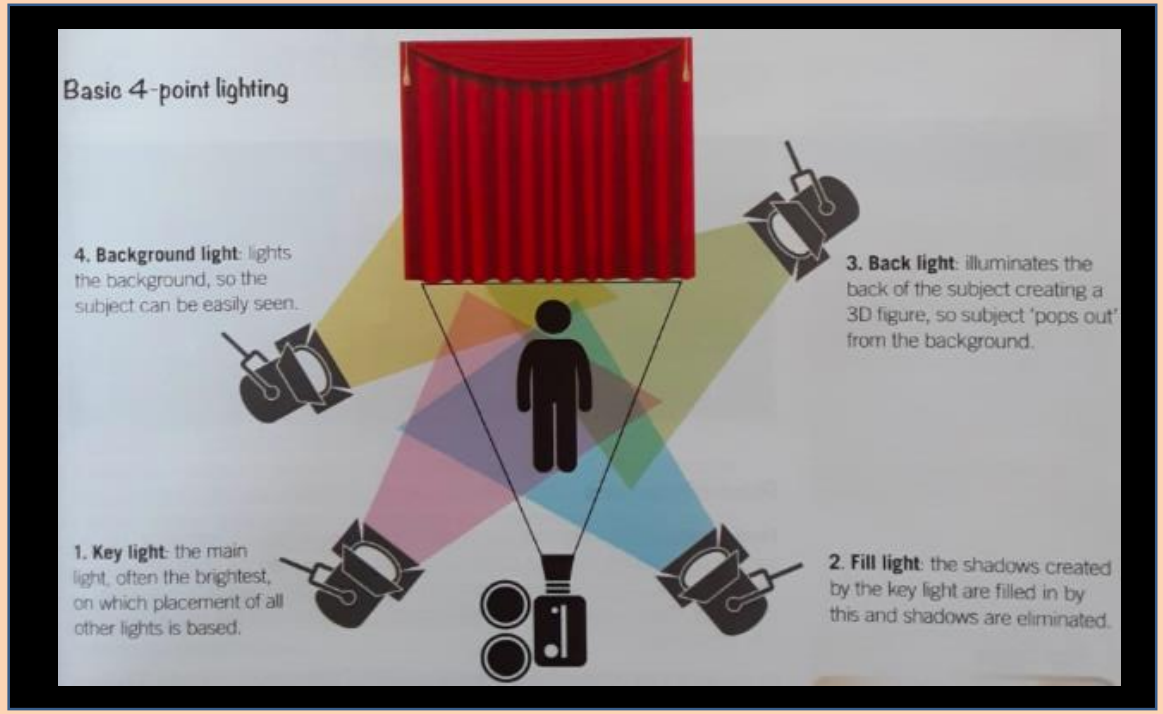
- **These may include;**
- An evaluation of a class performance using EV.
- Keeping a record of all research and learning in each lesson & rehearsal
- Lunch time and after school rehearsals as guidance permits
- Preparation of A4 notes to take into PPE Evaluation Examination
- Collation of detailed research notes into a 900 word portfolio as per guidance

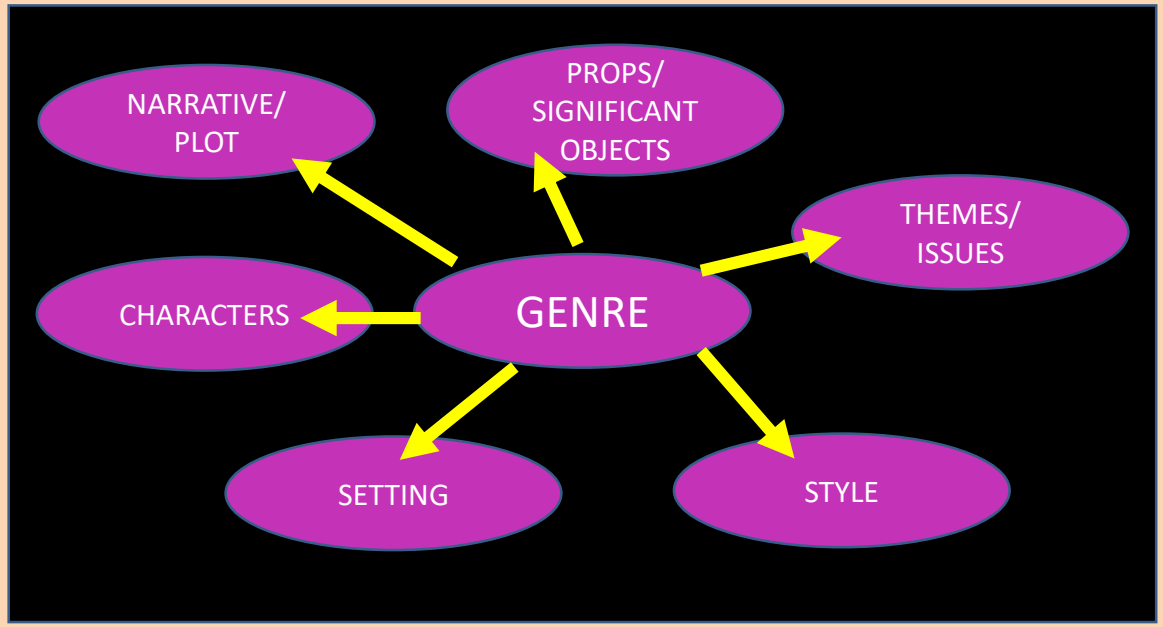
FILM STUDIES TERM 1 - INTRODUCTION TO TECHNICAL CODES

TECHNICAL CODE	TERMINOLOGY	DEFINITION
EDITING 	**STRAIGHT CUT**	Smooth cut between one shot and the next
	FADE	Where a shot gradually turns black or white
	DISSOLVE	A technique that creates gradual fade from one image to another. Often used to connect images in some way.
	WIPE	Where one shot replaces another by travelling from one side of the frame to another
LIGHTING 	**HIGH KEY**	When bright colour is created through the use of lots of filler lights – few/no shadows
	LOW KEY	When fewer filler lights are used to help create pools of shadows
	CHIAROSCURO	An Italian term usually used in art to refer to the high contrast light and dark in paintings. Used in cinema to describe the use of high and low key lighting in film noir films (lots of dark shadows, city scapes, shadowy characters)
SOUND 	**DIEGETIC**	Sound that is part of the film's world e.g. birds singing, traffic passing
	NON-DIEGETIC	Sound that is not part of the film's world e.g. musical score or voice over narration
	PARALLEL	Music that matches the action on screen
	CONTRAPUNTAL	Sound that does not seem to 'fit' with the image on screen. It often works to add another layer of meaning or irony to what we see.
	INCIDENTAL MUSIC	Music used as a background to create /emphasise an atmosphere.
	PLEONASTIC	Emphasized sound to appeal to emotions or draw attention to significant action or prop eg. taking safety off a gun
	DIALOGUE	A conversation between two or more people

FILM STUDIES TERM 1 - INTRODUCTION TO TECHNICAL CODES







FILM STUDIES TERM 1 - INTRODUCTION TO TECHNICAL CODES

KEY TERM	DEFINITION
GENRE	A style or category of art, film, music or literature
CINEMATOGRAPHY	the art and technology of motion-picture photography. Involves such techniques as the general composition of a scene; the lighting of the set or location; the choice of cameras, lenses, filters, and film stock; the camera angle and movements; and the integration of any special effects.
BUDGET	A financial plan that is followed (mostly) when creating something. The money you are able to spend when making something.
MARKETING	How something is promoted to its target audience
SYNERGY	Where different media platforms work together to promote something. Can include duvet sets, toys, fancy dress…
MISE-EN-SCENE	The arrangement of scenery, props, costume etc on the set of a film
SPECIAL EFFECTS and CGI	These are illusions or visual tricks to portray imagined events in a story or virtual world. Can be divided in to mechanical effects and optical effects. Often use CGI (Computer Generated Imagery)
SYMBOLISM	The use of something to represent a particular idea or quality. The Houses of Parliament behind Bond in 'Skyfall' film poster suggests that Bond is there to protect the British Institutions.
ENIGMA	A puzzle or something that is difficult to understand/mysterious. Films present enigmas – questions that are then answered for the audience (keeps them watching)
COLOUR PALETTE	The choice of colours used when creating something visual. Bright colours appeal to young audience, muted appeal to a more sophisticated audience
PATHETIC FALLACY	the reflection of the mood of a character (usually the protagonist) in the weather eg. In film when something terrible is about to happen, the weather usually turns stormy with lightening etc
POLYCHROMATIC	Two or more varying colours
FILM AESTHETICS	Refers to the philosophy of film, the way that the subject of the film is shown in order to have an impact on its audience
FRANCHISE	A collection of related films in succession that share the same fictional universe or are marketed as a series eg. Fast and the Furious, Ice Age, Shrek, Star Wars…

BLOCKBUSTER	Any film that takes over 100 million dollars at the American box office. These are usually created with both huge production and marketing budgets
INDEPENDENT	An independent film is one that receives less than 50% of its funding from one of the 'big six' major film studios. Typically has a relatively small budget and the filmmaker gets to tell the story they want in the way they want.

CAMERA MOVEMENTS	EXPLANATION
DUTCH ANGLE	A tilted camera angle that causes horizon to be diagonal to the bottom of the frame. Can be used to express a character's drunken state, disorientation, anxiety or mental state.
HAND HELD	When the camera does not remain still, but is shaky. Most famous example is probably "Blair Witch Project'
PANNING	The camera moves slowly from one area of the setting to another. If done quickly, known as a whip pan.
SHOT REVERSE SHOT	A good way to show dialogue between characters that gives the audience the feeling they are watching the conversation in a 'real life' way
TRACKING SHOT	The camera moves alongside the subject it is filming
ZOOM IN OR OUT	The camera shot moves closer to or further away from the subject

VERBAL CODE – everything to do with language (either written or spoken).

NON-VERBAL CODE – this is how something is communicated through body language, gestures and actions (how an actor moves, their make up, their costume)

FILM STUDIES TERM 1 - INTRODUCTION TO TECHNICAL CODES

FILM STUDIES TERM 2 - INTRODUCTION TO NARRATIVE

STUDYING REPRESENTATION

- HOW MUCH OF THE WORLD IS REPRESENTED THROUGH THE MEDIA?
- HOW DO AUDIENCES READ REPRESENTATIONS DIFFERENTLY
- EXAMINE THE NEGATIVE AND POSITIVE ASPECTS OF STEREOTYPING
- ANAYLSE THE RELATIONSHIP BETWEEN REPRESENTATION AND GENRE
- LOOK AT HOW FILMS COMMUNICATE MESSAGES

LEVI STRAUSS IDENTIFIED THAT SOCIETY IS BUILT UPON OPPOSITIONAL PERPSPECTIVES. FILMS TEND TO USE THIS THEORY CALLED 'BINARY OPPOSITION'

EXAMPLES OF 'OPPOSITES' THAT CAN BE SEEN REGULARLY IN FILM TEXTS INCLUDE:

- GOOD V EVIL
- HERO V VILLAIN
- MAN V NATURE
- MAN V WOMAN
- CIVIL V SAVAGERY
- EAST V WEST
- RICH V POOR
- LOVE V HATE

YOU COULD PROBABLY NAME SOME EXAMPLES ALREADY!

HOW DO WE 'READ' A TEXT?

Stuart Hall (1973) suggested that there were three main perspectives involved in the way in which an audience responds to a media product. This involves how the audience is positioned by the product and influences their response to it.

Preferred reading

This is where the audience responds to the product exactly as the producer intended. The Times will hope that many of their stories will reflect the political and ideological position of the readers.

Negotiated reading

This is where the audience accepts parts of the product and not others. In our modern media-aware world this is increasingly an issue in all newspapers from all but the most 'loyal' readers.

Oppositional or resistant readings

This can happen in newspapers as some members of the audience will consume the news from The Times even though they may disagree with it's political and ideological position.

FILM STUDIES TERM 2 - INTRODUCTION TO NARRATIVE.

TERM	DEFINITION
LINEAR NARRATIVE	Is a story that takes place in a sequential manner. Generally, starts with the beginning, moves to the middle and concludes everything at the end (with all loose ends tied up nicely).
NON-LINEAR NARRATIVE	Where events are portrayed out of chronological order or the logical order presented in a story. The pattern of events jumps around. Also known as disjointed narrative or disrupted narrative. Flashbacks a common theme.
OPEN NARRATIVE	Has no sense of ending and they can go on forever (eg a soap opera such as Eastenders of Hollyoaks. Have lots of characters
CLOSED NARRATIVE	Where a story is when story is fully told and completed by the end of the film. Generally consists of clear beginning, middle and end.
MULTI STRAND NARRATIVE	Where a story is told from the points of view of several different characters.
DENOUEMENT	The final part of a play, film or narrative in which the strands of the plot are drawn together and everything is explained or resolved. Example would be at the end of every 'Death in Paradise' episode when all suspects are gathered together, the murderer is exposed and how they committed the crime is explained.
ENIGMA CODES	Not the WW2 film. This is simply the idea that a film text (does not have to be a film) portrays a mystery to draw the audience in and keeps them interested.
NARRATIVE FUNCTION	The importance of a particular type of character to the ways the story is told and understood (we can make predictions once we have identified their character type)

NARRATIVE THEORY

TODOROV'S NARRATIVE STAGES

- **Equilibrium:** everything in the film world is normal (not necessarily good, but it is normal).
- **Disruption:** something happens (usually caused by the film's main antagonist) to disrupt normal life.
- **Recognition of disruption:** the protagonist/s realise that something is wrong in their world or discover the disruption.
- **Attempt to solve:** the main protagonist goes on a journey to solve the disruption.
- **New equilibrium:** the disruption is solved and a new normality occurs (things can never the be same as they were before the disruption, but a new 'normal life' is created).

CHARACTER THEORY

Propp's Character Theory http://foxhugh.com/literary-elements/character-theories-and-types/
Vladimir Propp developed a character theory for studying media texts and productions, which indicates that there were 7 broad character types in the 100 tales he analysed, which could be applied to other media.
1) The (magical) helper (helps the hero in the quest)
2) The dispatcher (character who makes the lack known and sends the hero off)
3) The donor (prepares the hero or gives the hero some magical object)
4) The false hero (perceived as good character in beginning but emerges as evil)
5) The hero [AKA victim/seeker/paladin/winner, reacts to the donor, weds the princess
6) The princess (person the hero marries, often sought for during the narrative)
7) The villain (struggles against the hero)

Welcome to the GCSE Music Journey

AOS1 Musical Forms and Devices

Topic 1 – The Development of Music

The Baroque Era: 1600-1750

Main composers: Bach, Handel, Vivaldi, Purcell

Main features of the music:

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

The Classical Era: 1750-1810

Main composers: Mozart, Beethoven, Haydn

Main features of the music:

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

The Romantic Era: 1810-1910

Main composers: Chopin, Liszt, Wagner, Tchaikovsky

Main features of the music:

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

Topic 2 – Musical Form and Structure

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

Binary from – A B

Ternary form – A B A

Rondo form – A B A C A

Minuet and Trio – Minuet Trio Minuet

Variation from – Theme Variation 1, 2, 3 etc

Strophic form – A A A A

Other key terms

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

Topic 3 – Devices

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

MUSIC GCSE

Essential Listening

MUSIC GCSE

AOS1 Musical Forms and Devices

BADINERIE

Knowledge Organiser

SONORITY

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

STRUCTURE

BINARY FORM

A → B

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

7th movement of orchestral suite No. 2 by **J.S BACH**

Composed in 1738-1739

TEXTURE

Homophonic

melody and accompaniment

DYNAMICS

Mostly forte, including terraced dynamics *f*

TEMPO

Allegro

RHYTHM & METRE

2/4

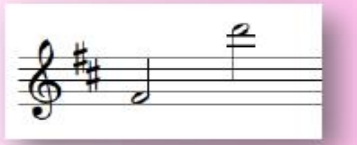
Anacrusis

Ostinato rhythms

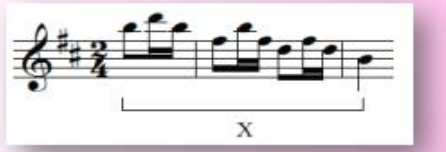
mainly Quavers / semiquavers

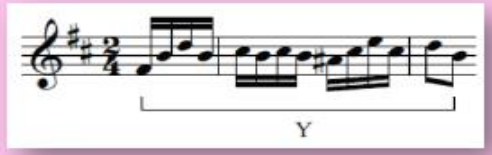
MELODY

Flute range (2 octaves pitch range):



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





HARMONY & TONALITY

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

AOS2 Music for Ensembles

Topic 1 – Timbre, Sonority and Texture

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

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

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

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

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

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

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

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

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

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

Topic 2 – Musical Ensembles

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

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

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

Topic 3 – Chamber Music

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

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

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

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

Topic 4 – Musical Theatre

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

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

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

Topic 5 – Jazz and Blues

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

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

MUSIC GCSE

Essential Viewing

AOS2 Music For Ensemble

MUSIC GCSE

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)

Countermelody – 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 5^{th}

Blues notes – flattened 3rds, 5^{th}, 7^{th} notes

Riffs – short repeated musical pattern

Duet – 2 performers

Trio – 3 performers

Quartet – 4 erformers

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

MUSICAL THEATRE

jazz

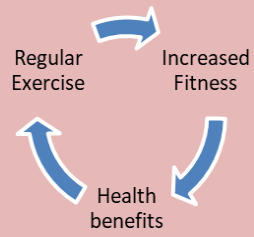
3.1 Health and Fitness

3.2 Components of Fitness

Health and fitness:
Fitness definition: 'The ability to meet the demands of the environment'
Health: 'A state of complete emotional, physical and social wellbeing ant not merely the absence of disease or infirmity'

AQA GCSE PE Paper 1 Chapter 3: Physical Training

The relationship between health and fitness:



Exercise improves fitness, an increase in fitness will improve performance
Exercise improves all aspects of health (physical, social, emotional)
If you are not healthy enough to take part in regular exercise your fitness will deteriorate causing your performance to drop. Health benefits will not be gained

Cardiovascular fitness	Muscular Endurance	Flexibility	Reaction Time	Power	Speed	Agility	Balance	Coordination	Strength
'The ability of the heart and lungs to supply oxygen to the working muscles'	'The ability of a muscle group to undergo repeated contractions, avoiding fatigue'	'The range of movement possible at a joint'	'The time taken to respond to a stimulus'	'Is the ability to do strength performances quickly' Power = Strength x Speed	'The amount of time it takes to perform a particular action or cover a particular distance'	'Is the ability to change position of the body quickly while maintaining control of the movement'	'Is the ability to retain the body's centre of mass above the base of support' static or dynamic	'Is the ability to use two or more body parts together smoothly and efficiently'	'The ability to overcome a resistance. it requires a force to be applied to a muscle or muscle group'
Explanation	Explanation	Explanation	Explanation	Explanation	Explanation	Explanation	Explanation	Explanation	Explanation
They need good cardiovascular fitness to be able to maintain a high standard of performance throughout the race/match.	They need a prolonged additional oxygen delivery to the working muscles to repeat muscle contractions over a long period of time without tiring	Performers need good flexibility to be able to get into position without getting injured and to perform complex movements	Performers need to react to a stimulus. A stimulus can include: a ball, whistle, starters gun, or an opponent	Performers need power to improve performance. Speed and strength are needed in sports where you throw jump kick and sprint	Performers need speed to get from one position to another. This may be leg speed to run or arm speed when throwing or hitting	Performers need agility to change direction quickly. This can be used to evade opponents or move around the court or pitch quickly	Performers need balance so they don't fall over. E.g. in gymnastics when performing a balance (static) or travelling across the beam (dynamic)	Performs need coordination when they are using two body parts at the same time. It can be used when aiming, or striking/hitting a ball	Performers need Strength to support weight (static) lifting a weight (maximal) punch (dynamic) throw (explosive)
Sports	Sports	Sports	Sports	Sports	Sports	Sports	Sports	Sports	Sports
Games players Long distance runners/rowers	Cyclist (legs) Boxing (punching) Swimmer (arms/legs)	Gymnasts Goal keepers Divers	Sprinters Badminton players Rugby players	Shot put Football (kicking) High jump	Sprinting Badminton Javelin thrower	Rugby side-step Tennis Badminton	Gymnastics Skiing Hammer throw	Tennis Archery Football	Weight lifting Rugby Gymnastics
									
Fitness Test	Fitness Test	Fitness Test	Fitness Test	Fitness Test	Fitness Test	Fitness Test	Fitness Test	Fitness Test	Fitness Test
Multi stage fitness test	Sit-up bleep test	Sit and reach	Ruler drop test	Vertical jump	30m sprint	Illinois agility run	Stork balance test	Wall toss	Grip dynamometer 1 rep max test

3.4-3.14 Fitness Tests

Agility Fitness Test

Fitness Test	Test Procedure
Illinois run	• 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

Used by performers who change direction quickly such games players

Coordination Fitness Test

Fitness Test	Test Procedure
Wall toss test	• 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 badminton and cricket players

Power Fitness Test

Fitness Test	Test Procedure
Vertical jump	• 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

Used by sprinters, rugby players and long jumpers

Maximal Strength Fitness Test

Fitness Test	Test Procedure
One rep Max	• Warm up • Lift the maximum weight you can in one attempt • Record result and compare to a rating chart

Used by performers such as power lifters, rugby players and boxers

Balance Fitness Test

Fitness Test	Test Procedure
Stork test	• 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

Used by gymnasts and games players

Flexibility Fitness Test

Fitness Test	Test Procedure
Sit and reach test	• 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 performers such as gymnasts and divers

Reaction Time Fitness Test

Fitness Test	Test Procedure
Ruler Drop	• 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

Used by basketball, rugby and badminton players

Strength Fitness Test

Fitness Test	Test Procedure
Hand grip dynamometer	• 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 performers such as climbers (to lift body weight)

Cardiovascular endurance test

Fitness Test	Test Procedure
Multi stage fitness test	• 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

Used by badminton and cricket players

Muscular endurance Fitness Test

Fitness Test	Test Procedure
Sit-up bleep test	• 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

Used by tennis and football players

Speed Fitness Tests

Fitness Test	Test Procedure
30m sprint	• Measure and mark out 30 metres in a straight line • Place one cone at the start and one at the end • On 'Go' run as fast as you can • Record result and compare to a rating chart

Used by 100k sprinters and rugby players

Qualitative or quantitative data:
When collecting pieces of data for fitness tests they are usually quantitative meaning.
The measurements can be quantified as numbers such: Time (seconds) Distance (meters) Levels or numbers

Data can be collected qualitative meaning the measurements are based on quality rather than quantity, such as a number out of 10 for a routine. They are opinions not facts.

3.3 Fitness Testing

Reasons for fitness testing:

Before a training programme:

- To identify strengths and areas for improvement
- Identify training requirements
- To show a starting level of fitness
- To motivate and provide goals

During and after a training programme:

- To monitor improvement
- To provide variety to a training programme
- Compare results against norms of the group
- To identify whether training has been successful

Limitation of fitness testing:

- Tests are often general and not sport specific
- The movement required in the test is not the same as in the actual activity
- Tests do not have competitive conditions required in sports
- Some tests do not use direct measuring and are an estimate or are submaximal
- Some tests need motivation, because they are exhausting to complete
- Some tests questionable reliability

3.15 Principles of Training

Specificity: Training must match the requirements of the activity so that the right muscles and body systems are adapted.
Progression Overload: Gradually increasing the amount of working training so that fitness gains occur, but without the risk of injury.
Reversibility: Just as fitness improves with training it can decline if you stop training.
Tedium: This is the boredom that can occur when you train the same way every time. A variety of training methods are needed to keep motivated to carry on without giving up.

Applying overload using the F.I.T.T principle:
Frequency: How often you train (should be gradually increased) Week 1 = train once per week - Week 2 = train twice per week
Intensity: How hard you train (should be gradually increased)
Week 1 = 1 set of 5 repetitions of a 5 kg weight - Week 2 = 2 sets of 5 repetitions of a 5 kg weight
Time: How long you train (should be gradually increased) Week 1 = 20-minute session - Week 2 = 25-minute session
Type: Relates to specificity. training should closely match the activity. E.g. A marathon runner should use continuous training

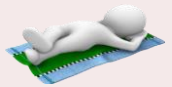
Training intensities:
Max Heart rate = 220 - age
Aerobic target zone: 60% - 80% of MHR
Anaerobic training zone: 80% - 90% of MHR

Strength/Power: high weight/low reps above 70% of 1 rep max (3 sets of 4/8 reps)
Muscular endurance: low weight/high res below 70% of 1 rep max (3 sets of 12-15 reps)

3.17 Types of Training

Continuous Training	Fartlek Training	Circuit Training	Interval Training	Plyometric Training	Weight Training	Static Stretching
Is sub-maximal aerobic exercise that has no breaks or rest. It lasts for a minimum of 20 minutes and can improve cardiovascular & muscular endurance	Form of continuous training that varies in pace and terrain. It is both aerobic & anaerobic and can improve cardiovascular & muscular endurance	Contains stations organised in a circuit, they can be skill or fitness based, aerobic or anaerobic Intensity is measure by circuits, time or repetitions. Can be adapted to improve all types of fitness	High intense exercise followed by periods of rest to recover Usually anaerobic can be used in a variety of locations Improves speed but can improve strength and cardiovascular	Maximal intensity involving jumping/bounding. It involves an eccentric contraction (muscle lengthens) immediately followed by a concentric (muscle shortens) Improves power (speed & strength)	Form of interval training which involves reps and sets. The weight provides the resistance. Can be done using free or fixed weights. It improves strength, power and muscular endurance	Stretch as far as you can. The stretch is held (isometric) for up to 30 seconds. It Can be done on your own, with apparatus or with a partner. Improves flexibility
Advantages	Advantages	Advantages	Advantages	Advantages	Advantages	Advantages
No equipment or facilities Has many health benefits (CHD) Can be done on your own	No equipment or facilities Change of pace can be more interesting Can be done on your own	Variety of stations generates interest Can be skill or fitness Can easily be adapted	Can be used to improve health and fitness (aerobic & anaerobic) No equipment needed	Develops power quickly No equipment	Can target specific areas of the body	Develops flexibility
Disadvantages	Disadvantages	Disadvantages	Disadvantages	Disadvantages	Disadvantages	Disadvantages
Boring No change of pace Can cause impact injuries	High intensity can be avoided A safe route may be hard to find	Equipment can be costly Can be time consuming to set up	Can be repetitive and boring Need to plan and keep track of sets	Can cause injury due to high intensity	Can cause injury with poor technique a spotter needed with free weights Can be expensive	Not as effective as other stretchng metrhods and can take alog time to go through all muscle groups
Sporting Example	Sporting Example	Sporting Example	Sporting Example	Sporting Example	Sporting Example	Sporting Example
Marathon running Cycling Swimming	Fotball Rugby Netball	Can be adapted to suit all sports	Usually for speed It can be adapted to other sports	Basketball Long jump Hurdles	Weight lifting, tennis (muscular endurance)	Most sports and activities benefit from static stretching

3.18 Preventing Injury

Complete a warm up	A warm up should be completed to: increase the temperature in the muscles, tendons and ligaments. This increases the elasticity which will help prevent muscle pulls and strains	
Avoid overstretching	Stretching should be completed carefully without overstretching or bouncing as this can result in a muscle strain	
Avoid overtraining	If you train too hard adaptations will not take place e.g. lifting too heavy weight can cause an injury such as a strain	
Take adequate rest	Training programmes should include rest days. Make sure you have enough resting between sessions to allow for recovery	
Use taping or bracing	When necessary taping and bracing can be used to provide additional support to joints and muscles. E.g. an ankle support can reduce the chance of a twisted ankle (sprain)	
Remain hydrated	Maintain an appropriate level of hydration by drinking water. If you don't maintain your hydration levels you can become dehydrated, this can lead to dizziness and nausea	
Wear appropriate clothing and footwear	This may included non-slip footwear such as boots to prevent ankle injures Gum shield in rugby to protect the teeth in boxing and rugby Shin pads to reduce impact on the shins in football and hockey.	
Use correct technique	When completing any activity, using correct technique will lead to better results. Help avoid injury by using the correct technique when lifting weight or throwing the javelin	

3.17 High Altitude Training

<u>High Altitude training as a form of aerobic training</u>:

- **There are fewer air molecules at altitude. This means there is less oxygen available to take into our body. This means there is less oxygen available to get to the working muscles. The body's oxygen carrying capacity is reduced at high altitude.**
- **When an athlete first tries altitude training their performance will be worse. However, after several weeks of training at high altitude their body will adapt:**
- **Increasing red blood cells**
- **Increasing haemoglobin**
- **When they return to sea level, they will have an advantage because their oxygen carrying capacity will have increased**

<u>Benefits of high-altitude training</u>:

- Increased red blood cell production
- Increased oxygen carrying capacity
- A greater amount of oxygen being transported to the working muscles once athletes return to sea level
- These benefits are particularly helpful to endurance athletes who rely on aerobic energy production for example marathon runners and triathletes

<u>Limitations of high-altitude training</u>:

- Adaptations take time
- Expensive to live away from home
- Timing of training for competition needs careful planning
- Altitude sickness (nausea caused by training at altitude)
- Limited to aerobic activities (no effect on anaerobic events)
- Can make it harder to train at high intensities need for anaerobic activities

3.19 Training Seasons

Pre-season (preparation phase):

This is the period up to competition.

Training includes:

- Develop techniques specific to the sport
- General fitness training such as continuous, fartlek or interval training sessions to increase aerobic fitness
- Weight training to build up strength and muscular endurance

Benefits:

- Fitness and skill lost during post season can be regained
- Skills and techniques can be improved. This means matches at the start of the season are more successful

Competitive-season (peak):

This is the playing season
Training includes:
Taking part in matches every week
Maintenance of fitness related to activity
Limited training, as it may cause fatigue which would decrease performance
Concentration on skills, set plays and tactics to improve performance
Benefits:
Fitness levels and quality of performance can be maintained throughout the season

Post-season (transition phase):

This is the period of rest, active recovery and light aerobic work after the competitive season

Training includes:

Rest to recover from the competitive season
Light aerobic exercise, to maintain a level of general fitness

Benefits:

Athletes are fully rested, ready for pre-season
Not too much fitness is lost

July
Pre-season
(Preparation phase)

June
Post-season
(Transition phase)

August – May
Competitive season
(peak)

3.20 Warming up and Cooling down

Warm-up

A warm-up has three phases:

Phase 1 Pulse raiser
To raise the heart rate and speed up oxygen delivery to the working muscles. E.g. jogging a lap of the pitch

Phase 2 Stretching
Stretching the muscles and soft tissues you are about to use increases their elasticity and range of movement

Phase 3 Drills
These are more intense practices relating to the main session, such as dribbling if you are playing basketball

Benefits of a warm-up	To physical and mentally prepare for exercise	To increase oxygen delivery to the working muscles	Increase temperature of muscles, tendons, and ligament. Reducing the chance of injury	Increase the range of movement at a joint which will aid performance

Cool-down

A cool-down has two phases:

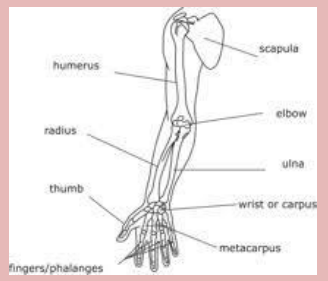
Phase 1 Light exercise
e.g. slow jogging at a much lower intensity you have been working

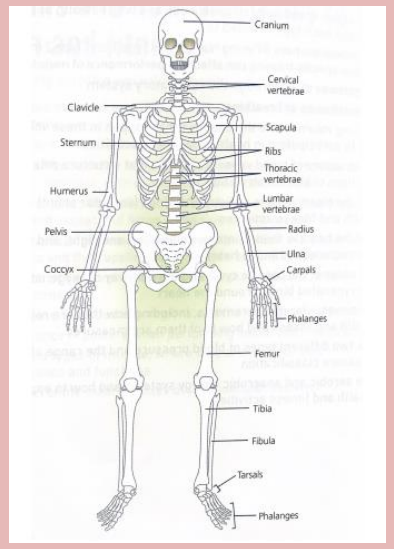
Phase 2 Stretching
Stretch the muscles you have used in the main activity

Why we cool down	The removal of lactic acid and CO_2	Prevents muscle soreness DOMS	Bring heart and breathing rate slowly back to resting	Helps avoid dizziness due to blood pooling	Improves flexibility

1.1 Skeletal System

AQA GCSE PE
Paper 1
Chapter 1:
Applied Anatomy and Physiology

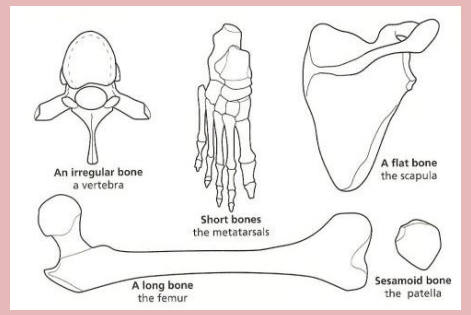




Joint	Bones @ the joint	Type of joint	Movement
Shoulder	Scapula, Clavicle, Humerus	Ball and Socket	Flexion, Extension, Abduction, Adduction, Rotation, Circumduction
Elbow	Humerus, Radius, Ulna	Hinge	Flexion, Extension
Hip	Pelvis, Femur	Ball and Socket	Flexion, Extension, Abduction, Adduction, Rotation, Circumduction
Knee	Femur, Patella, Tibia, Fibula	Hinge	Flexion, Extension
Ankle	Tibia, Fibula, Talus	Hinge	Dorsiflexion, Plantar flexion

Functions:
- ***Support***: for muscles and vital organs
- ***Shape and Structure***: maintains the basic form of the body
- ***Protection of the vital organs***: cranium protects the bone
- ***Movement***: occurs at joints when muscles contract and pull on bones
- ***Mineral storage***: essential for major body functions.
- ***Blood cell production***: takes place in the bone marrow (red blood cells, white blood cells, platelets)

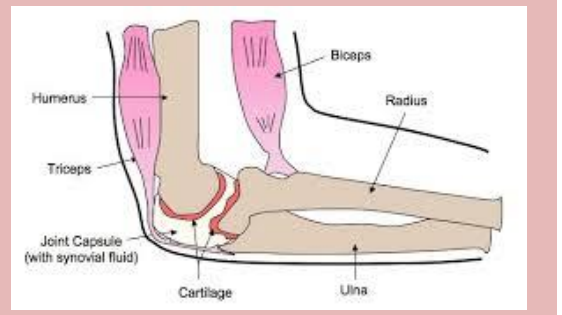
Type of Bones:
Short: fine, controlled movements
Long: gross, large movements
Flat :quite large and usually protect vital organs
Irregular: Specifically shaped to protect

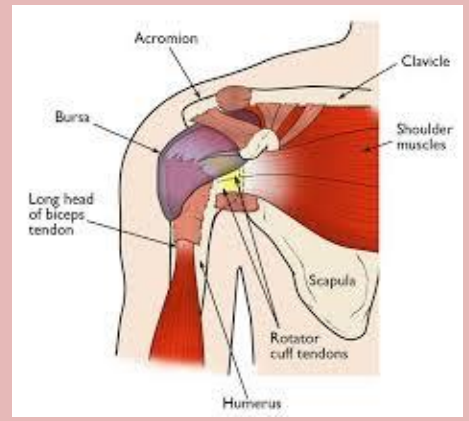


Types of freely moveable joints
Ball and socket joints: can move away from the body, back towards the body and can also rotate

Hinge joints: can only move in one direction, towards and away from each other

Features of a synovial joint:
- ***Tendon***: very strong, elastic cords that join muscle to bone
- ***Bursae***: a sac filled with liquid, floating inside the joint, to reduce friction between tendon and bone.
- ***Cartilage***: a tough but flexible tissue that acts as a buffer between bones rubbing together and causing friction.
- ***Joint capsule***: tissue that stops synovial fluid from escaping and encloses, supports and holds the bones together.
- ***Synovial membrane***: the lining inside the joint capsules that secretes synovial fluid
- ***Synovial fluid***: a clear and slippery liquid that lubricates the joint and stops the bones rubbing together
- ***Ligaments***: bands of elastic fibre that attach bone to bone, keeping the joints stable by restricting movement.

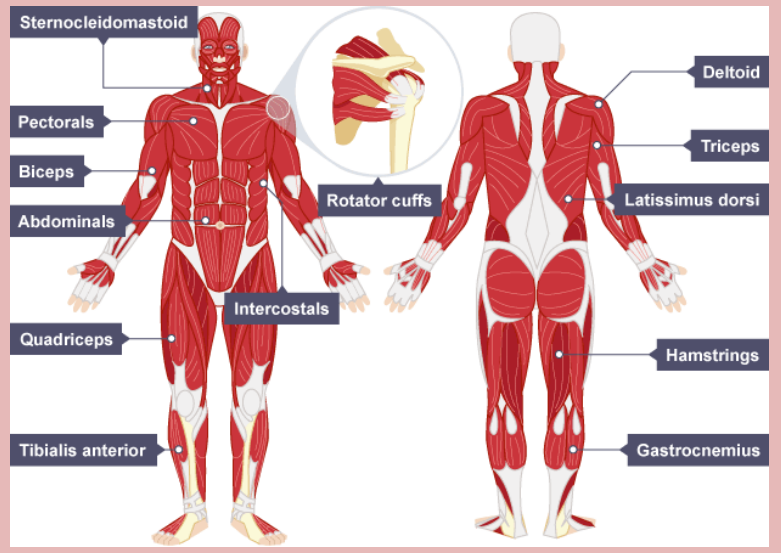




1.1 Muscular System

Muscle	Movement	Sporting example
Latissimus dorsi	Extension, adduction or rotation at the shoulder	Butterfly stroke
Deltoid	Flexion, extension, abduction or overarm rotation at the shoulder	Front crawl
Rotator cuff	Rotation and abduction at the shoulder	Bowling in cricket
Pectorals	Adduction and horizontal flexion at the shoulder	Forehand drive in tennis
Biceps	Flexion at the elbow	Upward phase of a bicep curl
Triceps	Extension at the elbow	During a jump shot in basketball
Abdominals	Flexion at the waist	During a sit up
Hip flexors	Flexion of the leg at the hip	Lifting the knee when sprinting
Gluteals	Extension, rotation and abduction of the leg at the hip	Pushing the body forward when running
Hamstrings	Flexion at the knee	Bringing the foot back before kicking a football
Quadriceps	Extension at the knee	When performing a drop kick in rugby
Gastrocnemius	Plantar flexion at the ankle	Standing on your toes in ballet pointe work
Tibialis anterior	Dorsiflexion at the ankle	Bringing the toes up towards the shin when extending the legs in the long jump

Joint	Muscles
Shoulder	Deltoid, trapezius, pectorals, latissimus dorsi, biceps, triceps, rotator cuff
Elbow	Biceps, triceps
Hip	Gluteals, hip flexors
Knee	Quadriceps, Hamstrings
Ankle	Gastrocnemius, Tibialis anterior



Muscle contraction

Muscles transfer force to bones through tendons. They move our bones and associated body parts by pulling on them – this process is called muscle contraction.

Muscle Contractions:

Isotonic muscle contraction – results in movement

- Concentric muscle contraction – muscle shortens
- Eccentric muscle contraction – muscle lengthens

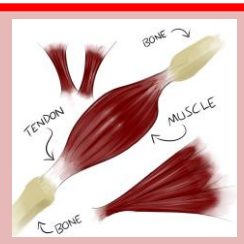
Isometric muscle contraction – muscle contracts but no visible movement

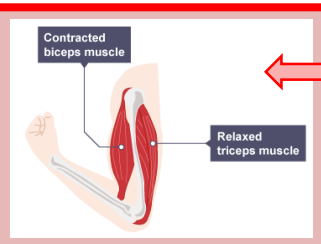
Antagonistic muscle action:

Muscles work in 'antagonistic muscle pairs'. One muscle of the pair contracts to move the body part, the other muscle in the pair then contracts to return the body part back to the original position. Muscles that work like this are called antagonistic pairs.

In an antagonistic muscle pair as one muscle contracts the other muscle relaxes or lengthens. The muscle that is contracting is called the agonist and the muscle that is relaxing or lengthening is called the antagonist.

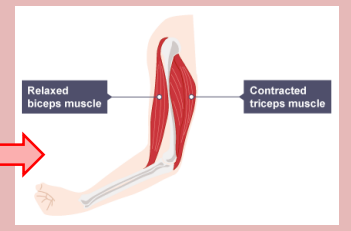
When you perform a bicep curl, the biceps will be the agonist as it contracts to produce the movement, while the triceps will be the antagonist as it relaxes to allow the movement to occur.





The biceps contracts and raises the forearm as the triceps relaxes.

The triceps contracts and lowers the forearm as the biceps relaxes.



NCFE Technical Award in Health and Fitness

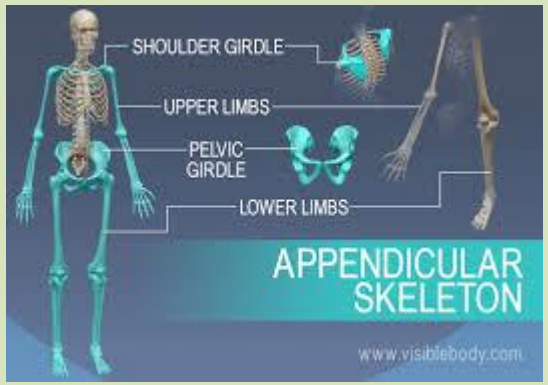
Unit 1: Introduction to body systems and principles of training in health and fitness

LO1: Understand the structure and function of body systems and how they apply to health and fitness

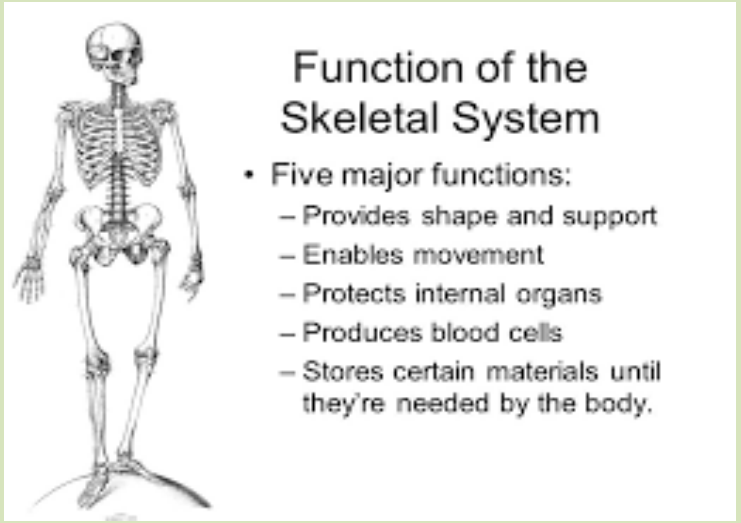
1.1 Skeletal System

1.1.1 Structure the skeleton

Axial Skeleton	Appendicular Skeleton
Cranium Sternum Ribs Vertebrae	Clavicle Scapula Humerus Radius Ulna Carpals Tarsals Pelvis Femur Tibia Fibula Phalanges



1.1.2 Functions of the skeletal system

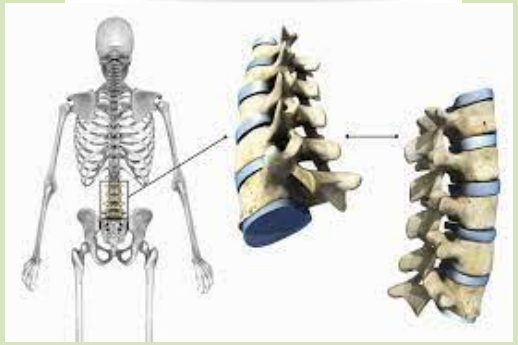


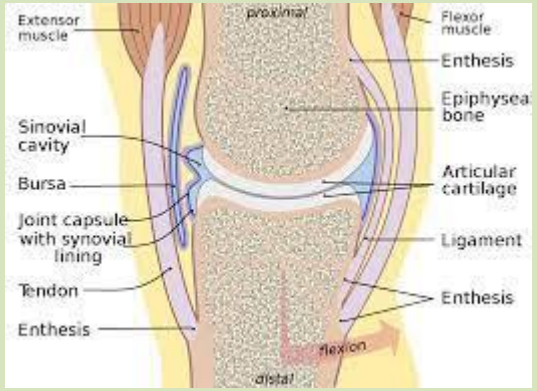
1.1.3 Types of bones

Type of bones	Description
Long Bones	These bones are longer than they are wide
Short Bones	Theses bones are as wide as they are long
Flat Bones	These bones provide a broad flat surface
Irregular Bones	These bones all have a specific shape and can not be classified as any of the others
Sesamoid Bones	These bones are embedded in tendon or muscle

1.1.4 Types of joint

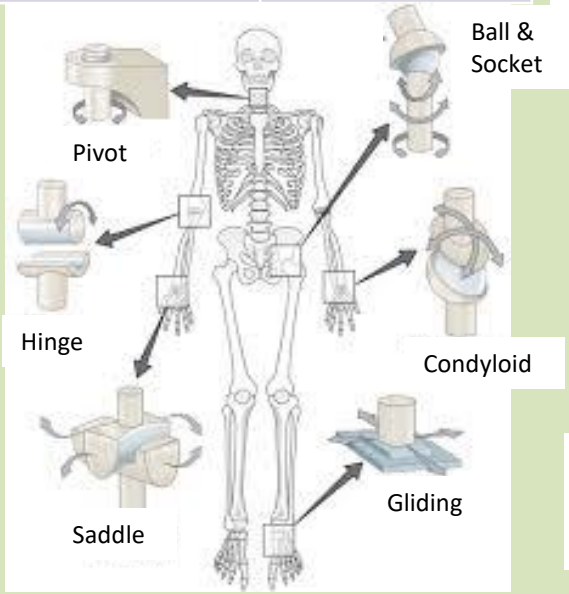
Joints:
A joint is where two or more bones meet.





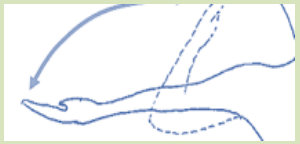
Synovial Joints:
A synovial joint joins together with a cavity that encloses the ends of the bones. The cavity is filled with fluid that allows the joints to move freely.

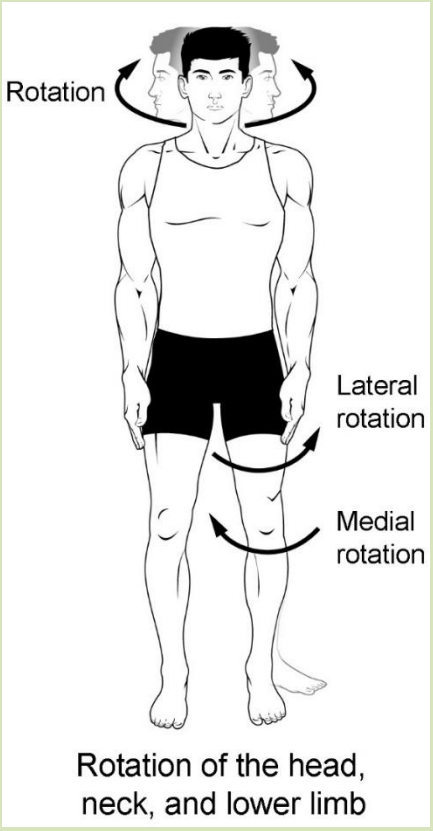
Synovial Joints	
Joint	**Location**
Ball and socket	Hip, Shoulder
Hinge	Knee, Elbow
Gliding	Carpals
Pivot	Neck
Saddle	Thumb
Condyloid	Wrist



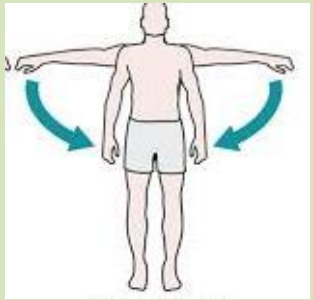
1.1.5 Joint actions

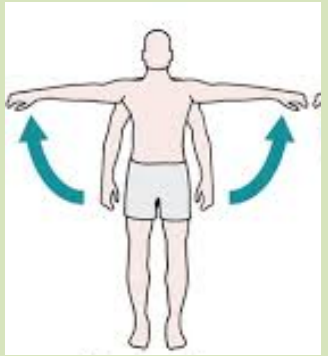
Flexion	Extension	Rotation	Adduction	Abduction
Movement where the angle between two bones decreases	Movement where the angle between two bones increases.	Turning/ twisting movement around an axis.	Movement of part of the body towards the midline of the body	Movement of part of the body away from the midline of the body.





Rotation of the head, neck, and lower limb

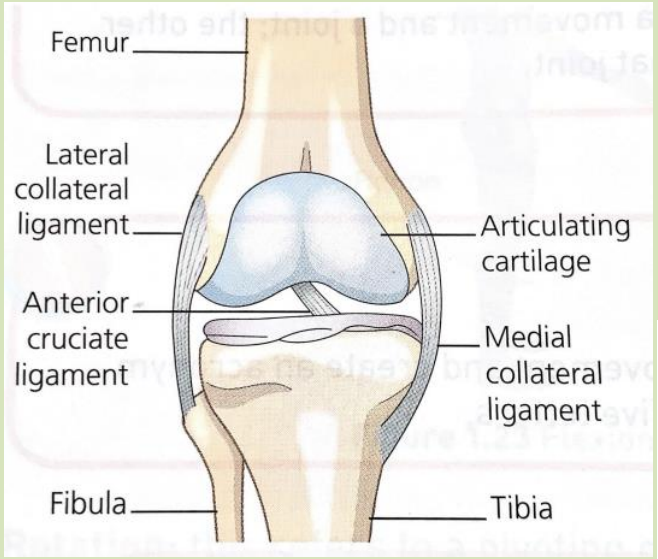


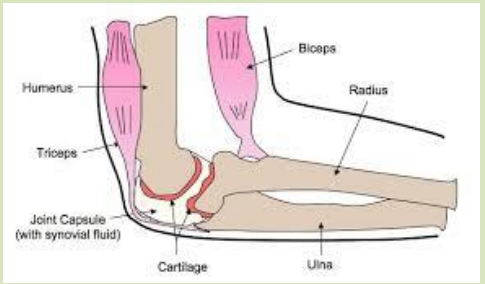


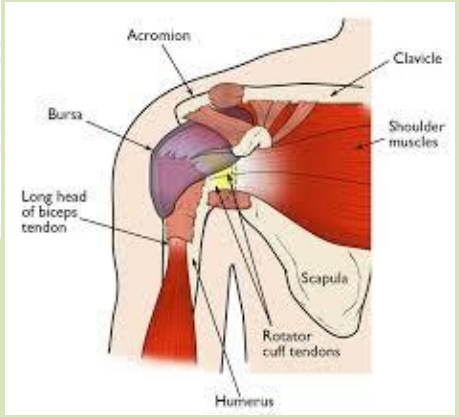
1.1.6 Structure of a synovial joint

Features of a synovial joint:

- ***Tendon***: very strong, elastic cords that join muscle to bone
- ***Bursae***: a sac filled with liquid, floating inside the joint, to reduce friction between tendon and bone.
- ***Cartilage***: a tough but flexible tissue that acts as a buffer between bones rubbing together and causing friction.
- ***Joint capsule***: tissue that stops synovial fluid from escaping and encloses, supports and holds the bones together.
- ***Synovial membrane***: the lining inside the joint capsules that secretes synovial fluid
- ***Synovial fluid***: a clear and slippery liquid that lubricates the joint and stops the bones rubbing together
- ***Ligaments***: bands of elastic fibre that attach bone to bone, keeping the joints stable by restricting movement.



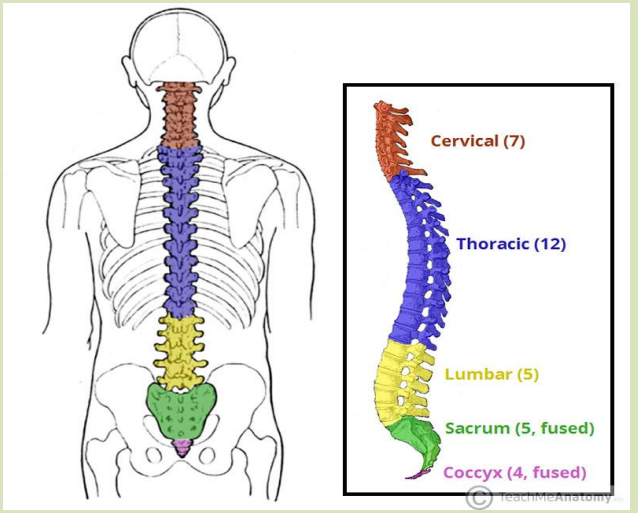


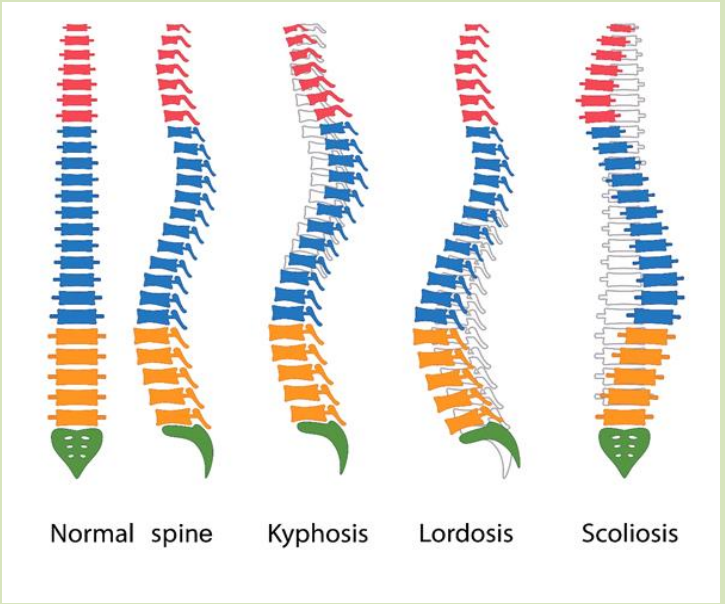


1.1.7 Structure of the spine and posture

Posture

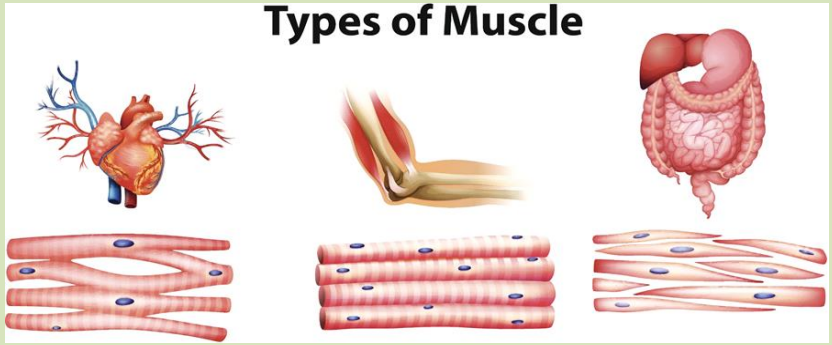
Posture is a term used to describe a position of the body or the body parts relative to one another.





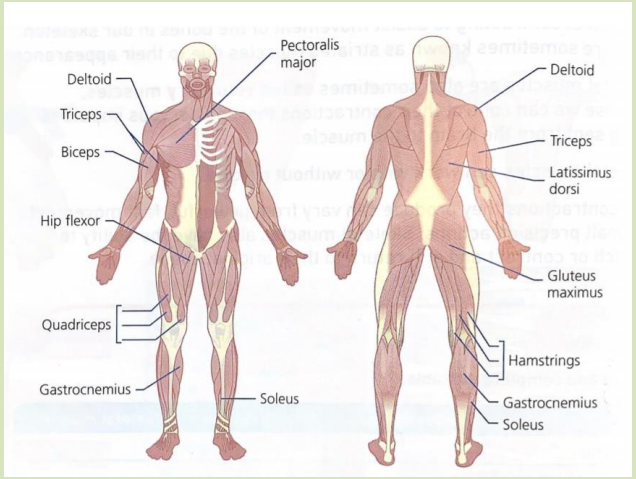
1.2 Muscular System

1.2.1 Types of muscle



Cardiac Muscle	Skeletal Muscle	Smooth Muscle
Found in the heart.	Attached to bones to assist in the movement of the skeleton	Found in the walls of many organs – intestine, lungs
Involuntary as not under our conscious control.	Voluntary muscles – we control their contractions through nerve impulses.	Involuntary muscle
Resistant to fatigue but is dependent on a good supply of oxygen.	Have the ability to stretch or contract and still return to original shape.	Unstriated in appearance
Cardiac muscle contracts when our heart beats.	Contractions produced can be very powerful, fast movements to small precision actions.	Slow, rhythmical contractions in all directions, used to control internal organs

1.2.2 Structure of the muscular system



1.2.4 Muscle fibre types

Type 1 slow twitch muscle fibres	Type 2 fast-twitch muscle fibres
• Red in colour – rich oxygen supply • Resistant to fatigue • Capable of producing repeated slow contractions	• White in colour – due to low oxygen content • Suffer from rapid fatigue • Capable of producing fast contracts and bursts of power
• Muscles involved in posture – back, neck	• Muscles of the arms and legs

1.2.3 Muscle movement and contraction

Muscle contraction

Muscles transfer force to bones through tendons. They move our bones and associated body parts by pulling on them – this process is called muscle contraction.

Antagonistic muscle action:

Muscles work in 'antagonistic muscle pairs'. One muscle of the pair contracts to move the body part, the other muscle in the pair then contracts to return the body part back to the original position. Muscles that work like this are called antagonistic pairs.

In an antagonistic muscle pair as one muscle contracts the other muscle relaxes or lengthens. The muscle that is contracting is called the agonist and the muscle that is relaxing or lengthening is called the antagonist.

When you perform a bicep curl, the biceps will be the agonist as it contracts to produce the movement, while the triceps will be the antagonist as it relaxes to allow the movement to occur.

Muscle Contractions:

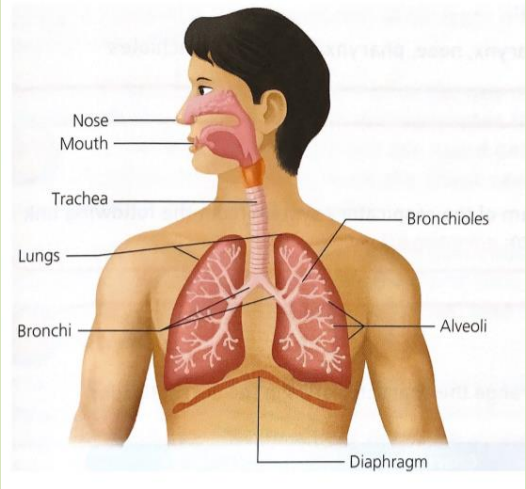
Isotonic muscle contraction – results in movement

- Concentric muscle contraction – muscle shortens
- Eccentric muscle contraction – muscle lengthens

Isometric muscle contraction – muscle contracts but no visible movement

1.3 Respiratory System

1.3.1 Structure of the respiratory system

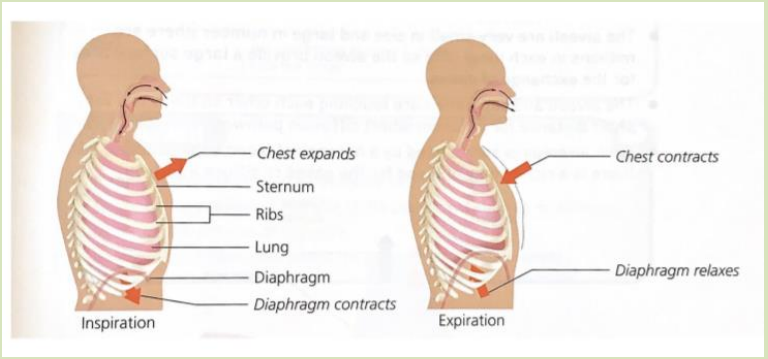


Structure	Characteristics
Nasal passage	Take air into each lung
Pharynx	Windpipe carrying air towards the lungs
Larynx	Two large bags containing air
Trachea	Chamber at the back of the throat
Lungs	Voice box
Bronchi	Air sacks
Bronchioles	Air enters the body through these
Alveoli	Tiny tubes

1.3.2 Functions of the respiratory system

Breathing in/ Inspiration:

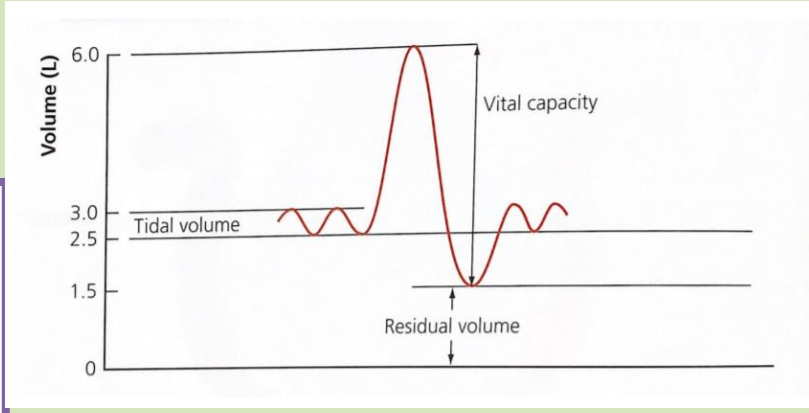
- The diaphragm contracts and flattens.
- The intercostal muscles contract which causes the rib cage to rise.
- Both these actions cause the chest cavity to increase in size / volume.
- This reduces the pressure in the chest cavity, due to this the air passes from the higher pressure outside of the lungs to the lower pressure inside the lungs.
- This causes the lungs to expand and fill the chest cavity



Breathing out/ Expiration:

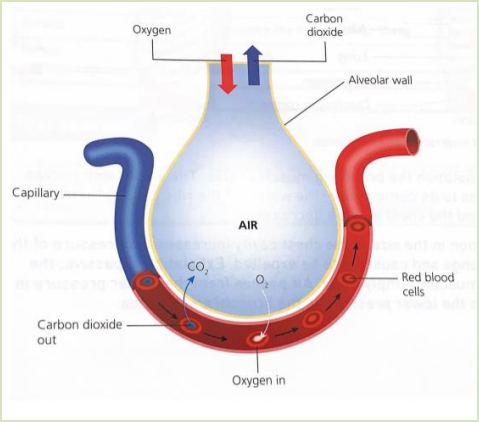
- The diaphragm relaxes and bulges up, returning to its original dome shape.
- The intercostal muscles also relax causing the ribs cage to lower.
- Both these actions cause the chest cavity to decrease in size / volume.
- The reduction in the size of the chest cavity increases the pressure of the air in the lungs and causes it to be expelled.
- The air passes from the high pressure in the lungs to the low pressure in the bronchi and trachea.

1.3.2 Lung volumes



Gaseous Exchange

- Takes place in the alveoli through diffusion
- Oxygen (high concentration) diffuses through the capillaries into the blood stream and sent to the heart.
- Carbon dioxide (high concentration) in the capillaries replaces oxygen (exchanged) in the alveoli so that it can be removed from the body.



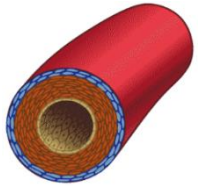
Key features of the alveoli that assist in Gaseous Exchange:

- Large surface area
- Moist thin walls(one cell thick)
- Short distance for diffusion
- Lots of capillaries
- Large blood supply
- Movement of gas from high concentration to low concentration

1.4 Cardiovascular System

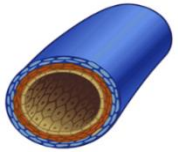
1.4.1 Structure and function of the cardiovascular system

Artery



- Thick muscular walls
- Thick elastic walls
- Small lumen (internal diameter)
- Carry blood at high pressure
- Cary blood away from the heart
- Usually carry oxygenated blood (except the pulmonary artery)

Vein

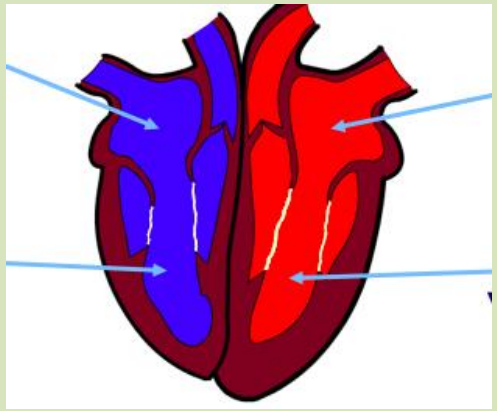


- Thin walls
- Large lumen (internal diameter)
- Carry blood at low pressure
- Contain valves
- Mainly carry deoxygenated blood (except the pulmonary vein)

Capillary

- Very thin walls (one cell thick)
- Small lumen (internal diameter)
- Link smaller arteries with small veins
- Allow gaseous exchange
- Carry blood at low pressure

1.4.2 Structure of the heart



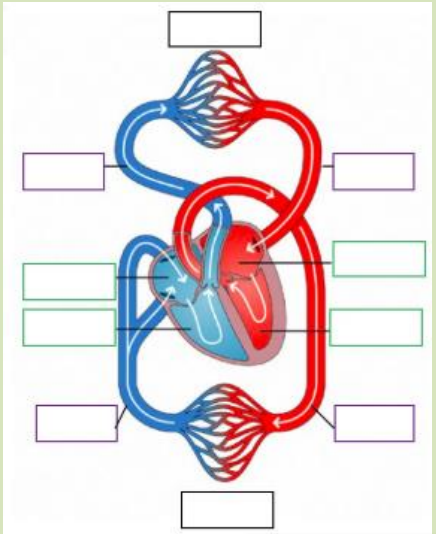
Vascular shunt

When we exercise blood is redistributed. The working muscles need more oxygen than other inactive areas of the body such as the stomach. Blood is diverted away from inactive areas to the working muscles.

Vasoconstriction means that the blood vessels constrict to make them smaller. Chemical changes signal the nervous system to constrict blood vessels to inactive areas.

Vasodilation means that the blood vessels dilate to make them bigger. Chemical changes signal the nervous system to dilate blood vessels that supply active areas.

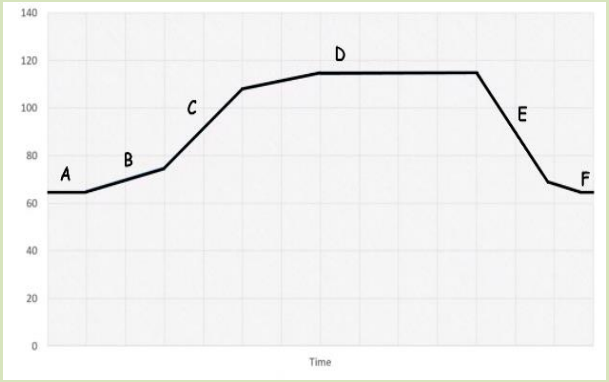
1.4.3 Cardiac cycle



Deoxygenated blood from the body	Oxygenated blood from the lungs
Vena cava	Pulmonary vein
Right atrium	Left atrium
Right ventricle	Left ventricle
Pulmonary artery to the lungs	Aorta to the body
Pick up oxygen and nutrients to become oxygenated	Drop off nutrients and pick up waste products
	Becomes deoxygenated

1.4.4 Cardiovascular measurements

Radial Pulse: Place your index finger and middle fingers together on the opposite wrist, about ½ inch on the inside of the joint, in line with index finger.
Carotid Pulse: To measure your heart rate at the neck, place your first two fingers on either side of the neck until you feel the beats.



A = Heart rate is at its lowest at rest
B = Immediately before exercise resting heartrate will increase. This is called an **anticipatory rise;** this is due to the release of the hormone adrenaline.
C = When you start to exercise the heart rate increases sharply. This is due to the demand of oxygen. **Cardiac output** increases
D = During continuous exercise heart rate levels because the heart rate is sustaining the amount of oxygen needed.
E = Immediately after exercise heart rate decreases sharply, this is because exercise has stopped and the demand for oxygen has reduced.
F = Heart rate slowly returns to its resting rate

1.4.5 Blood pressure

The blood that leaves the heart is under pressure in the arteries so that it can reach all parts of the body.

Blood Pressure is measured in millimetres of mercury (mmHg): Systolic/Diastolic
Normal range: **120/80–90/60mmHG**
High BP: **140/90mmHg**
Low Bp: **90/60mmHg**

Systolic Blood Pressure:
The higher blood-pressure measurement that occurs when the heart beats, pushing blood through the arteries.

Diastolic Blood Pressure:
The lower blood-pressure measurement that occurs when the heart rests between beats.

Cardiac Output = Stroke Volume x Heart Rate

Cardiac Output = amount of blood leaving the heart per minute
Stroke Volume = amount of blood ejected from the heart per beat
Heart Rate = the number of times the heart beats per minute

1.5 Energy Systems

Aerobic Exercise	Anaerobic Exercise
• Uses oxygen for energy production • Includes activities that are of a long duration • Includes activities that are of a moderate intensity • The heart and lungs can supply all the blood and oxygen to the working muscles to produce energy aerobically	• Does not use oxygen for energy production • Include activities that are of a short duration • Includes activities that are of a high intensity • The heart and lungs cannot supply blood and oxygen to muscles fast enough to use so energy is produced anaerobically
Sports and activities: Long distance cycling:  Marathon Running: 	Sports and activities: Shot putt:  Sprinting: 
Aerobic equation: Glucose + O_2 → CO_2 + H_2O + Heat + Energy • Glucose and oxygen combine to release energy aerobically • This process produces carbon dioxide, water and heat (and energy)	**Anaerobic equation:** Glucose → lactic Acid + Energy • Lactic acid is produced as a waste product when carbohydrates are broken down without oxygen during anaerobic respiration • This causes muscles to become tired and work less efficient

LO2: Understand the effects of health and fitness activities on the body

2.1.1 Short-term effects of health and fitness activities.

Short-term effect	Explanation
Breathing rate	As the body's muscle need more oxygen to make more energy, breathing rate increases.
Heart rate	Heart rate increases to force blood to get to the muscles quicker – carrying oxygen
Stroke volume	Stroke Volume is the amount of blood ejected from the heart ventricles per beat (contraction). This increases during exercise to pump more blood out.
Cardiac output	Cardiac output is the volume of blood ejected from the heart per minute (stroke volume x heart rate). As heart rate and stroke volume increase during exercise, so does cardiac output.
Blood pressure	During exercise it is important to increase blood flow to muscles to provide them with oxygen. As blood pressure increases, the heart forces blood out of the ventricles with more pressure.
Body temperature (sweating)	Up to 70% of the energy that powers muscles during exercise is lost as heat. This heat has to be lost by the body and blood is pushed closer to the skin to do this.
Hydration levels decrease	As the body starts to sweat, body fluid is lost and hydration levels decrease. This can cause dehydration, whereby the blood becomes thick (viscous) and decision making is negatively affected. Heart rate will also rise to keep the viscous blood flowing.
Muscle fatigue	As the muscles start to build up lactic acid, muscle function can be negatively affected and fatigue occurs.
Delayed onset of muscle soreness (DOMS	The delayed onset of muscle soreness (DOMS) tends to occur 24-48 hours after exercise. This is caused by small tears in the muscle fibres as a result of exercise/

2.1.2 Long-term effects of health and fitness activities.

Long-term cardiovascular/ aerobic light-intensity training

- Body shape may change (e.g. more muscle tone)
- Improvements in specific components of fitness (e.g. cardiovascular endurance)
- Improve muscular endurance
- Improved stamina (being able to withstand fatigue)
- Increase in the size of the heart (cardiac hypertrophy)
- Lower blood pressure (as exercise increases the size of your heart, more blood can be pumped out per beat)
- Lower resting heart Rate (bradycardia)
- Improve ability to use oxygen
- More red blood cells made

Weight training using light weights and high reps

- Body shape may change (e.g. more muscle tone)
- Improvements in specific components of fitness (e.g. Muscular endurance)
- Slight increase in the size of the heart (cardiac hypertrophy)
- Slightly lower resting heart Rate (bradycardia)

Weight training using heavy weights and low reps

- Body shape may change (e.g. more muscle bulk/ size - Hypertrophy)
- Improvements in specific components of fitness (e.g. Muscle strength/ power)

Ectomorph	Mesomorph	Endomorph
• Tall and thin • Narrow shoulders and hips	• Muscular appearance • Wide shoulders • Narrow hips	• Pear-shaped • Wide hips • Narrow shoulders
		

LO3: Understand health and fitness and the components of fitness

3.1.1 Health and Fitness

Health: 'a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity' (WHO 184)

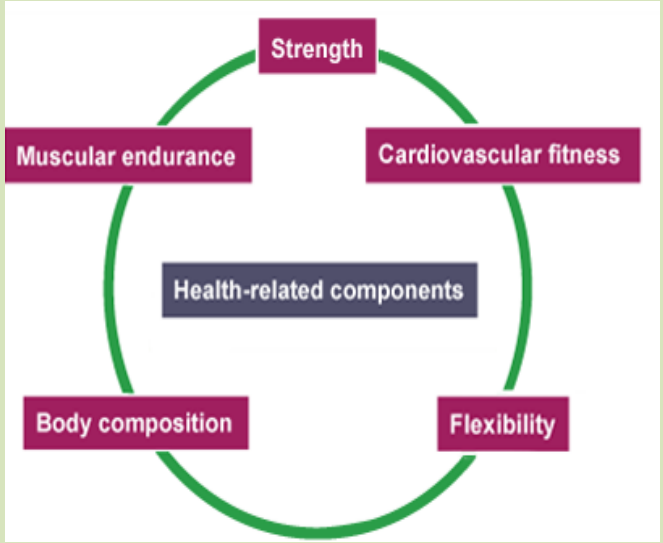
Fitness: the ability to cope with the daily demands without suffering undue fatigue.

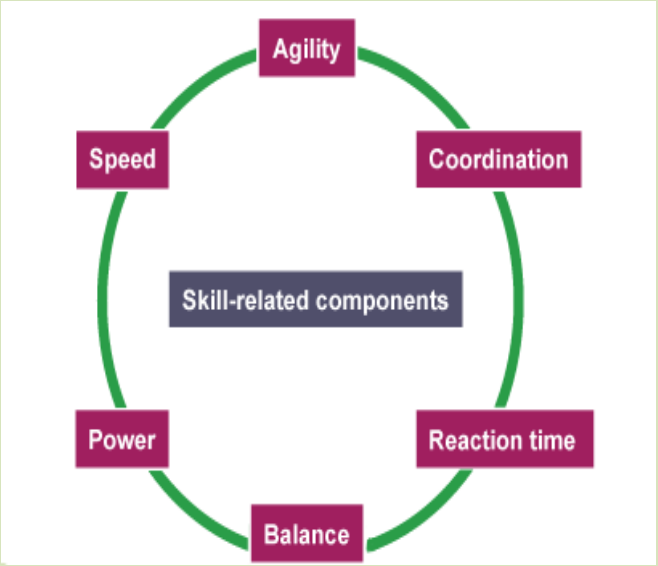
3.2.1 Health related fitness

Component	Definition
Body composition	The percentage of body weight which is fat, muscle and bone.
Cardiovascular endurance	The ability of the heart lungs and blood to transport oxygen
Flexibility	The range of motion around a joint (ROM)
Muscular endurance	The ability to use muscles repeatedly without tiring
Muscular strength	The amount of force a muscle can exert against a resistance

3.2.2 Health related fitness

Component	Definition
Agility	The ability to change the position of the body quickly and to control the movement of the whole body
Coordination	The ability to use 2 or more body parts together
Reaction Time	The time between the presentation of a stimulus and the onset of a movement
Balance	The ability to retain the body's centre of mass above the base of support
Speed	The rate as which an individual is able to perform a movement or cover a distance in a period of time
Power	The ability to do strength performances quickly. (strength x speed)





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LO4: Understand the principles of training

4.1.1 Principles of Training

Specificity	Training must match the requirements of the activity so that the right muscles and body systems are adapted.
Progression	Overload should gradually be increased as the body adapts and gets better, this helps the reduce the chances of injury.
Overload	Working harder than normal
Reversibility	If an individual stops or reduces their training level, then fitness and performance are likely to drop.
Tedium	This is the boredom that can occur when you train the same way every time. A variety of training methods are needed to keep motivated to carry on without giving up.

4.1.2 Principles of FITT

Applying overload using the F.I.T.T principle:

Frequency: How often you train (should be gradually increased)
Week 1 = train once per week
Week 2 = train twice per week

Intensity: How hard you train (should be gradually increased)

Week 1 = 1 set of 5 repetitions of a 5 kg weight
Week 2 = 2 sets of 5 repetitions of a 5 kg weight

Time: How long you train (should be gradually increased)

Week 1 = 20-minute session
Week 2 = 25-minute session

Type: Relates to specificity. training should closely match the activity.

E.g. A marathon runner should use continuous training

Training intensities:

Max Heart rate = 220 – age
= 220 – 15 = 205bpm

Aerobic target zone: 60% - 80% of MHR

60% = 123bpm
80% = 164bpm

Anaerobic training zone: 80% - 90% of MHR

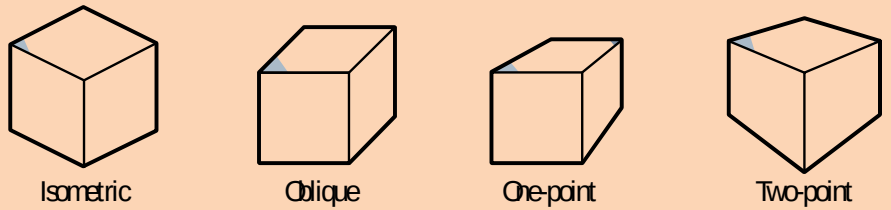
80% = 164bpm
90% = 181bpm

Strength/Power:
- High weight/low reps
- Above 70% of 1 rep max
- 3 sets of 4/8 reps

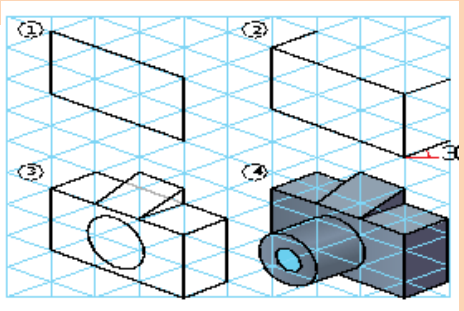
Muscular endurance:
- Low weight/high reps
- Below 70% of 1 rep max
- 3 sets of 12-15 reps

D&T – Timbers

How to creatively and effectively communicate your design ideas.



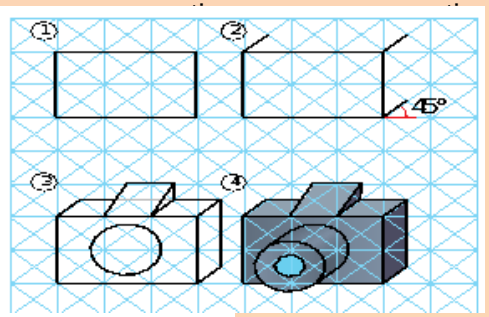
Isometric



Isometric drawings look more realistic than oblique ones and are based on 30-degree lines. For support, use isometric grid paper to guide your angles:

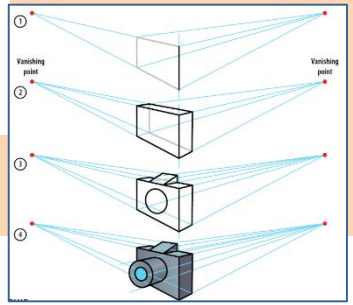
1 Instead of drawing the 2D front view in oblique, you begin with an edge of the product – draw this as a vertical straight line.
2 From this line, create **construction lines** going off at 30 degrees.
3 Fill in the next vertical lines.
4 From these vertical lines, draw your next construction lines going off at 30 degrees (repeat steps 3 and 4 depending on the complexity of your drawing).
5 Within these construction lines, draw your product.

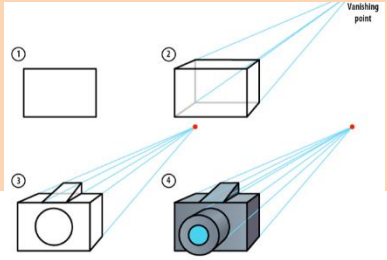
Oblique



Oblique projection is the simplest method of creating 3D designs based on 45-degree lines. For support, use oblique grid paper to guide your angles:

1 Draw the front view in 2D.
2 From each corner, draw construction lines projecting out at 45 degrees.
3 On the construction lines, measure half the true length.
4 Draw the back of the product to complete the product.





One-point perspective

One-point perspective is often used in interior design, as it quickly creates an image with a good sense of depth that enables the customer to rapidly visualise the designer's idea. This then allows the designer and customer to work together to develop and adjust the idea to suit the customer's requirements.

One-point perspective is the easier type of perspective drawing.

1 Just like oblique drawing, start by drawing the front view in 2D.
2 From each corner, create construction lines to a point in the distance called a single **vanishing point**.
3 Draw your next vertical lines between your construction lines.
4 Join up your vertical lines with horizontal lines (keep these faint). **5** Draw your product within these lines

Two-point perspective

Two-point perspective is often used by architects when developing their ideas in 3D, as it gives a speedy realistic interpretation. Like interior designers, the architects can work alongside their customer to develop their ideas to the customer's requirements. Two-point perspective uses two vanishing points either side of the object to produce a more realistic representation of the product.

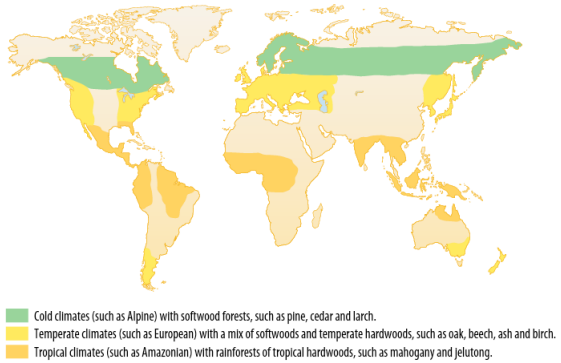
1 Just like isometric drawing,
you begin with an edge of the product – draw this as a vertical straight line.
2 From each corner, create construction lines to two vanishing points.
3 Draw in your next vertical lines between the construction lines.
4 From these vertical lines, draw construction lines going off to the vanishing points.
5 Draw in your product between your construction lines.

The types, properties, structure and uses of the main natural and manufactured timbers

Natural timbers: hardwoods

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

Type	Description	Advantages	Disadvantages	Common uses
Oak		• Strong and durable • Has an attractive grain when well finished	• Expensive • Becoming rarer • Harder to work with than some woods • Corrodes iron and steel	• Used a lot for building houses and boats in the past • Now used for high-end furniture and wine and whisky barrels
Mahogany		• Has a very attractive finish • Quite easy to work	• Expensive • Environmental problems with sourcing from tropical forests • Oils in the wood can give some people a skin rash or breathing problems	• High-quality furniture, jewellery boxes, windows
Beech		• A tough wood • Does not crack or splinter easily • Hard	• Expensive • Not very resistant to moisture • Not suitable for exterior use	• Toys, cooking implements, solid and laminated furniture
Balsa		• Very lightweight • Easy to cut	• Much too soft and weak for most products	• 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



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

Stock forms/types

Timber is available in a variety of stock forms.

Name	Availability	Picture	
Regular sections	• Timber is sold in a standard range of cross-sectional shapes and sizes – sawmills do this for convenience, so there is a limited range of sizes to cut • Designers can use the standard sizes when designing products		Commonly available sizes and shapes of timber
Mouldings	• 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	• 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	• 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

Natural timbers: softwoods

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

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

Manufactured timbers

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

Key term

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

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

The types, properties, structure and uses of the main natural and manufactured timbers

The physical characteristics of timber

Because of the way trees grow, all timbers have a similar set of physical characteristics.

Knots

A knot in timber appears where a branch grew out of the tree: the grain swirls around and the wood can be harder, so a knot can make that part of the timber harder to cut with saws and chisels. Knots also fall out, leaving a hole, so it is good to use timber that is free from them. However, knots can also make timber visually appealing, but if timber is to be painted, knots should be treated with knotting (shellac dissolved in methylated spirits) to prevent resin in the knot from staining the painted surface.

Colour

Different woods have different colours, from the pale colours of pine to the rich, dark reddish browns of mahogany. But trees are living organisms and their colours will vary from tree to tree and within the tree itself. This means that when buying timber it's important to remember that colour may vary from plank to plank.

Grain structure and density

Timbers are split into hardwoods and softwoods. Hardwoods have two types of long vessels, known as fibres and pores, which run the length of the tree. Softwoods have one main cell called tracheids. Both have annual rings, produced as growth is added under the bark each year. These give timber its grain. Slow growth and narrow annual rings is sometimes called close grained. Birch and holly do not have clear growth rings but they can be seen by staining. Parana pine has almost no discernible growth rings and its small cells give it a very fine texture, whereas pitch pine and western red cedar have clear growth rings. In some hardwoods such as utile or iroko, the vessels spiral through the tree, giving an attractive interlocking grain, which is difficult to work with as it tears whichever way you plane it.

Open grain refers to hardwoods where the vessels are quite large and show at the surface (also called coarse grained). Birch and holly are close grained timbers with small vessels similar in size, hence fine grained. All hardwoods are somewhere between open and close grain. For example, red oak is very open, birch is close.

When applying finishes to grain, softwoods generally require sanding first. With most hardwoods, grain filler is needed before painting or polishing, otherwise the vessels will show through. Even very dense hardwoods like rosewood need grain filler.

Density varies from timber to timber; balsa wood has a density of 60 kg per cubic metre, while oak has a density of 750 kg.

Working properties

When talking about materials, you must use the correct meaning of the words that describe the properties of materials. It is helpful to compare properties of materials when describing them. For example, rubber is more elastic than metal.

Elasticity

The elasticity of a material is its ability to stretch and return to its original length or shape. Rubber is an elastic material. Wood is not very elastic, although some woods are a little more elastic than others. Yew is excellent for making bows (archery).

Tensile strength

The tensile strength of a material is the amount of force it can withstand when being pulled. The tensile strength of most timbers is three to four times the compressive strength. Ash and oak have high tensile strength, more than double that of western red cedar.

Compressive strength

The compressive strength of a material is the amount of force it can withstand from a crushing force. The denser the wood, the more likely it is to have good compressive strength. Hickory has approximately double the compressive strength of western red cedar.

Social footprint

Trend forecasting

Manufacturers and retailers try to forecast the trends there will be in a year or two, so they can invest in designing and making products people will want in the future.

One current trend is the increase in the use of softwoods from sustainable sources. Tropical hardwoods are being used much less, partly because of the damage their loss causes to rainforest areas and the impact that has on the people and wildlife that rely on those rainforests.

Another current trend is towards greater use of manufactured timbers in construction, with builders using manufactured I shaped beams for joists instead of the traditional solid timber.

Impact of logging on communities

Sometimes logging (cutting trees for timber), an industry, brings jobs and money to an area. However, in many poorer regions, such as the Amazon rainforest, logging is badly managed and large companies log in areas where indigenous people live. Logging activity often pushes them out of their ancestral homes, leaving them with nowhere to go, and destroys their traditional way of life and the wildlife they depend on for food.

Recycling and disposal

Timber is a natural material that will biodegrade and rot away in time. Composite materials, such as chipboard covered with plastic, are much harder to dispose of. Timber cannot be recycled by melting it down and re-moulding it like plastics and metals can. Sometimes timber can be reused for something else, e.g. by cleaning it up and sawing it into smaller pieces. Timber can be disposed of by burning to create heat, which can be useful if it is well managed, and biomass boilers generate electricity from burning wood. 'Clean' timber – meaning a supply of timber that is not mixed with manufactured boards and other rubbish – is sometimes turned into boards such as chipboard or MDF. Timber can be disposed of by burning to create heat, which is useful if it is well managed.

Ecological footprint

At its simplest, it is the amount of the environment required to produce the goods and services necessary to support a particular lifestyle. It includes the whole product life cycle, from cutting the trees down and seasoning the timber, to manufacturing, use of the product and disposal after use.

Sustainability

Sustainability of timber is the idea that there are always trees available to be used. Hardwood trees take a long time to grow, so are rarely replanted once cut down. Softwood trees grow more quickly and are often planted in large areas of forestry. Some forests now are sustainably managed, which means that trees are being replanted as soon as others are cut down, so that there is always an area of the forest that is mature enough to be cut down.

FSC®

The Forest Stewardship Council lets timber producers use its logo on their timber if that timber comes from forests that are shown to be sustainably managed. Schemes like this help consumers make informed choices

Deforestation

Deforestation is a global problem, with trees being cut down faster than they grow. Most of Europe was deforested hundreds of years ago and deforestation is now a major problem for areas of the developing world, such as South America and West Africa. Deforestation can cause a lot of accompanying environmental issues such as soil erosion. For example, in Nepal deforestation has caused problems with landslides. Worldwide about 46,000–58,000 square miles of forest are lost each year. That is an area the size of England every year, or equivalent to 48 football fields every minute.

Because trees absorb carbon dioxide from the air, scientists think that having fewer trees will make the greenhouse effect worse, which will warm the Earth and affect the climate and sea levels for the whole world.

Habitat destruction and loss

When an area of forest is destroyed, the animals that live there lose their habitat, and they usually have nowhere else to go. Some well-known animals including tigers, gorillas, orangutans and elephants are in danger due to loss of habitat, and there are hundreds more species of animals, birds and insects that are at risk of extinction if deforestation continues.

This photo shows a large area of forest cut down: the land is likely to be used to grow crops or keep cattle, not replanted with trees

Processing

When a tree is cut down it needs to be processed to make usable timber. A tree trunk will be sawn into planks and then dried out in a process called seasoning (natural or kiln-drying). These processes, particularly kiln-drying, use energy which adds to the ecological footprint of the timber. Waste material such as leaves and small branches are no use, so are often burnt or left to rot.

Transportation

When a tree is cut down in a forest, it must be taken out of the forest to go for processing, either on lorries or sometimes by being floated down a suitable river. Most of the timber used in Britain has been imported. As most transport burns fossil fuels this increases the carbon footprint of the timber.

Wastage

The trunk of a tree will be used for planks, but other parts of the tree such as small branches and leaves that are not useful will be left to rot or burnt if the l and is being cleared for farming. Larger branches and the waste from the trunk after cutting into useful planks may be turned into chipboard or MDF. As timber has become scarcer it has become more expensive. It is also becoming increasingly important to reduce wastage. It is important to note that many of these timbers and manufactured timbers (such as MDF) appear on the toxic wood list. When prolonged turning and routing take place, the exposure to toxicity can be high and can cause health problems such as skin, nose and eye irritation, and respiratory issues such as asthma. The Health and Safety Executive produces Woodworking Information Sheet Number 30, which covers how to reduce negative effects. This includes ensuring that work areas are well ventilated and that protective equipment, such as gloves and masks, are used.

Pollution

Trees absorb carbon dioxide from the atmosphere and release oxygen, so living trees are very good for the environment. When wood is burnt for firewood, or to clear land, it releases carbon dioxide into the air, which increases the greenhouse effect. The other pollution from timber comes from the transportation of it around the world.

Aesthetic factors

Aesthetics is about how a product looks.

Form

The form of a product is the way that the overall shape and structure looks. Some products are designed to be purely functional; some are designed to look good to the consumer. A good product manages to do both. Timber's flowing, sometimes twisting grain patterns make it particularly attractive.

Colour and texture

Timber can vary in colour from light yellowish brown to dark browns, even to almost black. Lighter timber, such as pine, is sometimes stained to make it look like a darker wood, keeping the distinctive grain pattern that gives natural wood its characteristic look. The texture of wood can be quite rough, but it finishes to a smooth surface that feels quite warm to the touch. Ash is light brown; western red cedar is dark brown/red; sycamore is white; beech is pinkish-brown to white.

Environmental factors

Designers and manufacturers need to consider certain environmental factors in order to choose the most suitable material for their product/chosen application.

Sustainability

If timber from sustainable sources is used, it does less damage to the environment. This is better for the long-term health of local ecosystems and global climate.

Genetic engineering

Genetic engineering allows scientists to make changes to the DNA of a tree. If they can work out how to change the right parts of DNA in the right way they can create a tree that is different from natural trees. It is possible to make a tree resistant to particular diseases. Scientists are also trying to develop trees that grow faster than they do naturally. This would mean timber could be grown more quickly.

Campaigners against genetic engineering of plants are concerned that we do not know enough about the long-term effects of releasing genetically engineered plants into the environment.

Seasoning

A freshly cut tree is about 85 per cent water, so it's very wet. It must be dried out to below 18 per cent water, and is often dried to 10–12 per cent water for indoor use. Drying timber is called **seasoning**.

Seasoned timber has increased strength, resistance to decay, and stability, meaning it is less likely to **warp** (bend).

Air seasoning stacks the planks outside and after a few years they have dried out to about 18 per cent water. This is a slow process, and does not get the timber dry enough to use indoors. Kiln seasoning stacks the planks in a room and pumps first steam then warm dry air around them. This dries them to the required level in a few weeks. Kiln-drying is much quicker, it kills insect eggs in the timber, and it can dry the wood to the 10 per cent needed for use in our warm, dry, centrally heated houses. A designer will select timbers that have been correctly and appropriately seasoned for their intended purpose. This ensures that the final product, for example a wooden window frame, will not warp in use.

Upcycling

A timber product can sometimes be given a new lease of life by upcycling. A designer may specify used timber to create a particular style, such as rustic or shabby chic. A piece of old furniture might be repaired and then painted to make it look more modern and stylish. Old pallets can be turned into a product such as a garden table. This continued use of the timber is better than burning it.

Availability factors

Use of stock materials

Materials are processed and sold in standard sizes, called stock materials. A sawmill cuts timber into standard sizes. If a designer uses stock sizes it saves time cutting the wood again to make it smaller, and saves a lot of wasted timber.

Use of specialist materials

There are some specialist timber products that can be used for specific purposes, for example:

- marine plywood is waterproofed for outdoor use
- expensive hardwood veneers can be laminated on the outside of cheaper timber
- structural house timbers can be treated with flame retardant chemicals to slow the spread of fire.

Hurricanes, storms and disease

Trees can be affected by naturally occurring events. Hurricanes and severe storms can blow trees over. It can take a long time for trees to grow again.

Disease can kill trees. If a new disease arrives in a country it can spread and kill off a particular type of tree. In Britain a lot of elm trees were killed by a disease called Dutch elm disease. More recently ash trees have died from a disease called ash dieback, and about 126 million trees in British woods are at risk from this disease.

Cost factors

Quality of material

Timber is a natural material, and trees grow with variations and defects. Sometimes timber can warp (bend), depending on how it is cut and seasoned. Some pieces of timber have more knots than others; some develop splits as they dry. Timber is sorted, graded and sold for different purposes.

Constructional carcassing timber is used for structural applications, such as joists, roof trusses (the wooden frames that support roofs) and stud walls (plasterboard walls supported by a wooden frame), where it will not be seen. It is graded for strength. For softwood C16 is the most common grade. C24 is also quite common and is a bit stronger.

Joinery timber comprises the better-looking pieces of timber, and is used for products where the timber will be seen, e.g. window frames and doors. It has low knot content, straight grain and a smooth finish.

Manufacturing processes necessary

The manufacturing processes required affect the cost of the product. The scale of production chosen will depend on how many products are to be made. The scale of production needed will also affect the choice of manufacturing processes. The designer will use stock sizes and standard components bought in, so that their company does not need the specialist equipment to prepare timber or make parts that can be bought ready made.

Treatments

Timber will burn and rot quite easily and quickly. It can be treated with chemicals to reduce this.

Timber can be pressure treated with a preservative. The pressure treatment forces the preservative chemicals deep into the wood, and makes it resistant to rotting. Pressure treated timber can be used outside for years. A common chemical used is called Tanalith E, and the treated timber is called tanalised timber.

Timber can be treated with fire proofing chemicals that make it burn less well. Correctly treated wood can slow the spread of flames, allowing more time for people to escape, reducing damage to the wooden structure and giving more time to extinguish the blaze.

Social factors

Use for different social groups

Groups of people of different ages or interests will like different things. If a product designer can create a product that is appealing to a particular social group the product may sell well to that group of people. That product may be less appealing to other groups, so it can be a difficult balance between making it acceptable to everyone or desirable to only some people.

Cheaper materials, such as chipboard and MDF, are more likely to be used in the mass-consumer market, such as for flat-pack furniture. Bespoke furniture made by a local carpenter for a wealthier clientele is more likely to be made of more expensive hardwood, such as oak.

Trends, fashion and popularity

Trends and fashions come and go. The popularity of a product depends on lots of factors. It has to work well, but it also has to look good and appeal to consumers.

Solid timber was used more in the past as newer, cheaper materials were not available. A hundred years ago children's toys would often be made of wood, but now such products are usually made of plastic. Bespoke wooden toys are still very popular, for example wooden rocking horses, but they are often very expensive. Most furniture was made of solid wood and people expected it to last their lifetime. But the trend now is using chipboard, or veneered chipboard, and many people only expect furniture to last for a few years.

Cultural and ethical factors

Avoiding offence

It is obvious that if people find your product offensive they are not going to buy it. It is less obvious that people in different parts of the world, or other cultures and religions, might be offended by something that is not offensive to the product designer. It is important to have some understanding of different cultures and religions so that you can avoid accidentally causing offence with a word, symbol or picture that has a different significance to other people.

Suitability for intended market

It is important to understand the intended market for a product, so you can make sure a product is suitable.

It is also important that a product designed for a user of a particular age, or with a particular need, is suitable for people of that age or need. If you understand the needs of your user, you can make sure they can use the product and that it is safe for them.

The consumer society

In Britain, and much of the richer developed world, we live in a consumer society. We are relatively wealthy and products are quite cheap, so some people can afford to buy a lot of things they do not really need. There are lots of companies advertising products to try to sell us these things we do not actually need.

There is nothing wrong with people having nice things or useful things if they are affordable, but some people can go so far as to get themselves into debt consuming too much. From an environmental point of view, some people think that as a society we are using up limited resources too quickly and damaging our environment.

The effects of mass production

Carpenters used to make products one at a time. Now products tend to be mass produced. Mass production and manufactured boards have made products a lot cheaper than they used to be. This means they are more affordable and people can buy more things than they used to be able to.

Mass production also means factories are more automated than before. Lots of people used to have jobs in factories making the same thing every day. Now machines do more of that work, so there are fewer low-skilled jobs. These have been replaced by jobs for smaller numbers of engineers and computer programmers to run the machinery that has taken the jobs of the manual workers.

Built-in product obsolescence

A lot of products only have a short lifespan. Manufacturers deliberately make some products with parts that fail after a time and cannot be replaced. This process of making products with a short lifespan – that are intended to be thrown away and replaced – is called built-in obsolescence. Manufacturers like it because it means people buy new products more often. For example, using lower quality boards such as chipboard will lead to early product failure. It is not very environmentally friendly because it means a lot more rubbish is created when people dispose of things rather than mending them or replacing a part.

Processes to cut and shape materials

Routing

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

Sawing

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

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

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

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

Use of a mortiser

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

Use of a bag press

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

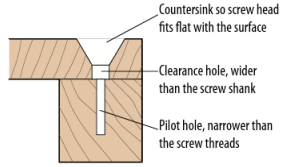
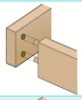
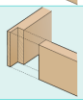
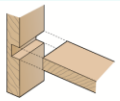
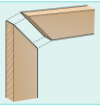
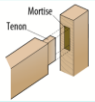


Figure 7.7.3 Drilling timber parts ready for a countersunk screw

Scale	Description	Advantages	Disadvantages
One-off	One product made at a time, either for a specialist product or to test an idea	• No set-up cost • 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	• 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	• 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

Name	Appearance	Advantages	Disadvantages
Butt		Easy to make, it is just square ends glued together	• 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		• Holds a shelf or divider securely in the middle of a carcass (frame) • Pairs well with corner lap joints	• 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		• Looks good because no end grain shows • Good for picture frames	Weak, it is only a butt joint at 45°
Mortise and tenon		• A strong joint • Good for joining a table or chair frame to legs	Time consuming to cut by hand
Dovetail		• A very strong joint – the dovetails lock together securely • Good for a drawer front that will get pulled hard	Very tricky to cut accurately by hand

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

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.

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.

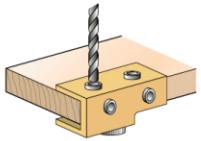


Figure 7.6.2 A drilling jig that has been clamped to the corner of the workpiece to get the holes in the correct place

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.

The purpose of a range of tools used for working wood

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

Tools and equipment

Hand tools

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

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

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

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

Machinery

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

Digital design and manufacture

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

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

Name	Appearance	Use	Advantages	Disadvantages
Twist drill		• 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	• Usually only up to 13 mm diameter • Deep holes can block up the flutes
Flat bit		Drilling larger holes in wood	• 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	• Only good for quite thin materials • Limited range of sizes available

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.

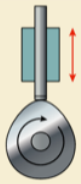
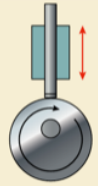
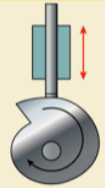
Name	Appearance	Use	Advantages	Disadvantages
File		A range of tooth sizes and shapes available	Good for smoothing and shaping the sawn edges of manufactured boards	Small teeth are quite slow on wood
Rasp		• Large individual teeth • Available in different shapes, usually flat, half-round and round	• Big 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	• Good for rough shaping of soft materials • Blade can be removed from frame and replaced	• Leaves a rough surface • Hard work on harder woods

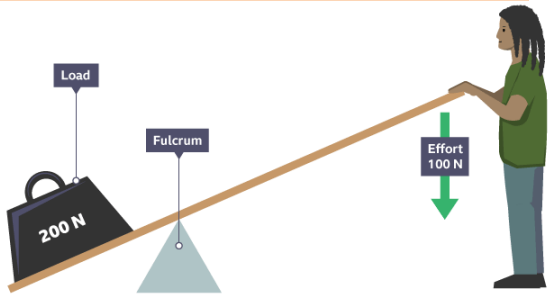
	Description	Advantages	Disadvantages
Painting	• A coloured pigment in liquid that dries out	• Available in a range of colours	• Covers up the natural wood grain
Staining	• A coloured liquid that soaks into the wood surface	• Makes a pale-coloured wood like pine a darker colour to mimic more expensive 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	• 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	• Easy to apply • Gives a plain, natural look	• Rubs away and needs reapplying • Not a glossy finish
Oil	• Is rubbed onto the surface and soaks in	• Good waterproofing for timber • Vegetable oil on kitchen ware is non-toxic	• Surface feels oily
Shellac	• 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

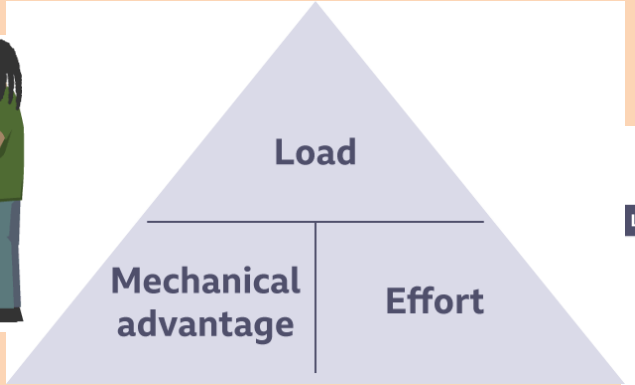
Mechanisms are devices that can change one form of force or movement into another. They range from simple mechanisms such as a door handle, scissors or a hole punch to complex car engines, bicycles and manufacturing machinery.

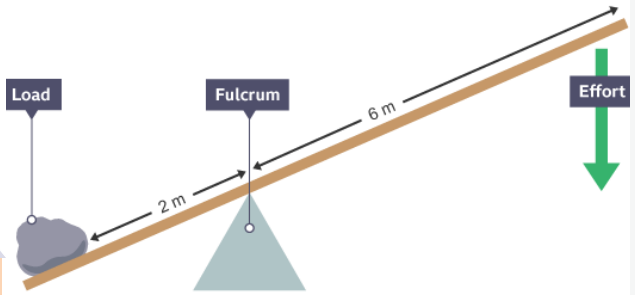
Types of movement /motion

- **Rotary** – Motion around a central point Example: a fan or a bike wheel
- **Oscillating** - Motion that swings backwards and forwards in an arc from a central point Example: child on a swing or a pendulum
- **Linear** - Moving in a straight line in one direction Example: chain on a bike
- **Reciprocating** - Moving backwards and forwards in a straight line Example: sewing machine needle or car piston

	Pear-shaped	Eccentric/circular	Drop (Snail)
Effect of shape	• Motionless (dwells) for about half the cycle • During the second half it rises and falls	• Circular to give a smooth continuous movement as the follower rises or falls	• Gives a slow rise with a spiral cross-section and then a sudden fall
Example	• Opens and closes valves in a car engine	• In a fuel pump or in steam engines	• Used in hammers/ punches or machines needing a sudden drop
			



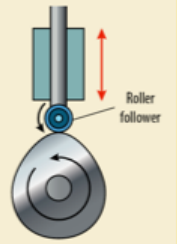
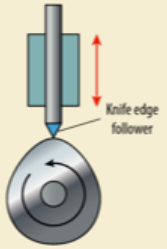
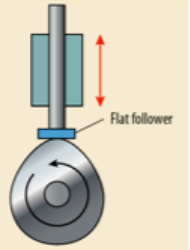




- A person lifting a load of 200 N but only using 100 N of effort:
- Therefore, the mechanical advantage = 200 ÷ 100 = **2.**
- This can also be written as 2:1. The person is able to lift twice the load using 100 N of effort.
- The mechanical advantage can also be calculated theoretically by measuring the distance between the load and pivot and the effort and pivot.
- In the picture below the distance between the load and fulcrum is 2 m. The distance between the effort and fulcrum is 6 m.
- Therefore, the mechanical advantage = 6 ÷ 2 = **3** or **3:1**
- The person will find this load three times easier to lift.

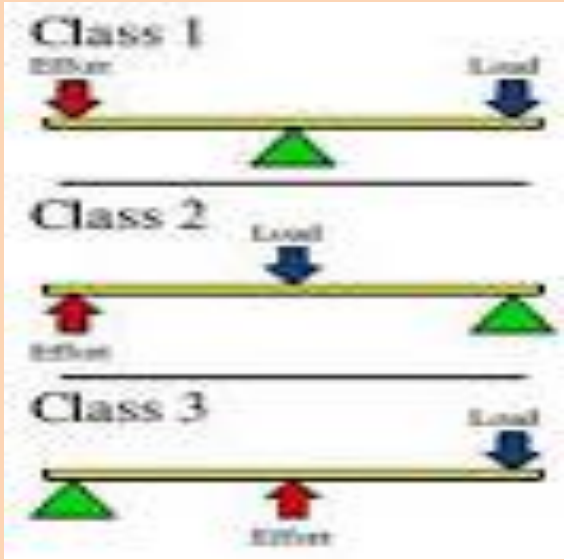
Followers

Different followers are used for specific purposes, but all slide or roll on the external profile of the cam.

Roller	Knife edge	Flat
		
• Used when higher speeds are required, such as in engines • Rolling motion reduces friction so it will wear better • Has separate parts in the roller mechanism and contends with forces pushing them to the side	• Used when accuracy is required, such as in an embroidery machine, as the cam's profile is followed closely • Suffers from a rapid rate of wear and contends with forces pushing them to the side	• Used when higher load bearing capabilities are required, such as in a steam engine • Has reduced forces pushing it, but suffers from increased friction • The larger surface area means it could rotate, but has larger load carrying abilities

There are three categories of **levers**. They are chosen for their ability to produce the most mechanical advantage for a particular task. These classes of lever arrange the effort, fulcrum and load in a different order:

First order	Effort	Fulcrum	Load
Second order	Effort	Load	Fulcrum
Third order	Fulcrum	Effort	Load



First order levers

First order levers (Class 1) place the fulcrum between the effort and the load. An example would be a seesaw, which places the fulcrum in the centre and allows equally weighted children to lift each other up. If the load is closer to the fulcrum it becomes easier to lift. When the fulcrum is in the centre, like a seesaw, the effort and the load have to be equal to balance them. If a person is slightly heavier at one end or leans back, moving the weight, one end of the seesaw moves down.

Second order levers

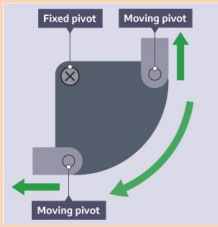
Second order levers (Class 2) place the fulcrum at one end of the lever and the effort at the other, with the load in the centre. The closer together the fulcrum and load are, the easier it is to lift the load. Examples include wheelbarrows, nutcrackers and some bottle openers.

Third order levers

Third order levers (Class 3) place the effort between the fulcrum and the load. If the effort and the fulcrum are further apart, it becomes easier to lift. A third order lever does not have the mechanical advantage of first order levers or second order levers so are less common.
They are generally used for moving small or delicate items. Examples include tweezers or fishing rods.

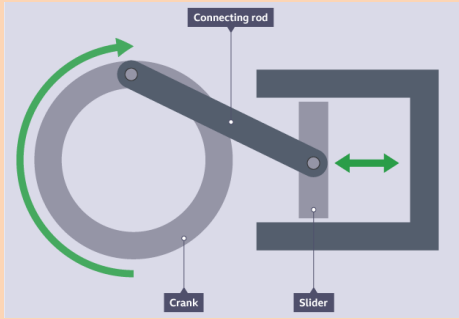
Reverse motion linkages change the direction of input so that the output goes the opposite way. A fixed pivot forces the change in direction. These are often used on foldable clothes horses.

Bell crank linkages change the direction of force through 90°. The amount of output force can be changed by moving the fixed pivot. When used in bicycle brakes, the rider can pull the brakes from the handlebars, which changes direction through the bell crank to make the brake pads touch the wheels.



Crank and slider linkages change rotary motion from the crank into a reciprocating motion of the slider, or vice versa.

The crank and slider are connected through a connecting rod which helps convert the motion. There are arrangements in which a crank and slider can be used. The crank arm can be used as the driver in a car engine piston, the ignition of petrol by the spark plugs pushes the slider up, moving the connecting rod and turning the crank.



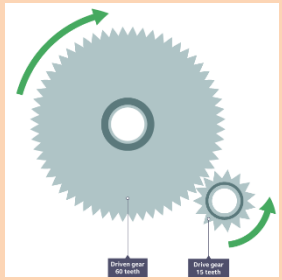
Alternatively, the slider can be used as the driver in a steam engine where the wheels turn because of the pressure that moves the slider.

Gears change the direction or the speed of movement. As there are teeth around the edge of the gears they grip together and so can withstand a greater force, enabling them to move large items such as cars or bicycles.

Gear trains: Gear trains are when two or more gears are joined together. In a simple gear train, the drive gear causes the driven gear to turn in the opposite direction. Smaller gears with fewer teeth turn faster than larger gears with more teeth. This difference in speed is called the gear ratio.

Gear ratio = number of teeth on driven gear ÷ number of teeth on the drive gear

Example



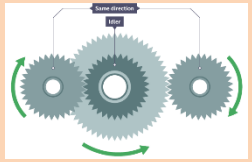
The driven gear has 60 teeth and the drive gear has 15 teeth.

Gear ratio = 60 ÷ 15 = 4

For each rotation of the drive gear, the driven gear would rotate four times. Gear ratio = 1:4

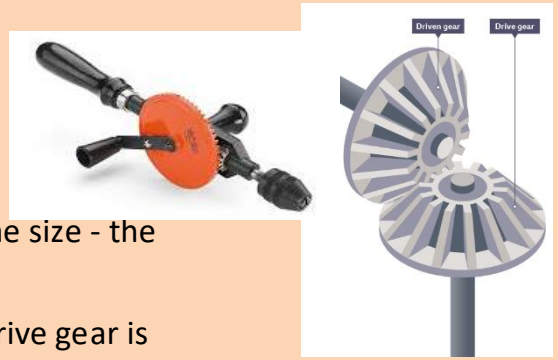
This is known as gearing up. If the driven gear had 15 teeth and the drive gear had 60 teeth, the gear ratio would be 4:1 which is known as gearing down.

Question: If a cyclist is pedalling with a drive gear of 50 teeth and a driven gear of 25 teeth, what is the gear ratio?



Gear types

If the drive gear and the driven gear are separated by another gear, called the idler, they will move in the same direction.



Bevel gears

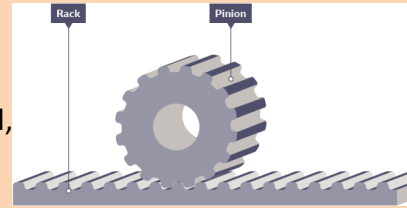
A bevel gear is a special gear that can transfer rotary through 90 degrees. The diagram below shows two gears of the same size - the name given to this arrangement is a mitre-gear.

However, the two gears can vary in size to achieve a different gear ratio. An example of this is in a hand drill, where the drive gear is larger than the driven gear. However, the two gears can vary in size to achieve a different gear ratio.

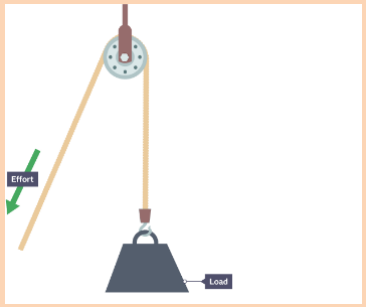
An example of this is in a hand drill, where the drive gear is larger than the driven gear.

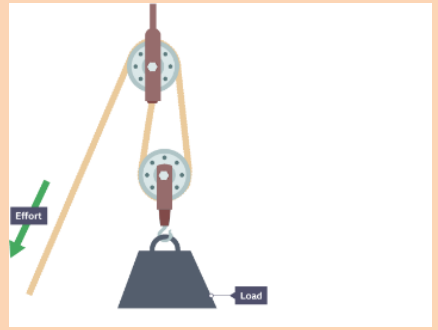
Rack and pinion

A rack and pinion is an arrangement of a gear wheel and a rack which allows the rotary motion to be converted to linear motion. An example of this is in a pillar drill, where the table bed is moved up and down.



Pulleys use mechanical advantage, similar to levers, to lift up loads. Pulleys are wheel shaped with a groove that allows a cord to sit inside the groove. They can be used by hand or attached to a motorised winch to increase the amount of weight that can be lifted. Pulleys are a simple and manoeuvrable way to move large objects. They are easy to transport to where they are needed and set up, but they do require somewhere stable to hang.





- A single pulley changes the direction of force, making pulling down easier than lifting up. Single pulley systems are demonstrated in cranes, lifting a bucket from a well, raising a flag or adjusting window blinds. Even though there is no actual mechanical advantage with one pulley, it is referred to as having a mechanical advantage of one.
- One pulley doesn't make a mechanical advantage, as the same amount of force is needed. However, if additional pulleys are added, a mechanical advantage is created. Using two pulleys together means you need half the force to lift. This is called a block and tackle, and is used to lift large, difficult-shaped objects, such as furniture. Adding more wheels to the block and tackle increases the load it can lift.

Belt drives transfer movement from one rotating pulley to another, each held on a shaft. Shafts and pulley wheels can be made out of any material, whereas pulley belts are generally made from a soft, flexible material such as rubber. Grooves on the pulleys and belts help them to grip and turn.

Winches, treadmills and washing machines are examples of belt-driven mechanisms.

Belts can be attached around different-sized pulleys to drive shafts to change speed. As with gears, the bigger the wheel, the slower the speed. The velocity ratio between two pulleys can be calculated.

Velocity ratio = diameter of the driven pulley ÷ diameter of the driver pulley

Output speed = input speed ÷ velocity ratio

AQA Design & Technology 8552
Materials and Working Properties Textiles

Fabrics

Natural Fabrics

Cotton	Soft, good absorbency, prints well, machine washable, strong breathable	Origins from the Cotton Plant.	Uses: Jeans, towels, Shirts, dresses, underwear
Wool	High UV protection, flameproof, breathable, durable insulating	Origins from Sheep.	Uses: Jumpers, Coat, blankets
Silk	Smooth, Soft, Strong	Origins from the silk worm.	Uses: Wedding dresses, lingerie.
Linen	Strong, cool in hot weather	Origins from the flax plant	Uses: Trousers, tops.
Leather/Suede	Strong, hardwearing, durable.	Origins from the skin of animals, mainly cows.	Uses: Jackets, Trousers, Shoes.

Synthetic fabrics

Polyester	Durable, wrinkle resistant, stain resistant	Uses: Shirts, jackets. Also used in safety belts, conveyor belts and tyre reinforcement.
Polyamide (Nylon)	Durable, high abrasion resistance	Uses: Sportswear, carpets.
Elastane (Lycra)	Stretchy, durable, high stain resistance	Uses: Sportswear, Swimwear, tights.
Viscose	Soft, comfortable, absorbent, easily dyed.	Uses: Dresses, linings, shorts, shirts, coats, jackets and outerwear.
Acrylic	Absorbent, retains shape after washing, easily dyed, resistance to sunlight.	Uses: Jumpers, tracksuits, linings in boots.

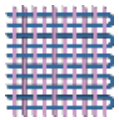
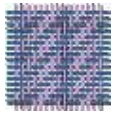
Blended and mixed Fabrics

These fabrics take on the positive characteristics of their combinations

Cotton/Polyester	Easy care and crease resistant	Uses: School shirts.

2. Fabric Construction

Woven

Plain Weave	Extremely strong and hard wearing	
Twill Weave	Extremely high strength and abrasion resistant.	

Knitted

Knitted fabrics	Stretchy, soft and comfortable.	

Non-Woven

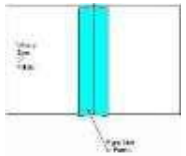
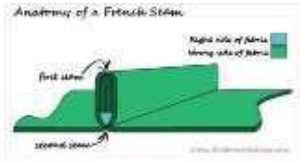
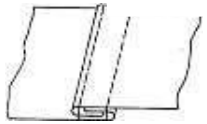
Bonded Fabrics	These are webs of fibres held together by glue or stitches.	
Felted Fabrics	Felt is made by combining pressure, moisture and hear to interlock a mat of wool fibres.	

Care Labels

- Machine wash. It will usually have a max. temp number included
- Hand Wash only
- Do not wring out
- Line Dry
- Iron on low heat. The more dots the higher the heat setting
- Tumble Dry
- Do not bleach
- Dry Clean

AQA Design & Technology 8552
Working with textile based Materials and Fixings

Construction Techniques

Open seam	This is used as the main method for constructing textile products. It is normally finished with overlocking to neaten the edges and prevent fraying.	
French Seam	This seam is used on delicate fabrics that can not be overlocked. It is generally used within lingerie.	
Flat Fell Seam	Very strong double stitched seam for heavy fabrics. Commonly used on jeans.	
Overlocking	Used to neaten seams to prevent fraying. Generally hidden on the inside of a product.	
Binding	Used to finish a curved edge on a product, where overlocking is not suitable.	

Decorative Techniques

Applique

Patchwork

Pleats

Gathers

Tie Dye

Beads & Sequins

Darts

Tucks

Batik

Hand Embroidery

Equipment

Sewing Machine

Overlocker

Sewing threads

Iron

Ironing Board

Quick unpick

Pins

Tape Measure

Needle

Embroidery Scissors

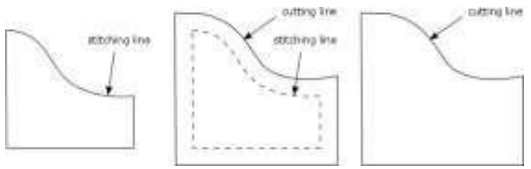
Fabric Shears

Pinking Shears

Construction Terminology

Pattern
This is the term given to a paper template to aid in the cutting out of fabric for accurate construction.

Seam Allowance
This is usually a 1cm 'boarder' around your pattern to allow for construction to be the correct size.



Right Side
This is the 'correct' side of the fabric that you wish to see.

Wrong Side
This is the side of the fabric that you do not wish to see.

Pressing
This is the term given when ironing your product; e.g. press your seams open, would refer to when an open seam is sewn and they need to pressed outwards to give a flat finish.

AQA Design & Technology 8552 Making Principles
Specialist tools, equipment, techniques and processes

Tool Selection

Specialist material areas often require tools that perform only one function, others can be adaptable and perform multiple tasks. E.g. A Tenon saw is used to cut straight or angles in wood, a pillar drill can be used to drill into a variety of materials.

Safety for Yourself and Others

Once your equipment has been selected you must consider health and safety. Some machinery has age restrictions and/or training requirements see the equipment/machinery **data sheets** and **risk assessments** for information. Basic requirements for all projects are **PPE** (**Personal Protective Equipment**).

Other areas to think about are:

Extraction (to remove dust/fumes)
Cleaning up spillages immediately
Carrying tools correctly.
Visual checks for damage/maintenance

Golden rule – if in doubt check it out

Outsourcing

Some companies may not have the skills for specialist tasks such as cutting and finishing toughened glass. Getting another company to do this them is called **outsourcing**.

Data Sheets and Instructive Manuals

Data sheets are usually provided by a material manufacturer that are considered to be hazardous. This could be because they need to be handled in a particular way or because they give off harmful gasses. Some equipment and machinery is also considered hazardous and may have a safety data sheet or safety information in the instruction manual for example a laser cutter.

Risk Assessment

Risk assessments must be produced as they are specific to individual workshops, the hazards in one workshop are not necessarily the same as another. A risk assessment is carried out to identify whether or not it is safe to carry out a particular task in that environment. A risk assessment looks for potential risks of a process, tool, material or piece of equipment.

There are 5 stages to a risk assessment: 1. Individual risk factors
2. Identify who is at risk
3. Decide the likelihood of the severity
4. Record findings and implement control measures
5. Monitor and review the risk assessment

Risk assessment: Soldering Iron / Soldering

What are the hazards?	Who might be harmed and how?	What are you already doing?	Do you need to do anything else to manage this risk?	Risk Level H—High M—Medium L– Low	Action by whom?	Action by when?	Done
Handling soldering iron while soldering	The operator of the soldering iron. If the soldering iron is not held using the handle burns to the hands is likely. If the operator does not store the soldering iron in the stand provided burning to the contact area will result. If the operator of the soldering iron does not pay attention to who is around them and makes contact with them this will result in burning	Soldering is undertaken in a specific area in S2 and S4. Strict guidance is given to operators and unsafe behaviour will result in immediate removal of the operator from the task	No	M	HCL/PRO	Ongoing	
Burning through electric wire	The operator because the soldering is not being stored correctly and attention to safe storage of the soldering iron is not being observed	Clear guidance on the safe use of the soldering is given with specific instructions on storing the iron when in use. The electric supply is not protected	A safety sheet required to remind operators of the correct way to use and make aware of possible hazards	L	HCL/PRO	Nov 2013	
Fumes	The operator could possibly inhale the fumes and also possible eye irritation could occur	Operators are required to wear goggles. This is supported through the smaller allocation of operators soldering to minimise the generation of fumes. Observation and monitoring by the session member of staff	No	L			

- This risk assessment and proposed actions have been discussed with staff and students (where appropriate)
- The risk assessment will reviewed annually as it might no longer be valid or if there are any significant changes to the hazards in the workplace, such as new equipment or work activities. A review date has been set.
- Operator refers to all persons carrying out an activity using a process, a series of processes using equipment within the department. An operator may be a member of staff, student or visitor.

AQA Design & Technology 8552
New and emerging Production Systems and Methods

CAD – Computer Aided Design

Advantages of CAD	Disadvantages of CAD
Designs can be created, saved and edited easily, saving time	CAD software is complex to learn
Designs or parts of designs can be easily copied or repeated	Software can be very expensive
Designs can be worked on by remote teams simultaneously	Compatibility issues with software
Designs can be rendered to look photo-realistic to gather public opinion in a range of finishes	Security issues - Risk of data being corrupted or hacked
CAD is very accurate	CAD Software
CAD software can process complex stress testing	

CAM – Computer Aided Manufacture

Advantages of CAM	Disadvantages of CAM
Quick – Speed of production can be increased.	Training is required to operate CAM.
Consistency – All parts manufactures are all the same.	High initial outlay for machines.
Accuracy – Accuracy can be greatly improved using CAM.	Production stoppage – If the machines break down, the production would stop.
Less Mistakes – There is no human error unless pre programmed.	Social issues . Areas can decline as human jobs are taken.
Cost Savings – Workforce can be reduced.	


Laser Cutter


Digital jet printer


Digital Knitting machine

Production Methods

Flexible Manufacturing Systems (FMS) : involves an assembly of automated machines commonly used on short-run batch production lines where the products frequently change.

Lean Manufacturing: It aims to manufacture products just before they are required to eliminate areas of waste including:

- Overproduction
- Waiting
- Transportation
- Inappropriate processing
- Excessive inventory
- Unnecessary motion
- Defects

Just In Time (JIT) : Items are created as they are demanded. No surplus stock of raw material, component or finished parts are kept.

Advantages of JIT	Disadvantages of JIT
No warehousing costs	Reliant on a high quality supply chain
Ordered secured before outlay on parts is required	Stock is not available immediately off-the-shelf
Stock does not become obsolete, damaged or deteriorated	Fewer benefits from bulk purchasing

Scales of Production

<u>One off/Bespoke</u>: when you make a unique item.

<u>Batch</u>: when a limited number of the same product is made.

<u>Mass</u>: when a large quantity of the same product are made over a long period of time. This typically uses a production line.

<u>Just-In-Time</u>: a form of stock control when goods are delivered 'just in time' to use on the production line.

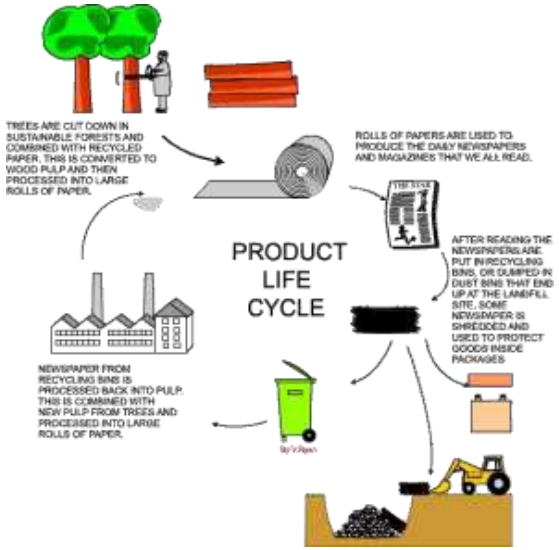
Informing Design Decisions

1.Planned obsolescence - Planned obsolescence is when a product is deliberately designed to have a specific life span. This is usually a shortened life span.

2.Design for maintenance - Products are often designed to be thrown away when they fail... This can be achieved by designing products that can be repaired and maintained.

3.Disposability – Some products are designed to be disposable.

4. Product Lifecycle -




AGV – Automated Guided Vehicle


Robots


Barcode Scanner

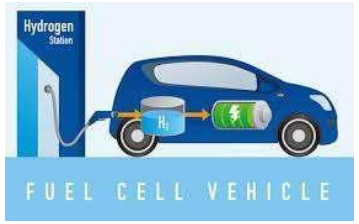
CNC	Computer Numerical Control
EPOS	Electronic Point Of Sale (Barcodes)

AQA Design & Technology 8552
New and emerging Technologies – Industry and Enterprise

New and Emerging Technologies

New technologies are those that are currently being developed or will be developed in the next 5 to 10 years, and which will alter the business and social environment.
Examples:

Fuel-cell vehicles
Zero-emission cars that run on hydrogen



Additive manufacturing
The future of making things, from printable organs to intelligent clothes

Enterprise

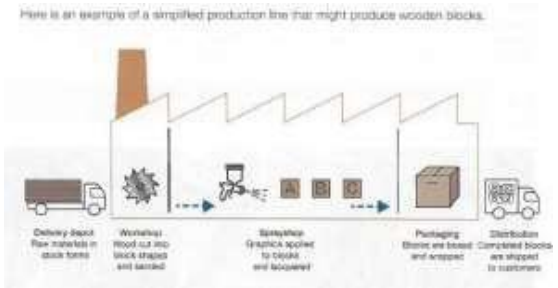
An idea that is developed into a business proposal for a product that has commercial viability.
Products developed in this way require a patent to protect the idea so that other companies cannot use it without permission this is called a registered trademark.

Industry – Automation and the use of Robots

As industry has grown new and emerging technologies have changed the way designers, architects and engineers work.
Intelligent machines and robotics have replace machine operators and engineers.
The development of work now almost always involves the use of **Computer Aided Design (CAD)**.
This software can carry out complex tasks such as virtual stress testing this is called **Computer Aided Testing (CAT)**.
Designs can be produced to look 3D so customers ca give opinions before **prototyping** begins.

Buildings and the place of work

The development of the internet has changed how data is transferred. This has lead to people being able to work together remotely (from different buildings or countries).
Projects can be sent to machines using **computer aided manufacturing (CAD)** techniques including **computer numerical control (CNC)** machines such as laser cutters and rapid prototyping (RPT) machines such as 3D printers.
Physical layout of buildings for production should be logical to increase efficiency. This will reduce unproductive time, movement and waste materials.



Co-operatives

A farm, business, or other organization which is owned and run jointly by its members, who share the profits or benefits.

Crowdfunding

Funding a project or venture by raising money from a large number of people who each contribute a relatively small amount, typically via the Internet.

Virtual Marketing and Retail

Virtual marketing the use of search engines positioning and ranking, banner advertising, e-mail marketing and social media in order to reach a wider audience to promote a product.

Fairtrade

A farm, business, or other organization which is owned and run jointly by its members, who share the profits or benefits.
Trade between companies in developed countries and producers in developing countries in which fair prices are paid to the producers.

AQA Design & Technology 8552
New and emerging Technologies – People, Culture and Society

People

Consumer Choice

Growth of global manufacturing has lead to a wider variety of products being available, prices of products are kept low because of the wider competition.

Technology Push

Advances in technology and science lead to the development of new products. Research and Development (R&D) Departments are used within large companies to ensure they can create new and exciting products.

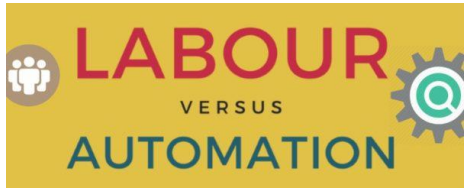
Advances in touchscreen technology

Market Pull

The demand for new products from the consumer market. Market Pull is the pressure put on a company to improve or redevelop their products by consumers to meet the consumers changing needs.

Changing Job Roles

The development of new technologies and automation has meant there is less reliance on manual labour. Workers need to be 'skilled up' and be more flexible.



Society

Companies putting the environment and people before profit.
Examples:

- Carbon Neutral Products
- Use of renewable materials
- Reduction of carbon emissions/greenhousegasses
- Use of recycled materials
- Products designed to be 100% recyclable
- Promotion of Fairtrade
- Reduction of transportation
- Non profit organisations that reinvest money to support good causes
- Consideration to designing products for the elderly ordisabled
- Consideration to different religious groups

4 main ways to consider the population when designing

Type of Production	Example
One size fits all	Door Frames Baths
A range of sizes to cover all	Shoes Clothes
Adjustability to allow use by all	Car Seats Shower head height
Adaptability to support location or user	Children's booster seats Car roof bars

Culture

A combination of ideas, beliefs, customs and social behaviours of a society or group of people.

Fashion and Trends

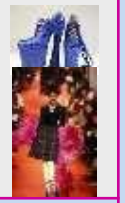
Designers developing products that are influenced by 'the latest thing'.

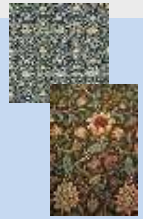
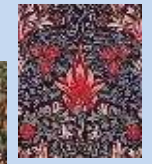
Faiths and Beliefs

Designers being responsible for the impact their design choices may have on a community.

AQA Design & Technology 8552

Designing Principles - The work of others

Designer Name	Facts	Logo	Examples
Coco Chanel	**Gabrielle Bonheur "Coco" Chanel** (19 August 1883 – 10 January 1971) was a French fashion designer and businesswoman. She was the founder and namesake of the Chanel brand.	CHANEL	 
Alexander McQueen	**Lee Alexander McQueen**, CBE (17 March 1969 – 11 February 2010), known professionally as **Alexander McQueen**, was a British fashion designer and couturier. He is known for having worked as chief designer at Givenchy from 1996 to 2001 and for founding his own Alexander McQueen label.		  
Vivienne Westwood	**Dame Vivienne Isabel Westwood** DBE RDI (born 8 April 1941) is a British fashion designer and businesswoman, largely responsible for bringing modern punk and new wave fashions into the mainstream.	Vivienne Westwood	 
Harry Beck	**Henry Charles Beck** (4 June 1902 – 18 September 1974), known as **Harry Beck**, was an English technical draughtsman best known for creating the present London Underground Tube map in 1931.	HARRY BECK	
Norman Foster	**Norman Robert Foster, Baron Foster of Thames Bank**, OM, HonFREng (born 1 June 1935) is a British architect whose company, Foster + Partners, maintains an international design practice famous for high- tech architecture.	NORMAN FOSTER	  

Designer Name	Facts	Logo	Examples
Marcel Breuer	**Marcel Lajos Breuer** (22 May 1902 – 1 July 1981) was a Hungarian-born modernist, architect, and furniture designer. Breuer extended the sculptural vocabulary he had developed in the carpentry shop at the Bauhaus into a personal architecture		
Sir Alec Issigonis	**Sir Alexander Arnold Constantine Issigonis**; 18 November 1906 – 2 October 1988) was a British-Greek designer of cars, widely noted for the ground-breaking and influential development of the Mini, launched by the British Motor Corporation (BMC) in 1959.		
William Morris	**William Morris** (24 March 1834 – 3 October 1896) was an English textile designer, poet, novelist, translator, and socialist activist. Associated with the British Arts and Crafts Movement, he was a major contributor to the revival of traditional British textile arts and methods of production.	MORRIS & Co	 
Mary Quant	**Dame Barbara Mary Quant, Mrs Plunket Greene**, (born 11 February 1934) is a Welsh fashion designer and British fashion icon She became an instrumental figure in the 1960s London-based Mod and youth fashion movements.	MARY QUANT	
Louis Comfort Tiffany	**Louis Comfort Tiffany** (February 18, 1848 – January 17, 1933) was an American artist and designer who worked in the decorative arts. He is best known for his work in stained glass.	LOUIS TIFFANY	 
Philippe Starck	**Philippe Starck** (born January 18,. 1949) is a French designer known since the start of his career in the 1980s for his interior, product, industrial and architectural design including furniture	S+ARCK	 

AQA Design & Technology 8552
Designing Principles - The work of others: Product & Industrial Design

Name	Facts	Logo	Examples
Raymond Templier	**RAYMOND TEMPLIER** (1891 - 1968) like many of his contemporaries in jewelry, was born to a family with a long tradition as jewelers.		
Gerrit Rietveld	**Gerrit Thomas Rietveld**; 24 June 1888 – 25 June 1964) was a Dutch furniture designer and architect. One of the principal members of the Dutch artistic movement called De Stijl, Rietveld is famous for his Red and Blue Chair.	Gerrit Rietveld	
Charles Rennie Macintosh	**Charles Rennie Mackintosh** (7 June 1868 – 10 December 1928) was a Scottish architect, designer, water colourist and artist. His artistic approach had much in common with European Symbolism. His work was influential on European design movements such as Art Nouveau and Secessionism.	CHARLES RENNIE MACKINTOSH	
Aldo Rossi	**Aldo Rossi** (3 May 1931 – 4 September 1997) was an Italian architect and designer who achieved international recognition in four distinct areas: theory, drawing, architecture and product design. He was the first Italian to receive the Pritzker Prize for architecture.	ALDO ROSSI	
Ettore Sottsass	**Ettore Sottsass** (14 September 1917 – 31 December 2007) was an Italian architect and designer during the 20th century. His work included furniture, jewellery, glass, lighting, home objects and office machine design, as well as many buildings and interiors.		

Name	Facts	Logo	Examples
Alessi	**Alessi** is a housewares and kitchen utensil company in Italy, producing everyday items from plastic and metal, created by famous designers.	ALESSI	
Apple	**Apple Inc.** is an American multinational technology company headquartered in Cupertino, California that designs, develops, and sells consumer electronics, computer software, and online services.		
Braun	**Braun GmbH** formerly **Braun AG**, is a German consumer products company based in Kronberg. From 1984 until 2007, Braun was a wholly owned subsidiary of The Gillette Company, which had purchased a controlling interest in the company in 1967.	BRAUN	
Dyson	**Dyson Ltd.** is a British technology company established by James Dyson in 1987. It designs and manufactures household appliances such as vacuum cleaners, hand dryers, bladeless fans, heaters and hair dryers.	dyson	
GAP	**The Gap, Inc.** commonly known as **Gap Inc.** or **Gap**, (stylized as **GAP**) is an American worldwide clothing and accessories retailer.	GAP	
Primark	**Primark** known as **Penneys** in the Republic of Ireland) is an Irish clothing and accessories company which is a subsidiary of AB Foods, and is headquartered in Dublin.	PRIMARK	
Under Armour	**Under Armour, Inc.** is an American company that manufactures sports and casual apparel and footwear.		
Zara	**Zara** is a Spanish clothing and accessories retailer based in Arteixo, Galicia. It is the main brand of the Inditex group, the world's largest apparel retailer.	ZARA	

Design: The ability to communicate with the consumer in an interesting and affective way.

2D Design: Two –dimensional design is better for plan views and for expressing size and adding dimensions. It can also help explain mechanical and electrical concepts clearly.
3D Design: Three-dimensional design is better for conveying the overall shape of a design and for visually explaining aesthetic properties.

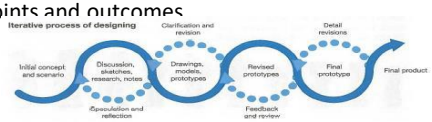
Design Brief: A design brief can be as simple as an intent to design and make a certain product. A good design brief will set a clear context for why the product is required, as well as understanding any possible constraint's

Specification:
Using research and testing, a set of objectives for the product can be produced. This is called a **manufacturing specification**.
A thorough manufacturing specification should include:
> Detailed points relating to the product's form and function.
> Any known constraints, such as exact timescale for product and maximum budget.
It is vital that as many points as possible as measureable, so the product can be tested against these criteria.

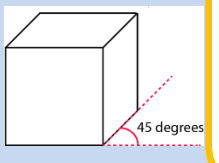
The 3D sketch of the bottles allows the viewer to imagine how they might feel in the hand, whereas the 2D version gives a technical profile that could be measured more accurately.

Design Fixation: Is a common condition for designers. It simply means that they become stuck in a rut and can only produce a range of similar designs, blinkered or blind to alternative ideas available.
Factors that can make design fixation worse include the fear of making mistakes, playing safe and not taking risks. Don't assume your first idea is best and allow enough time to explore other routes.
The most common strategies used to avoid design fixation are as follows:
>Work with others– use collaborative design techniques, even just having a quick exchange of ideas with another person can break the gridlock.
>Accept and understand the design fixation and force yourself to use a new starting point.
> Stop drawing and start making– model something in 3D from a chosen medium.
>Get some failures out the way– do not be afraid to get it wrong a few times and move on quickly. It is widely believed that the more you fail the better you become.

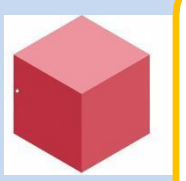
Iterative design: The iterative approach to designing is a flexible way of designing by working through ideas with sketches and notes and developing models when they are needed. It is a journey that could have a number of different starting points and outcomes



The iterative approach gives the designer the freedom to follow an idea in the direction that feels best for that idea. The designer's tools of sketching, modelling, testing and evaluating may be used in any order as long as they support rather than hinder the flow of ideas.

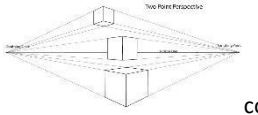


Oblique Drawing: Uses a 45-degree angle to draw lines that represent the depth of the side (end) and top (plan) of the drawing. The length of the line to represent the end is half of the measurement required; i.e. if the length should be 4cm the drawn length is 2cm.



Isometric Drawing: Uses a 30-degree angle and is much more realistic. For a basic cuboid, all of the height, width and depth lines follow the 30-degree isometric grid lines. Dimensioning can be done accurately and, by simple techniques, complex shapes can be constructed or carved out of a simple cuboid.

Prototypes: Prototype modelling can be constructed to test different elements of a design to help work out how viable it is likely to be. Modelling can involve creating a whole scaled up or down product or it may just be needed to help work through an important element of the design.



Two Point Perspective: Uses two **vanishing points** that are set to the outer edges of the page. The main construction lines create the width and depth are all projected back to the two vanishing points. Two point perspective gives the most realistic view as it emulates the way the viewers eye sees perspective, meaning that things get smaller the further away they are. It is a great technique to give a realistic view of what a product might look like.

Evaluation: When a prototype is completed it is still not ready for full scale production. It needs to be critically analysed, tested an devaluated to see what works well an d what needs further improvement.

To make sure that your design becomes a high-quality prototype, you should follow this advice:
>**Satisfying the clients design brief:** Make sure that the clients needs and wants are fully addressed.
>**Innovation:** Imagination, creativity and innovation are three traits that are looked for throughout the design and development of a prototype or product. This doesn't always mean that a totally new concept or 'design' needs to be 'invented'
>**Functionality:** Make sure that a prototype performs its task effectively. Consider its performance under 'worst case scenario' situations.
>**Aesthetics:** The aim is to produce a prototype that looks good enough to sell. This means that throughout the iterative design process, clients' views will have been considered and acted upon.
> **Marketability:** A prototype is a preliminary version of a product; it should look good and be fully functioning. The proposed product should be aesthetically pleasing, functional and appeal to the target market.

Hospitality and Catering

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 patissier* - The King or Queen of the pastry section; baked goods, pastries and desserts are this chefs forte.
Sauté chef - *aka saucier or sauce chef* - They're responsible for sautéing foods, but their most vital role lies within the creation of the sauces and gravies that will accompany other dishes.
Soup Chef - *aka le potager* - Responsible for making soups and preparation of accompaniments for the dishes
Vegetable Chef - *aka le legumier* - The vegetable chef prepares all vegetables for dishes, in smaller restaurants the vegetable chef would also make soups.
Fish chef - *aka le poissonnier* - An expert in the preparation of fish dishes, and often responsible for fish butchering as well as creating the appropriate sauces.

Styles of service

TABLE SERVICE	**Plate:** Pre-plated meals from the kitchen. Can be a basic plated meal or a decorated nouveau cuisine style
	Family: Dishes are put on the table where spoons are provided and the customers swerve themselves. Suited to ethnic restaurants such as Indian, Chinese and Spanish tapas
	Silver: Food is served by the staff using spoon and fork
	Gueridon: Food is served from a side table or a trolley using a spoon and fork. Sometimes dishes are assembled or cooked in front of the customer
COUNTER SERIVCE	**Cafeteria:** A single long display counter but can sometimes be multiple counters
	Buffet: Set up in a room usually along one long table. It can be self service or staff can serve customers. Carvery service is where joints of meat are carved in front of customers and plated
	Fast Food: Takeaway with eat-in areas where customers collect food from one small counter
PERSONAL SERIVCE	**Tray or Trolley:** An assembled meal provided or a choice of food and drink from a trolley
	Vending: Sold from a machine
	Home Delivery: Delivered to house individually or on a round

Suppliers to the hospitality and catering industry:

- Specialist markets – e.g. butchers, fish markets. Some deliver
- Local suppliers – local deliveries are better for the environment but might not have a wide selection of stock
- Equipment suppliers – provide equipment and appliances to the catering industry
- Large wholesalers – large quantities of stock, can buy premade and proportioned food but can be expensive
- Independent suppliers

Hotel job roles
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

Permanent (Over 36hrs a week)
Have permanent jobs and work all year. Contract explaining the terms of their employment. They may work set shifts or have shifts that change daily/weekly/ monthly. Entitled to sick pay and holiday pay. Entitled to maternity pay

Part time (4-36 hrs)
Have permanent jobs and work all year. Contract. They will work mostly at the busiest times of the day/week including weekends. Entitled to sick pay and holiday pay (in proportion) Entitled to maternity pay

Temporary
Employed for a specific length of time such as the summer tourist season or the month of December. Temporary staff have the same rights as permanent staff for the duration of their contract. Temporary staff employed for longer than 2 years become permanent by law

Casual
Work for specific functions and can be employed through an agency. They do not have a contract or set hours of work. They are needed at busier times of the year e.g. At Christmas or for weddings, New years eve

LO1 The environment in which hospitality and catering providers operate

Ratings

Michelin guide
Anonymous inspectors visit establishments and have a meal and write a review of the establishment can award stars for excellence.

AA guide
Inspectors visit restaurants or hotels and write a review of the establishment -award rosettes for restaurants, stars for hotels.

Good food guide
Members of the general public who have visited the establishment fill in a review which is compiled into a guide. Award points for excellence .

Online and written reviews
There are a number of online review sites where anyone can post their reviews of an establishment.
with a large number of reviews, a restaurant's average score is likely to be reasonably accurate.

Success Factors

Economy
Do people have the spare money to spend on luxuries such as eating or staying out

Costs
Rent, stock, gas & electricity, council tax, staff wages, new equipment

Environment
3 R's, packaging, food waste, global warming, carbon footprint, clean eating

Cooking techniques
sous vide, clean eating, steaming, new restaurants

Competition
Other places nearby, prices, delivery companies, new restaurants

Technology
Delivery and stock control – touch screen customer ordering, systems, stock management, apps for delivery services

Political factors
Increasing regulations – from government due to health issues, Brexit, use of migrant labour, migrants – ethnic foods

Customer service
If people aren't happy they won't come back. They will also spread word.

Media
Social media, online reviews, newspaper/TV coverage, celebrity endorsement.

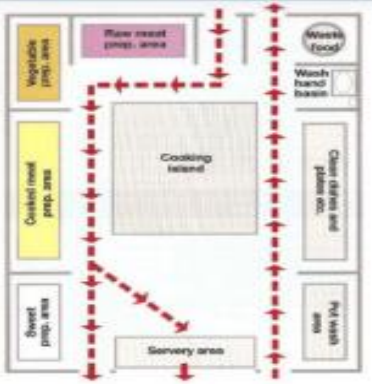
Trends
Keeping up with what is fashionable: vegan food, whole food, healthy fast food etc.

Hospitality and Catering

Documentation

Kitchen	Temperature charts: fridge, freezer, display, point of sale. Taken at least twice per day.	Time sheets: logging staff working hours	Accident report forms: used to report any accidents and near misses	Food safety information: blast chill records, food related incidents and cleaning rotas	Equipment fault reports: What was the issue and how was it dealt with.	Stock usage reports: order books, stock control sheets, invoice, delivery notes
Front of House	Bookings/ reservations: Electronic booking system, electronic reservations system, diary with bookings and reservations Feedback forms	Personnel records: Hours worked, personal details, Wages, Taxation, National insurance, Training, Accidents, Staff rotas and timetables	Financial records: Incomings and outgoings for Income tax, VAT, Wages, Insurance, Profit & loss, Staff costs, Heating, lighting	Health and safety: Fire certificate, Staff training records, Accident book, Food hygiene checks, Cleaning checks, First aid records	Purchasing: Food and drink orders Packaging orders, equipment Tables, chairs etc, Consumables and disposables, Cutlery and crockery, Staff uniforms	Stock control: Monitor stock levels for re ordering, Decide frequency of stock check, First in First out for items with a shelf life

Documents should be:
Legible (readable)
At correct interval (daily, hourly), completed accurately.
Signed and dated.
Remember
Some information is confidential or sensitive i.e. staff personal information. There is a legal requirement under the data protection act to store this type of information securely



Kitchen Workflow
Workflow in the kitchen 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


Sous Vide


Blender


Oven

LO2 Understand how hospitality and catering provisions operate


Hot plate


Bain Marie


Fryers


Blast Chiller

Customer needs

Local Residents	Business Customers	Leisure Customers
• Value for money • 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	• 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	• 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

Customer Rights

1. The right to be protected (against hazardous goods)
2. The right to be informed (about quality, quantity, allergies etc)
3. The right to have their complaints be heard
4. The right to seek redressal (compensation.)
5. the right to receive satisfactory goods that match their product description


POS Till Point


Grill


Perculator

DRESS CODE:
White shirt
Formal trousers
Formal shoes
Apron
Tie

DRESS CODE:
Chef's jacket
Chef's pants
Hat
Neckerchief
Apron
Hand towel
Slip-resistant shoes

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:
1. Chemicals including cleaning chemicals
2. Micro-organisms
3. Dusts
4. Medicines, pesticides, gases
5. HSE list (Health and safety executive)

Employees must:
1. Use control measures and facilities provided by the employer
2. Ensure equipment is returned and stored properly
3. Report defects in control measures
4. Wear and store personal protective equipment (PPE)
5. Removing PPE that could cause contamination before eating or drinking
6. Proper use of washing, showering facilities when required
7. Maintaining a high level of personal hygiene
8. 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 protectiv equipment at work regulations

PPE is equipment that will protect the user against health or safety risks at work. Includes clothing and other items worn by staff to protect themselves from work hazards
It can include items such as Gloves, goggles, hard hats, hearing protectors, warm clothing (in cold conditions), safety shoes or boots, respirators etc
Hearing protection and respiratory protective are not covered by these Regulations there are specific regulations that apply to them. these items need to be compatible with any other PPE provided.

PPE could include:
- non-slip shoes where there is a slipping risk;
- 100% cotton garments (for example, chefs' whites) where there is a risk that the material may aggravate burns in the event of a fire
- where caustic cleaning substances are used, long-sleeved vinyl gloves, goggles, a visor and possibly respiratory equipment.

LO3 Meeting health and safety requirements

Security hazards

Workers can be at risk from security hazards in the same way they are from safety hazards.
Security risks include

- Disagreements between customers
- Customers being intoxicated (alcohol)
- Customers who have used drugs
- Verbal abuse
- Physical assaults

Prevention

- Brightly lit areas
- CCTV
- Easy escape routes
- Area for handling larger sums of money
- Appoint more senior staff to deal with problems and complaints
- Train staff to 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.

Hospitality and Catering

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

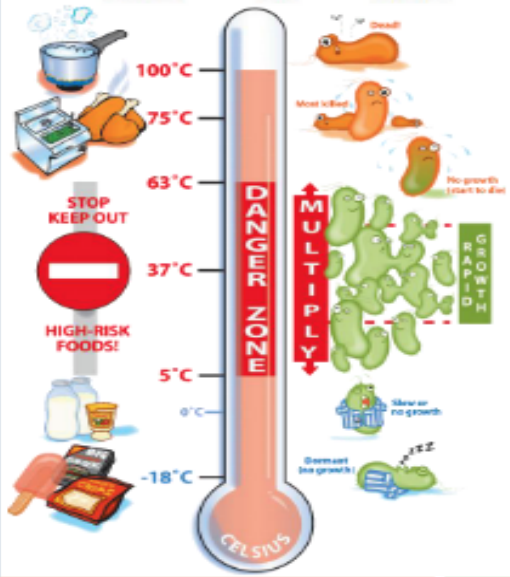
- Avoid milk and milk products
- Experience nausea, bloating, pain in the abdomen and diarrhoea
- Eat lactose-reduced products or alternatives such as goats cheese, soya milk, feta cheese, rice milk

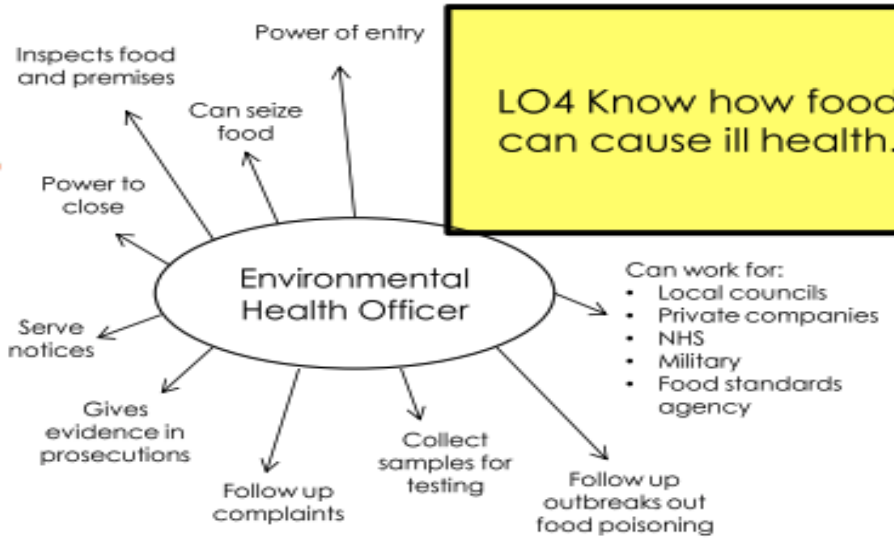
Coeliac disease/gluten intolerance

- 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.

	Found In	Symptoms	Onset	Dur
Campylobacter	Poultry , raw meat, unpasteurised milk products, water	Headache, abdominal pain, bloody diarrhoea	2-5 days after infection	Up to 10 days
Salmonella	Raw meat, unwashed vegetables, eggs undercooked chicken	Fever, diarrhoea, vomiting, abdominal pain, blood in poo	12-72 hours	4-7 days can be up to 3 weeks
E-Coli	beef, chicken, lamb, unpasteurised milk cheese, spinach, salads, raw veg	Abdominal cramps, bloody diarrhoea, nausea	Up to 24 hours	Up to 24 hours
Clostridium perfringens	Undercooked meats, large volumes of food ,casseroles, gravies	Stomach cramps, fever, diarrhoea (not usually vomiting)	6-24 hours	4-7 days can be up to 3 weeks
Listeria	Raw foods, fridge temperatures, unpasteurised milk, cheese, smoked salmon, pate, raw sprouts	Headache, stiff muscles, confusion, fever, convulsions	3-70 days (21 typical)	3 weeks
Bacillus cereus	Rice, leftover food, foods at room temperature, sauces and soups	1)Watery diarrhoea, cramps, 2)vomiting and nausea	1) 30 min-6 hrs 2) 6-15 hours	24 hours
Staphylococcus aureus	Foods made by hand and no additional cooking Salads, ham, tuna chicken, cream pastries, sandwiches, dairy products, meat, eggs	Projectile vomiting, diarrhoea, abdominal cramps, fever	1-6 hours	24-48 hours

Food related causes of ill health

Microbes - Some microorganisms cause food borne illness which is not classified as food poisoning because of other symptoms they cause. The two main ones are: Norovirus From leafy greens such as lettuce, fresh fruits and foods that are not washed before eating and Toxoplasmosis From infected meat (also cat poo but you wouldn't eat that)

Chemicals - Some chemicals can end up in our food and potentially make us ill. These chemicals could come from: hormones, pesticides, fertilizer, packaging additives, cleaning fluids

Metals - When ingested metals can be extremely harmful to the body. Some metals can be found in food because they occur naturally, they enter the food chain or residues of metals can be found in food.

Poisonous plants - Some plants can be poisonous when eaten, these could be contaminants such as weeds or naturally occurring foods such as rhubarb leaves, raw potatoes and uncooked kidney beans.

Food Safety Act

Food businesses:
- Must ensure that the food served or sold is of the nature, substance or quality which consumers would expect
- Ensure that the food is labelled, advertised and presented in a way that is not false or misleading, e.g. photos on menus that do not look like the dishes served to customers

Food Safety (General Food Hygiene Regulations)

- Food premises
- Personal hygiene of staff
- Hygienic practices

Food businesses must:
- make sure food is supplied or sold in a hygienic way;
- identify food safety hazards;
- know which steps in your activities are critical for food safety;
- ensure safety controls are in place, maintained and reviewed.

Food Labelling Regulations

This information is required on packaging by law:

- the name of the food
- weight or volume
- ingredient list & allergen information
- genetically modified ingredients
- date mark and storage conditions
- preparation instructions
- name and address of manufacturer, packer or seller & place of origin
- lot (or batch) mark
- nutrition information